

**DIVERSITY AND DISTRIBUTION PATTERN OF
MOTHS (LEPIDOPTERA: HETEROCERA) WITH
SPECIAL EMPHASIS ON FAMILY NOCTUIDAE
IN ASKOT WILDLIFE SANCTUARY,
UTTARAKHAND**

A THESIS

Submitted by

UTTARAN BANDYOPADHYAY

For the award of the Degree of

DOCTOR OF PHILOSOPHY

IN

WILDLIFE SCIENCE

Under the guidance of

Dr V. P. Uniyal

Wildlife Institute of India, Dehradun



Saurashtra University

Rajkot-360 005

NOVEMBER 2021

DECLARATION

I declare that the thesis entitled **“Diversity and Distribution Pattern of Moths (Lepidoptera: Heterocera) with Special Emphasis on Family Noctuidae in Askot Wildlife Sanctuary, Uttarakhand”**, submitted by me for the degree of Doctor of Philosophy is the record of research work carried out by me during the period from 2017 to 2021 under the guidance of Sr. Professor Virendra Prasad Uniyal, Scientist-G, Head, Department of Landscape Level Planning and Management, Wildlife Institute of India, Dehradun and Co-supervision of Dr Kailash Chandra, former Director, Zoological Survey of India, Kolkata and has not formed the basis for the award of any degree, diploma, associateship, fellowship, titles in this or any University or other institutions of higher learning.

I further declare that the material obtained from other sources has been duly acknowledged in the thesis. I shall be surely responsible for any plagiarisms or other irregularities if noticed in the thesis.

Date: 24.11.2021

Place: Kolkata

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भारतीय वन्यजीव संस्थान
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Dr. V.P. Uniyal
Professor & Scientist - G


Dated: 14 October 2021

CERTIFICATE

Certified that the work incorporated in the thesis of **Mr. Uttaran Bandyopadhyay**, entitled “**Diversity and Distribution Pattern of Moths (Lepidoptera: Heterocera) with Special Emphasis on Family Noctuidae in Askot Wildlife Sanctuary, Uttarakhand**”, is an original piece of work submitted to the Saurashtra University Rajkot, for the award of Doctor of Philosophy (Ph.D.) in Wildlife Sciences from Wildlife Institute of India under my supervision.

To the best of my knowledge: (i) **Mr. Uttaran Bandyopadhyay** has not submitted the same research work to any other institution for any degree/diploma, associateship, fellowship or other similar titles (ii) the thesis submitted is a record of original research work done by the him during the period of study under my supervision, and (iii) the thesis represents independent research work on the part of the student.





(Dr. V.P. Uniyal)

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CERTIFICATE BY RESEARCH CO-SUPERVISOR

Certified that the work incorporated in the thesis “**Diversity and Distribution Pattern of Moths (Lepidoptera: Heterocera) with Special Emphasis on Family Noctuidae in Askot Wildlife Sanctuary, Uttarakhand**”, submitted by **Mr. Uttaran Bandyopadhyay** was carried out by the candidate under my supervision and guidance. To the best of my knowledge: (i) the candidate has not submitted the same research work to any other institutions for any degree/diploma, associateship, Fellowship or similar title (ii) the thesis submitted is a record of original research work done by the student during the period of study under my co-supervision, and (iii) the thesis represent work on the part of the student.



(Signature of the Co-supervisor)

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I also certify that the Research work was appreciated by all who remain present and there were no comments made for this research work.

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paper text:

SUMMARY Background and Objectives Lepidoptera is a very large and diverse group of herbivorous insects consisting more than 1,50,000 described species all over the world among which 80% are moths. This huge diversity, their short lifecycles and the response and adaptability with the changing environment makes them a good indicator taxon. Although the knowledge about the Lepidoptera diversity is very uneven across the country, the Himalayan moth fauna is comparatively better worked out. But the huge diversity of the Himalayan region contributes to a great and unique diversity. Review of literature revealed that although some Lepidoptera studies were undertaken in the Himalayan region recently, but the species conservation is at very nascent stage. Under one such programme, this study has been planned to prepare a consolidated inventory of moth fauna of one of the most diverse protected areas of Uttarakhand, the Askot Wildlife Sanctuary, to assess the seasonal variation of a specialist group, the Noctuidae. The study also aimed to determine the effects of the environmental factors that govern the distribution as well as assemblage pattern of this particular family and targeted to identify the species with potential to indicate overall quality of the different habitats altitudinally which in term will contribute in future species conservation strategies.

Thesis organization The **thesis is organized into following chapters: Chapter 1** : General **Introduction**, discussing **the**

overall scenario related to importance of insect as well as moth studies including global and Indian works also focussing on the morphological, molecular and ecological studies. Chapter 2: Study Area and Methodology, discussing the overview of Askot Wildlife Sanctuary including climate, different vegetation types and the localities sampled along with general methodology of moth sampling. Chapter 3: Taxonomic Inventory of Moth Fauna in Askot Wildlife Sanctuary, with taxonomic notes and diagnostic characteristics of Noctuids. Chapter 4: Seasonal Diversity Pattern of Family Noctuidae, examining the effect of different seasons on Noctuidae assemblage. Chapter 5: Processes Governing Assemblage of Family Noctuidae, dealing with effects of different environmental factors like altitude, vegetation, rainfall etc. on Noctuidae species ensemble. Chapter 6: Assessing Indicator Potential of Family Noctuidae and Predicting Climatic Suitability of Selected Noctuids, discussing the indicator potential of different Noctuids and predicting probable distribution of some ecologically important Noctuids in current climatic scenario. Chapter 7: Synthesis, jotting down main findings of the study with comments on moths being suitable tool for monitoring climate studies. Methodology Study area: The Askot Wildlife Sanctuary

ACKNOWLEDGEMENTS

I still remember the days of childhood when I and my cousin brother used to chase the Butterflies and Dragonflies on the lazy afternoons in the small garden of my grandpa's house. My cousin brother was only one and a half years older than me and thus we shared the same kind of enthusiasm a kid has at that point in life. He used to catch Dragonflies and butterflies with his bare hands and then very carefully let me see those extraordinary creatures and we wondered together, how can they be so fascinating! All of this just to say that, from that very nascent stage of my conscience, I became more and more addicted to knowing about these tiny insects and never knew that I am going to get this opportunity to work on them one day. Now, after spending five years in this field and writing a whole lot of chapters and papers, it seems like this is the hardest part to write. I have never imagined that this could be so difficult for me to write about the people who immensely helped me during this journey and it will make me this nostalgic as now I can see it is coming to an end. But I will always remember as they say, "The journey is way more beautiful than the destination itself".

I believe that I could not have completed this mammoth task without the blessings of *Lord Shiva* and *Goddess Tara*. I always had faith in them and am grateful that they have blessed me enough to achieve this goal. Then there are too many people to name individually to whom I am indebted for helping me in their own ways to make this journey a success and I am grateful for that. But I am most thankful to both of my supervisors who constantly supported me throughout this study. I am lucky to have Dr V. P. Uniyal as my mentor from my M.Sc. dissertation days. Sir has always encouraged me and believed in me no matter what the situation is and was always a phone call away from extending his generous helping hand. My heartfelt gratitude to Dr Kailash Chandra Sir, who was always very supportive and a true inspirer from the very beginning.

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SUMMARY

Background and Objectives

Lepidoptera is a very large and diverse group of herbivorous insects consisting more than 1,50,000 described species all over the world among which 80% are moths. This huge diversity, their short lifecycles and the response and adaptability with the changing environment makes them a good indicator taxon. Although the knowledge about the Lepidoptera diversity is very uneven across the country, the Himalayan moth fauna is comparatively better worked out. But the huge diversity of the Himalayan region contributes to a great and unique diversity. Review of literature revealed that although some Lepidoptera studies were undertaken in the Himalayan region recently, but the species conservation is at very nascent stage. Under one such programme, this study has been planned to prepare a consolidated inventory of moth fauna of one of the most diverse protected areas of Uttarakhand, the Askot Wildlife Sanctuary, to assess the seasonal variation of a specialist group, the Noctuidae. The study also aimed to determine the effects of the environmental factors that govern the distribution as well as assemblage pattern of this particular family and targeted to identify the species with potential to indicate overall quality of the different habitats altitudinally which in term will contribute in future species conservation strategies.

Thesis organization

The thesis is organized into following chapters:

Chapter 1: General Introduction, discussing the overall scenario related to importance of insect as well as moth studies including global and

Indian works also focussing on the morphological, molecular and ecological studies.

Chapter 2: Study Area and Methodology, discussing the overview of Askot Wildlife Sanctuary including climate, different vegetation types and the localities sampled along with general methodology of moth sampling.

Chapter 3: Taxonomic Inventory of Moth Fauna in Askot Wildlife Sanctuary, with taxonomic notes and diagnostic characteristics of Noctuids.

Chapter 4: Seasonal Diversity Pattern of Family Noctuidae, examining the effect of different seasons on Noctuidae assemblage.

Chapter 5: Processes Governing Assemblage of Family Noctuidae, dealing with effects of different environmental factors like altitude, vegetation, rainfall etc. on Noctuidae species ensemble.

Chapter 6: Assessing Indicator Potential of Family Noctuidae and Predicting Climatic Suitability of Selected Noctuids, discussing the indicator potential of different Noctuids and predicting probable distribution of some ecologically important Noctuids in current climatic scenario.

Chapter 7: Synthesis, jotting down main findings of the study with comments on moths being suitable tool for monitoring climate studies.

Methodology

Study area: The Askot Wildlife Sanctuary is located in the north of Pithoragarh District of State Uttarakhand and lies between the coordinates 29°35'0" to 30°35'0" N Latitude and 80°10'0" to 81°0'0" E Longitude. It shares the international boundaries with Nepal, India and Tibet (China). The total region 4463 km² area with an altitudinal variation ranging from 560 m

above msl to 7434 m. This biogeographic uniqueness and variety of habitats in AWLS gives rise to massive biodiversity value and high species richness. Mainly, 11 major forest communities were identified from the landscape, with 573 species of plants recorded, among which 124 trees, 112 shrubs, 24 climbers, 35 orchids and 278 species of herbs were identified.

Sampling & identification: Moths were sampled using traditional light trap method in two major altitudinal gradients from 35 sites in Askot WLS covering 12 different habitats, such as Dry Siwalik Sal Forest, Rianj Oak Forest, Western Mixed Coniferous Forest, West Himalayan Upper Oak-Fir Forest, West Himalayan Birch-Fir Forest etc. during the period 2016-2019. Moths were initially identified by studying external morphology following the descriptions and illustrations provided in the taxonomic literature. Further, identification of confusing species were confirmed by studying male genital characters. Detailed synonymies, diagnostic characters, male genitalia illustrations and distribution of Noctuid moths and habitus images of all species were provided in the systematic account for species encountered during the present study.

Data analysis: All diversity measures and analysis were calculated in the programme PAST 2.17c. The total sampling period was divided into two broad seasons viz. Pre-monsoon (May–July) and Post-monsoon (August–November) based on mean monthly temperature and precipitation patterns of Askot WLS and sampling data for whole study period was pooled according to months and seasons for seasonality related comparisons. To assess seasonal fluctuations in moth assemblages, diversity indices of moths in different

seasons were separately calculated. Site wise diversities in both the seasons were then compared using ANOSIM-SIMPER to assess seasonal fluctuations in pre-monsoon and post-monsoon sites. Effects of environmental variables were estimated using Canonical Corresponding Analysis (CCA). Dissimilarity of moth communities within and between different sampling sites (categorized by vegetation and altitude) was also investigated by an analysis of similarities (ANOSIM). A particular species contributing to the dissimilarity was revealed by SIMPER. Canonical Correspondence Analysis (CCA) was performed to see the contribution of topographical variables in species assemblage in different altitudinal groups. Indicator Species Analysis was performed in PCORD to produce Indicator value of each species mentioning to a particular site. For testing the significance of Indicator value for each species, random reallocation procedure of sites among site groups was used. For predicting climatic suitability, species occurrence data along with the spatial environmental variables were combined for selected *Phlogophora* species and the MaxEnt software (Ver: 3.4.1) was used to develop such similar climatic areas to predict and quantify the probability of present occurrence of the selected *Phlogophora* spp. across the Himalayan Biodiversity Hotspot (HBH).

Results and discussion

Inventory: Altogether, 895 species of moths were recorded from AWLS under 494 genera belonging to 83 subfamilies of 22 families within 10 superfamilies which included Cossidae (2 genera, 2 species), Limacodidae (9 genera, 11 species), Zygaenidae (4 genera, 4 species), Thyrididae (4 genera,

4 species), Callidulidae (1 genus, 1 species), Pyralidae (11 genera, 12 species), Crambidae (46 genera, 52 species), Drepanidae (22 genera, 35 species), Lasiocampidae (5 genera, 9 species), Eupterotidae (2 genera, 3 species), Brahmaeidae (1 genus, 1 species), Endromidae (2 genera, 3 species), Bombycidae (2 genera, 2 species), Saturniidae (2 genera, 2 species), Sphingidae (16 genera, 24 species), Uraniidae (4 genera, 6 species), Geometridae (142 genera, 310 species), Notodontidae (35 genera, 48 species), Erebidae (97 genera, 183 species), Euteliidae (3 genera, 3 species), Nolidae (14 genera, 16 species) and Noctuidae (70 genera, 164 species).

Geometridae was the most species rich family with 310 species followed by Erebidae with 183 species and Noctuidae with 164 species. 35 species of moths were recorded for the first time in India from Askot WLS along with 121 species which were not previously recorded from Uttarakhand. The study also contributed to one new species *Donda unispinosa* of Noctuidae. It also hosts a database of diagnosis of 164 Noctuids along with the male genitalia illustration of 140 species. The study also updated the status of the species *Sarbanissa dissimilis* as a good species which was earlier considered as the junior subjective synonym of *S. transiens*.

Assemblage pattern: The family-wise species assemblage of 895 recorded species showed Geometridae was the most species rich family with 310 species distributed among 4 subfamilies representing nearly 31.5% relative abundance, of which Ennominae was represented by 182 species. Family Erebidae was second in number represented by 183 species belonging to 14 subfamilies among which Arctiinae was largest represented by 81 species.

Lymantriinae was the second largest subfamily represented by 37 species. Family Noctuidae was third largest family represented by 164 species belonging to 17 subfamilies, among which, Xyleninae was most species rich being represented by 54 species and followed by Noctuinae with 47. Site-wise, highest number of species was encountered at Chipla Kedar with 40 species followed by Kanar_18 with 34 and Jauljibi with 32 species respectively. Whereas, highest abundance was observed at Chipla Kedar (357 individuals) followed by Tejamkhaya (141 individuals) and Vayman_30 (95 individuals). Alpha diversity was highest at Jauljibi [Fisher's alpha 44.13; Simpson (1-D) 0.9579; Shannon 3.326]. Kanar_18 was found to be the next most diverse site [Fisher's alpha 28.18; Simpson (1-D) 0.9568; Shannon 3.335].

Seasonal pattern: Noctuidae richness and relative abundance showed a general seasonal trend along altitudinal bands and was significantly governed by average monthly rainfall. Average monthly precipitation also played a key role for Noctuidae richness and abundance. For both pre-monsoon and post-monsoon, the relative abundance in Low altitude group was comparatively very less but the alpha diversity was high which indicates the congregation of singleton and doubleton species in the low altitudinal areas. However, the Shannon diversity increased with increase in altitude for both the seasons, Fishers' alpha decreased in the post-monsoon. The CCA between pre-monsoon and post-monsoon sites incorporating environmental factors clearly indicated that majority of the sites sampled in both pre-monsoon and post-monsoon shows similar seasonal ensembles by forming a cluster among the

positive values of both axes, depicting a major influence of Annual Mean Temperature (Bio1), Annual Precipitation (Bio12), Average Monthly Precipitation and NDVI. Pair wise ANOSIM test showed that significant difference in species composition occurred between pre-monsoon and post-monsoon season. The SIMPER analysis between pre-monsoon and post-monsoon indicated that *Trachea guttata* associated with pre-monsoon was the most important species contributing for maximum significant differences.

Processes governing assemblage: The altitudinal distribution box plot showed that members of the major subfamilies like Noctuidae ranged from 1600–4200 m with majority being distributed in between 3000–4200 m. For Xyleninae, the species were majorly distributed within 2600–4200 m with a mean distribution at 3200 m. The CCA diagram clearly indicated that sampled sites in different altitudinal zones shows unique species ensembles especially in the low altitudinal zones by forming different cluster with no/minimum overlapping. Also, the Global R statistics from ANOSIM showed that the overall difference between six major habitat types were large and statistically significant.

Indicator species analysis and climatic suitability: Among 164 Noctuidae species selected from 7 altitudinal zone each ranging 500 m, 14 species met the indicator criteria while 7 species met the criteria of detector species. 5 species showed maximum indicator percentage (100) value, all of which are found only in the highest altitude zone (>3500 m) indicating strict specificity towards the alpine habitat. For all the three *Phlogophora* species modelled, very high suitable regions in the Indian Himalaya were predicted to fall

majorly under districts of West, South, East and the non-trans Himalayan zones of North Sikkim; Darjeeling and Kalimpong districts of West Bengal; West and East Kameng of Arunachal Pradesh; Chamoli, Pithoragarh and Pauri Garhwal districts of Uttarakhand. The preliminary study findings show that the predicted distribution range for most of the species are majorly governed by temperature dependent variables. The values of these governing variables were more or less similar to that of the collected field data temperature and elevation.

Synthesis and conclusion: Askot WLS, owing to its location at the western Himalayan region, acts as a mixing ground representing fauna from various other biogeographic zones. The moth assemblage of Askot WLS was chiefly Oriental (97%) with 71% species having distributions in Palearctic region also. 19% species were shared with Australian realm, whereas 11% species had affinity for Ethiopian realm. Among Indian Biogeographic Zones and Provinces, only 20% species were shared with two Trans-Himalayan habitats (Ladakh Mountain- 1A and Tibetan Plateau- 1B), whereas, 80% species were distributed in Central Himalaya (2C), followed by 66% and 54% species shared with North-Western Himalaya (2A) and Eastern Himalaya (2D) respectively.

CHAPTER 1: GENERAL INTRODUCTION

1.1 Overview

Invertebrates are the most diverse and abundant animals in most ecosystems (New, 1995) and include about 97% of all animal species. Although they play fundamental roles in nature, invertebrates have been systematically ignored in conservation studies (Franklin, 1993; Kremen et al. 1993).

Lepidoptera is a large, diverse and among the best-known orders of insect which includes moths (Heterocera) and butterflies (Rhopalocera). It is the most diverse order of herbivorous insects with the number of described species ranging from 1,46,277 (Heppner 1991) to 1,57,424 (van Nieukerken et al., 2011). Among them moths are the most diverse group and is nocturnal in nature, and includes 80% of the Lepidopteran species. Moths constitute the maximum part of the known Lepidoptera richness. Presently, a total of 1,37,720 species of moths belonging to 14,636 genera and spreading among 116 families are documented (Pogue, 2009).

Approximately 15,000 species of moths and butterflies are known from India (ZSI, 2012) including 4107 species from Indian Himalayas of which about 1500 species are endemic. From Himalayan states, Lepidoptera species reported till now is: J&K- 128, Himachal Pradesh- 370, Uttarakhand- 1089, West Bengal- 404, Sikkim- 2168, and Arunachal Pradesh- 235 (Sanyal et al., 2018).

Himalayan mountain region spreads over a West-Northwest to east-Southeast distance of about 2500 km and covers political boundaries of Afghanistan, Pakistan, India, Nepal, Bhutan and China ranging between 26°20′-35°40′ N latitude and 74°50′-95°40′ E Longitude. Indian Himalaya is biogeographically divided into two zones, namely Trans Himalaya and Himalaya (Rodgers and Panwar, 1988). Trans Himalaya is further classified into two parts: Ladakh Mountains- 1A and Tibetan Plateau- 1B; whereas Himalaya is further divided into four parts: North-West Himalaya- 2A, Western Himalaya- 2B, Central Himalaya- 2C and East Himalaya- 2D.

Though Himalayan region possess a great and unique diversity, insect conservation is at a very nascent stage. The climatic conditions are very delicate in the area and having short lifecycles and rapid response towards climate change, makes insect, Lepidoptera in particular, a good indicator taxa (Bale et al. 2002; Ronkay, 2004). Climate change can also affect Lepidoptera species by changing their abundance, range (both altitudinal and latitudinal), distribution or area and phenology (Woiwod, 1997).

Insect assemblage and community structure and the factors that govern the distribution are always of a major interest to ecologists. Climatic factors greatly affect the diversity and abundance of moths in a particular area. Moonlight and temperature can significantly affect the light trap efficiency (McGeachie, 1989, Yela & Holyoak 1997), which may lead to less attraction to the species available in an area towards the trap. It has been already established that the insect abundance changes both in long-term and short-

term cycles (Wolda, 1978, Cook & Graham 1996) and rainfall play a key role (Intachat et al. 2001). In forests, variation in plant diversity is correlated with changes in both insect diversity and community composition (Southwood et al. 1979, Summerville and Crist 2002). And it is quite evident that large forest patches can support a greater number of moth species (Summerville and Crist, 2003).

Insect communities may also act differently to different anthropogenic disturbances. Intermediate disturbance Hypothesis (Connell, 1978) shows selectively logged strands may lead to greater floristic diversity supporting higher species richness in the case of Lepidoptera and Coleoptera. The diversity may also depend on the scale of disturbance (Hill et al. 1995, Hamer and Hill 2000). The presence of fire sign and livestock grazing may also play a major role in Lepidopteran diversity.

1.2 Literature Review

1.2.1 Global Studies: J. D. Holloway is the most promising name among the renowned lepidopterists as he published several family-wise volumes of literatures from the 20th century till date on the taxonomy of Bornean moths which are still considered to be the ultimate references for any moth related work in Asia. But Studies on moths started long back in the early 18th century by Linnaeus (1758). After that, in 19th century Hübner (1806-1823), Boisduval (1829), Herrich-Schäffer (1854), Wallengren (1856 and 1860), Felder (1874) and Snellen (1884-1890) done some scientific taxonomic work on moths. In the early twentieth century, Forbes (1923) published a valuable

document on the Lepidoptera. Common (1990) published the first comprehensive, illustrated book describing the diversity, distribution, larval host plants and behaviour of Australian Moth. Haruta from 1994 to 2002 did a detailed study on Moths of Nepal. Ian J. Kitching of British Natural History Museum is a world-renowned expert of biosystematics and phylogeny of Sphingidae. He published an illustrated book on world Sphingid in the year 2000.

1.2.2 Indian Studies: The faunistic records of Indian Lepidoptera were done long back by Linnaeus (1758), Cramer (1775), Fabricius (1775), Kollar (1844), Cotes and Swinhoe (1886), Butler (1886) and Swinhoe (1885). Moore (1886) worked on many lepidopteran specimens collected by J. H. Hockings. In 1891, Hampson published document on Lepidopterous Fauna of Nilgiris. Hampson (1892, 1894, 1895 and 1896) published the best consolidated accounts of Indian moth fauna till date in four volumes of the 'Fauna of British India'. Edward Meyrick (1910-1914) was the first to publish detailed descriptions of Indian Microlepidoptera. The fifth volume of the 'Fauna of British India' which only included Sphingide description was prepared by Bell and Scott (1937). In 1956, Sevastopulo contributed significantly to the moth fauna of Kolkata.

