

# A new combination of a tussock moth species under Genus Himala Moore (Lepidoptera: Erebidae: Lymantriinae) and its range extension

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## Abstract

The present communication deals with updating of the taxonomic status of a tussock moth species *Leucoma ochripes* Moore, making a new combination in the genus *Himala* Moore as *Himala ochripes* (Moore). The external morphological characters especially distinct male genitalic features served as the basis for the taxonomic placement. The collection of this species from Himachal Pradesh and Jammu & Kashmir forms its first record from North-West India.

**Keywords:** *Argentea*, Genitalia, *Himala*, India, Lymantriinae, *Ochripes*

## Introduction

Moore (1879) originally introduced the present species i.e., *ochripes* (Moore) under genus *Stilpnotia* Westwood from Darjeeling, India. Hampson (1892) and Swinhoe (1903) described it under the genus *Caviria* Walker and the genus *Caragola* Moore respectively. Holloway (1999) discussed it under the genus *Leucoma* Stephens, and Chao (2003) also proposed its placement under genus *Leucoma* Stephens as a new combination. The species *ochripes* (Moore) with distinctive male genitalic attributes as that of *Himala* Moore has now been updated as new combination i.e., *Himala ochripes* (Moore). The collection of this species from Himachal Pradesh and Jammu & Kashmir forms its first record from North-West India.

Kaleka *et al.* (2018) studied another species i.e., *argentea* Walker, the type species, of the genus *Himala* Moore in detail and also updated the genus diagnosis. Presently, this genus is known by four species viz., *Himala argentea* (Walker, 1855); *Himala nigripennis* Kishida, 2000; *Himala eshanensis* (Chao, 1983) and *Himala ochripes* (Moore, 1879) from India, China and Vietnam. Only two species namely *Himala argentea* (Walker) and *Himala ochripes* (Moore) are known from India. Another species of the genus *Leucoma* Stephens i.e., *niveata* Walker also

has the same male genitalic attributes as that of *ochripes* (Walker) and can be transferred to the present genus after its detailed analysis. The various external morphological characters particularly the genitalic features in accordance with wing maculation and venation have been examined and compared with the other species and particularly with *argentea* Walker, the type species of *Himala* Moore, which is the only known Indian species.

## Material and Methods

Different localities of Himachal Pradesh (32°5' 3.141" N, 77°34' 16.201" E) and Uttarakhand (30° 18' 59.385" N and 78° 1' 55.876" E) were surveyed for the collection of adult moths. The light traps equipped with a 160w mercury bulb and vertical white sheet were used for collection. To study of wing venation, the methodology proposed by Zimmermann (1978) was followed. The male and female moths were dissected out to examine the external genitalic features (Robinson, 1976) and the terminology for naming various genitalic parts given by Klots (1970) was followed in the present communication. After detailed study, the specimens were preserved in the Lepidoptera Lab, Department of Zoology & Environmental Sciences, Punjabi University Patiala.

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**Abbreviations:** 2A: Second anal vein, 3A: Third anal vein, AED: Aedeagus, CU1: First cubital vein, CU2: Second cubital vein, DU. EJ: Ductus Ejaculatorius, L.VLV: Left Valva, M1: First Medial vein, M2: Second Medial vein, M3: Third Medial vein, R1: First Radial vein, R2: Second Radial vein, R3: Third Radial vein, R4: Fourth Radial vein, R5: Fifth Radial vein, R.VLV: Right Valva, Rs : Radial sector, SA : Saccus, Sc : Subcosta, Sc+R1 : Subcosta and first radial vein, TG: Tegumen, UN: Uncus, VIN: Vinculum, VLV: Valva

## Results

The external morphological characters like ornamentation of antennae, legs and abdomen; wing maculation; wing venation and significantly the external genitalic features contributed towards the authentic identification and characterization of examined species. The taxonomic status of the genus *Himala* Moore has been updated along with its distributional range.

### Genus *Himala* Moore 1879

1879. *Himala* Moore, *Descr. Ind. Lepid. Coll. Atkinson*, **1**: 57.  
 1892. *Himala* Hampson, *Moths India*, **1**: 467.  
 1922. *Himala* Swinhoe, *Ann. Mag. Nat. Hist.*, (9)**10** (58): 471.  
 2003. *Himala* Chao, *Fauna Sinica*, **30**: 304.  
 2012. *Himala* Kaleka, *Colemania*, **34**: 5.  
 2018. *Himala* Kaleka *et al.*, *Ann. Entomol.*, **36**(1): 27-30.