Indian authors also have significant contributions in the taxonomic studies of moths of in the country. Arora and Gupta (1979) published monograph of Indian Saturniidae. Arora and Chaudhury (1982) studied the moth fauna of Arunachal Pradesh and adjoining areas. Arora (1983) also

documented the moth fauna of Andaman & Nicobar for the first time. Chandra (1993 and 1996) published his works on moths from Bay Islands and Great Nicobar Biosphere Reserve. Arora (1997, 2000) published some moth species from the Nanda Devi Biosphere Reserve and some Pyralid species of economic importance. Mandal and Ghosh (1997), Mandal and Maulik (1997), Ghosh and Choudhury (1997) and Bhattacharya (1997) worked on the moth fauna of West Bengal. Walia (2005) recorded 184 species of Geometridae moth from different locations in Himachal Pradesh. Chandra (2007) studied moth diversity of Madhya Pradesh and Chhattisgarh and described 142 species of moths from 16 families. Smetacek (2008) has listed 887 species of moths from Nainital district of Kumaon Himalaya, Uttarakhand and contributed significantly for the state fauna. Gurule et al. (2010) documented 70 species of moths of family Noctuidae from Nashik district of Maharashtra. Sanyal et al. (2011, 2013, 2018) have studied the diversity and distribution of moth assemblages across different vegetation zones in the Gangotri Landscape, Western Himalaya and also documented the moth fauna of Entire Indian Himalayas. Uniyal et al. (2016), contributed to the documentation of the diversity of moth fauna in the different protected areas of Uttarakhand. Raha (2017) studied the seasonal assemblage pattern of moths in Chhattisgarh. Chandra et al. (2018, 2019) catalogued the Notodontidae fauna found in the country as well as documented the Lepidoptera fauna of different protected areas of Indian Himalaya along with their detailed distribution.

1.2.3 Group specific studies: Family Noctuidae is the third largest family of Lepidoptera after Erebidae and Geometridae with more than 12,000 described species (van Nieukerken et al., 2011) and some of the members are notoriously known for their nature of impacting human welfare directly. Very recently Keegan et al. (2021) contributed to the stable classification of global Noctuids but the group specific studies are a few decades old. Most of the studies on Noctuids are done recently at the end of 20th Century. Starting from the contributions of Yoshimoto (1993, 1994, 1995), Haruta (1993) and Hreblay & Ronkay (1998) in the Moths of Nepal series, the studies on Noctuids started to flourish. The Noctuidae Europaeae series (1990–2011) and A Taxonomic Atlas of the Eurasian and North African Noctuoidea series (2008–2019) contributed mostly to the European Noctuidae fauna. In 2007, Verga and Ronkay studied genus *Diarsia* in details. Behounek et al. (2015) studied genus *Tambana*, Volynkin et al. (2015–2017) studied genus *Acronicta*, Gyulai et al. (2015) studied genus *Phlogophora*, Han et al. (2016) studied genus *Atrovirensis*. In 2017, Varga et al. studied Eurasiatic species of subtribe Poliina. Wei et al. (2019) studied genus *Sarbanissa*, Gyulai and Saldaitis (2019, 2020) studied genus *Diarsia*, Zhang et al. (2019) studied the Tribe Leucaniini in south west China. Gyulai & Saldaitis (2021) also studied genus *Dichagyris* in details. Most recently, Bandyopadhyay et al. (2021) studied the taxonomy as well as ecology of the genus *Phlogophora* in Indian Himalayas.

1.2.4 Studies based on genitalia: Detailed methodology to preparation of slides for the genitalia study of Lepidoptera were designed by Clarke, 1941; Busck, 1942 and Hardwick, 1950 designed the. Bayer, et al. (1960), published genitalia study of Noctuidae. Then, Mikkola, (1992) observed the genitalia structures for the identification of Noctuid moth. Monti, et al. (2000) studied the genitalia of Spodoptera genus belonging to Noctuidae. Pogue, (2011) also studied the genitalia structure of Family Noctuidae. Scoble, 2002 published a revision of a genera belonging to Ennominae based on genitalia study.

1.2.5 Studies based on molecular characterization: Numerous studies can be found on phylogeny reconstruction of moths of different families through DNA barcoding viz. Abraham et al. (2001), Erkiöunap et al. (2005), Yamamoto et al. (2007), de Waard et al. (2011), Sihvonen et al. (2011), Strutzenberger et al. (2011 and 2012), Hausmann et al. (2009 and 2011). Fang et al. (1997), Mitchell et al. (2006), Behere et al. (2007), Schmidt et al. (2008), Moyal et al. (2010), Zahiri et al. (2010), Li et al. (2011), Yang et al. (2013) and Mastrangelo et al. (2014) studied molecular taxonomy for phylogenetic analysis in case of Noctuidae moths.

1.2.6 Ecological studies: Apart from taxonomy, ecology related works on moths started much late in the 20th century. T. H. Ricketts, G. C. Daily, R. Ehlich and J. Fay (2001) worked on the countryside biogeography of moths in a fragmented landscape in native and agricultural habitats in Andean Montane Forest. K. Summerville and T. O. Crist (2004) worked on the suitability of forest moth taxa as an indicator of habitat disturbance. N. Hilt

(2005) also worked on Andean moths in which he studied the diversity and composition of Arctiinae along a successional gradient.

1.3 Justification of the study

Lepidoptera plays a major role in ecosystem functioning in various ways. They are most diverse among the insects but less studied. As the Himalayan environment is unique and delicate in nature, importance should be given to the studies of such taxa which are indicator in nature and can readily react to small changes in the environment. Moths are one of the best groups to study such patterns.

Few ecological works have been done on Moths in Indian Himalayan Region (IHR). Some important works in Uttarakhand had been carried out by Wildlife Institute of India. One of the most important work has been done by Sanyal, 2015. Previous literature shows about 548 species of Noctuidae from IHR and 158 from Uttarakhand, whereas recent studies show about 364 species from Askot WLS (Bandyopadhyay et al., 2019).

The current study, which was carried out under the umbrella of the National Mission on Himalayan Studies (NMHS) funded project titled "*Lepidoptera (Insecta) as a Potential Indicator Taxa for Tracking Climate Change in the Indian Himalayan Region*", primarily focuses on the documentation of the entire moth fauna in the study area which will act as detail database and help the future lepidopterists in their study. The ecological part of the study viz. distribution pattern of Noctuid moths in different vegetation pattern and along the altitudinal gradient will help a better

understanding of the assemblage of moths in the area. Also, the indicator species approach will help to plan future management programs to conserve different habitats in the area.

1.4 Aims and Objectives

In the subsequent five chapters, I explore the diversity and distribution pattern of Noctuids in the Askot Wildlife Sanctuary, as well as tried to explore the relationships between moths and various contributing factors and environments, to scrutinize the following objectives:

- Documentation and preparation of taxonomic inventory of the rich moth fauna of Askot Wildlife Sanctuary giving special emphasis on family Noctuidae.
- To analyse the effect of different seasons on the Noctuidae assemblage in Askot Wildlife Sanctuary.
- To assess the diversity and distribution pattern of Noctuid moths along the different altitudinal gradient in the study area, as well as the effect of vegetation and different environmental parameters on the assemblage pattern of family Noctuidae.
- To identify the indicator species of Family Noctuidae which reflects the habitat quality and also climatic suitability modelling of some ecologically important Noctuids to see their probable distribution in current climatic scenario.

The thesis is organized into following chapters:

Chapter 1: General Introduction, discussing the overall scenario related to importance of insect as well as moth studies including global and Indian works also focussing on the morphological, molecular and ecological studies.

Chapter 2: Study Area and Methodology, discussing the overview of Askot Wildlife Sanctuary including climate, different vegetation types and the localities sampled along with general methodology of moth sampling.

Chapter 3: Taxonomic Inventory of Moth Fauna in Askot Wildlife Sanctuary, with taxonomic notes and diagnostic characteristics of Noctuids.

Chapter 4: Seasonal Diversity Pattern of Family Noctuidae, examining the effect of different seasons on Noctuidae assemblage.

Chapter 5: Processes Governing Assemblage of Family Noctuidae, dealing with effects of different environmental factors like altitude, vegetation, rainfall etc. on Noctuidae species ensemble.

Chapter 6: Assessing Indicator Potential of Family Noctuidae and Predicting Climatic Suitability of Selected Noctuids, discussing the indicator potential of different Noctuids and predicting probable distribution of some ecologically important Noctuids in current climatic scenario.

Chapter 7: Synthesis, jotting down main findings of the study with comments on moths being suitable tool for monitoring climate studies.

CHAPTER 2: STUDY AREA & METHODOLOGY

2.1 Overview of Askot Wildlife Sanctuary

Indian Himalaya is immensely rich in both biological and cultural diversity. Though the environment is very much delicate and readily changes with time, conservation of the rich repositories is much needed. Over 105 Protected Areas have been identified and established in this region which covers more than 6% of total geographical area (Green, 1993).

Askot Wildlife Sanctuary is one of such protected areas. The conservation of the place started in 1916 as reserve forests. Later on, in 1986, the area was upgraded as Askot Musk Deer Sanctuary for its exceptional species richness and valuable biodiversity elements (Sammant et al., 1998).

The Askot Wildlife Sanctuary is located in the north of Pithoragarh District of State Uttarakhand in Western Himalayan biogeographic province (Rodgers and Panwar, 1988) and lies between the coordinates 29°35'0" to 30°35'0" N Latitude and 80°10'0" to 81°0'0" E Longitude. It shares the international boundaries with Nepal, India and Tibet (China). The northern boundary of the Landscape runs in a straight line near Lipu Lekh and goes west to the Lissar Yangti River. The Eastern boundary is marked by the River Kali from Nabhidang to Jauljibi along with Indo-Nepal border moving south-west. The Western boundary runs with River Gori from Jauljibi till Ralam Gadh. It also includes the entire Ralam basin (Fig. 2.1).

The total region is about 120 km long and 51.5 km wide approximately which covers around 4463 km² area with an altitudinal variation ranging from 560 m above msl at Jauljibi to 7434 m at the summit of Nandadevi East. This helps growing a massive biodiversity and species richness containing 2607 species of vascular plants, 37 of mammals and 265 species of birds (Negi, 2012), which also include three critically endangered species (Satyr Tragopan, Monal Pheasant and Cheer Pheasant). It also reportedly has a high diversity of orchids containing over 47% of North Western Himalayan Orchid flora. The landscape contains 129 villages falling in the Dharchula and Munsiri Tehsils with a great Schedule Caste and Schedule Tribe population (over 30%) (Premi, 1991). Of which Bhotias, who are Schedule Tribes, are dominant whereas Ban Rajis are classified as a “primitive tribe” of the area.

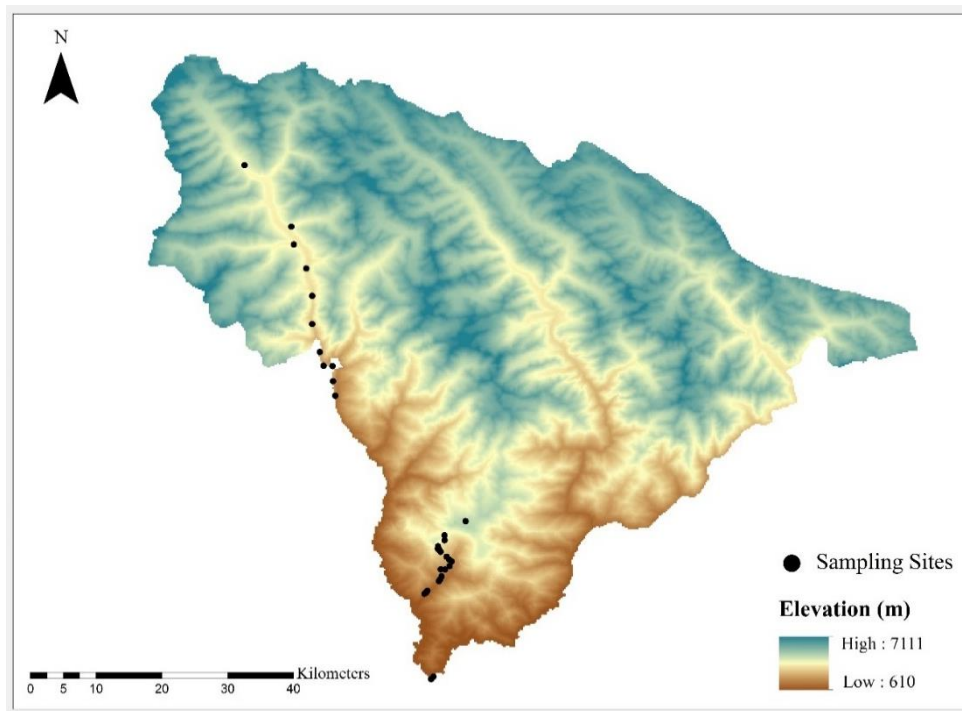


Fig. 2.1: Study area map with sampling sites

2.2 Climate

Sharp variation in altitudes plays an important role in determining climatic factors in a landscape. As the Askot landscape is situated in the tri junction of India, Nepal, and Tibet (China), the converging point of the Western Himalaya, the Central Himalaya, and the Trans-Himalaya represents all three bio-geographic zones and their distinct habitats.

With every successive rise of 1000 meter elevation there is a significant drop in air pressure, availability of oxygen and in temperature. By theory, the average temperature is known to be dropped by 1 degree Celsius with every climb of 270 meters however this could vary unpredictably above 1500 m altitude. Unique combinations of severity of slope, varying soil depth and moisture contents, produce very diverse habitats within a small geographic area, for both plant and animal species.

Rainfall is quite variable in this region. It ranges between below 200 cm annually in an average at the lower reaches of the valleys, to as much as 300 cm in the areas in the Greater Himalaya zone. The upper Trans-Himalaya reaches of the valleys are in the rain shadow, and receives less than 15 cm of rain annually excluding the precipitation in the form of snow in winter. Snow at the high altitudes is heavy and wet, and unlike other places in the trans-Himalaya where dry snow is blown away by strong winds, it accumulates up to the roofs of the alpine habitations, making it necessary for people to migrate with their livestock to lower villages in the montane belt in early October.

2.3 Vegetation

The habitat diversity ranges from subtropical *Shorea robusta*, to alpine meadows and in between fourteen major vegetation types have been identified in the landscape like Pine Mix Forest, Sub-tropical Riverine Forest, Banj Oak Forest, Moru Oak, Kharsu Oak, Alder Forest, Cypress Forest, Temperate Secondary Grasslands, Hemlock or Tansen Forest, Temperate Secondary Scrub including Berberis, Prinsepia, Rubus, Temperate Broadleaf Forest including Acer, Betula, Juglans, Aesculus, Blue Pine, Sub-alpine Forest including Birch-Fir and Birch Rhododendron forest, Alpine Scrub consisting Dwarf Rhododendron and Juniper scrub. About 58% of the landscape also falls under alpine conditions that are characterized by moist alpine habitats in the Greater Himalaya and dry alpine habitat in the Trans Himalaya sections of the landscape (Uniyal et al., 2016).

This biogeographic uniqueness and variety of habitats in AWLS gives rise to massive biodiversity value and high species richness. Mainly, 11 major forest communities were identified from the landscape, with 573 species of plants recorded, among which 124 trees, 112 shrubs, 24 climbers, 35 orchids and 278 species of herbs were identified (Bisht et al., 2018). A total of 16 plant species were of conservation importance, like *Aconitum heterophyllum*, *Dactylorhiza hatagirea*, *Picrorhiza kurrooa*, *Podophyllum hexandrum*, *Saussurea obvallata* etc. 480 species of birds were recorded, mainly from Gori Ganga Valley (Raza, 2005), including 10 species of pheasants, prominent among which were Satyr Tragopan, Himalayan Monal, Cheer

Pheasant. 40 species of mammals were reported, among which important Carnivore species were Snow Leopard, Eurasian Lynx, Leopard Cat and Tiger reported recently from 3050 m altitude (Bhattacharya & Habib, 2016). Five families of butterflies, 19 families of moths and 7 families of beetles are known, with report of 12 species of fishes (Rajput et al., 2015).

The sampling sites were categorized into 12 dominant vegetation types (Fig.2.2–2.4) according to Champion & Seth (1968), which are as follows:

2.3.1 Dry Siwalik Sal Forest (5B/C1a): A dry deciduous forest of irregular canopy, grown on shallow, sandy soil, derived from Siwalik sand rock. Dominated by *Shorea robusta*, *Anogeissus latifolia*, *Diospyros*, *Terminalia*, *Cassia fistula*, often associated with *Lagerstroemia*, *Mallotus*, *Dendrocalamus*. Only one sampling site was categorized under this type.

2.3.2 Himalayan Chir Pine Forest (9/C1b): High Forest of *Pinus roxburghii*, predominant between 1200–1800 m on easy sloping grounds with scanty shrub undergrowth and grass-cover growing during monsoon only. Five sampling sites fell under this category.

2.3.3 Banj Oak Forest (12/C1a): A closed canopy forest of *Quercus incana*, *Carpinus*, *Cedrela*, grown generally along damp ravines between 1800–2300 m, with association of *Rhododendron arboreum* and *Lyonia ovalifolia*, with shrubby undergrowth. This forest type is generally overlapped with the Chir Pine Forest. A single sampling site fell under this category.

2.3.4 Moist Deodar Forest (12/C1c): A pure forest of mainly Deodar, with occasional Blue Pine, Oaks and Rhododendrons grown on cool and moist slopes between 1700–2500 m, with tall shrub layer, mainly of *Parrotia*. Only one sampling site was categorized under this.

2.3.5 Rianj Oak (*Q. lanuginosa*) Forest: This type of forest can be found between 1500–2000 m on rocky and drier slopes, chiefly of *Quercus lanuginosa* associated with *Rhododendron arboreum*. Three sampling sites fell under this category. Along with Ban and Moru Oak, this typical Oak Forest is considered under Lower Western Himalayan Temperate Forest.

2.3.6 Western Mixed Coniferous Forest (12/C1d): Varying mixture of conifer trees like *Abies pindrow*, *Picea smithiana*, with varying mixture of broadleaved like *Quercus semicarpifolia*, *Euonymus*, *Rhamnus*, *Meliosma*, grown between 2400-3000 m, often broken by open grassy meadows, and with undergrowth of *Rosa*, *Lonicera*, *Strobilanthes*, *Smilax*. Three sampling sites fell under this category.

2.3.7 Kharsu Oak (12/C2a): A dense crop of *Quercus semicarpifolia*, *Q. dilatata*, *Betula alnoides*, *Pyrus lanata*, associated with *Meliosma*, *Rhododendron arboreum*, *R. barbatum*, *Sorbus*, *Acer*, often with dense breaks of dwarfs Bamboo and ground cover of Deciduous Shrubs of *Rosa*, *Viburnum*, *Cotoneaster*, *Strobilanthes*. Generally grown in moist zone between 2500–2900 m, in areas of short summer and winter with heavy snow fall. One sampling site came under this category.

2.3.8 West Himalayan Upper Oak-Fir Forest (12/C2b): A two-storied high forest with *Abies pindrow*, standing singly over *Quercus semicarpifolia*, *Q. dilatata*, *Pyrus lanata*, *Rhododendron arboreum*, *R. barbatum* grown on sheltered slopes between 2600–3400 m. Generally associated with good shrub cover of *Rosa*, *Viburnum*, *Berberis* etc., often associated with *Arundinaria*, *Thamnocalamus*. Two sampling sites fell under this category.

2.3.9 West Himalayan Birch-Fir Forest (14/C1b): An irregular forest consisting of *Abies spectabilis*, *Betula utilis*, *Quercus semicarpifolia* with dense undergrowth of *Rhododendron campanulatum*, *Sorbus*, *Arundinaria*, *Cotoneaster*, *Rosa* grown on snow-free slopes above 3000 m. Two sampling sites fell under this group.

2.3.10 Birch Rhododendron Scrub Forest (15/C1): A very dense thicket of *R. campanulatum*, *R. lepidotum* associated with *Betula utilis*, *Sorbus foliolosa*, *Quercus semicarpifolia*, *Berberis*, *Cotoneaster* grown on thick layer of black humus on very wet soil which remain under snow-cover for most of the year. Only one was categorized under this type.

2.3.11 Deciduous Alpine Scrub (15/C2): A low deciduous scrub formation of *Rhododendron anthopogon*/ *R. lepidotum*/ *R. campanulatum* grown on dry and arid alpine ground chiefly between 3200–4100 m, with outlying colonies of *Betula* and broken up by grass. Three sampling sites fell under this group.



Fig 2.2: Major vegetation types sampled in AWLS (Downwards):
Dry Siwalik Sal Forest; Rianj Oak Forest; Western Mixed
Coniferous Forest

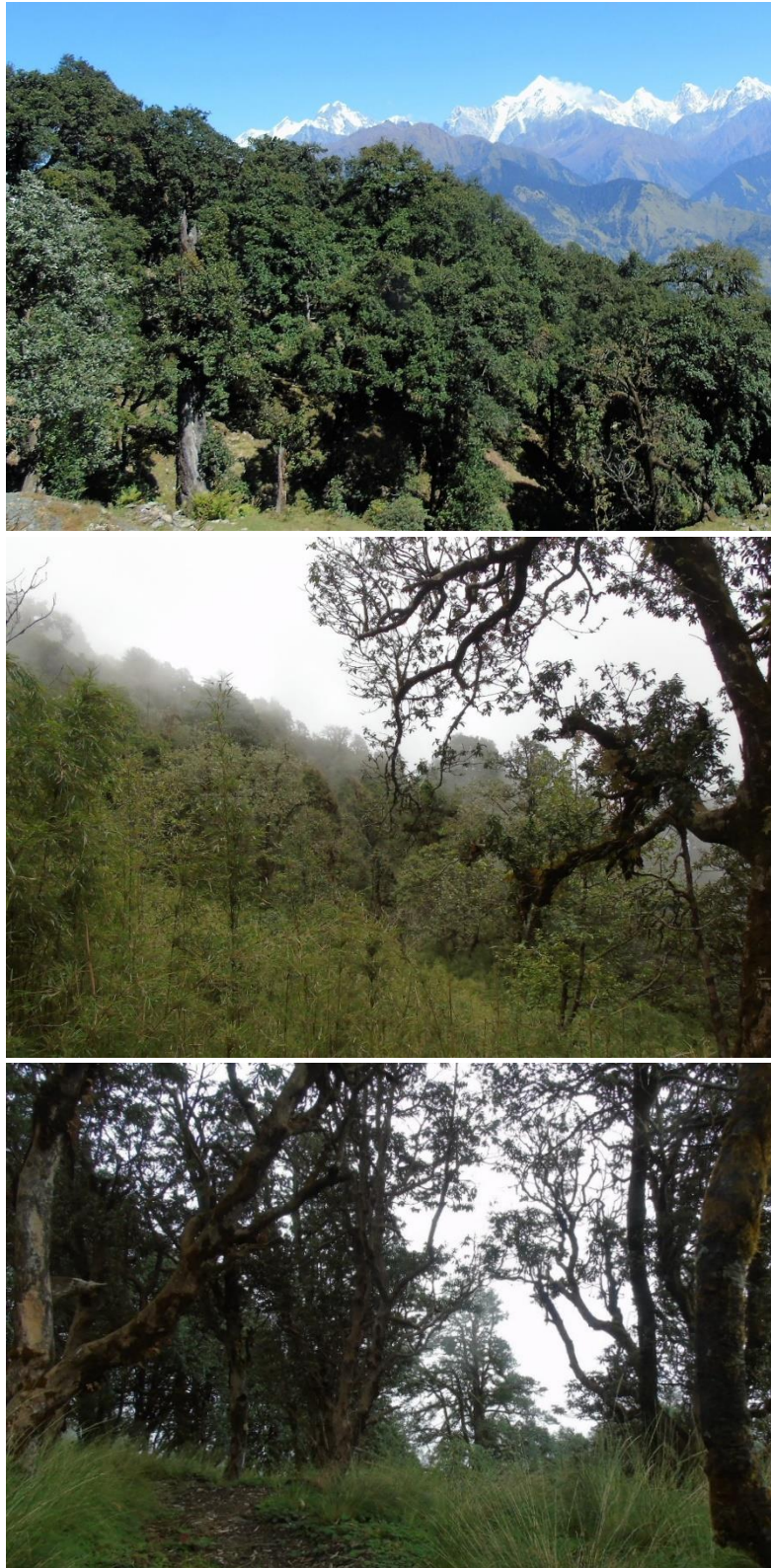


Fig 2.3: Major vegetation types sampled in AWLS (Downwards):
Kharsu Oak Forest; West Himalayan Upper Oak-Fir Forest; West
Himalayan Birch-Fir Forest



Fig 2.4: Major vegetation types sampled in AWLS (Downwards):
Birch-Rhododendron Scrub Forest; Alpine Pasture

2.3.12 Alpine Pasture (15/C3): Meadow type of habitat, grown in areas having very short snow free period, composed mostly of perennial mesophytic herbs, mainly *Primula*, *Anemone*, *Fritillaria*, *Iris*, *Gentiana*, with very little grass. Two sampling sites fell under this category.