**Type species:** *Redoa argentea* Walker 1855, *List Spec. Lepid. Insects Colln. Brit. Ind.*, **4**: 827.

**Distribution:** India: Himalayas, Assam; *Elsewhere:* China; Europe; Japan; Korea; Malaysia; North-America; Nepal; Vietnam (Inoue, *et al.*, 1956; Holloway, 1999).

**Diagnosis:** Medium sized moths, usually white in colouration. Labial palpi slender, porrect. Antennae bipectinate, with tufts of long scales from the basal joint, pectinations reduced at distal end. Forewing slightly acute at apex; discal cell more than half the length of wing, closed; 1A+2A from base of wing, 3A absent; Cu<sub>1</sub>, M<sub>3</sub> and M<sub>2</sub> from near angle of cell; M<sub>1</sub> from upper angle; R<sub>5</sub>-R<sub>3</sub> stalked from upper angle of cell; Sc from base of wing, not reaching apex. Hindwing oblong; discal cell less 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<sub>1</sub>, M<sub>3</sub> and M<sub>2</sub> from near lower angle of cell; M<sub>1</sub> and Rs stalked from upper angle of cell; Sc+R<sub>1</sub> from

base of wing anastomosing with cell near its middle. Legs dressed with scales; fore-tibia with an epiphysis; mid-tibia with one pair of tibial spurs; hind-tibia with two pairs of tibial spurs of equal size. Abdomen long, slender; distinct anal tuft in females. Male genitalia with uncus of moderate size, simple; juxta oblong; valvae asymmetrical; left valva simple, short; right valva well developed, broad, distal half narrow, strongly curved, almost double the length of left valva; aedeagus of moderate size, vesica without any distinct cornuti. Female genitalia with corpus bursae quite short, membranous; ductus bursae short, membranous; posterior apophysis longer than anterior ones; papilla analis oblong, well developed.

### Key to the known Indian species of the genus *Himala* Moore

1. Forewing with veins streaked with black; hindwing with veins streaked with black towards outer margin. Male genitalia with left valva short, narrow, having a triangular setosed protrusion before middle on saccular side; right valva distally dilated, bifid with one long projection and other broad triangular projection ..... *H. argentea* (Walker)
- Forewing and hindwing without such streaks. Male genitalia with left valva short, broad, without any setosed protrusion on saccular side; right valva broad, with rounded distal end ..... *H. ochripes* (Moore) comb.n.

### *Himala argentea* (Walker, 1855) (Figure 1)

1855. *Redoa argentea* Walker, *List Spec. Lepid. Insects Colln. Brit. Ind.*, **4**: 827.  
 1859. *Dasychira ilita* Moore, *Cat. Lepid. Ins. Mus. Nat.*, **2**: 341.  
 1879. *Himala argentea* Walker: Moore, *Descr. Ind. Lepid. Coll. Atkinson*. **1**: 57.  
 1892. *Himala argentea* Walker: Hampson, *Moths India*, **1**: 467.  
 1922. *Himala argentea* Walker: Swinhoe, *Ann. Mag. Nat. Hist.*, (9)**10**(58): 471.  
 2003. *Himala argentea* Walker: Chao, *Fauna Sinica*, **30**: 304.  
 2008. *Himala argentea* Walker: Smetacek, *Bionotes*, **10**(1): 14.  
 2012. *Himala argentea* Walker: Kaleka, *Colemania*, **31**: 9.  
 2018. *Himala argentea* Walker: Kaleka *et al.*, *Ann. Entomol.*, **36**(1): 27-30.