The main reason of choosing this region as study area for this particular work is its uniqueness, as the biogeographical elements of the Western Himalaya, the Central Himalaya and the Tibetan Plateau converge

here. As there are only a few works done on Moths in this area, the main goal is to build up an inventory database on Moth diversity and to study the environmental factors that affect the assemblage pattern.

2.4 General Study design

Moths have been collected from different sampling area based on elevation, vegetation type and land use practices from the study area for the study of diversity and distribution pattern. Sample collection have been done by using traditional light trap method in 35 sites (Table 1).

The main strategy which has been followed for fulfilling the objectives is Stratified Random sampling method. For this, along a transect ranging from lowest to highest altitude, random sites have been selected at every 300 m vertical distance. If a gradient starts from 1500 m and extended up to 4000 m, nine sites have been selected at 1500 m, 1800 m, 2100 m, 2400 m and so on. One or two light trap stations are established at each site, two to three nightly catches have been performed until at least 25 individuals are sampled. Sites that not reach 25 benchmarks are not included in further statistical analysis.

For the nocturnal species, specimens were collected from different habitats installing light traps running for 4 hours, in two sessions at a particular site for two consecutive nights, e.g., first night from 8 pm to 12 o'clock midnight and second night from 12 o'clock midnight to 4 am. This ensures recording all the moths flying in a particular site or habitat in different

quarters of night. For setting light traps, Mercury bulb (160W) or CFL bulb (more than 40W) or a solar powered lantern equivalent to 80-Watt White Actinic bulb and gas petromax was set up in front of a white cloth measuring 1.5 m × 2 m (Fig. 2.5). The cloth was then fixed vertically between two poles or trees and the bulb was hanged in such a way that it reaches nearly half the length of the cloth with a gap of at least 1 ft. between the bulb and the cloth. Netting has been done primarily on the day for day-flying species of moth. Sites were selected such that the immediate vicinity of the trap should provide some cover from the wind and provide maximum possible light catchments area. Small clean vials or glass jars were used as killing bottles in which Ethyl Acetate was used as killing agent. Collected specimen were kept in insect envelopes made of oil paper with the proper label of date and site of collection and the envelopes stored in ordinary cardboard boxes.



Fig. 2.5: A usual light-trap set up with Solar Powered Lantern and Gas petromax lamp

Table 2.1: Details of sampling locations

Sl. No.	Location	Date	Location Code	Details							
				Lat (°N)	Long (°E)	Altitude (m)	Habitat	Avg. Temp. (°C)	Avg. Hum. (%)	Moon Phase	
23	1	Jauljibi	19.ix.2016	AS632A	29.75087	80.37885	632	Dry Siwalik Sal Forest (5B/C1a)	18.25	88.5	WNII
			24.xi.2016	AS632B					6.25	83.125	WNX
			10.vi.2017	AS632C					19.1	94.3	WNI
			24.ix.2017	AS632D					22.8875	95.3875	WXIV
			26.x.2019	AS632E					17.125	92.375	WNXII
2	Ganagaon	11.vi.2017	AS749A	29.75433	80.38205	749	Himalayan Chir Pine forest (9/C1b)	6.25	83.125	WNII	
3	Baram	06.vi.2018	AS825A	29.8554	80.3522	825		24.125	90.375	WNVIII	
4	Baram_10	28.x.2019	AS1029A	29.8674	80.36981	1029		19.9	84.86	NM	
5	Baram Pool	26.ix.2016	AS1121A	29.86902	80.37186	1121		17.1	85.5	WNIX	
		08.vi.2018	AS1121B	29.87140	80.37358	1222		23.96	92.04	WNX	
6	40 Khet Pool	02.vi.2017	AS1272A	29.88477	80.38955	1272		19.5	92.375	WXVII	

Sl. No.	Location	Date	Location Code	Details						
				Lat (°N)	Long (°E)	Altitude (m)	Habitat	Avg. Temp. (°C)	Avg. Hum. (%)	Moon Phase
7	Kanar_13	29.x.2019	AS1356A	29.90064	80.39195	1356	Banj Oak forest (12/C1a)	20.88	80.1	WXI
8	Jalebi Bend	09.vi.2018	AS1430A	29.88693	80.39088	1430	Himalayan Chir Pine forest (9/C1b)	22.26	91.7	WNXI
9	Kanar_16	10.vi.2018	AS1630A	29.89115	80.39308	1630	Banj Oak forest (12/C1a)	19.225	82.075	WNXII
		30.x.2019	AS1630B					14.45	79.4	WXII
10	Kanar_17	04.vii.2018	AS1692A	29.90049	80.39786	1692	Banj Oak forest (12/C1a)	17.2	80.125	WNVI
11	Chilamdhar	09.x.2017	AS1714A	30.13751	80.24781	1714	Himalayan Chir Pine forest	20.96	73.46	WNIII

Sl. No.	Location	Date	Location Code	Details						
				Lat (°N)	Long (°E)	Altitude (m)	Habitat	Avg. Temp. (°C)	Avg. Hum. (%)	Moon Phase
12	Kanar_18	03.vi.2017	AS1843A	29.90498	80.40393	1843	Banj Oak forest (12/C1a)	18.125	97.5	WXVIII
		11.vi.2018	AS1843B					19.225	82.075	WNXIII
13	Pamdiyo	27.ix.2017	AS2009A	30.15743	80.24467	2009	Moist Deodar forest (12/C1c)	22.8	82.2	WXVII
14	Kanar_20	13.vi.2018	AS2061A	29.9113	80.40699	2061	Riyanj Oak forest	20.2	89.56	WNXV
		31.x.2019	AS2061B					13.475	79.925	WXIII
15	Sarmoli	18.x.2019	AS2195A	30.07690	80.23568	2195	Western Mixed Coniferous forest (12/C1d)	13.55	76.08	WNIV
16	Gowalghat	14.vi.2018	AS2248A	29.91398	80.40338	2248	Riyanj Oak forest	17.7	94.02	NM

Sl. No.	Location	Date	Location Code	Details						
				Lat (°N)	Long (°E)	Altitude (m)	Habitat	Avg. Temp. (°C)	Avg. Hum. (%)	Moon Phase
17	Syuni	07.x.2017	AS2279A	30.19712	80.2267	2279	Western Mixed Coniferous forest (12/C1d)	17.1	85.6	WNI
18	Babaldhar	28.ix.2017	AS2442A	30.1783	80.23179	2442	Western Mixed Coniferous forest (12/C1d)	15.25	94.775	WXVIII
		21.x.2019	AS2442B					9.45	80.225	WNVII
19	Gowalghat_24	22.ix.2016	AS2462A	29.91782	80.4001	2462	Riyanj Oak forest	14.02	97.33	WNV
		04.vi.2017	AS2462B			2462		18.6	93.33	WXIX
		16.vi.2018	AS2462C			2462		16.62	97.92	WXII
20	Main Singh Top	08.x.2017	AS2547A	30.17795	80.24402	2547	Western Mixed Coniferous forest (12/C1d)	17.633	74.3	WNII
21	Jimjari	05.vi.2017	AS2655A	29.92903	80.38804	2655	Kharsu Oak forest (12/C2a)	13.85	85.25	WXX
		18.vi.2018	AS2655B					14.76	79.442	WXIV

Sl. No.	Location	Date	Location Code	Details						
				Lat (°N)	Long (°E)	Altitude (m)	Habitat	Avg. Temp. (°C)	Avg. Hum. (%)	Moon Phase
22	Nahardevi	29.ix.2017	AS2723A	30.23525	80.21622	2723	Western Mixed Coniferous forest (12/C1d)	12.73	73.26	WXIX
23	Ringal Forest I	20.vi.2018	AS2800A	29.9237	80.393	2800	West Himalayan Upper Oak-Fir forest (12/C2b)	13.86	89.98	WXVI
24	Ringal Forest II	25.ix.2016	AS2932A	29.92458	80.39169	2932		13.12	98.75	WNVIII
25	Mapang	06.x.2017	AS3015A	30.27378	80.21619	3015	West Himalayan Birch-Fir Forest (14/C1b)	16.033	65.366	FM

Sl. No.	Location	Date	Location Code	Details						
				Lat (°N)	Long (°E)	Altitude (m)	Habitat	Avg. Temp. (°C)	Avg. Hum. (%)	Moon Phase
26	Vayman_30	03.vii.2018	AS3065A	29.92711N	80.38988	3065	West Himalayan Birch-Fir Forest (14/C1b)	11.34	96.48	WNV
27	Railkot	30.ix.2017	AS3150A	30.31121	80.20812	3150		13.3	83.15	WXX
28	Vayman Field	06.vi.2017	AS3166A	29.9291	80.38808	3166		8.25	98.75	WXXI
29	Vayman	23.ix.2016	AS3225A	29.93197	80.38841	3225		9.125	97.63	WNVII
		23.vi.2018	AS3225B					10.36	95.44	WXIX
30	Bhujani	11.x.2017	AS3226A	30.06475	80.20822	3226		6.5	87.5	WNV
31	Burfu	05.x.2017	AS3343A	30.36835	80.18764	3343	Deciduous Alpine scrub (15/C2)	11.175	79.35	WXXV
32	Vatyakhan	24.ix.2016	AS3390A	29.94033	80.3972	3390		6.75	96.75	WNVII
		24.vi.2018	AS3390B					10.66	96.1	WXX
33	Martoli	01.x.2017	AS3427A	30.34386	80.19105	3427		12.48	87.36	WXXI
34	Tejamkhaya	26.vi.2018	AS3700A	29.94704	80.39703	3700	Alpine pasture (15/C3)	10.04	97.5	WXXII
35	Chipla Kedar	30.vi.2018	AS4200A	29.96631	80.42598	4216		8.95	100	WNII

*WX= Waxing Phase, WN= Waning Phase, NM= No Moon, FM= Full Moon.

Sampling is performed in such a manner that two adjacent altitudinal sites are never sampled one after another. A gradient is covered in downward fashion, i.e., starting at highest altitudinal site, i.e., 4000 m and sampling downward moving towards lower areas. This minimizes overlapping of species assemblage from two neighbouring altitudinal sites. This basic study design as a flexible approach to record moth diversity and factors affecting their distribution pattern along altitudinal gradient is repeated along the entire landscape studied.

Sampling has been done in two prominent seasons: Pre-monsoon (May–July) and Post-monsoon (August–November). For the abiotic factors governing moth diversity like ambient temperature, relative humidity, wind speed, cloud cover etc. data have been collected during sampling. The biotic factors suspected to govern moth diversity like vegetation and anthropogenic disturbances are recorded in nested quadrates of 20×20 square meter surrounding light trapping stations (Fig. 2.6). Within a homogenous vegetation type, one quadrat is centred on the position of the light trapping station and the two others are randomly located 50 m from the centre.

Collected sample were then exposed to sunlight for warm for some time to avoid growth of fungus. These boxes also contained sufficient quantity of naphthalene powder. The insects were pinned with entomological pins through the centre of the thorax such that twice as much pin protrudes below as above, and the angle of the pin slightly forwards above. The moths were then pinned into the foam/insect stretch boards with the pin vertical so

that the body comes firmly up against the surface (Fig. 2.7). The wings and the legs were manipulated on either side into a roughly spread position. Permanent storage was done in larger insect cabinets with glass top drawers and grooved sides for filling with sufficient naphthalene and cotton balls dipped in Carbolic Acid (Phenol and Camphor solution) and then specimens were arranged in the proper orientation.



Fig. 2.6: Data collection in a typical Nested Quadrat

CHAPTER 3: TAXONOMIC INVENTORY OF MOTH

FAUNA IN ASKOT WILDLIFE SANCTUARY

3.1 Introduction

Moths are often considered as the 'Poor Cousins' of the butterflies as they often lack the charismatic appearance as their relatives do and also due to their stringency of habitat preference. There are also lack of funds in moth studies compared to butterflies or other insect taxa of economic importance. However, moths can be a good target taxon for tracking climate effects and biodiversity monitoring studies due to their short life cycle and ability to rapidly react with the changing environment (Bale et al., 2002).

Preparation of an Inventory of insects are not an easy job especially in case of groups like Lepidoptera, where the described species number is more than 1,57,000 (van Nieukerken et al., 2011) worldwide. However, it is very important to study the diversity to be able to focus on the conservation of threatened and scheduled species to safeguard them as well to protect a typical habitat which harbours such unique diversity. This study aims to make baseline data of the Askot Wildlife Sanctuary area on which future workers can rely on. Based on such background, the present chapter aimed to establish an extensive inventory of rich moth fauna of Askot Wildlife Sanctuary for the first time giving a special emphasis on family Noctuidae. Since, moth is an exclusively phytophagous and hyper diverse insect group including numerous

cryptic and confusing species, their appropriate identification is crucial and prime step towards effective habitat management practices.

3.2 Methodology

3.2.1 Identification: Initial identification was done by comparing voucher specimens with the museum collections of the National Zoological Collections (NZC) of ZSI, Kolkata. Identification was continued following keys, descriptions and illustrations provided in the taxonomic books by Hampson (1892–1896), Bell and Scott (1937), Barlow (1982), Holloway (1983–2011), Haruta (eds.) (1992–2000), Robinson et al., (1994), Inoue (1997), Kononenko and Pinratana (2005 & 2013), Zolotuhin and Pinratana (2005), Pinratana and Cerny (2009), Schintlmeister and Pinratana (2007), Schintlmeister (2008), Kirti and Singh (2015 & 2016) and several revisionary works, such as Matsumura (1927), Fletcher (1974), Sato (1981, 1983, 2003, 2005 & 2011), Schintlmeister (1997), Yen (2003), Solovyev and Witt (2009), Dan and Hun (2005), Zolotuhin and Sinyaev (2009), Jiang et al., (2011), Jiang et al., (2012), Kirti and Gill (2010), Singh et al., (2013) etc and several other revisionary works and BMNH Lepindex and Funet websites were consulted for latest valid names of the identified specimens. Several confusing species whose identification up to species level was not possible by only looking at outer morphological characters were confirmed by studying male genital characters.

In India, very few works on moth genitalia are available at present. Male genital characters are excellent parameters for accurately distinguishing

morphologically similar species and even cryptic species. Identified male specimens were dissected for identification confirmation. Several specimens of a single species were considered for investigating the variation in genital parts within a species. Confusing specimens were also dissected for appropriate identification. For studying genitalia morphology, abdominal segments of male specimens were removed and digested in 10% NaOH overnight. The NaOH solution helps in dissolving and softening the muscles, tissues and chitin. Soaked abdominal segments were rinsed with water for several times and genitalia was dissected very carefully in 20% Ethanol and studied under Leica S8AP0 HD binocular microscope. Temporary genitalia slides using water as mounting agent were prepared and photographed under Leica MC120 HD camera and dissected genitalia were later preserved in 70% Ethanol for further studies (Hardwick DF, 1950).

3.2.2 General morphology of Moths: Lepidoptera are possibly the most uniform of the large holometabolous insects both biologically, as well as morphologically (Daly et al., 1998). Adults can be very tiny to large in size with body and wings covered with scales or hairs; mouthparts often modified as a proboscis and consisting of small maxillary palpi and large labial palpi. Prothorax usually small with patagia; mesothorax large with scutum and scutellum with tegulae covering wing bases. Wings are covered with scales and with frenulum joining the hind wing to fore wing. Legs are well adapted for walking; prothoracic legs sometimes reduced. Abdomen with 10 segments of which 9th and 10th segments are modified to genitalia.

Although very similar, moths and butterflies differ from one another in many ways superficially. Most commonly, butterflies always have club-tipped or hooked (Skippers) antennae which are mostly variable in case of moths, ranging from bipectinated comb-like, to even club-shaped (Zygaenidae) like butterflies. The fore and hind wings are sometimes locked together by frenulum during flight whereas in some moths but such structure is usually absent in butterflies.

Based on the body size moths can be divided into two groups viz. Micro- and Macro-moths, though the criterion for such division sometimes depends on the phylogenetic history of a moth family. The body of an adult moth is divided into three main parts, Head, Thorax and Abdomen (Fig. 3.1).

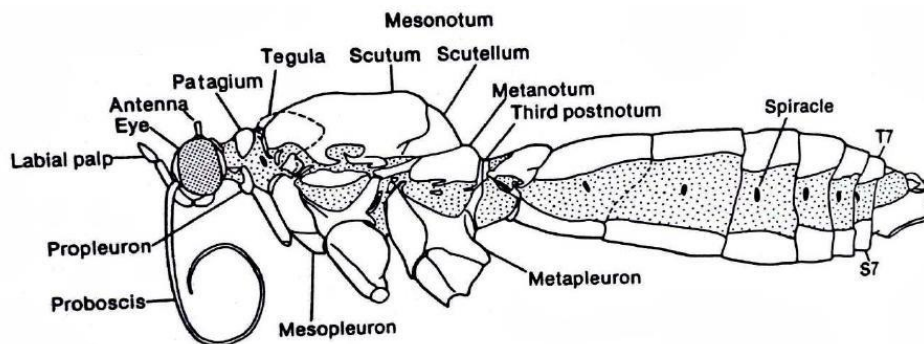


Fig. 3.1: Anatomy of typical Lepidoptera (Lateral view). (Source: Daly et al., 1998)

Head is relatively small, largely covered with a pair of prominent black compound *eyes* present at the base of *antennae* which may be smooth, hairy or lashed. Shape and structure of antenna are important family and genus specific characters. They can be of various types from simple filiform, unipectinate, bipectinate, doubly bipectinate to ciliate, setose-ciliate,

lamellate, fasciculate or combination of these (Fig. 3.2). In some families, such as Cossidae and Notodontidae the basal half of the antennae is pectinate and the apical half simple. In some species the structure of antennae is different between males and females and shows some sexual dimorphism (Barlow, 1982).

Thorax is divided into three parts; prothorax, mesothorax and metathorax. which are usually fused and not easily distinguishable from each other. Prothorax reduced to a narrow collar in higher groups having patagia or dorsolateral sclerites. Mesothorax is largest and bears a pair of articulated dorsal plate called the tegulae. Metathorax is of same size or smaller than mesothorax, with posteriorly directed sclerites over the bases of primaries.

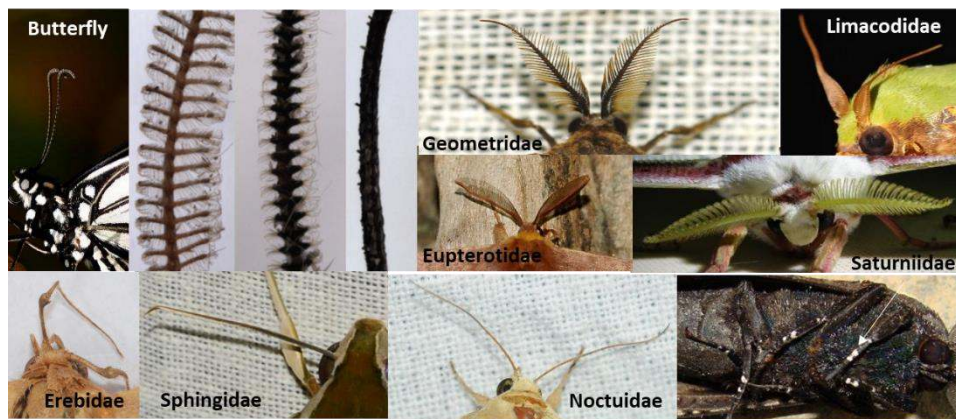


Fig. 3.2: Different types of antennae and some characters on legs

The *wings* are well developed, usually covered with scales on both dorsal and ventral side, with fore wings usually larger than hind wings. Wings consists of an upper and lower membrane which are usually connected by minute fibres and strengthened by veins. The wing venation pattern is of considerable importance in family and genus level identification. Comstock-

Needham system of wing venation is the most widely accepted system of nomenclature, however Hampson (1892–1896) used simple numerical system for naming the veins in his descriptions in *The Fauna of British India, Moths* (Fig. 3.3).

Abdomen is made up of ten segments. A tympanum may be present on the sides of segment near the first pair of abdominal spiracles. Spiracles are small respiratory openings, lead to a series of tracheae through which air diffuse to all parts of body of adult moth. The ninth & tenth segments are fused together and modified to form sclerotized **genitalia**.

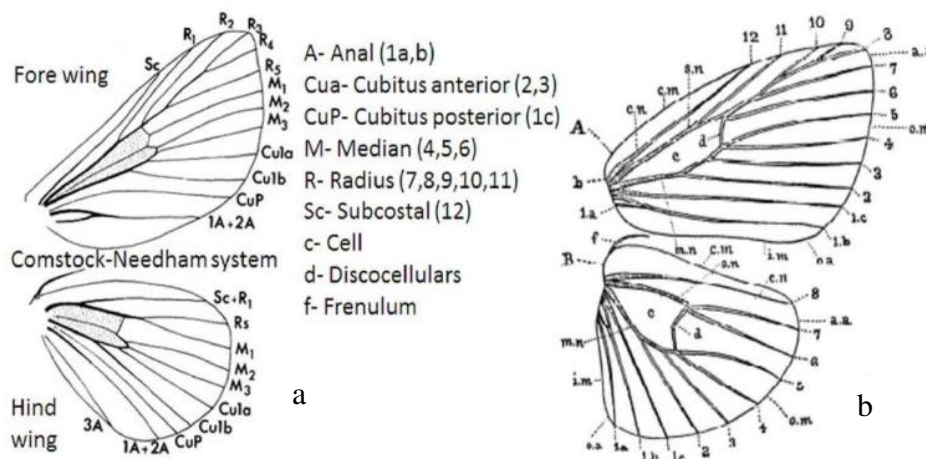


Fig 3.3 Different system of wing venation nomenclature a) Comstock-Needham system b) Simple numerical system (Source: Hampson, 1892)

Genitalia in male and female of a particular species are adapted to fit each other like a lock (female) and key (male). In males, the ninth abdominal segment is divided into **tegumen** and vinculum. They form a ring-like structure for the attachment of genital parts and a pair of lateral clasp organ called claspers or **harpe**. The male also has a tubular organ called **aedeagus**

which is used to inseminate the female. Different parts of female genitalia include the female ovipositor lobes or *papilla analis*, anterior and posterior *apophyses*, the female copulatory orifice, called *ostium bursae*, *ductus seminalis*, a membranous and sclerotized tube, called *ductus bursae* and a dilated membranous sac, known as *corpus bursae*.

3.3 Inventory

Altogether, 895 species of moths were recorded from AWLS under 494 genera belonging to 83 subfamilies of 22 families within 10 superfamilies which included Cossidae (2 species), Limacodidae (11), Zygaenidae (4), Thyrididae (4), Callidulidae (1), Pyralidae (12), Crambidae (52), Drepanidae (35), Lasiocampidae (9), Eupterotidae (3), Brahmaeidae (1), Endromidae (3), Bombycidae (2), Saturniidae (2), Sphingidae (24), Uraniidae (6), Geometridae (310), Notodontidae (48), Erebidae (183), Euteliidae (3), Nolidae (16) and Noctuidae (164) (Table 3.1). Geometridae was the most species rich family with 310 species distributed among 4 subfamilies of which Ennominae was represented by 182 species. *Abraxas nigrivena* and *Hirasa muscosaria* were recorded in high numbers while *Loxaspilates hastigera* was super abundant. Subfamily Larentiinae was represented by 83 species with *Neotephria ramalaria* and *Parentephria stellata* being super abundant while *Photoscotia fulguritis* was recorded in high abundance.

Family Erebidae was represented by 183 species belonging to 14 subfamilies among which Arctiinae was represented by 81 species. *Cretonotos transiens*, *Cyana adita* and *Preparctia hanningtoni* were

recorded in high number of individuals. Lymantriinae was the second largest subfamily represented by 37 species with *Pida patrana* and *Pida calligramma* recorded in high numbers. Erebinae was represented by 26 species with high abundance of *Mocis undata*. Among other subfamilies, abundance of *Asota producta* (Aganainae) was high.

Family Noctuidae was third largest family represented by 164 species belonging to 17 subfamilies, among which, Xyleninae was most species rich being represented by 54 species and followed by Noctuinae with 47. In Noctuinae *Xestia forsteri* and in Xyleninae *Trichoridia canosparsa* (Hampson, 1897) and were super abundant while *Trachea guttata*, *Oroplexia decorata* and *Phlogophora plumbeola* were also very abundant. Among all the other subfamilies, *Helicoverpa armigera* of Heliothinae was recorded in high number. The study also updated the status of the species *Sarbanissa dissimilis* as a good species which was earlier considered as the junior subjective synonym of *S. transiens*.

Total 48 species of Notodontidae was recorded belonging to 8 subfamilies among which Notodontinae was most diverse with 20 species, with most abundant species being *Peridea moorei moorei*. Two Thaumetopoeinae species viz. *Gazalina apsara* and *G. chrysolopha* were recorded in very high numbers.

Overall, 24 Sphingidae species were recorded with Macroglossinae (16 species) being most diverse. *Nephele hespera* was highly abundant

species of Macroglossinae, while *Leucophlebia lineata* of Smerinthinae was recorded in high number.

Interestingly, 34 species of moths were recorded for the first time in India from AWLS; *Teliphasa similalbifusa*, a Pyralidae species, new to India, previously reported from China; *Udea stigmatalis* of family Crambidae was only known from Japan, Taiwan and Russia; *Gaurena sinuata dierli* of Drepanidae was earlier restricted to Nepal and Tibet; *Euthrix imitatrix* of Lasiocampidae, previously known from Myanmar and China; *Epiplema adamantina* of Uraniidae was known from Nepal only; *Alcis trikotaria* and *Nothomiza costinotata* (Geometridae : Ennominae), previously reported only from Pakistan, Kyrgyzstan, Tajikistan and Nepal and Bhutan respectively; *Eucyclodes albisparsa* (Geometridae : Geometrinae) was known from Thailand, Malaysia, Indonesia, Philippines till date; 5 species of Larentiinae (Geometridae) viz. *Dysstroma planifasciata*, *Photoscotia pallidimaculata*, *Venusia roseicosta* and *Xenortholitha falcata* previously known from Nepal only and *Photoscotia funebris* from China and Vietnam; a Notodontidae species *Honveda nepalina* was restricted to Nepal earlier; of family Erebidae, Arctiinae species *Lemyra persephone* was known from Nepal till date and Hypeninae species *Hypena tristalis* was found only in China and Russia previously; *Meganola scriptoides* of Family Nolidae was till found only in china, Thailand and Borneo; from family Noctuidae, *Diphtherocome divarticulata* of subfamily Amphipyriinae was earlier restricted to China; *Euplexia annapurna* and *Oroplexia pectinosa* of subfamily Xyleninae were

only found in Nepal and China earlier; *Dasypolia templi* was previously found only in Europe and Australia; 2 species of genus *Apamea* viz. *A. chhiringi* and *A. gratissima* and *Hyalobole subapicalis* and *Parabole rectilinea*, all known from Nepal earlier; of subfamily Noctuidae, *Diarsia Claudia*, 4 species of *Hermonassa*, *H. divida*, *H. marginata*, *H. oxypila* and *H. sherpae* and 5 species of *Xestia*, *X. angara*, *X. bdelygma*, *X. gandakiensis*, *X. isochroma* and *X. lobbichleri*, all known to be restricted to Nepal and Tibet.

Four species were recorded for the first time from Indian Himalaya, which includes, *Telchines vialis* (Thyrididae), previously restricted to Meghalaya; 2 Notodontids namely *Nerice pictibasis* was earlier reported from Assam and Meghalaya and *Pheosiopsis niteria* from Assam and Thailand; *Hypena albisigna* (Erebidae) was previously known from Meghalaya and Hong Kong. The study also reported 121 species which were not previously recorded from Uttarakhand.

3.4 Taxonomic Account

Family NOCTUIDAE Latreille, 1809

According to recent Lepidoptera classification, Noctuidae has become the third largest family following Erebidae and Geometridae representing more than 12,000 described species under more than 1100 genera (van Nieukerken et al., 2011). They are distributed throughout the world, mostly represented from all major continent and oceanic islands (Keegan et al., 2021) but more abundant in the tropical areas. Mostly Noctuids are dark coloured,

nocturnal and known as long distance migrators. They are also typical grass feeders and notoriously famous for their pest nature. Majority of the species sit with the trailing edges of the fore wings brought together or slightly overlapping, thus, hiding the hind wings, and holding like tent over the body.

According to the recent taxonomic understanding, Noctuidae comprises only the triffin subfamilies being characterized by the loss of vein M2, such that the posterior angle of the cell has only three veins arising from it, M3, CuA1 and CuA2, in both fore and hind wings.

Subfamily **PLUSIINAE** Boisduval, 1829

Tribe **ABROSTOLINI** Eichlin & Cunningham, 1978

Genus *Abrostola* Ochseneimer, 1816

1. *Abrostola anophioides* Moore, 1882 (H.P 1.1; G.P 1.1)

1882. *Abrostola anophioides* Moore, *Descr. Indian lep. Atkinson* (2): 148.

(TL: Darjeeling)

1894. *Abrostola anophioides*; Hampson, *Fauna Br. India (Moths)* **2**: 577.

1958. *Abrostola crinita* Dufay, *Bonner Zool. Beitr.* **8**: 318, f. 4.

1993. *Abrostola anophioides*; Yoshimoto, *Tinea* **13** (Suppl. 3): 52, pl. 44, f.

2.

2013. *Abrostola anophioides*: Ronkay, Ronkay, László, Fu & Wu,

Fibigeriana Suppl. **1**: 42.

Material examined: AS632D(1), AS1843B(1)

Diagnosis: Wing expanse: 46–48 mm. The species can be easily identified by its dark umber-brown forewing colouration with narrow black ante and postmedial crosslines and black bordered broad orbicular and reniform marks. In the male genitalia, the main diagnostic features are the highly excurved costal margin of the valvae, long, excurved harpe and finger-like extension of the sacculus. The aedeagus with bunch of short carinal spines and three vesical cornuti are other characteristics of the species.

Distribution: India: Uttarakhand, West Bengal. **Elsewhere:** Nepal, China, Taiwan.

Tribe **ARGYROGRAMMATINI** Eichlin & Cunningham, 1978

Genus *Chrysodeixis* Hübner, [1821]

2. *Chrysodeixis acuta* (Walker, 1858) (H.P 1.2; G.P 1.2)

1858. *Plusia acuta* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **12**: 922.

(TL: Congo)

1894. *Plusia eriosoma* Hampson, *Fauna Br. India (Moths)* **2**: 569.

1963. *Neoplusia furihatai* Okano, *Ins. Matsumurana* **25**: 90, f.

1974. *Shensiplusia nigribursa* Chou & Lu, *Acta ent. Sinica* **17** (1): 68, f. 16.

2013. *Chrysodeixis acuta*: Ronkay, Ronkay, László, Fu & Wu, *Fibigeriana Suppl.* **1**: 55.

Material examined: AS632D(1), AS1029A(1)

Diagnosis: Wing expanse: 40–42 mm. *C. acuta* differs from its most closely related species *C. chalcites* in the forewing being much olive-brown instead of pale brown and the presence of a small silver coloured spot on the medial line which is absent in case of *C. chalcites*. In the male genitalia, the valvae is apically broad in *acuta* which is very narrow and overall sickle-shaped in *chalcites*.

Distribution: India: Himachal Pradesh, Uttarakhand, West Bengal, Maharashtra, Karnataka. **Elsewhere:** Pakistan, Nepal, Sri Lanka, China, Taiwan, Hong Kong, Vietnam, Thailand, Indonesia (Sumatra, Borneo, Bali, Flores), Philippines, Timor, Papua New Guinea, Australia, Japan, Europe, UAE, Cameroon, Namibia, Zimbabwe, Congo, Kenya, Nigeria, Ethiopia, Ghana, South Africa, Uganda.

3. *Chrysodeixis chalcites* (Esper, 1789) (H.P 1.3; G.P 1.3)

1789. *Phalaena (Noctua) chalcites* Esper, *Die Schmett., Th. IV, Bd. 1* (39): pl. 141, f. 3.

1790. *Phalaena chalsytis* Hübner, *Beitr. Ges. Schmett.* **2** (3): 75 (emend. *Phalaena chalcites* Esper, 1789)

1794. *Noctua bengalensis* Rossi, *Mant. Ins.* **2**: 22, pl. 3, f. P.

1794. *Noctua quaestionis* Fabricius, *Ent. Syst.* **3** (2): 81.

1798. *Phalaena (Noctua) chalcites* Esper, *Die Schmett., Th. IV, Bd. 2* (Abs. 1) (49-50): 447.

1880. *Plusia buchholzi* Plötz, *Stettin ent. Ztg* **41** (7-9): 298.

2010. *Chrysodeixis chalcites*: Ronkay, Ronkay & Behounek, *Witt Catalogue* **4**: 79.

Material examined: AS1029A(2)

Diagnosis: Wing expanse: 38–40 mm. Discussed under the previous species.

Distribution: India: Uttarakhand, West Bengal, Arunachal Pradesh, Delhi, Punjab, Kerala, Tamil Nadu, Meghalaya. **Elsewhere:** Pakistan, Sri Lanka, Italy, Greece, France, Portugal, Spain, Malta, Sicily.

Genus *Ctenoplusia* Dufay, 1970

4. *Ctenoplusia albostriata* (Bremer & Grey, 1853) (H.P 1.4; G.P 1.4)

1853. *Plusia albostriata* Bremer & Grey, *Schmett. N. China*: 18.

1853. *Plusia albostriata* Bremer & Grey, in Motschulsky, *Etud. Ent.* **1**: 65.

1865. *Abrostola subchalybaea* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **33**: 833.

1887. *Abrostola nubila* Moore, *Lepid. Ceylon* **3** (4): 549.

1894. *Plusia oxygramma* Hampson, *Fauna Br. India (Moths)* **2**: 575.

1976. *Plusia albostriata*: Holloway, *Moths of Borneo with special reference to Mt. Kinabalu*: 32.

1994. *Ctenoplusia albostriata*: Yoshimoto, *Tinea* **14** (Suppl. 1): 127.

Material examined: AS1630B(1)

Diagnosis: Wing expanse: 40–42 mm. *C. albostriata* is closely related to *C. oxygramma* in outer morphology but can be separated by the gamma marking being shorter and less straight. In the male genitalia, the juxta is comparatively broader and a small cornutus present in the vesica.

Distribution: India: Himachal Pradesh, Uttarakhand, Arunachal Pradesh, Punjab, Delhi, Kerala, Tamil Nadu, Karnataka, Orissa, Meghalaya.

Elsewhere: China, Sri Lanka, Indonesia, New Guinea, Australia, New Zealand.

5. *Ctenoplusia furcifera* (Walker, [1858]) (H.P 1.5; G.P 1.5)

1858. *Plusia furcifera* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **12**: 927. (TL: Punjab)

1894. *Plusia furcifera* Hampson, *Fauna Br. India (Moths)* **2**: 568.

1906. *Plusia babooni* Bethune-Baker, *Novit. Zool.* **13** (2): 270.

1920. *Phytometra polisha* Strand, *Archiv Naturg.* **84** A (12): 130.

1994. *Ctenoplusia furcifera*; Yoshimoto, *Tinea* **14** (Suppl. 1): 127.

Material examined: AS1843B(1)

Diagnosis: Wing expanse: 36–38 mm. *C. furcifera* can be differentiated from its congeners by its unicolorous dark brown forewing with more or less prominent pattern and very small white gamma marking with very indistinct metallic brilliance. The male genitalia is characterized by bulbous cucullus and outer margin of valvae with series of organized spines.

Distribution: India: Himachal Pradesh, Uttarakhand, West Bengal, Arunachal Pradesh, Punjab, Haryana, Delhi, Kerala, Tamil Nadu, Karnataka.

Elsewhere: Taiwan, Sri Lanka, New Guinea.

Genus *Thysanoplusia* Ichinose, 1973

6. *Thysanoplusia orichalcea* (Fabricius, 1775) (H.P 1.6)

1775. *Noctua orichalcea* Fabricius, *Syst. Ent.*: 607.

1797. *Phalaena chrysitina* Martyn, *Psyche*: pl. 21.

1813. *Noctua aurifera* Hübner, *Samml. eur. Schmett.* [4]: f. 463.

1894. *Plusia orichalcea* Hampson, *Fauna Br. India (Moths)* **2**: 573.

1976. *Diachrysia orichalcea*; Holloway, *Moths of Borneo with special reference to Mt. Kinabalu*: 32

1995. *Thysanoplusia orichalcea*; Yoshimoto, *Tinea* **14** (suppl. 2): 68.

Material examined: AS1843B(1)

Diagnosis: Wing expanse: 28–30 mm. *T. orichalcea* can be readily separated from its closely related species *T. intermixta* by the golden patch on the forewing being much narrower and the head, frons and vertex being dull rather than bright red in case of *T. intermixta*. In the male genitalia, *T. orichalcea* is characterized by the long valvae with bulbous cucullus and aedeagus vesica with very long and stout terminal cornutus.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Punjab, Delhi, Kerala, Tamil Nadu, Karnataka, Bihar,

Manipur, Meghalaya. **Elsewhere:** Taiwan, Philippines, Indonesia, New Guinea.

Tribe **PLUSIINI** Boisduval, 1829

Genus *Autographa* Hübner, [1821]

7. *Autographa purpureofusa* (Hampson, 1894) (H.P 1.7; G.P 1.6)

1894. *Plusia purpureofusa* Hampson, *Fauna Br. India* (Moths) **2**: 570. (TL: Sikkim)

1995. *Autographa purpureofusa*; Yoshimoto, *Tinea* **14** (suppl. 2): 67, pl. 114, f. 25.

2008. *Autographa purpureofusa*: Ronkay, Ronkay & Behounek, *Witt Catalogue* **1**: 94.

Material examined: AS3166A(1)

Diagnosis: Wing expanse: 38–40 mm. Differs from the very closely related *A. nigrisigna* in the head, thorax and forewing being suffused with purple and in most cases the arms are separated from the tail of the gamma mark. The male genitalia is characterized by very long uncus and moderately broad valvae with long, thin harpe.

Distribution: **India:** Uttarakhand, Sikkim. **Elsewhere:** Nepal, Myanmar, China.

Subfamily **BAGISARINAE** Crumb, 1956

Genus *Chasmina* Walker, 1856

8. *Chasmina tibialis* (Fabricius, 1775) (H.P 1.8)

1775. *Bombyx tibialis* Fabricius, *Syst. Ent.*: 578. (TL: New Holland)

1852. *Leocyma diana* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **6** (Noct. 2):
213.

1856. *Chasmina cygnus* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **9**:
147.

1865. *Chasmina glabra* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **32**:
636.

1910. *Chasmina tibialis*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **9**: 353,
f. 162.

Material examined: AS632C(1), AS632D(1)

Diagnosis: Wing expanse: 38–40 mm. Very close to *C. candida* and almost impossible to separate morphologically except the orange upper part of the fore femora with a fuscous streak in case of *C. tibialis* which is absent in *C. candida* and presence of two black spots instead of three in the fore tibia.

Distribution: India: Uttarakhand, Sikkim, Punjab, Tamil Nadu. **Elsewhere:** Sri Lanka, Sumatra, New Guinea, Australia, Madagascar, Senegal.

Genus *Xanthodes* Guenée, 1852

9. *Xanthodes intersepta* Guenée, 1852 (H.P 1.9)

1852. *Xanthodes intersepta* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **6** (Noct. 2): 212. (TL: Indes Orientales)

1865. *Xanthodes duplicata* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **33**: 778.

1894. *Acontia intersepta* Hampson, *Fauna Br. India* (Moths) **2**: 323.

1994. *Xanthodes intersepta*; Yoshimoto, *Tinea* **14** (Suppl. 1): 125, pl. 87, f. 3.

Material examined: AS632B(1), AS2442A(1)

Diagnosis: Wing expanse: 44–50 mm. Discussed under the next species.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh, Assam, Tripura, Chhattisgarh, Madhya Pradesh, Maharashtra, Andaman. **Elsewhere:** Nepal, Sri Lanka, Bangladesh, Myanmar, China, Taiwan, Hong Kong, Vietnam, Thailand, Indonesia (Java, Sulawesi, Sumatra, Celebes), Philippines, Japan, Africa.

10. *Xanthodes transversa* Guenée, 1852 (H.P 1.10; G.P 1.7)

1852. *Xanthodes transversa* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **6** (Noct. 2): 211. (TL: Java)

1858. *Xanthodes migrator* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **12**: 779.

1891. *Trileuca dentalis* Smith, *Trans. amer. ent. Soc.* **18**: 123.
1894. *Acontia transversa* Hampson, *Fauna Br. India* (Moths) **2**: 323.
1918. *Acontia dohertyi* Swinhoe, *Ann. Mag. Nat. Hist.* (9) **2** (7): 74.
1918. *Acontia talauta* Swinhoe, *Ann. Mag. Nat. Hist.* (9) **2** (7): 74, pl. 8, f. 8.
1994. *Xanthodes transversa*; Yoshimoto, *Tinea* **14** (Suppl. 1): 125.

Material examined: AS632A(1)

Diagnosis: Wing expanse: 40–44 mm. *X. transversa* and *X. intersepta* are very closely related both in outer morphology and male genitalia but they can be easily separated by much more prominent dark reddish-brown transverse lines (hence the name *transversa*) on the forewing which are quite obsolescent. Also, the brown patch at the terminal area of the forewing is much broader in case of *X. transversa*. The main characters of the male genitalia of *transversa* are the acute spine like projection of cucullus and aedeagus with a narrow vesica.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Assam, Madhya Pradesh, Maharashtra, Karnataka, Tamil Nadu, Kerala, Andaman. **Elsewhere:** Pakistan, Nepal, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Indonesia (Java), Philippines, Timor, Papua New Guinea, Australia, Japan, Korea.

Subfamily **EUSTROTIIINAE** Grote, 1882

Genus *Maliattha* Walker, 1863

11. *Maliattha picata* (Butler, 1889) (H.P 1.11; G.P 1.8)

1889. *Acontia picata* Butler, *Ill. typical Spec. Lep. Het. Colln Br. Mus.* **7**: 62, pl. 129, f. 2. (TL: Dharmsala)

1894. *Hyelopsis picata* Hampson, *Fauna Br. India* (Moths) **2**: 305.

1993. *Maliattha picata*; Yoshimoto, *Tinea* **13** (Suppl. 3): 51, pl. 43, f. 43.

Material examined: AS1430A(1)

Diagnosis: Wing expanse: 20–44 mm. The species is characterized by the pure white forewing with brown outer areas. The reniform stigma is represented by two black dots. The male genitalia is characterized by the irregular finger-like projection of the cucullus.

Distribution: India: Himachal Pradesh, Uttarakhand. **Elsewhere:** Nepal.

Genus *Micardia* Butler, 1878

12. *Micardia pulcherrima* (Moore, 1867) (H.P 1.12; G.P 1.9)

1867. *Leucania pulcherrima* Moore, *Proc. zool. Soc. Lond.* **1867**: 48, pl. 6, f. 7. (TL: Darjeeling)

1894. *Micardia pulcherrima*; Hampson, *Fauna Br. India* (Moths) **2**: 309.

2012. *Micardia pulcherrima*; Chen & Xue, *Zootaxa* **3417**: 46.

2019. *Micardia pulcherrima*; Liang, Zhu, Weng & Sun, *Zootaxa* **4559** (3): 594.

Material examined: AS2061A(1)

Diagnosis: Wing expanse: 30–33 mm. The species can be readily identified by the purplish forewing costa with a white streak along the medial nervure. The male genitalia is characterized by long, hook-like uncus with asymmetrical cucullus and small curved harpe.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh, Nagaland, Karnataka, Tamil Nadu, Kerala. **Elsewhere:** Bhutan, China (Tibet).

Note: This species is being reported for the first time from Uttarakhand.

Subfamily **ACONTIINAE** Guenée, 1841

Tribe **ACONTIINI** Guenée, 1841

Genus *Acontia* Ochsenheimer, 1816

13. *Acontia (Emmelia) marmoralis* (Fabricius, 1794) (H.P 1.13; G.P 1.10)

1794. *Noctua marmoralis* Fabricius, *Ent. Syst.* **3**(2): 234. (TL: India Orientalis)

1852. *Acontia tropica* Guenée, *Hist. nat. Ins. Spec. gen. (Lepid.)*, **6**: 217.

1858. *Acontia maculosa* Walker, *List Lep. Ins. Brit. Mus.*, **12**: 795.

1858. *Acontia bipunctata* Walker, *List Lep. Ins. Brit. Mus.*, **12**: 798.

1994. *Acontia marmoralis*; Yoshimoto, *Tinea* **14** (Suppl. 1): 125, pl. 87, f.

8.

2013. *Acontia (Emmelia) marmoralis*; Kononenko & Pinratana, *Moths of Thailand*, **3**(2): 269.

Material examined: AS1630A(2), AS1714A(1)

Diagnosis: Wing expanse: 20–22 mm. A very small species and can be distinguished by the olive-green medial spots and the dark brown postmedial area. In the male genitalia, the uncus is long, hook-shaped, right valvae with a small projection. The aedeagus vesica with a small acute spine.

Distribution: India: Uttarakhand, Arunachal Pradesh, Jharkhand, Chhattisgarh, Karnataka, Tamil Nadu, Kerala. **Elsewhere:** Nepal, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Cambodia, Thailand, Indonesia (Java), Australia, Japan, Oman, UAE.

Note: This species is being reported for the first time from Uttarakhand.

Subfamily **AEDIINAE** Beck, 1960

Genus *Aedia* Hübner, 1816

14. *Aedia leucomelas* (Linnaeus, 1758) (H.P 1.14; G.P 2.1)

1758. *Phalaena leucomelas* Linnaeus, *Syst. Nat.* (10th ed.), **1**: 518 (TL: Europe).

1829. *Catephia ramburii* Boisduval, *Eutop. Lep. Index Methodicus, Suppl.:* 7.

1894. *Catephia acronyctoides*: Hampson, *Fauna Br. India* (Moths), **2**: 482.

1993. *Aedia leucomelas*; Haruta, *Tinea* **13** (Suppl. 3): 69, pl. 52, f. 17.

2003. *Aedia leucomelas*; Goater, Ronkay & Fibiger, *Noct. Eur.* **10**: 43.

Material examined: AS749A(1)

Diagnosis: Wing expanse: 30–32 mm. Very closely related to *A. hollowayi* but differs being smaller in size and not covered in fuscous beyond postmedial line. Also, there are two pale streaks below reniform and the basal white marking of the hindwing are much bigger compared to *A. hollowayi*. The male genitalia differ in the valvae being much squarer rather than spindle-shaped as in *hollowayi* and the basal saccular spines are much longer and acute than in *hollowayi*.

Distribution: **India:** Himachal Pradesh, Uttarakhand, Jharkhand, Chhattisgarh, Karnataka, Andaman Islands. **Elsewhere:** Pakistan, Nepal, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia (Borneo, Java, Sulawesi), Philippines, Fiji, Papua New Guinea, Australia, Japan, Korea, Russia, Ukraine, Turkey, Israel, Jordan, Italy, France, Greece, Germany, Portugal, Poland, Austria, Romania, Africa.

Note: The species has been recorded for the first time from Uttarakhand.