**Type- locality:** India (Assam)

**Wing Expanse:** Male: 52mm; Female: 62mm.

**Body Length:** Male: 16mm-18mm; Female: 17mm-21mm.

**Material examined:** 1 ♂ (LYM-62i): India, Himachal Pradesh, Kalhel (32.737°N, 76.111°E), Alt. 1920 masl.,

23.ix.2015; 1 ♀ (LYM-62xvi): India, Himachal Pradesh, Majhwar (31.975°N, 76.774°E), Alt. 375 masl., 15.ix.2015; 1 ♂ (LYM-62ii): India, Himachal Pradesh, Naina Tikkar (30.805°N, 77.117°E), Alt. 1297 masl., 5.vii.2014; 1 ♀ (LYM-62 xvii): 01.ix.2015; 3 ♂ (LYM-62iii-v) & 1 ♀ (LYM-62xviii): 15.ix.2015; 7 ♂ (LYM-62vi-xii): India, Himachal Pradesh, Pokhuri (32.445°N, 76.023°E), Alt. 489 masl., 15.ix.2014; 1 ♂ (LYM-62xiii): India, Himachal Pradesh, Ropa (31.795°N, 78.421°E), 2086 masl., 14.ix.2014; 1 ♂ (LYM-62xiv): India, Himachal Pradesh, Sainj (31.770°N, 77.304°E), Alt. 1337 masl., 19.ix.2014; 1 ♂ (LYM-62xv): India, Uttarakhand, Kasauni (29.844°N, 79.603°E), Alt. 1890 masl, 14.vi.2015, Collected by: Gagan Bali.

**Distribution:** India: Himachal Pradesh, Uttarakhand (Smetacek, 2008, Kaleka *et al.*, 2018), Sikkim, Assam; *Elsewhere:* China (Chao, 2003).

**Remarks:** This species has already been studied and illustrated in detail by Kaleka *et al.* (2018).

***Himala ochripes*** (Moore, 1879) comb.n. (Figure 2)

1879. *Stilpnotia ochripes* Moore: *Descr. Indian Lepid. Atkinson*, (1): 45.

1892. *Caviria ochripes* Moore: Hampson, *Moths India*, 1: 490.

1895. *Dendrophleps semihyalina* Swinhoe, *Trans. Ent. Soc., London*, 1895: 14.

1903. *Caragola ochripes* Moore: Swinhoe, *Trans. Ent. Soc., London*, 1903: 378.

1933. *Stipnotia niveata* Moore: Matsumura, *Ins. Matsumur.*, 7: 151.

1934. *Euzona ochripes* Moore: Bryx, *Lepid. Cat.*, 62: 123.

1999. *Leucoma ochripes* Moore: Holloway, *Moths Borneo*, 5: 109.

2003. *Leucoma ochripes* Moore: Chao, *Fauna Sinica*, 30: 287.

**Type-locality:** India (Darjeeling)

**Diagnosis:** Head with vertex and frons clothed with white scales. Labial palpi minute, fringed with yellowish-orange scales, antennae with scape and flagellum studded with creamish-white scales. Thorax, collar and tegula covered with white scales. Legs dressed with white scales, forelegs with orange scales. Abdomen furnished with white scales, distal end with white long scales.

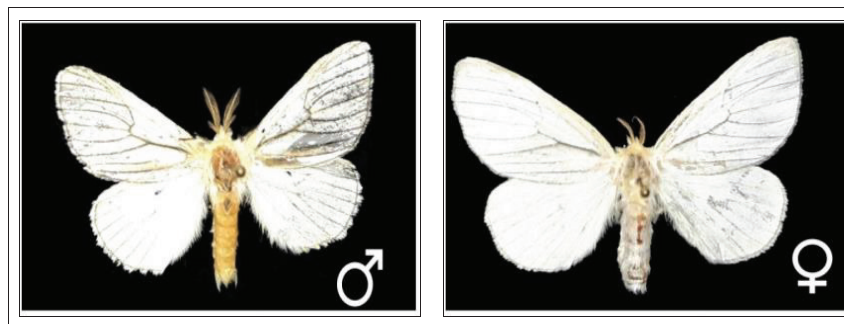
**Wing maculation:** Forewing with ground colour pure white, without any markings, Hindwing pure white.

**Wing venation:** Forewing triangular;  $Cu_2$  from two-third of cell;  $Cu_1$  well before lower angle of cell;  $M_3$  from lower angle of cell;  $M_2$  from above lower angle of cell;  $M_1$  from upper angle of cell;  $R_5-R_3$  stalked from before upper angle of cell;  $R_2$  from well before upper angle of cell, anastomosing at the bifurcation of  $R_5$ , ( $R_4$  &  $R_3$ ) to form an areole;  $R_1$  from well beyond middle of cell. Hindwing with  $Cu_2$  from three-fourth of cell;  $Cu_1$  and  $M_3$  shortly stalked from lower angle of cell;  $M_2$  well above lower angle of cell;  $M_1$  and  $R_s$  minutely stalked from upper angle of cell;  $Sc+R_1$  from base of wing anastomosing well before middle of cell.