Subfamily **PANTHEINAE** Smith, 1898

Genus *Anacronicta* Warren, 1909

15. *Anacronicta infausta* (Walker, 1856) (H.P 1.15; G.P 2.2)

1856. *Mamestra infausta* Walker, 237; (TL: Silhet)

1894. *Trisuloides infausta* Hampson, *Fauna Br. India* (Moths) **2**: 436.

1912. *Tamba nigra* Warren, *Novit. Zool.* **19**: 5.

1994. *Anacronicta infausta*; Yoshimoto, *Tinea* **14** (Suppl. 1): 95, pl. 13, f. 18.

Material examined: AS1843B(8), AS2061A(5), AS2248A(3)

Diagnosis: Wing expanse: 40–45 mm. The species is characterized by its dark grey-brown forewing colour with prominent transverse lines. The reniform and orbicular is well defined and outlined by black. Hindwing pale orange-yellow without any cell spot. The male genitalia is characterized by the long uncus, narrow, spindle-shaped harpe with long, medially curved, acute harpe. Aedeagus vesica with two bunch of small cornuti.

Distribution: **India:** Uttarakhand, Meghalaya. **Elsewhere:** Nepal, Bangladesh.

Genus *Donda* Moore, 1882 (H.P 2.1; G.P 2.3)

16. *Donda unispinosa* Bandyopadhyay, Raha and Chandra, 2019

2019. *Donda unispinosa* Bandyopadhyay, Raha and Chandra, *Ent. News*

129 (1): 51 (TL: Jauljibi, Uttarakhand).

Material examined: AS632D(1)

Diagnosis: Wing expanse: 32–34 mm. *D. unispinosa* resembles *D. eurychlora*, *D. continentalis* and *D. sundana* in the outer morphology. It differs externally from the above three congeners with the following characters: presence of subbasal trapezoid patch instead of triangular one in the forewing; presence of a distinct acute tooth-like extension originating from the middle of inner edge of the tornal patch. The detailed study of male genitalia shows marked differences with *D. eurychlora* and *D. sundana* in the shape of juxta, cucullus and saccular process. It shows striking similarities with *D. continentalis*, but the new species varies in juxta being more sclerotized, aedeagus relatively smaller and carina region having one prominent robust spine instead of two spines.

Distribution: India: Uttarakhand. **Elsewhere:** Unknown.

Genus *Tambana* Moore, 1882

17. *Tambana subflava* (Wileman, 1911) (H.P 2.2; G.P 2.4)

1911. *Trisuloides subflava* Wileman, *Entomologist* **44** (572): 31. (TL: Formosa, Rantaizan)

1913. *Trisuloides albitessellata* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **13**: 348, pl. 233, f. 8.

2004. *Tambana albitessellata*; Kononenko, *Mitt. Int. Ent. Ver.* **29** (3): 78.

2004. *Tambana subflava*; Kononenko, *Mitt. Int. Ent. Ver.* **29** (3): 78.

2015. *Tambana subflava*; Behounek, Han & Kononenko, *Zootaxa* **4048** (3): 304.

Material examined: AS1843B(1)

Diagnosis: Wing expanse: 55–58 mm. A large species with dark brown forewing straited with some white; the orbicular a small white dot and the reniform is a C-shaped marked defined by black in inner side and rather an elongate white spot beyond it; the hindwing orange and terminal area brown except at tornus. The male genitalia is characterized by the strong and long harpe and the extended projection of the tegumen.

Distribution: India: Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh, Assam, Nagaland, Meghalaya. **Elsewhere:** Nepal, China, Taiwan, Vietnam, Thailand, Japan.

Note: The species has been recorded for the first time from Uttarakhand.

Genus *Trisuloides* Butler, 1881

18. *Trisuloides sericea* Butler, 1881 (H.P 2.3; G.P 2.5)

1881. *Trisuloides sericea* Butler, *Ann. Mag. nat. Hist.* (5) **7** (37): 36. (TL: Shillong; Assam)

1894. *Trisuloides sericea*; Hampson, *Fauna Br. India* (Moths) **2**: 436.

2011. *Trisuloides sericea*; Behounek, Han & Kononenko, *Zootaxa* **3069**: 6.

Material examined: AS2248A(1)

Diagnosis: Wing expanse: 60–64 mm. *T. sericea* is most closely related to its Chinese counterpart *T. prosericea* and differs in the forewing being much paler tint and the absence of a prominent antemedial fascia. The male genitalia varies in the uncus being comparatively longer and the harpe being much more serrate where in *T. prosericea* there are two basal teeth present in the harpe.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Meghalaya. **Elsewhere:** Pakistan, Nepal, Myanmar, China, Taiwan, Vietnam, Thailand, Japan.

Subfamily **ACRONICTINAE** Harris, 1841

Tribe **ACRONICTINI** Smith & Dyar, 1898

Genus *Acronicta* Ochseneimer, 1816

19. *Acronicta bicoloraria* (Yoshimoto, 1994) (H.P 2.4; G.P 2.6)

1994. *Viminia bicoloraria* Yoshimoto, *Tinea* **14** (Suppl. 1): 96, 128, pl. 83, f. 11. (TL: Janakpur, Jiri)

Material examined: AS2248A(1)

Diagnosis: Wing expanse: 38–40 mm. Most closely related to *A. grumi bicolor* in outer morphology and male genitalia. The species can be readily identified by dark blackish-grey forewing with indistinct transverse lines and small whitish-grey reniform mark. It differs from *A. g. bicolor* in the hindwing being suffused with grey in the terminal area which is pure white in case of *bicolor*. In male genitalia, the harpe is strong and apically bent. The

aedeagus vesica with numerous small spines at the basal area and tip and with a large cornutus at middle.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

20. *Acronicta (Triaena) denticulata* (Moore, 1888) (H.P 2.5; G.P 2.7)

1888. *Triaena denticulata* Moore, *Proc. zool. Soc. Lond.*, 1888: 408 (TL: Kangra).

1909. *Acronycta rubiginosa* Hampson, *Cat. Lep. Phalaenae Brit. Mus.*, **8**: 115.

1937. *Acronicta (Hyboma) longatella* Draudt, *Ent. Rundschau*, **54**: 381, pl. 4:1f.

1993. *Triaena denticulata* Yoshimoto, *Tinea* **13**, (Suppl. 3): 124, pl. 61:21.

2010. *Acronicta (Triaena) denticulata*; Han & Kononenko, *Zootaxa*, **2678**: 65.

Material examined: AS1843B(1)

Diagnosis: Wing expanse: 40–45 mm. This species has been synonymised with *A. rubiginosa* earlier and after Holloway (1989) it is considered as a good species. Although both the species are almost identical in outer morphology but the subtle differences in male genitalia helps in separating the two by having a strongly bifid distal saccular process in *denticulata* which is missing in *rubiginosa*.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

21. *Acronicta gastridia* (Swinhoe, 1895) (H.P 2.6; G.P 2.8)

1895. *Acronicta gastridia* Swinhoe, *Ann. Mag. nat. Hist.*, (6) **15** (85): 5;
(TL: Punjab, Murree).

1909. *Acronicta gastridia*; Hampson, *Cat. Lep. Phalaenae Brit. Mus.*, **8**:
138, pl. 126:16.

Material examined: AS3225A(1)

Diagnosis: Wing expanse: 40–42 mm. The species can be identified by its greyish-white forewings black-ringed, round orbicular and brown reniform with black bar on each side. The male genitalia is characterized by the spindle-shaped valvae like its congeners and a long curved harpe. Aedeagus vesica with long cornuti and a small sclerotized patch with minute sines.

Distribution: India: Jammu & Kashmir, Uttarakhand. **Elsewhere:** Nepal, Pakistan.

22. *Acronicta pruinosa* (Guenée, 1852) (H.P 2.7)

1852. *Acronicta pruinosa* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **5** (Noct. 1): 53. (TL: Java; Silhet)

1865. *Polia soluta* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **33**: 723.

1879. *Acronicta consanguis* Butler, *Ann. Mag. Nat. Hist.* (5) **4** (23): 358.

1894. *Acronicta pruinosa* Hampson, *Fauna Br. India (Moths)* **2**: 242.

1909. *Acronicta albiorbis* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 74.

1909. *Acronycta pruinosa* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 91, pl. 125, f. 10.

1976. *Acronycta pruinosa*; Holloway, *Moths of Borneo with special reference to Mt. Kinabalu*: 13

Material examined: AS1692A(1), AS1843B(1)

Diagnosis: Wing expanse: 44–48 mm. The species can be differentiated from *A. rubiginosa* by the reduced black streaks of the basal and sub-tornal region and prominent pale orbicular. The male genitalia is variable throughout the specimens of different geographical region but majorly characterized by the narrower valvae and longer harpe than the congeners.

Distribution: India: Uttarakhand. **Elsewhere:** Sri Lanka, Myanmar, Borneo, Java, Taiwan, Malaysia, New Guinea.

Tribe *Unassigned*

Genus *Harmandicrania* Kiss, 2017

23. *Harmandicrania nubilata* (Hampson, 1894) (H.P 2.8)

1894. *Euplexia nubilata* Hampson, *Fauna Br. India (Moths)* **2**: 208. (TL: Sikkim)

1909. *Craniophora nubilata*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 55, pl. 124, f. 5. 1994. *Craniophora nubilata*; Yoshimoto, *Tinea* **14** (Suppl. 1): 97, pl. 83, f. 12;

2010. *Craniophora nubilata*; Han & Kononenko, *Zootaxa* **2678**: 67.

2017. *Harmandicrania nubilata*; Kiss, *Zootaxa* **4355** (1): 39.

Material examined: AS2462C(1)

Diagnosis: Wing expanse: 44–48 mm. The species can be identified by reddish-brown forewing with double subbasal, antemedial, medial and postmedial lines and a single submarginal line, reniform represented by a dark lunule. The male genitalia is characterized by broad valvae and ling uncus, aedeagus vesica with finger-like projection and six minute spines.

Distribution: India: Uttarakhand, Sikkim. **Elsewhere:** Nepal.

Genus *Thalathoides* Holloway, 1989

24. *Thalathoides conjecturalis* (Swinhoe, 1890) (H.P 2.9)

1890. *Bryophila conjecturalis* Swinhoe, *Trans. ent. Soc. Lond.* **1890** (2): 222.

(TL: Burma, Rangoon)

1862. *Thalatha sinens* Walker, *J. Proc. Linn. Soc. (Zool.)* **6**: 187.

1894. *Acronycta conjecturalis* Hampson, *Fauna Br. India (Moths)* **2**: 242.

1909. *Thalatha conjecturalis*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 47.

1989. *Thalathoides conjecturalis*; Holloway, *Malayan Nature J.* **42** (2-3): 108, pl. 2, f. 149-150, 153.

Material examined: AS632D(1)

Diagnosis: Wing expanse: 34–36 mm. The species closely resembles its Bornean counterpart *T. curtails* in outer and genitalia morphology but can be separated by the heavy fasciation and presence of black suffusion from the central black triangle on the costa. The subternal black marking is not angled. In male genitalia, the valvae is broader and the saccular margin is angled rather than curved.

Distribution: India: Uttarakhand. **Elsewhere:** Sri Lanka, Myanmar, Borneo.

Subfamily **AGARISTINAE** Boisduval, 1833

Genus *Aegocera* Latreille, 1809

25. *Aegocera bimacula* Walker, 1854 (H.P 2.10; G.P 3.1)

1854. *Aegocera bimacula* Walker, *List Spec. Lepid. Insects Colln Br. Mus.*

1: 57. (TL: North India)

1882. *Aegocera bimacula*; Moore, *Lepid. Ceylon* **2** (1): 33, pl. 94, f. 2.

1894. *Aegocera bimacula*; Hampson, *Fauna Br. India* (Moths) **2:** 158.

1901. *Aegocera bimacula*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **3:**

598.

1994. *Aegocera bimacula*; Sugi, *Tinea* **14** (Suppl. 1): 161, pl. 94, f. 3.

Material examined: AS632D(1), AS632C(2)

Diagnosis: Wing expanse: 44–46 mm. A beautiful and unmistakable species with dark red-brown forewing with three yellowish-white longitudinal band, one subbasal, one on cell and one beyond cell; the subbasal is sometimes

broken. Hindwing orange-yellow with a broad waved marginal black band and a big black cell spot. Male genitalia is characterized by broad, sickle-shaped valvae with strong, acute harpe.

Distribution: India: Uttarakhand, Sikkim, Assam, Jharkhand, Chhattisgarh, Madhya Pradesh, Maharashtra. **Elsewhere:** Nepal, Sri Lanka, Myanmar, Cambodia, Thailand.

Genus *Sarbanissa* Walker, 1865

26. *Sarbanissa dissimilis* (Swinhoe, 1890) (H.P 2.11; G.P 2.9)

1890. *Seudyra dissimilis* Swinhoe, *Trans. ent. Soc. Lond.* **1890** (1): 174.

(TL: Mandalay)

1998. *Sarbanissa dissimilis*; Sugi, *Tinea* **15** (suppl. 1): 79, pl. 58, f. 8, 10.

Material examined: AS1430A(1)

Diagnosis: Wing expanse: 48–50 mm. There is much confusion related to this and the next species as *S. dissimilis* is considered as the junior subjective synonym of *S. transiens* by Wei et al., 2019 due to the unavailability of male genitalia of the types of *S. dissimilis*. But after studying both the genitalia, it is hereby confirmed that both the species have major differences in the male genitalia and thus can be considered as distinct species. Although the outer morphology is almost same except *S. transiens* is a larger species and in the forewing, the postmedial oblique white band is broader and much more prominent in case of *transiens*. Also, in hindwing, the marginal black band is much broader and more acutely curved near vein 2 in case of *dissimilis*. In

the male genitalia, the costal margin of the valvae of *dissimilis* is much excurved rather than plain in case of *transiens*. Also, the harpe of *transiens* is much longer, almost double in size compared to that of *dissimilis* and the tip is blunt, whereas in *dissimilis* it is acute and also overall much less curved. Thus, based on these characters, hereon both the species are being treated as good species.

Distribution: India: Uttarakhand, Sikkim, West Bengal, Assam, Meghalaya, Nagaland. **Elsewhere:** Nepal, Myanmar, Vietnam, Thailand, Indonesia (Java, Borneo).

Note: The species has been recorded for the first time from Uttarakhand.

27. *Sarbanissa transiens* (Walker, 1856) (H.P 2.12; G.P 2.10)

1856. *Eusemia transiens* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **7**: 1588.

1910. *Seudyra transiens*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **9**: 437, f. 298.

1976. *Sarbanissa transiens*; Holloway, *Moths of Borneo with special reference to Mt. Kinabalu*: 6.

1993. *Sarbanissa transiens*; Sugi, *Tinea* **13** (Suppl. 3): 96, pl. 58, f. 14-15.

2019. *Sarbanissa transiens*; Wei, Kishida & Wang, *Zootaxa* **4648** (2): 361.

Material examined: AS632D(1)

Diagnosis: Wing expanse: 48–50 mm. Discussed under the previous species.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh, Assam, Meghalaya, Nagaland, Chhattisgarh. **Elsewhere:** Nepal, Bhutan, Myanmar, China, Vietnam, Malaysia, Thailand, Indonesia (Sumatra, Java, Borneo, Bali).

Subfamily CUCULLIINAE Herrich-Schäffer, [1850]

Genus *Apostema* Warren, 1913

28. *Apostema distigmata* (Hampson, 1906) (H.P 2.13; G.P 3.2)

1906. *Cosmia distigmata* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **6**: 509, pl. 107, f. 19. (TL: Punjab, Kulu, Sultanpur)

1913. *Apostema distigmata*; Warren, *Gross-Schmett. Erde* **11**: 116.

Material examined: AS2547A(2), AS3150A(1), AS3343A(1), AS3427A(1)

Diagnosis: Wing expanse: 40–45 mm. A comparatively large species and can be identified by orange-yellow forewing with large orbicular and reniform stigma. Reniform with two distinct white dots at the lower extremity. The male genitalia is characterized by the narrow valvae with hook-like extended projection of the cucullus and the aedeagus vesica with a broad cornutus with irregular, minute basal spines.

Distribution: India: Himachal Pradesh, Uttarakhand.

Genus *Cucullia* Schrank, 1802

29. *Cucullia pullata* (Moore, 1881) (H.P 2.14; G.P 3.3)

1881. *Callaenia pullata* Moore, *Proc. zool. Soc. Lond.* **1881**: 358. (TL: Dalhousie)

1894. *Cucullia pullata*; Hampson, *Fauna Br. India* (Moths) **2**: 239.

1995. *Cucullia pullata*; Yoshimoto, *Tinea* **14** (suppl. 2): 59, pl. 112, f. 1.

2009. *Cucullia pullata*; Ronkay & Ronkay, *Witt Catalogue* **2**: 67.

Material examined: AS3150A(1), AS3166A(4)

Diagnosis: Wing expanse: 70–72 mm. A very beautiful and unmistakable species with apically elongated, grey forewing and white hindwing with a broad, black marginal band and a large, black discocellular spot with black veins. The male genitalia bear typical features like its congeners that is long, thick uncus and narrow, extremely long valvae with short, curved harpe. Aedeagus vesica long, with two distinct, short cornuti.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim. **Elsewhere:** Nepal, China.

Subfamily **AMPHIPYRINAE** Guenée, 1838

Tribe **AMPHIPYRINI** Guenée, 1838

Amphipyra Ochsenheimer, 1816

30. *Amphipyra cupreipennis* Moore, 1888 (H.P 2.15; G.P 3.4)

1882. *Amphipyra cupreipennis* Moore, *Descr. Indian lep. Atkinson* (2): 155.

(TL: Darjiling)

1894. *Amphipyra cupreipennis*; Hampson, *Fauna Br. India* (Moths) **2**: 192.

1908. *Amphipyra cupreipennis*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.*

7: 30, pl. 108, f. 12.

1993. *Amphipyra cupreipennis*; Yoshimoto, *Tinea* **13** (Suppl. 3): 136, pl.

62, f. 27.

1998. *Amphipyra cupreipennis*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1):

273, pl. 157, f. 15.

Material examined: AS3150A(2)

Diagnosis: Wing expanse: 54–58 mm. The species can be easily identified by its uniformly dark purplish-brown forewing colour with almost no markings and the cupreous-red hindwing brownish costal margin. The male genitalia is unique and characterized by a very long and thick uncus and aedeagus vesica with organised, multiple, broad, strong cornuti.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, West Bengal. **Elsewhere:** Bhutan, Bangladesh, China, Taiwan, Japan, Korea, Russia.

31. *Amphipyra pyramidea* (Linnaeus, 1758) (H.P 3.1; G.P 3.5)

1758. *Phalaena (Noctua) pyramidea* Linnaeus, *Syst. Nat.* (Edn 10) **1**: 518.

1880. *Amphipyra pyramidea* var. *obscura* Oberthür, *Étud. d'Ent.* **5**: 85.

1888. *Amphipyra pyramidea* var. *obliquilimbata* Graeser, *Berl. Ent. Zs.* **32** (2): 352.

1908. *Amphipyra pyramidea*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 28.

Material examined: AS1714A(1)

Diagnosis: Wing expanse: 55–57 mm. *A. pyramidea* can be recognized by the reddish-brown forewing irrorated with ochreous white having a prominent, double, strongly dentate antemedial line which is filled in with white. The hindwing is cupreous-red and the costal area is yellowish-brown, underside with prominent dark discoidal spot and a dark postmedial line. In male genitalia, uncus is rather extremely long and broad, valvae narrow and aedeagus vesica with multiple long spines and a patch of minute cornuti.

Distribution: India: Jammu & Kashmir, Uttarakhand. **Elsewhere:** China, Taiwan, Japan, Korea, Russia, Finland, Poland, Turkey, Lebanon, Syria,

Israel, Iraq, Iran, Kazakhstan, Germany, United Kingdom, Norway, Italy, Austria, Finland, Netherlands, France, Portugal, Sweden, Denmark, USA.

Note: The species is being reported for the first time from Uttarakhand.

Genus *Nacna* Fletcher, 1961

32. *Nacna prasinaria* (Walker, [1865]) (H.P 3.2; G.P 3.6)

1865. *Diphthera prasinaria* Walker, *List Spec. Lepid. Insects Colln Br. Mus.*

32: 615. (TL: Darjeeling)

1894. *Diphthera prasinaria* Hampson, *Fauna Br. India* (Moths) **2:** 294.

1909. *Canna prasinaria*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8:** 19, pl. 123, f. 18.

1994. *Nacna prasinaria*; Yoshimoto, *Tinea* **14** (Suppl. 1): 95, pl. 13, f. 26.

Material examined: AS2248A(1)

Diagnosis: Wing expanse: 35–38 mm. The species can be identified by its bright emerald green forewing colouration with contrasting jet-black pattern. A prominent triangular basal black patch and the reniform is represented by a diffused white patch; marginal series of black spots. Hindwing white with a series of marginal specks. Male genitalia is characterized by spindle-shaped valvae and the aedeagus vesica with multiple long, strong cornuti.

Distribution: India: Uttarakhand, Sikkim, West Bengal. **Elsewhere:** Nepal, China, Thailand.

Note: The species has been recorded for the first time from Uttarakhand.

Tribe **PSAPHIDINI** Grote, 1896

Genus *Diphtherocome* Warren, 1907

33. *Diphtherocome discibrunnea* (Moore, 1867) (H.P 3.3; G.P 3.7)

1867. *Diphthera discibrunnea* Moore, *Proc. zool. Soc. Lond.* **1867**: 46, pl. 6, f. 14. (TL: Bengal)

1894. *Diphthera discibrunnea* Hampson, *Fauna Br. India* (Moths) **2**: 295.

1909. *Daseochaeta discibrunnea*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 32, pl. 123, f. 22.

1994. *Diphtherocome discibrunnea*; Yoshimoto, *Tinea* **14** (Suppl. 1): 95, pl. 13, f. 25.

Material examined: AS2248A(1), AS2655B(2)

Diagnosis: Wing expanse: 36–42 mm. A much smaller species compared to its Himalayan congeners and can be easily identified by much prominent and more filled-in forewing pattern. The reniform defined by black at sides and whitish striae at middle and a dark brown postmedial band. In the male genitalia, uncus comparatively very long, cucullus narrow and apically curve, aedeagus vesica without any prominent spine or cornuti.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Meghalaya, Nagaland. **Elsewhere:** Nepal, China.

34. *Diphtherocome diverticulata* Hreblay & Kononenko, 1999 (H.P 3.4;
G.P 3.8)

1999. *Diphtherocome diverticulata* Hreblay & Kononenko, *Esperiana* **7**: 673.
(TL: Likiang, N. Yunnan)

Material examined: AS3065A(2), AS3390B(1), AS3700A(1)

Diagnosis: Wing expanse: 30–36 mm. Almost identical in outer appearance like *D. pallida* but differs in the forewing being slightly broad and the medial black band of hindwing being almost obscurely complete. These two species can be differentiated by the male genitalia characters such as the shape of cucullus, which is less arcuate in case of *D. diverticulata* and the harpe is also thicker and blunter compared to *D. pallida*.

Distribution: India: Uttarakhand. **Elsewhere:** China.

Note: The species has been recorded for the first time from India.

35. *Diphtherocome fasciata* (Moore, 1888) (H.P 3.5; G.P 3.9)

1888. *Diphthera fasciata* Moore, *Proc. zool. Soc. Lond.* **1888**: 408. (TL: Kangra)

1894. *Diphthera pallida* Hampson, *Fauna Br. India* (Moths) **2**: 295.

1909. *Daseochaeta fasciata*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 28.

1994. *Diphtherocome fasciata*; Yoshimoto, *Tinea* **14** (Suppl. 1): 96, pl. 13, f. 24.

Material examined: AS3150A(1)

Diagnosis: Wing expanse: 40–46 mm. *D. fasciata* can be readily identified by its much simpler forewing pattern with minimal striation and patches. Orbicular and reniform stigmata are often obsolete with faint black and white outer marking and a big quadrate black patch between them. The male genitalia is similar to that of *D. pallida* but differs in the valvae being more narrower and the harpe is relatively short and much acute; cucullus having no arc.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh. **Elsewhere:** Nepal, China.

36. *Diphtherocome pallida* (Moore, 1867) (H.P 3.6; G.P 3.10)

1867. *Diphthera pallida* Moore, *Proc. zool. Soc. Lond.* **1867**: 46, pl. 6, f. 6.
(TL: Sikkim)

1894. *Diphthera pallida* Hampson, *Fauna Br. India* (Moths) **2**: 295.

1909. *Daseochaeta pallida*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 24,
f. 4.

1994. *Diphtherocome pallida*; Yoshimoto, *Tinea* **14** (Suppl. 1): 96, pl. 83, f.
5.

Material examined: AS632B(1), AS2547A(4), AS3225B(1), AS3015A(1),
AS3150A(1)

Diagnosis: Wing expanse: 40–46 mm. Discussed under *D. divarticulata*.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh, Nagaland. **Elsewhere:** Pakistan, Nepal, China (Tibet).

Subfamily **HELIOTHINAE** Boisduval, [1828]

Genus *Helicoverpa* Hardwick, 1965

37. *Helicoverpa armigera* (Hübner, [1805]) (H.P 3.7; G.P 4.1)

1805. *Noctua armigera* Hübner, *Samml. eur. Schmett.* [4]: pl. 79, f. 370.

1894. *Heliothis armigera* Hampson, *Fauna Br. India* (Moths) **2**: 174.

1994. *Helicoverpa armigera*; Yoshimoto, *Tinea* **14** (Suppl. 1): 97, pl. 14, f. 21.

Material examined: AS1843A(3), AS2462A(6), AS3065A(4)

Diagnosis: Wing expanse: 30–34 mm. Closely related to *H. assulta* having similar forewing pattern and hindwing with a lenticular dark brown border but can be differentiated by the submarginal brown band of both wings underside which is much prominent in *armigera* rather than weak in *assulta*. Also, the forewing underside fascinations are much more clearly defined in *armigera* with prominent double postmedial. In male genitalia, the aedeagus vesica is coiled with cluster of spines.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, West Bengal, Arunachal Pradesh, Assam, Bihar, Punjab, Chhattisgarh, Madhya Pradesh, Maharashtra, Karnataka, Tamil Nadu. **Elsewhere:** Afghanistan, Pakistan, Nepal, Sri Lanka, Myanmar, China, Taiwan, Hong

Kong, Thailand, Indonesia (Borneo, Java), Philippines, Papua New Guinea, Australia, New Zealand, Japan, Korea, Turkey, Germany, Denmark, Portugal, Italy, France, Spain, Norway, Finland, Austria, Netherlands, United Kingdom, UAE, South Africa, Kenya, Tanzania, Uruguay, Peru.

Subfamily **CONDICINAE** Poole, 1995

Tribe **CONDICINI** Poole, 1995

Genus *Bagada* Walker, 1858

38. *Bagada poliomera* (Hampson, 1908) (H.P 3.8; G.P 4.2)

1908. *Perigeodes poliomera* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 287, pl. 115, f. 11. (TL: Assam, Khasis)

1928. *Perigeodes poliomera albinotata* Prout, *Bull. Hill Mus.* **2**: 69.

1989. *Bagada poliomera*; Holloway *Malayan Nature J.* **42** (2-3): 197, pl. 6, f. 370, 372.

1994. *Bagada poliomera*; Yoshimoto, *Tinea* **14** (Suppl. 1): 117, pl. 86, f. 1.

Material examined: AS632D(1)

Diagnosis: Wing expanse: 32–36 mm. The species can be easily identified by the most diagnostic characteristic having extensive whitish borders of costa and dorsum of the brown forewing. The male genitalia is characterized by the apically broad but medially narrow valvae with a strong harpe having apical acute hook. juxta is bifurcated with acute points.

Distribution: India: Uttarakhand, Assam. **Elsewhere:** Nepal, China, Sumatra, Borneo.

Genus *Condica* Walker, 1856

39. *Condica atricuprea* (Hampson, 1908) (H.P 3.9)

1908. *Perigea atricuprea* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 316, pl. 115, f. 32. (TL: Sikkim Tibet, Yatung)

2007. *Condica atricuprea*; Fibiger & Hacker, *Noct. Eur.* **9**: 38.

Material examined: AS2655A(1), AS2655B(1), AS2800A(1), AS3225A(1)

Diagnosis: Wing expanse: 34–38 mm. This species can be identified by the glossy black-brown forewing which is slightly irrorated with white. the antemedial line is black, defined by white on inner side and with an obscure subterminal line with white striga from the costa. Hindwing greyish with an obscure black discal spot. Cilia with white line through them.

Distribution: India: Uttarakhand, Sikkim. **Elsewhere:** China (Tibet).

40. *Condica capensis* (Guenée, 1852) (H.P 3.10; G.P 4.3)

1852. *Apamea capensis* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **5** (Noct. 1): 213.

1852. *Apaemea afra* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **7** (Noct. 3): 399.

1891. *Perigea meleagris* Saalmüller, *Lepid. Madagascar* (2): 271, f. 228.

1908. *Perigea capensis*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 332, pl. 116, f. 20.

2007. *Condica capensis*; Fibiger & Hacker, *Noct. Eur.* **9**: 38.

Material examined: AS632D(1), AS749A(2), AS1222A(1), AS1272A(1), AS1356A(1), AS1843B(1), AS2248A(1)

Diagnosis: Wing expanse: 26–36 mm. The species can be recognized by the rufous forewing suffused with fuscous, irrorated with grey on costal and terminal area with dark streaks on the veins. Orbicular and reniform obsolete with reniform only being marked with few white dots. The hindwing basal area is pale brown with extremities more suffused with dark fuscous. The male genitalia is characterized by the long and very narrow uncus, valvae with a curved harpe.

Distribution: India: Himachal Pradesh, Uttarakhand, West Bengal, Maharashtra, Assam, Tamil Nadu, Karnataka. **Elsewhere:** China, Taiwan, Sri Lanka, Myanmar, Borneo, New Guinea, Philippines, Morocco, Egypt, Somalia, Kenya, Burundi, Zaire, Zambia, South Africa, Ghana, Cape Verde, Comoros, Madagascar.

41. *Condica illecta* (Walker, 1865) (H.P 3.11; G.P 4.4)

1865. *Perigea illecta* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **32**: 684.

1865. *Hadena spargens* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **33**: 739.

1865. *Hadena funesta* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **33**: 740.

1976. *Platysenta illecta*; Holloway, *Moths of Borneo with special reference to Mt. Kinabalu*: 14.

1994. *Condica illecta*; Yoshimoto, *Tinea* **14** (Suppl. 1): 117, pl. 16, f. 29.

2007. *Condica illecta*; Fibiger & Hacker, *Noct. Eur.* **9**: 38.

2019. *Condica illecta*; Keegan, Lafontaine, Wahlberg & Wagner, *Syst. Ent.* **44**: 458.

Material examined: AS825A(1), AS1029A(3), AS1121A(1), AS1630B(1), AS1714A(2), AS1843B(3)

Diagnosis: Wing expanse: 34–38 mm. This species is different from its congeners by having more uniform brown forewing with obscure reniform markings with a fragmented outline. It resembles *C. conducta* in outer morphology but *conducta* is smaller in size and have a pale zone at the base of the forewing. the male genitalia of *illecta* is distinctive with the long, narrow uncus and the aedeagus vesica with a sclerotized plate armed with minute small spines.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal, Borneo, Australia.

Genus *Hadjina* Staudinger, [1892]

42. *Hadjina cupreipennis* (Moore, 1882) (H.P 3.12; G.P 4.5)

1882. *Ilattia cupreipennis* Moore, *Descr. Indian lep. Atkinson* (2): 112. (TL: Darjiling)

1894. *Amyna octo* Hampson, *Fauna Br. India* (Moths) **2**: 251.

1909. *Hadjina cupreipennis*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 525, pl. 136, f. 13.

1993. *Hadjina cupreipennis*; Yoshimoto, *Tinea* **13** (Suppl. 3): 136, pl. 62, f. 31.

Material examined: AS2800A(2), AS3065A(1), AS3225B(1)

Diagnosis: Wing expanse: 30–36 mm. This species is readily recognized by its unique bright cupreous red shading of the forewing with orbicular and reniform being marked with whitish brown. Hindwing glossy brown. The male genitalia is characterized by the spindle-shaped valvae and hook shaped uncus.

Distribution: India: Uttarakhand, Sikkim, West Bengal. **Elsewhere:** Nepal, Pakistan.

Subfamily **ERIOPINAE** Herrich-Schäffer, [1851]

Genus *Callopistria* Hübner, [1821]

43. *Callopistria callopistroides* (Moore, 1881) (H.P 3.13; G.P 4.6)

1881. *Callopistria callopistroides* Moore, (TL: India)

2009. *Callopistria callopistroides*; Yen & Wu, *Biota Taiwanica*: 58.

Material examined: AS1430A(1), AS1692A(1), AS1843B(2)

Diagnosis: Wing expanse: 32–34 mm. The species can be readily identified by the unique hindwing colouration, which is bright yellow at the base and the marginal area having a dark brown band. This is unique to this species and the most important diagnostic feature. The male genitalia is characterized by the apically narrow valvae and spatulate uncus. The aedeagus vesica with a small basal sclerotized patch.

Distribution: **India:** Uttarakhand, Assam. **Elsewhere:** Indonesia, Philippines (Luzon).

44. *Callopistria minor* Hampson, 1891 (H.P 3.14; G.P 4.7)

1891. *Callopistria minor* Hampson, *Ill. typical Spec. Lep. Het. Colln Br. Mus.*

8: 81, pl. 146, f. 16-17. (TL: Nilgiris)

1894. *Callopistria minor*; Hampson, *Fauna Br. India (Moths)* **2:** 254.

1908. *Eriopus minor*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7:** 566.

1994. *Callopistria minor*; Yoshimoto, *Tinea* **14** (Suppl. 1): 118, pl. 86, f. 11.

Material examined: AS1356A(1), AS1430A(1), AS1630A(1), AS1843B(4)

Diagnosis: Wing expanse: 20–24 mm. A small species compared to its congeners and can be identified by the rufous forewing irrorated with black; the medial area more blackish. Reniform with whitish striga in centre and yellow annulus, orbicular defined by an oblique black bar defined by white on each side. The hindwing blackish brown with yellowish line at the base of the cilia. The male genitalia is defined by the narrow valvae and spatulate uncus. The aedeagus vesica with multiple long and strong cornuti.

Distribution: India: Uttarakhand, Tamil Nadu. **Elsewhere:** Nepal.

45. *Callopistria pulchrilinea* (Walker, 1862) (H.P 3.15)

1862. *Obana pulchrilinea* Walker, *J. Proc. Linn. Soc. (Zool.)* **6**: 190. (TL: Sarawak)

1884. *Eriopus reticulata* Pagenstecher, *Jahrb. Nassau. Ver. Naturk.* **37**: 226.

1908. *Eriopus pulchrilinea*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 542, f. 120.

1994. *Callopistria pulchrilinea*; Yoshimoto, *Tinea* **14** (Suppl. 1): 118, pl. 16, f. 39.

2009. *Callopistria pulchrilinea*; Yen & Wu, *Biota Taiwanica*: 48.

Material examined: AS632D(1), AS1029A(1), AS1222A(1), AS1692A(2), AS1714A(1), AS1843B(2), AS3343A(1)

Diagnosis: Wing expanse: 20–22 mm. the species is very much variable through its geographical range but can be mainly identified by the yellowish-brown forewing suffused with black; veins with slight pale streaks. Orbicular represented by a oblique white streak across the cell and the reniform by a whitish spot. The hindwing is reddish brown with yellowish cilia.

Distribution: India: Uttarakhand, Sikkim, Tamil Nadu. **Elsewhere:** Nepal, Myanmar, Sri Lanka, Vietnam, Singapore, Java, Borneo, Fiji.

46. *Calloplistria repleta* Walker, 1858 (H.P 4.1; G.P 4.8)

1858. *Calloplistria repleta* Walker, *List Spec. Lepid. Insects Colln Br. Mus.*

12: 865. (TL: North India)

1894. *Calloplistria repleta*; Hampson, *Fauna Br. India (Moths)* **2:** 255.

1908. *Eriopus repleta* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7:** 562, f. 132.

1994. *Calloplistria repleta*; Yoshimoto, *Tinea* **14** (Suppl. 1): 118, pl. 16, f. 35.

2009. *Calloplistria repleta*; Yen & Wu, *Biota Taiwanica*: 5.

Material examined: AS632A(1), AS632D(1), AS1692A(1), AS1843B(3)

Diagnosis: Wing expanse: 20–24 mm. this species can be readily identified by its contrasting forewing colour pattern with white, rufous, grey and dark brown. The veins are streaked with white. the orbicular with oblique parallel white lines and the reniform is white, defined by black at sides. The hindwing yellowish suffused with brown except at the costal area. The male genitalia

is characterized by the narrow cucullus and long uncus. The aedeagus vesica without any spines.

Distribution: India: Himachal Pradesh, Uttarakhand, Assam, Meghalaya, Tamil Nadu, Karnataka. **Elsewhere:** Pakistan, Nepal, China, Taiwan, Vietnam, Laos, Thailand, Malaysia, Indonesia (Sumatra, Borneo), Japan, Korea, Russia.

47. *Callopistria rivularis* Walker, 1858 (H.P 4.2; G.P 4.9)

1858. *Callopistria rivularis* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* 12: 867. (TL: Northern India)

1894. *Callopistria rivularis*; Hampson, *Fauna Br. India (Moths)* 2: 255.

1908. *Eriopus xanthopera* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* 7: 545, pl. 121, f. 1.

1908. *Eriopus rivularis*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* 7: 546, f. 122.

1908. *Eriopus cyclopis* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* 7: 547, pl. 121, f. 3.

1994. *Callopistria rivularis*; Yoshimoto, *Tinea* 14 (Suppl. 1): 118, pl. 16, f. 37.

2009. *Callopistria rivularis*; Yen & Wu, *Biota Taiwanica*: 53.

Material examined: AS632C(1), AS1272A(1)

Diagnosis: Wing expanse: 26–32 mm. The species can be differentiated from its congeners having a dark greyish-ochreous forewing irrorated with black. The orbicular represented by a black filled white annulus which is obliquely ‘V’-shaped, reniform with a oblique white line on the inner edge. Hindwing cupreous brown with white cilia. The male genitalia is characterized with a triangular valvae having narrow cucullus and a long uncus.

Distribution: India: Himachal Pradesh, Uttarakhand, Madhya Pradesh, Karnataka, Tamil Nadu, Kerala, Andaman. **Elsewhere:** Nepal, Sri Lanka, China, Taiwan, Hong Kong, Thailand, Malaysia, Indonesia (Sulawesi, Borneo), New Guinea, Fiji, Australia, Melanesia, Japan, Korea.

Subfamily **BRYOPHILINAE** Guenée, 1852

Genus *Bryophila* Treitschke, 1825

48. *Bryophila literata* Moore, 1881 (H.P 4.3; G.P 4.10)

1881. *Bryophila literata* Moore, *Proc. zool. Soc. Lond.* **1881**: 331. (TL: Kashmir)

1894. *Bryophila literata*; Hampson, *Fauna Br. India (Moths)* **2**: 297.

1908. *Bryophila literata*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 628, pl. 122, f. 16.

Material examined: AS3166A(1)

Diagnosis: Wing expanse: 28–34 mm. The species characterized by the greyish-white forewing with blackish irroration and with black and white

chequered cilia. The hindwing whitish with terminal half tinged with fuscous and a blackish discoidal spot. The male genitalia is characterized by the long uncus and harpe. The aedeagus vesica with a minute apical spine.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand.

Subfamily **XYLENINAE** Guenée, 1837

Tribe **PRODENIINI** Forbes, 1954

Genus *Spodoptera* Guenée, 1852

49. *Spodoptera cilium* Guenée, 1852 (H.P 4.4; G.P 5.1)

1852. *Spodoptera cilium* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **5** (Noct. 1): 156. (TL: Java)

1852. *Laphygma cycloides* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **5** (Noct. 1): 157.

1854. *Spodoptera capicola* Herrich-Schäffer, *Samml. aussereurop. Schmett.* (I) **1** (13-17): pl. 57, 1 (7): f. 131.

1855. *Caradrina latebrosa* Lederer, *Verh. zool.-bot. Ges. Wien* **5**: 205, pl. 2, f. 11.

1857. *Caradrina orbicularis* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **10**: 294.

1857. *Caradrina praeterita* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **10**: 294.

1857. *Caradrina insignata* Walker, *List Spec. Lepid. Insects Colln Br. Mus.*
10: 295.

1857. *Laphygma procedens* Walker, *List Spec. Lepid. Insects Colln Br. Mus.*
11: 721.

1862. *Laphygma obliterans* Walker, *Trans. ent. Soc. Lond.* (3) **1**: 87.

1865. *Laphygma imperviata* Walker, *List Spec. Lepid. Insects Colln Br. Mus.*
32: 651.

1870. *Laphygma retrahens* Walker, *Entomologist* **5** (80-81): 126.

1894. *Caradrina exigua*; Hampson, *Fauna Br. India (Moths)* **2**: 259.

1909. *Athetis capicola*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 303.

1994. *Spodoptera cilium*; Yoshimoto, *Tinea* **14** (Suppl. 1): 114, pl. 85, f. 32.

Material examined: AS2195A(1)

Diagnosis: Wing expanse: 28–30 mm. The species is rather uniform in males and females than compared to its congeners and can be easily identified by the filiform antennae in the males. Also, the species is much smaller compared to its congeners and have an entirely white hindwings except for a narrow bronze area in the margin. The male genitalia is characterized by the harpe with a lobed basal part and a hook at the apical end.

Distribution: India: Himachal Pradesh, Uttarakhand. **Elsewhere:** Nepal, China, Afghanistan, Israel, Iran, Iraq, Sri Lanka, Myanmar, Thailand,

Indonesia (Borneo, Java, Sumatra), Philippines, Singapore, Papua New Guinea, Australia, France, Greece.

50. *Spodoptera litura* (Fabricius, 1775) (H.P 4.5; G.P 5.2)

1775. *Noctua litura* Fabricius, *Syst. Ent.*: 601.

1775. *Noctua histrionica* Fabricius, *Syst. Ent.*: 612.

1781. *Noctua elata* Fabricius, *Spec. Ins.* **2**: 220.

1852. *Prodenia tasmanica* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **5** (Noct. 1): 163.

1852. *Prodenia ciligera* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **5** (Noct. 1): 164.

1856. *Prodenia subterminalis* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **9**: 196.

1856. *Prodenia glaucistriga* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **9**: 197.

1857. *Prodenia declinata* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **11**: 723.

1862. *Mamestra albisparsa* Walker, *J. Proc. Linn. Soc. (Zool.)* **6**: 186.

1884. *Prodenia evanescens* Butler, *Mem. Nat. Acad. Sci.* **2**: 94.

1909. *Prodenia litura*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 245.

1994. *Spodoptera litura*; Yoshimoto, *Tinea* **14** (Suppl. 1): 114, pl. 16, f. 9

2007. *Spodoptera litura*; Fibiger & Hacker, *Noct. Eur.* **9**: 56.

Material examined: AS632C(1)

Diagnosis: Wing expanse: 38–40 mm. This species can be identified by the more strikingly patterned forewing compared to its Himalayan congeners having diagnostic features like the orbicular produced into a streak towards the tornus and the reniform being marked with pale ochreous on a dark brown ground colour. The male genitalia is also uniquely characterized by the much broader valvae with a long harpe having an acute apical hook.

Distribution: India: Himachal Pradesh, Uttarakhand, West Bengal, Arunachal Pradesh, Assam, Nagaland, Tripura, Delhi, Punjab, Chhattisgarh, Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu, Kerala, Odisha, Goa.

Elsewhere: Pakistan, Nepal, Sri Lanka, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Indonesia (Borneo, Sarawak), Philippines, Timor, Australia, New Zealand, Papua New Guinea, Fiji, Melanesia, Tonga, Vanuatu, Japan, Korea, Russia, UAE.

51. *Spodoptera pecten* Guenée, 1853 (H.P 4.6; G.P 5.3)

1852. *Spodoptera pecten* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **5** (Noct. 1): 155. (TL: Java)

1862. *Agrotis infixa* Walker, *J. Proc. Linn. Soc. (Zool.)* **6**: 186.

1865. *Spodoptera insulsa* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **32**: 648.

1880. *Spodoptera erica* Butler, *Proc. zool. Soc. Lond.* **1880**: 675.
1890. *Spaelotis uniformis* Swinhoe, *Trans. ent. Soc. Lond.* **1890** (2): 226.
1894. *Caradrina pectinata* Hampson, *Fauna Br. India* (Moths) **2**: 264.
1909. *Spodoptera pecten*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 252, f. 63
1994. *Spodoptera pecten*; Yoshimoto, *Tinea* **14** (Suppl. 1): 114, pl. 16, f. 15.
2007. *Spodoptera pecten*; Fibiger & Hacker, *Noct. Eur.* **9**: 57.

Material examined: AS1714A(1)

Diagnosis: Wing expanse: 34–36 mm. The species resembles the brown morph of *S. mauritia* but can be readily differentiated by the bipectinated antennae of the males. Also, for both sexes, the veins lack the dark delineation like in *mauritia*. The male genitalia is similar to that of *S. pecten* but differs in the structure of the harpe. The harpe is longer and the apical hook is acuter in case of *pecten*.

Distribution: India: Uttarakhand, Sikkim, West Bengal, Assam, Nagaland.

Elsewhere: Nepal, Taiwan, Myanmar, Singapore, Borneo, Java, Korea.

Tribe **CARADRININI** Boisduval, 1840

Genus *Athetis* Hübner, [1821]

52. *Athetis bipuncta* (Snellen, 1886) (H.P 4.7)

1886. *Cosmia bipuncta* Snellen, *Midden-Sumatra* **4** (8): 43. (TL: Central Sumatra, Alahan Pandjang)

1895. *Caradrina lophophora* Hampson, *Trans. ent. Soc. Lond.* **1895** (2): 299.

1895. *Caradrina pratti* Bethune-Baker, *Novit. Zool.* **13** (2): 202.

1910. *Elydna bipuncta*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **9**: 528.

1994. *Athetis bipuncta*; Yoshimoto, *Tinea* **14** (Suppl. 1): 114, pl. 16, f. 18.

Material examined: AS632D(1), AS749A(1)

Diagnosis: Wing expanse: 24–28 mm. The species is similar in outer appearance with *A. lineosa* but can be differentiated by the darker brownish forewing with the antemedial, medial and postmedial lines more curved. Also, the reniform is marked with multiple white dots which is usually one in case of *lineosa*.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal, Borneo, Papua New Guinea.

53. *Athetis cognata* (Moore, 1882) (H.P 4.8; G.P 5.4)

1882. *Graphiphora cognata* Moore, *Descr. Indian lep. Atkinson* (2): 119. (TL: Darjiling)

1894. *Caradrina cognata* Hampson, Fauna Br. India (Moths) 2: 259.

1909. *Athetis cognata*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 347, pl. 130, f. 16.

1994. *Athetis cognata*; Yoshimoto, *Tinea* **14** (Suppl. 1): 115, pl. 85, f. 30.

Material examined: AS632C(1)

Diagnosis: Wing expanse: 20–22 mm. The species is smaller compared to its relatives and can be recognized by the ochreous-grey forewing with orbicular being represented by only a black dot and the reniform being a yellow spot with white dots above it. Hindwing white with the veins and terminal area tinged with dark brown. The male genitalia is characterized by the long, smoothly curved harpe and on a broad valvae and the saccular sclerotization having three spines. Aedeagus vesica with two small cornuti.

Distribution: India: Uttarakhand, West Bengal, Sikkim, Madhya Pradesh, Maharashtra, Tamil Nadu. **Elsewhere:** Nepal.