**Wing Expanse:** Male: 34mm-36mm; Female: Not Examined.

**Body Length:** Male: 13mm-15mm; Female: Not Examined.

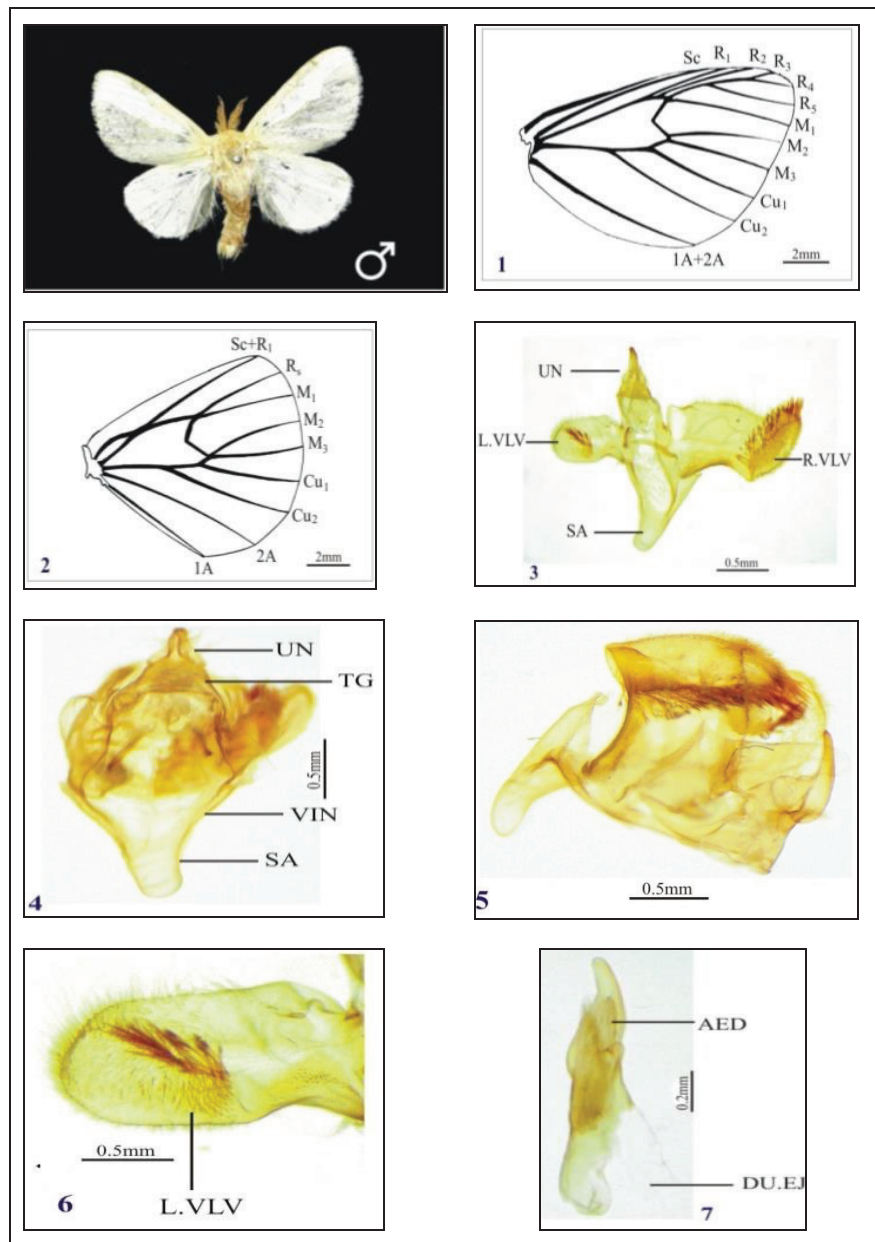
**Male genitalia:** Uncus of moderate size, semi-sclerotized, basal half broad, bulb-like in lateral view, laterally and



**Figure 1.** Adults of *Himala argentea* (Moore).

ventrally setosed, distal half curved, narrow with beaked tip; tegumen semi-sclerotized, U-shaped, medially expanded, narrow towards vinculum; vinculum narrow, semi-sclerotized, quite short, ending into prominent V-shaped saccus with rounded tip, saccus dorsally curved; juxta oblong, semi-sclerotized. Valvae simple, asymmetrical, left valva short, broad, having a bunch of prominent hairs in the middle, distal half setosed, rounded distal end, without any setosed protrusion on

saccular side; right valva well developed, broad, more than 2x length of left valva, distal half setosed, distal end broad, rounded, armed with rows of prominent hairs. Aedeagus of moderate size, semi-sclerotized, proximal one-third portion flap-like; ductus ejaculatorius entering under this flap; distal one-third portion curved; distal end narrow, rounded; vesica without any distinct cornuti, armed with minute spinules.