54. *Athetis lineosa* (Moore, [1881]) (H.P 4.9; G.P 5.5)

1881. *Dadica lineosa* Moore, *Proc. zool. Soc. Lond.* **1881**: 349. (TL: Punjab Hills)

1894. *Caradrina lineosa* Hampson, Fauna Br. India (Moths) 2: 265.

1910. *Elydna lineosa*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **9**: 167, f. 58.

1994. *Athetis lineosa*; Yoshimoto, *Tinea* **14** (Suppl. 1): 115, pl. 16, f. 16.

Material examined: AS632C(1), AS749A(1), AS1843B(1)

Diagnosis: Wing expanse: 28–30 mm. Discussed under *A. bipuncta*.

Distribution: India: Himachal Pradesh, Uttarakhand, Arunachal Pradesh.

Elsewhere: Nepal, Myanmar, China, Taiwan, Japan, Korea, Russia.

55. *Athetis sincera* (Swinhoe, 1889) (H.P 4.10; G.P 5.6)

1889. *Spaelotis sincera* Swinhoe, *Proc. zool. Soc. Lond.* **1889**: 411. (TL: India, Simla, Solun)

1894. *Caradrina sincera* Hampson, *Fauna Br. India (Moths)* 2: 265.

1909. *Athetis sincera*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **8**: 346, pl. 130, f. 15

2007. *Athetis sincera*; Fibiger & Hacker, *Noct. Eur.* **9**: 142.

Material examined: AS2195A(1), AS2442A(1)

Diagnosis: Wing expanse: 30–34 mm. The species can be identified by its ochreous forewing tinged with whitish. The orbicular is represented by a black point and the reniform is indistinct, fuscous and surrounded by few ochreous-white points. The hindwing is white except at the margins which is tinged with ochreous. The male genitalia is characterized by the bulbous cucullus and the valvae with the roundish harpe bearing multiple spines. The aedeagus vesica with two long, strong spines.

Distribution: India: Himachal Pradesh, Uttarakhand.

Tribe **DYPTERYGIINI** Forbes, 1954

Genus *Callyna* Guenée, 1852

56. *Callyna jugaria* Walker, 1858 (H.P 4.11; G.P 5.7)

1858. *Callyna jugaria* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **15**:

1809. (TL: North Hindostan)

1894. *Callyna jugaria*; Hampson, *Fauna Br. India (Moths)* **2**: 356.

1910. *Callyna jugaria*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **9**: 363.

2013. *Callyna jugaria*; Kononenko & Pinratana, *Moths of Thailand*, **3** (2):
287.

Material examined: AS632D(1)

Diagnosis: Wing expanse: 38–40 mm. this and the next species are very closely related in outer morphology but can be differentiated by the less ferruginous-black forewing and with a large cinereous subapical patch which is apical in case of *monoleuca*. In male genitalia, *jugaria* differs in the valvae being apically curved instead of overall spindle-shaped in *monoleuca*. Also, the uncus is spatulate in *jugaria* instead of hook-shaped in *monoleuca*.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Andamans. **Elsewhere:** Sri Lanka, Thailand.

57. *Callyna monoleuca* Walker, 1858 (H.P 4.12; G.P 5.8)

1858. *Callyna monoleuca* Walker, *List Spec. Lepid. Insects Colln Br. Mus.*

15: 1667. (TL: Canara)

1880. *Leocyma apicalis* Snellen, *Tijdschr. Ent.* **23** (2): 54, pl. 4, f. 9.

1894. *Callyna monoleuca*; Hampson, *Fauna Br. India* (Moths) **2**: 356.

1910. *Callyna monoleuca*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **9**: 366.

1994. *Callyna monoleuca*; Yoshimoto, *Tinea* **14** (Suppl. 1): 117, pl. 16, f. 23.

Material examined: AS632D(2)

Diagnosis: Wing expanse: 38–40 mm. Discussed under *C. jugaria*.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh, Assam, Jharkhand, Maharashtra, Karnataka, Tamil Nadu, Kerala, Andaman. **Elsewhere:** Nepal, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Indonesia (Java, Celebes), Philippines, Papua New Guinea, Australia, Japan.

Genus *Dipterygina* Sugi, 1954

58. *Dipterygina indica* (Moore, 1867) (H.P 4.13)

1867. *Dipterygina indica* Moore, *Proc. zool. Soc. Lond.* **1867**: 51. (TL: Darjeeling)

1891. *Dipterygina nocturna* Hampson, *Ill. typical Spec. Lep. Het. Colln Br. Mus.* **8**: 15, 78, pl. 145, f. 19.

1894. *Dipterygina indica* Hampson, *Fauna Br. India* (Moths) **2**: 236.

1908. *Dipterygina indica* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 69, pl. 109, f. 15.

1993. *Dipterygina indica*; Yoshimoto, *Tinea* **13** (Suppl. 3): 136, pl. 62, f. 35.

Material examined: AS1029A(1)

Diagnosis: Wing expanse: 38–44 mm. This species is recognized by the dark purplish-brown forewing with a whitish fascia on inner margin from base to the postmedial area. Claviform absent, orbicular and reniform very ill-defined, bordered with black. Hindwing fuscous brown, cilia with fine white line at base and with white tips.

Distribution: India: Uttarakhand, West Bengal, Tamil Nadu. **Elsewhere:** Nepal, Thailand.

Genus *Feliniopsis* Roepke, 1938

59. *Feliniopsis leucostigma* (Moore, 1867) (H.P 4.14; G.P 5.9)

1867. *Xylophasia leucostigma* Moore, *Proc. zool. Soc. Lond.* **1867**: 51. (TL: Bengal)

1894. *Ancara leucostigma* Hampson, *Fauna Br. India* (Moths) **2**: 224.

1902. *Euplexia oxydata* Hampson, *J. Bombay nat. Hist. Soc.* **14** (2): 199.

1908. *Parastichtis leucostigma* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 106, pl. 110, f. 16.

1994. *Feliniopsis leucostigma*; Yoshimoto, *Tinea* **14** (Suppl. 1): 113, pl. 85, f. 23.

Material examined: AS2248A(1)

Diagnosis: Wing expanse: 48–50 mm. The species can be identified by the bright ferruginous-red forewing mixed with some ochreous and an ill-defined reniform with pure white lunule on the outer side. Hindwing uniformly reddish brown with rufous cilia. The male genitalia is characterized by a bulbous cucullus with presence of strong spine-like corona and a strong, curved harpe. Aedeagus vesica with a sclerotized ridge with minute spines.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Nagaland. **Elsewhere:** Bangladesh, Nepal, China.

Note: The species is being reported for the first time from Uttarakhand.

Genus *Trachea* Ochsenheimer, 1816

60. *Trachea aurigera* (Walker, 1858) (H.P 4.15; G.P 5.10)

1858. *Berrhaea aurigera* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **15**:

1721. (TL: Hindostan)

1865. *Hadena megastigma* Walker, *List Spec. Lepid. Insects Colln Br. Mus.*

33: 738.

1894. *Euplexia aurigera* Hampson, *Fauna Br. India* (Moths) **2**: 215.

1908. *Trachea aurigera*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 148, pl. 111, f. 18.

1994. *Trachea aurigera*; Yoshimoto, *Tinea* **14** (Suppl. 1): 112, pl. 15, f. 37.

2007. *Trachea aurigera*; Fibiger & Hacker, *Noct. Eur.* **9**: 166.

Material examined: AS2655A(1), AS2655B(4), AS3225A(1), AS4216A(3)

Diagnosis: Wing expanse: 36–50 mm. This and the next species are very closely related in outer morphology but can be differentiated by the forewing being olive-brown (olive-green in fresh specimens) tinged with golden in case of *T. aurigera* which is typical dark olive-green in *T. guttata*. Also, the oblique semi-lunular patch below the median nervure and the fascia conjoining the orbicular and reniform, is almost pure white in case of *guttata* which is rather pale ochreous in *aurigera*. In male genitalia, both are very similar but the harpe of *guttata* is longer and more apically curved and the costal spine of valvae are longer in *aurigera*. Also, the vesical spines of *guttata* are more scattered and smaller compared to *aurigera*.

Distribution: India: Uttarakhand, Sikkim, West Bengal. **Elsewhere:** Nepal, China (Tibet).

61. *Trachea guttata* (Warren, 1913) (H.P 5.1; G.P 6.1)

1913. *Euplexia guttata* Warren, in Seitz *Gr.-Schm.indoaustri* **11**: 140, pl. 17, row g. (TL: Sikkim; Bhutan)

1994. *Trachea guttata*; Yoshimoto, *Tinea* **14** (Suppl. 1): 112, pl. 85, f. 13.

2007. *Trachea guttata*; Fibiger & Hacker, *Noct. Eur.* **9**: 166.

Material examined: AS2248A(1), AS2655B(4), AS3225B(2), AS3015A(2), AS3150A(7), AS3166A(3)

Diagnosis: Wing expanse: 40–45 mm. Discussed under *T. aurigera*.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim. **Elsewhere:** Nepal, Bhutan, China (Tibet), Thailand.

Note:

62. *Trachea microspila* Hampson, 1908 (H.P 5.2; G.P 6.2)

1908. *Trachea microspila* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 149, pl. 111, f. 19. (TL: Dharmsala)

1994. *Trachea microspila*; Yoshimoto, *Tinea* **14** (Suppl. 1): 112, pl. 15, f. 36.

2007. *Trachea microspila*; Fibiger & Hacker, *Noct. Eur.* **9**: 166.

Material examined: AS1843A(1), AS2061A(1), AS2248A(1)

Diagnosis: Wing expanse: 50–58 mm. The species can be identified by greyish-brown forewing having medial area suffused with olive-green. Orbicular and reniform defined by green with some white in the middle and a small pinkish-white patch below it. Hindwing with basal part yellowish white with a small obscure cell dot and the terminal area fuscous. In the male genitalia, the cucullus is bulbous and the harpe is long, apically excurved. Aedeagus vesica with patches of multiple minute spines.

Distribution: India: Himachal Pradesh, Uttarakhand. **Elsewhere:** Nepal, China.

63. *Trachea tibetensis* (Warren, 1912) (H.P 5.3; G.P 6.3)

1912. *Euplexia tibetensis* Warren, *Novit. zool.* **19**: 27. (TL: Tibet, Chumbi Valley)

1998. *Trachea tibetensis*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 266, pl. 156, f. 12.

2007. *Trachea tibetensis*; Fibiger & Hacker, *Noct. Eur.* **9**: 166.

Material examined: AS2932A(3)

Diagnosis: Wing expanse: 30–32 mm. A smaller species compared to its Himalayan congeners and can be identified by its very dark olive-green forewing colouration which is suffused with black in places. Orbicular and reniform stigma pale green with dark centres and the semi-lunular patch below it light olive-green. Hindwing white at base and outer area dark fuscous. The male genitalia is characterized by club-shaped cucullus with presence of short, strong, acute harpe in the valvae and a strong, blunt spine in aedeagus vesica with a very short carinal spinose ridge.

Distribution: India: Uttarakhand. **Elsewhere:** China (Tibet).

Tribe **PHLOGOPHORINI** Hampson, 1918

Genus *Auchmis* Hübner, [1821]

64. *Auchmis inextricata* (Moore, 1881) (H.P 5.4; G.P 6.4)

1881. *Rhizogramma inextricata* Moore, *Proc. zool. Soc. Lond.* **1881**: 342;
(TL: Dalhousie; Solun)

1894. *Euscotia inextricata* Hampson, *Fauna Br. India* (Moths) **2**: 237.

1994. *Auchmis inextricata*; Yoshimoto, *Tinea* **14** (Suppl. 1): 112, pl. 15, f. 34.

2007. *Auchmis inextricata*; Fibiger & Hacker, *Noct. Eur.* **9**: 194.

Material examined: AS632D(1), AS1843B(1)

Diagnosis: Wing expanse: 30–34 mm. Allied to *A. indica* but differs in the forewing being brownish grey and veins speckled with black and white. Orbicular defined by a long, double, brown streak which breaks to form the reniform; a marginal series of black dots. Hindwing white at base with a light brown, broad marginal line. The male genitalia can be readily identified by the medially broad valve with narrow cucullus and broad sclerotized ear-like harpe. The aedeagus vesica with a patch of small cornuti.

Distribution: India: Himachal Pradesh, Uttarakhand. **Elsewhere:** Nepal.

Genus *Euplexia* Stephens, 1829

65. *Euplexia annapurna* Hreblay & Ronkay, 1998 (H.P 5.5; G.P 6.5)

1998. *Euplexia annapurna* Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 262, pl. 155, f. 25. (TL: Annapurna)

2007. *Euplexia annapurna*; Fibiger & Hacker, *Noct. Eur.* **9**: 192.

Material examined: AS2248A(1)

Diagnosis: Wing expanse: 30–33 mm. *E. Annapurna* is a representative of the *E. lucipara* group and very similar to its relatives *E. lilacina* and *E. cuprea*. Although all these species are close looking, but they can be easily distinguished by outer morphological as well as male genitalia characters. The *annapurna* differs from its relatives in having a much shorter and broader forewing which is less vibrant and brownish-grey in colour and also have the

darkest hindwing among these three. The male genitalia of *E. annapurna* differs from that *E. cuprea* in the harpe being significantly longer and the cucullus is much shorter. The two cornuti of the aedeagus vesica are also much smaller in comparison.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Note: The species has been recorded for the first time from India.

Genus *Karana* Moore, 1882

66. *Karana similis* (Moore, 1888) (H.P 5.6; G.P 6.6)

1888. *Karana similis* Moore, *Proc. zool. Soc. Lond.* **1888**: 407. (TL: Kangra)

1894. *Euplexia gemmifera*; Hampson, *Fauna Br. India (Moths)* **2**: 217.

1998. *Karana similis*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 267, pl. 156, f. 16.

Material examined: AS1843B(2), AS2061A(1), AS2248A(14)

Diagnosis: Wing expanse: 38–40 mm. Very similar to *K. gemmifera* but can be differentiated by the narrower antemedial line and much stronger metallic greenish tinge throughout the forewing. In the male genitalia, the most important differential feature is the bifurcation of the harpe of the right valva, which is closer to the base in case of *similis* and the outer arm is longer, more S-shaped.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, Maharashtra, Tamil Nadu. **Elsewhere:** Nepal, Myanmar, China, Taiwan, Thailand.

Genus *Oroplexia* Hampson, 1908

67. *Oroplexia decorata* (Moore, 1882) (H.P 5.7; G.P 6.7)

1882. *Mamestra decorata* Moore, *Descr. Indian lep. Atkinson* (2): 111, pl. 4, f. 8. (TL: Darjiling)

1894. *Erastria decorata*; Hampson, *Fauna Br. India (Moths)* 2: 302.

1908. *Oroplexia decorata*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* 7: 511, f. 107.

Material examined: AS2248A(1), AS2061A(3), AS2655B(6), AS2547A(3), AS3225B(2), AS3015A(1), AS3166A(1)

Diagnosis: Wing expanse: 40–42 mm. *O. decorata*, *O. hampsoni* and *O. pectinosa* are similar in outer appearance and are very closely related. It is very difficult to distinguish these three species only from their outer morphology. However, the a few differences in the outer morphology being the less violaceous striation of the forewing in *decorata* compared to the two others and the light reddish-brown forewing ground colour, which is much darker in case of *hampsoni* and *pectinosa*. Also, in *pectinosa*, there is no prominent medial line in the hindwing, which is almost clear in case of the other two. The postmedial area of *hampsoni* is much more straited with purple compared to *decorata* and *pectinosa*. In male genitalia, all the three species shows very much resemblance with each other. The male genitalia of *O. decorata* can be readily separated from that of *O. hampsoni* and *O. pectinosa* by the comparatively long, curved and slender harpe. The major genitalia

structures of *hampsoni* and *pectinosa* are almost same but differs in the harpe of *pectinosa* being apically more acute and the ampulla being a bit longer. Also, the aedeagus vesica is much longer and the cornuti with less broad base.

Distribution: India: Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh.

Elsewhere: Nepal, China (Tibet).

68. *Oroplexia hampsoni* Leech, 1900 (H.P 5.8; G.P 6.8)

1900. *Eurois hampsoni* Leech, *Trans. Ent. Soc. Lond.* **1900** (1): 93. (TL: Putsu-fong)

1995. *Trichoridia hampsoni*; Yoshimoto, *Tinea* **14** (suppl. 2): 62, pl. 113, f. 10.

1998. *Oroplexia hampsoni*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 254, pl. 155, f. 8.

Material examined: AS3065A(3), AS3225B(1)

Diagnosis: Wing expanse: 40–44 mm. Discussed under *O. decorata*.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal, China.

69. *Oroplexia luteifrons* (Walker, 1857) (H.P 5.9; G.P 6.9)

1857. *Dianthaecia luteifrons* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* **11**: 751. (TL: Northern India)

1894. *Eurois luteifrons*; Hampson, *Fauna Br. India (Moths)* **2**: 227.

1908. *Oroplexia luteifrons*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 513, pl. 120, f. 13.

1993. *Oroplexia luteifrons*; Yoshimoto, *Tinea* **13** (Suppl. 3): 135, pl. 62, f. 21.

Material examined: AS2279A(5), AS2442A(3), AS2547(2), AS2723A(1), AS2932A(2), AS3150A(2), AS3225A(6), AS3390A(1)

Diagnosis: Wing expanse: 32–36 mm. The species can be separated from its Himalayan congeners by a much smaller size and the forewing being suffused with yellow. The most prominent character of the species is its double, black antemedial line which is filled in with pure white. Hindwing dark fuscous with no prominent lines. The male genitalia can be identified by the triangular cucullus and the extremely excurved dorsal valval margin. Harpe short, strong; aedeagus vesica with one long, strong, acute spine.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Meghalaya, Punjab. **Elsewhere:** Nepal.

70. *Oroplexia pectinosa* Hreblay & Plante, 1996 (H.P 5.10; G.P 6.10)

1996. *Oroplexia pectinosa* Hreblay & Plante, *Lambillionea* **96** (4): 669. TL: (Solu Khumbu Himal)

1998. *Oroplexia pectinosa*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 254, pl. 155, f. 8.

Material examined: AS2462C(1), AS3150A(1), AS4216A(1)

Diagnosis: Wing expanse: 40–42 mm. Discussed under *O. decorata*.

Distribution: **India:** Uttarakhand. **Elsewhere:** Nepal.

Note: The species has been recorded for the first time from India.

Genus *Phlogophora* Treitschke, 1825

71. *Phlogophora conservuloides* (Hampson, 1898) (H.P 5.11; G.P 7.1)

1898. *Euplexia conservuloides* Hampson, *J. Bombay nat. Hist. Soc.* **11** (3):

443. (TL: Sikkim)

1908. *Chutapha conservuloides*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.*

7: 493, pl. 120, f. 4.

1994. *Phlogophora conservuloides*; Yoshimoto, *Tinea* **14** (Suppl. 1): 111,

pl. 15, f. 23.

Material examined: AS2248A(1), AS2061A(3), AS2655B(2)

Diagnosis: Wing expanse: 30–34 mm. In forewing, a prominent black speck between subbasal and antemedial line; submarginal line dark brown in colour between vein 7 and vein 3 particularly, otherwise indistinct and pale; prominent black postmedial line which is double above vein 4; medial area with a chocolate brown triangular patch conjoining the lower part of orbicular and reniform, continuing up to middle of inner margin; area between orbicular and reniform dark chocolate brown. Hindwing pale; cilia brown preceded by a fine ochreous line; underside of both wings paler with pinkish tinge; visible postmedial lines. The main characteristic feature of the male

genitalia is that the valva is narrow compared to its congeners and is long, pointed, sickle-shaped; harpe short, curved, horn-like, and the digitus small, blunt; aedeagus with two ridges of minute spines in carinal region.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh. **Elsewhere:** Nepal, China, Taiwan.

72. *Phlogophora costalis* (Moore, 1882) (H.P 5.12; G.P 7.2)

1882. *Chutapha costalis* Moore, *Descr. Indian lep. Atkinson* (2): 131. (TL: Darjiling)

1894. *Euplexia costalis*; Hampson, *Fauna Br. India (Moths)* **2**: 221.

1900. *Euplexia olivacea* Leech, *Trans. Ent. Soc. Lond.* **1900** (1): 84.

1908. *Chutapha olivacea*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 496, pl. 120, f. 6.

1908. *Chutapha costalis*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 495, pl. 120, f. 5.

1994. *Phlogophora costalis*; Yoshimoto, *Tinea* **14** (Suppl. 1): 110, pl. 15, f. 22.

1998. *Phlogophora costalis*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 258, pl. 155, f. 17.

Material examined: AS2655B(1)

Diagnosis: Wing expanse: 38–40 mm. This species closely resembles *P. humilis* but can be distinguished by relatively less elongated forewing and the

pale olive-green forewing ground colour with paler costal border. Fresh specimens with more prominent olive-green suffusion. However, *P. costalis* can be distinctly told apart from *humilis* by having an indistinct post medial line just before the marginal dark suffusion of hind wing. In the male genitalia, uncus narrow, hook shaped; valva spindle shaped with typical harpe-digitus complex which is characterized by a slender distally bent harpe and a triangular shaped digitus from the middle of valva extended beyond the saccular margin; aedeagus vesica moderately scobinate with a patch of minute cornuti.

Distribution: India: Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh.

Elsewhere: Nepal, China.

Note: The species is being reported for the first time from Uttarakhand.

73. *Phlogophora discisignata* (Moore, 1867) (H.P 5.13)

1867. *Euplexia discisignata* Moore, *Proc. zool. Soc. Lond.* **1867**: 57, pl. 6, f.

9. (TL: Darjeeling)

1894. *Euplexia discisignata*; Hampson, *Fauna Br. India (Moths)* **2**: 213.

1908. *Euplexia discisignata*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 232.

1993. *Phlogophora discisignata*; Yoshimoto, *Tinea* **13** (Suppl. 3): 135, pl. 62, f. 29.

2013. *Phlogophora discisignata*; Kononenko & Pinratana, *Moths of Thailand*, **3** (2): 328.

2015. *Phlogophora discisignata*; Gyulai, Ronkay, Ronkay & Saldaitis, *Zootaxa* **3949** (4): 589, f. 7-8.

Material examined: AS1356A(1)

Diagnosis: Wing expanse: 28–32 mm. Forewing ground colour of male is whitish pale yellow which is often greenish in fresh specimens; for females the ground colour of forewing more suffused with darker brown. The basal and postmedial area of forewing paler with few blackish streaks; medial area having ashy-brown patch from costa to submedian fold the lower part of which is sap green; reniform white with few brown specks; inner side of orbicular and reniform black; the marginal area suffused with purplish-grey with a black submarginal line. In male genitalia, uncus narrow, hook-shaped, valva spindle shaped with presence of a slender less-sclerotised harpe; aedeagus vesica broad, spherical.

Distribution: India: Uttarakhand, Sikkim, West Bengal, Nagaland.

Elsewhere: Nepal, Bhutan, Thailand, Vietnam.

Note: The species is being reported for the first time from Uttarakhand.

74. *Phlogophora distorta* (Moore, 1881) (H.P 5.14; G.P 7.3)

1881. *Euplexia distorta* Moore, *Proc. zool. Soc. Lond.* **1881**: 354, pl. 38, f. 18. (TL: Darjeeling)

1894. *Euplexia distorta*; Hampson, Fauna Br. India (Moths) **2**: 218.

1908. *Trachea distorta*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 121, pl. 110, f. 28.

1994. *Phlogophora distorta*; Yoshimoto, *Tinea* **14** (Suppl. 1): 110, pl. 15, f. 21.

2013. *Phlogophora distorta*; Kononenko & Pinratana, *Moths of Thailand*, **3** (2): 328.

Material examined: AS2248A(1)

Diagnosis: Wing expanse: 28–34 mm. The species has distinct white tipped palpi, ciliated antenna with white basal tufts and black collar with continuous outlying patches of broad golden-white hairs. It is distinctly recognizable by its zigzag black patterns on white forewing. A trapezoid black patch on middle of costa minutely conjoined with an irregular black patch starting from lower angle of cell to inner margin; a big black triangular patch on costa just before apex; a submarginal elongated black patch with crenulate outer margin not touching apex. The male genitalia is characterized by moderately long uncus, hook-shaped; juxta broad, apically narrow, moderately sclerotised with a small triangular sclerotised projection at the middle; valva long, spindle-shaped with one distally curved harpe, cucullus with prominent corona; aedeagus vesica with scattered patches of small cornuti.