**Figure 2.** Adult *Himala ochripes* (Moore) comb. n.: 1. Forewing, 2. Hindwing, 3. Male Genitalia – ventral view, 4. Dorsal view of male genitalia, 5. Lateral view of male genitalia, 6. Valva, 7. Aedeagus.

*Material examined:* 15 ♂ (LYM-63i-xv): India, Himachal Pradesh, Andretta (32.040°N, 76.567°E), Alt. 1301 masl., 08.x.2013; 4 ♂ (LYM-63xvi-ix): India, Himachal Pradesh, Basantpur (31.212°N, 77.164°E), Alt. 1734 masl., 09.vii.2013; 5 ♂ (LYM-63xx-xv): India, Himachal Pradesh, Chamunda Devi (32.051°N, 76.643°E), Alt. 1000 masl., 07.ix.2013; 3 ♂ (LYM-63xxvi-xxviii): India, Himachal Pradesh, Dharamshala (32.219°N, 76.323°E) Alt. 1457 masl., 10.x.2013; 1 ♂ (LYM-63xxix): India, Himachal Pradesh, Naina Tikkar (30.805°N, 77.117°E), Alt. 1552 masl., 05.vii.2014; 1 ♂ (LYM-63xxx): India, Jammu & Kashmir, Lamberi (33.077°N, 74.324°E), 336 masl., 11.ix.2013, 1 ♂ (LYM-63xxxi), Collected by: Gagan Bali.

*Distribution:* India: West Bengal, Darjeeling (Moore, 1879); Himachal Pradesh, Jammu and Kashmir (Present study); North-East Himalayas; *Elsewhere:* China; Europe; Korea; North-America (Inoue *et al.*, 1956); Sundaland (Borneo) (Holloway, 1999).

## Discussion

The present species i.e., *ochripes* Moore of subfamily Lymantriinae have been studied in detail. The genus *Leucoma* Stephens is characterized by upturned labial palpi; hind-tibia having single pair of tibial spurs; in wing venation, vein  $R_2$  arises independently from the rest of the  $R_s$  system; male genitalia with strong uncus, valves often small, sometimes with distal setae that can be enlarged into spines (Holloway, 1999). But on the contrary, in *Himala ochripes* labial palpi are slender, porrect; hind-tibiae possess two pair of tibial spurs;  $R_2$  anastomosing at the bifurcation of  $R_3$ , ( $R_4$  &  $R_3$ ) to form areole. Inoue (1956) studied the male genitalic features of the type species of genus *Leucoma* which is characterized by uncus with a long process, rounded at tip; valvae with slender costal arm nearly pointed. The male genitalia of genus *Himala* is

characterized by uncus of moderate size and asymmetrical valvae. Thus, in the present study, it has been proposed to place *ochripes* Moore under genus *Himala* for its proper placement, making a new combination as *Himala ochripes* (Moore).

Genital morphology is the characteristic feature that defines an insect species based on inter and intra-specific genital variations. In Insects, genitalic features are highly species-specific and particularly in Lepidoptera these features play a significant role in species identification and delimitation. This tussock moth genus i.e., *Himala* Moore (Moore, 1879) was established as monotypic genus for proper placement of *Redoa argentea* Walker from India and this genus is characterized by asymmetrical valvae in male genitalia. Kishida (2000) added two more species i.e., *nigripennis* Kishida (as new species) and *eshanensis* Chao from genus *Ivela* Swinhoe to this genus from Vietnam. Huang & Wang (2006) also studied the male genitalia of *nigripennis* Kishida as new record for China from South Eastern Guangxi. In the present study, the species *ochripes* Moore has been placed under genus *Himala* Moore making a new combination as *Himala ochripes* (Moore) on the basis of its morphological features and particularly the male genitalic features. Earlier, this species is known from North East Himalayas and its collection from Himachal Pradesh and Jammu & Kashmir as its range extension to North-West Himalayas in North-West India has also been recorded.

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