Distribution: India: Uttarakhand, Sikkim, West Bengal. **Elsewhere:**

Nepal, Thailand.

75. *Phlogophora plumbeola* (Hampson, 1894) (H.P 5.15; G.P 7.4)

1894. *Euplexia plumbeola* Hampson, *Fauna Br. India* (Moths) **2**: 217. (TL: Sikkim)

1908. *Euplexia plumbeola*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 235, pl. 114, f. 4.

1994. *Phlogophora plumbeola*; Yoshimoto, *Tinea* **14** (Suppl. 1): 111, pl. 85, f. 4.

Material examined: AS2248A(2), AS2061A(5), AS2655B(1), AS2547A(4)

Diagnosis: Wing expanse: 36–38 mm. The plumbeous/slaty blue-grey colour of the head, thorax and forewing is typical to *P. plumbeola* which also justifies the species name. Bunch of golden hairs present at the end of thorax. The golden pattern on the forewing is distinct on plumbeous background; reniform spot distinctly golden; a submarginal golden band with three prominent outward dentations between veins 2 and 4. Hindwing fuscous with a distinct whitish marginal line not reaching the costa and an indistinct medial line. Underside of forewing pale slaty-grey; hindwing white and grey suffused, with black cell spot and prominent waved postmedial line. Male genitalia is characterized by moderately broad uncus with lanceolate apex; broad valva with acute cucullus and a long medially bent harpe; the basal plate of harpe with apical sclerotization and presence of short digitus; sacculus with presence of multiple irregular spines in the dorsal margin.

Distribution: India: Uttarakhand, Sikkim. **Elsewhere:** Nepal.

76. *Phlogophora subpurpurea* Leech, 1900 (H.P 6.1; G.P 7.5)

1900. *Phlogophora subpurpurea* Leech, *Trans. Ent. Soc. Lond.* **1900** (1):

71. (TL: Ta-chien-lu)

1908. *Trigonophora subpurpurea*; Hampson, *Cat. Lepid. Phalaenae Br.*

Mus. **7**: 490, f. 97.

1994. *Phlogophora subpurpurea*; Yoshimoto, *Tinea* **14** (Suppl. 1): 110, pl.

85, f. 10.

Material examined: AS2547A(3)

Diagnosis: Wing expanse: 58–60 mm. Similar to *P. meticulodina* but easily distinguishable by the scarlet red coloration of underside of palpi, thorax and abdomen; forewing much darker, rufous brown with purplish suffusion, markings dark chocolate brown; orbicular, reniform and lower half of post medial line marked with purplish white; a narrow silvery-grey line originating from a same-coloured apical patch along outer margin which becomes obsolete in the middle. Hindwing pale brown with flesh coloured tinge; outer margin greyish; underside of both wing crimson red with prominent post medial lines. In male genitalia, uncus hook shaped; valva apically narrow, medio ventrally broadened; basal plate of harpe moderately sclerotised; clasper long, blunt, round-tipped; ampulla very small, less sclerotised; in aedeagus, carina region with a thumb like sclerotised plate; vesica without any scobinations.

Distribution: India: Himachal Pradesh, Uttarakhand. **Elsewhere:** Pakistan, Nepal, China (Tibet).

Genus *Valeriodes* Warren, 1913

77. *Valeriodes aurantiaca* Hreblay & Plante, 1995 (H.P 6.2; G.P 7.6)

1995. *Valeriodes aurantiaca* Hreblay & Plante, *Lambillionea* **95** (1, 2): 138.

1995. *Valeriodes aurantiaca*; Yoshimoto, *Tinea* **14** (suppl. 2): 64, pl. 113, f. 4.

Material examined: AS3225A(1), AS3700A(1), AS4216A(1)

Diagnosis: Wing expanse: 34–38 mm. The species is externally similar to *V. heterocampa* but differs in the forewing being much more variegated with dark purplish-brown. The male genitalia differ in the apical part of the valvae being less broad and much more roundish rather than triangular in case of *heterocampa*. Also, the harpe is smaller and less curved and the uncus is less spatulate.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

78. *Valeriodes cyanelinea* (Hampson, 1894) (H.P 6.3; G.P 7.7)

1894. *Euplexia cyanelinea* Hampson, *Fauna Br. India* (Moths) **2**: 222. (TL: Sikkim)

1908. *Trachea cyanelinea*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 115, pl. 110, f. 23.

1995. *Valeriodes cyanelinea*; Yoshimoto, *Tinea* **14** (suppl. 2): 64, pl. 113, f. 3.

Material examined: AS3065A(1)

Diagnosis: Wing expanse: 44–45 mm. Closely related to *V. icamba* in outer morphology but differs in the head, thorax and abdomen being pale red-brown. The forewing with the green area less suffused most distinctly the antemedial and postmedial lines are tinted with metallic blue-grey. Cilia of both forewing and hindwing with white tips. The male genitalia is also similar in characteristics but differs in the valvae being much narrower than *icamba* and also the harpe is much shorter and the caudal sclerotized plate of juxta is smaller.

Distribution: India: Uttarakhand, Sikkim. **Elsewhere:** Nepal.

79. *Valeriodes heterocampa* (Moore, 1882) (H.P 6.4; G.P 7.8)

1882. *Pachaetra heterocampa* Moore, *Descr. Indian lep. Atkinson* (2): 115, pl. 4, f. 15. (TL: Darjiling)

1894. *Euplexia heterocampa* Hampson, *Fauna Br. India* (Moths) **2**: 223.

1995. *Valeriodes heterocampa*; Yoshimoto, *Tinea* **14** (suppl. 2): 63, pl. 113, f. 1.

Material examined: AS3150A(1)

Diagnosis: Wing expanse: 42–45 mm. The species can be readily identified by its much more contrasting pattern than its congeners. The forewing is

largely black, irrorated and variegated with ochreous and purplish-grey with a bilobed spot obliquely below the cell; a reddish-brown postmedial band. Hindwing pale fuscous-brown with indistinct marginal white band. The male genitalia is characterized by apically broad valve with long, narrow, curved harpe and ampulla.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh, Nagaland. **Elsewhere:** Nepal, China (Tibet).

80. *Valeriodes icamba* (Swinhoe, 1893) (H.P 6.5; G.P 7.9)

1893. *Euplexia icamba* Swinhoe, *Ann. Mag. nat. Hist.* (6) **12** (70): 260. (TL: Sikkim)

1894. *Euplexia heterocampoides* Hampson, *Fauna Br. India* (Moths) **2**: 221.

1995. *Valeriodes icamba*; Yoshimoto, *Tinea* **14** (suppl. 2): 64, pl. 113, f. 2.

Material examined: AS3065A(5), AS3700A(1)

Diagnosis: Wing expanse: 40–42 mm. Discussed under *V. cyanelinea*.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim. **Elsewhere:** Nepal.

Genus *Xenotrachea* Sugi, 1958

81. *Xenotrachea albidisca* (Moore, 1867) (H.P 6.6)

1867. *Hadena albidisca* Moore, *Proc. zool. Soc. Lond.* **1867**: 59, pl. 6, f. 17. (TL: Bengal)

1889. *Dianthaecia nivescens* Butler, *Ill. typical Spec. Lep. Het. Colln Br. Mus.* **7**: 58, pl. 128, f. 2.

1894. *Euplexia auroviridis* Hampson, *Fauna Br. India* (Moths) **2**: 215.

1908. *Trachea albidisca*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 141.

1979. *Xenotrachea albidisca*; Kishida & Yoshimoto, *Tinea* **10** (26): 275.

1989. *Xenotrachea albidisca*; Holloway, *Malayan Nature J.* **42** (2-3): 124, pl. 3, f. 176.

Material examined: AS1692A(1)

Diagnosis: Wing expanse: 30–32 mm. The species can be easily identified by its pale yellowish-green forewing with a broad white discal patch just beyond the black-bordered white reniform. The hindwing is dark fuscous with yellow cilia.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Assam, Meghalaya, Nagaland, Tamil Nadu, Kerala. **Elsewhere:** Nepal, Bangladesh, Myanmar, China, Taiwan, Vietnam, Thailand, Malaysia, Indonesia (Borneo, Sumatra, Flores), Timor.

82. *Xenotrachea aurantiaca* (Hampson, 1894) (H.P 6.7; G.P 7.10)

1894. *Euplexia aurantiaca* Hampson, *Fauna Br. India* (Moths) **2**: 216. (TL: Sikkim)

1908. *Trachea aurantiaca*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 142, pl. 111, f. 8.

1979. *Xenotrachea aurantiaca*; Kishida & Yoshimoto, *Tinea* **10** (26): 275.

1994. *Xenotrachea aurantiaca*; Yoshimoto, *Tinea* **14** (Suppl. 1): 111, pl. 15, f. 27.

Material examined: AS2462C(1)

Diagnosis: Wing expanse: 30–32 mm. Differs from closely related *X. auroviridis* in the head, thorax and forewing being golden-brown instead of green with more prominent silvery-white lines. The forewing suffusions are deep golden-brown instead of black. The male genitalia is characterized by the slender valvae with long, curved harpe and aedeagus vesica with four prominent, closely situated, long, acute spines.

Distribution: India: Uttarakhand, Sikkim. **Elsewhere:** Nepal.

Tribe **APAMEINI** Guenée, 1841

Genus *Apamea* Ochsenheimer, 1816

83. *Apamea chalybaeata* (Walker, 1855) (H.P 6.8; G.P 8.1)

1865. *Mamestra chalybaeata* Walker, *List Spec. Lepid. Insects Colln Br. Mus.* 32: 665. (TL: Darjeeling)

1867. *Mamestra suffusa* Moore, *Proc. zool. Soc. Lond.* **1867**: 52.

1908. *Lasiplexia chalybeata*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 485, f. 95.

1994. *Lasiplexia chalybaeata*; Yoshimoto, *Tinea* **14** (Suppl. 1): 111, pl. 84, f. 14.

2005. *Apamea chalybaeata*; Zilli, Ronkay & Fibiger, *Noct. Eur.* **8**: 114.

Material examined: AS4216A(2)

Diagnosis: Wing expanse: 50–60 mm. The species can be differentiated from its congeners by the ciliated antenna of males and the anal tuft being rufous. Forewing greyish brown to black-brown having black orbicular and reniform. The reniform having pale white dots on the outer side. Hindwing yellowish suffused with brown having darker terminal area. In male genitalia, the uncus is very narrow, cucullus triangular with strong corona, harpe long, narrow; aedeagus vesica with one small acute spine with broad base and one small carinal spine.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim. **Elsewhere:** Nepal, China (Tibet).

84. *Apamea chhiringi* Hreblay, 1998 (H.P 6.9; G.P 8.2)

1998. *Apamea chhiringi* Hreblay in Hreblay & Ronkay, *Tinea* 15 (suppl. 1): 249; TL: (Ganesh Himal, 3km NE of Sunpati)

2005. *Apamea chhiringi*; Zilli, Ronkay & Fibiger, *Noct. Eur.* **8**: 114.

Material examined: AS3166A(1)

Diagnosis: Wing expanse: 33–34 mm. The species is externally similar to *A. reseri* but differs in the forewing medial and marginal area being much dark brown mixed with ochreous. Reniform dark brown, filled in pale brown and marked with white. In male genitalia, *A. chhiringi* differs from *A. reseri*

having stronger uncus, bifurcated clavus, shorter ampulla and the aedeagus vesica having four cornuti.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Note: The species has been recorded for the first time from India.

85. *Apamea fasciata* (Leech, 1900) (H.P 6.10)

1900. *Xylophasia fasciata* Leech, *Trans. Ent. Soc. Lond.* **1900** (1): 68; TL: (Chia-kou-ho; Pu-tsu-fong)

1908. *Trachea fasciata*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 204, pl. 113, f. 17.

1995. *Apamea fasciata*; Yoshimoto, *Tinea* **14** (suppl. 2): 65, pl. 113, f. 22.

2005. *Apamea fasciata*; Zilli, Ronkay & Fibiger, *Noct. Eur.* **8**: 114.

Material examined: AS4216A(2)

Diagnosis: Wing expanse: 38–44 mm. The species identified by its bright red-brown forewing colouration with grey-white basal and postmedial area. Claviform moderate and defined by black, orbicular and reniform defined by black with the reniform having white spots in its outer edge. Hindwing dark ochreous, uniformly suffused with reddish brown.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim. **Elsewhere:** Nepal, China (Tibet).

86. *Apamea gratissima* Hreblay & Ronkay, 1999 (H.P 6.11; G.P 8.3)

1999. *Apamea gratissima* Hreblay & Ronkay, *Esperiana* **7**: 552. TL:

(Gahesh Himal, 3km SE of Somdang)

2005. *Apamea gratissima*; Zilli, Ronkay & Fibiger, *Noct. Eur.* **8**: 114.

Material examined: AS3166A(1)

Diagnosis: Wing expanse: 38–42 mm. *A. gratissima* is characterized by the dark red-brown forewing with crenulate outer margin. The orbicular is very oblique and elongated, outlined by black; reniform dark brown filled, black outlined with some white spots on the external edges. A prominent black tornal streak. Hindwing light fuscous with obscure cell dot. The male genitalia is identifiable by broad, triangular cucullus, long, apically curved, blunt-tipped harpe and aedeagus vesica with strong cornuti.

Distribution: **India:** Uttarakhand. **Elsewhere:** Nepal.

Note: The species has been recorded for the first time from India.

87. *Apamea purpurina* (Hampson, 1902) (H.P 6.12; G.P 8.4)

1902. *Euplexia purpurina* Hampson, *J. Bombay nat. Hist. Soc.* **14** (2): 199.

(TL: Tibet, Yatung)

1908. *Parastichtis purpurina*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 106, pl. 110, f. 17.

1998. *Apamea purpurina*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 250, pl. 154, f. 23.

2005. *Apamea purpurina*; Zilli, Ronkay & Fibiger, *Noct. Eur.* **8**: 115.

Material examined: AS3166A(2)

Diagnosis: Wing expanse: 38–42 mm. The species is characterized by the purplish-red forewing ground colour with only distinct reniform stigma defined by white. Veins greyish-black, marked with black dots on postmedial area. hindwing fuscous-brown with dark cell dots. The male genitalia is identified by curved costal margin of valvae with broad, triangular cucullus having strong corona and the harpe is long, straight and acute.

Distribution: **India:** Uttarakhand, Sikkim. **Elsewhere:** Nepal, China (Tibet).

Genus *Bryoxena* Varga, Ronkay & Hacker, 1990

88. *Bryoxena centralasiae* (Staudinger, 1882) (H.P 6.13; G.P 8.5)

1882. *Polia centralasiae* Staudinger, *Stettin ent. Ztg* **43**: 37; TL: (Saisan)

1882. *Hecatera modesta* Moore, *Descr. Indian lep. Atkinson* (2): 125.

1882. *Hecatera transversa* Moore, *Descr. Indian lep. Atkinson* (2): 125.

1995. *Bryoxena centralasiae transversa*; Yoshimoto, *Tinea* **14** (suppl. 2): 63, pl. 113, f. 16, 19-20.

Material examined: AS3150A(6), AS3427A(2)

Diagnosis: Wing expanse: 32–35 mm. The species is characterized by the light grey-brown forewing with typical black bordered, white filled orbicular and reniform stigmata and dark fuscous hindwing. The male genitalia is characterized by narrow uncus and broad valvae with small, blunt costal

projection and a short ampulla; aedeagus vesica with six strong spines variable in shape and size.

Distribution: India: Jammu & Kashmir, Uttarakhand. **Elsewhere:** Afghanistan, Pakistan, Nepal, Kazakhstan, Turkmenistan, Tajikistan, Uzbekistan, Kyrgyzstan, Mongolia.

Genus *Chandata* Moore, 1882

89. *Chandata tridentata* Yoshimoto, 1982 (H.P 6.14)

1982. *Chandata tridentata* Yoshimoto, *Tyô to Ga* **32** (3,4): 144, f. 4. TL: (Kambachen)

1995. *Chandata tridentata*; Yoshimoto, *Tinea* **14** (suppl. 2): 65, pl. 113, f. 23.

2019. *Chandata tridentata*; Gyulai, Saldaitis & Wu, *Entomofauna* **40**: 193.

Material examined: AS4216A(1)

Diagnosis: Wing expanse: 14–16 mm. Similar in outer morphology with *C. bella* but larger with narrower forewing. Forewing black and white with a typical median white arched band with tridentate outer edge. In the male genitalia, harpe is much longer than *bella*, aedeagus vesica much broader and with a spine like cornutus.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Genus *Hygrostola* Warren, 1913

90. *Hygrostola robusta* (Hampson, 1894) (H.P 6.15; G.P 8.6)

1894. *Nonagria robusta* Hampson, *Fauna Br. India* (Moths) **2**: 285. (TL: Sikkim)

1910. *Xylostola robusta*; Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **9**: 336, pl. 144, f. 28.

1989. *Hygrostola robusta*; Poole, *Noctuidae Lepid. cat.* (n.s.) **118**: 1270.

Material examined: AS1692A(1), AS2061A(1), AS2462C(1), AS2655B(1)

Diagnosis: Wing expanse: 42–52 mm. The species is characterized by the red-brown forewing with black outlined orbicular and reniform; hindwing dark fuscous; anal tuft ochreous. Male genitalia is characterized by extremely curved costal margin of valve and narrow cucullus; aedeagus vesica with small spines.

Distribution: India: Uttarakhand, Sikkim, Assam. **Elsewhere:** Nepal.

Genus *Trichoridia* Hampson, 1906

91. *Trichoridia canosparsa* (Hampson, 1894) (H.P 7.1; G.P 8.7)

1894. *Polia canosparsa* Hampson, *Fauna Br. India* (Moths) **2**: 232. (TL: Sikkim)

1995. *Trichoridia canosparsa*; Yoshimoto, *Tinea* **14** (suppl. 2): 62, pl. 113, f. 6.

Material examined: AS3700A(5), AS4216A(52)

Diagnosis: Wing expanse: 38–40 mm. Closely related to *T. herchatra* but can be separated by much darker colouration with the head tinged with yellow. Forewing irrorated with grey and yellow speckled; hindwing fuscous, darker towards extremity. The male genitalia is characterized with triangular cucullus, spatulate uncus and aedeagus with one carinal sclerotized plate and a vesical patch and one small vesical spine.

Distribution: India: Uttarakhand, Sikkim. **Elsewhere:** Nepal.

92. *Trichoridia dentata* (Hampson, 1894) (H.P 7.2; G.P 8.8)

1894. *Polia dentata* Hampson, *Fauna Br. India* (Moths) **2**: 233. (TL: Sikkim)

1995. *Trichoridia dentata*; Yoshimoto, *Tinea* **14** (suppl. 2): 62, pl. 113, f. 7.

Material examined: AS2723A(1)

Diagnosis: Wing expanse: 38–40 mm. Similar to *T. endroma* but differs in the basal and outer areas of the forewing being suffused with grey instead of blue. The reniform stigmata is also smaller and lunulate. The male genitalia is characterized by spatulate uncus, acute triangular harpe, tongue like juxta and aedeagus vesica with two acute small spines.

Distribution: India: Uttarakhand, Sikkim. **Elsewhere:** Nepal.

93. *Trichoridia endroma* (Swinhoe, 1893) (H.P 7.3)

1893. *Crymodes endroma* Swinhoe, *Ann. Mag. nat. Hist.* (6) **12** (70): 259.

(TL: Sikkim)

1894. *Polia endroma*; Hampson, *Fauna Br. India* (Moths) **2**: 232.

1995. *Trichoridia endroma*; Yoshimoto, *Tinea* **14** (suppl. 2): 62, pl. 113, f. 9.

Material examined: AS3150A(1)

Diagnosis: Wing expanse: 38–40 mm. Discussed under *T. dentata*.

Distribution: **India:** Uttarakhand, Sikkim. **Elsewhere:** Nepal, Bhutan, China (Tibet).

Note: The species is being reported for the first time from Uttarakhand.

94. *Trichoridia fuscicuprea* Hreblay & Ronkay, 1998 (H.P 7.4)

1998. *Trichoridia fuscicuprea* Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 178, pl. 149, f. 21. TL: (Annapurna Himal, between Ghorepani and Deorali)

Material examined: AS2462A(1), AS2932A(2), AS3150A(3), AS3225A(13), AS3343A(1), AS3390A(4)

Diagnosis: Wing expanse: 38–40 mm. This species is very closely related to its allopatric sibling *T. cuprescens* and there is almost no significant difference between them in outer morphology. But in male genitalia, *T. fuscicuprea* differs from *T. cuprescens* in the longer and more tapering valvae, more rounded cucullus and the different shape and size of vesical cornuti.

Distribution: **India:** Uttarakhand. **Elsewhere:** Nepal.

Tribe **XYLENINI** Guenée, 1837

Genus ***Dasypolia*** Guenée, 1852

95. *Dasypolia templi* (Thunberg, 1792) (H.P 7.5; G.P 8.9)

1792. *Noctua templi* Thunberg, *Diss. Ent.* **4**: 56, f. 3. (TL: Hallandia)

1989. *Dasypolia templi*; Poole, *Noctuidae Lepid. cat.* (n.s.) **118**: 309.

Material examined: AS3150A(3), AS3427A(2)

Diagnosis: Wing expanse: 41–47 mm. A very large species and can be easily characterized by grey-brown, apically rounded forewings with obscure transverse lines and small dot-like white orbicular and white bordered, brown filled reinfos. The male genitalia is characterized by short, spatulate uncus and valvae with small apical projection. Harpe long, finger-like, outwardly curved; aedeagus with dentate carinal plate.

Distribution: **India:** Uttarakhand. **Elsewhere:** Austria, Italy, Sicily, Bulgaria, Romania, Switzerland, Morocco.

Note: The species is being reported for the first time from India.

Genus ***Hyalobole*** Warren, 1911

96. *Hyalobole nigripalpis* (Warren, 1911) (H.P 7.6; G.P 8.10)

1911. *Elwesia nigripalpis* Warren, *Novit. zool.* **18**: 141. (TL: Darjiling)

1913. *Elwesia nigripalpis*; Warren, *Gross-Schmett. Erde* **11**: 114, pl. 14 h.

1998. *Hyalobole nigripalpis*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 241.

2003. *Hyalobole nigripalpis*; Kobayashi, *Tinea* **17** (5): 274.

Material examined: AS3226A(1)

Diagnosis: Wing expanse: 31–32 mm. Very close to *H. taiwanensis* in outer morphology and can only be recognized by male genitalia characters such as shorter, apically bifurcated costal valval extension and significantly larger carinal dentate plate.

Distribution: India: Uttarakhand, West Bengal. **Elsewhere:** Nepal.

Note: The species is being reported for the first time from Uttarakhand.

97. *Hyalobole subapicalis* (Hreblay & Ronkay, 1998) (H.P 7.7; G.P 9.1)

1998. *Hyalobolea subapicalis* Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 238, pl. 153, f. 26–27. (TL: Nepal, Arun valley, 12km N of Chitre)

2003. *Hyalobolea subapicalis*; Kobayashi, *Tinea* **17** (5): 273.

Material examined: AS2279A(2), AS2442B(1)

Diagnosis: Wing expanse: 31–35 mm. *H. subapicalis* is close to *H. apicalis* but differs in being much darker red-brown in forewing and the hindwing is also darker grey-brown. In male genitalia, *H. subapicalis* differs in the valvae being shorter, more apically curved and with smaller cornuti of aedeagus vesica.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Note: The species is being reported for the first time from India.

Genus *Mniotype* Franclemont, 1941

98. *Mniotype olivascens* (Draudt, 1950) (H.P 7.8; G.P 9.2)

1950. *Blepharidia olivascens* Draudt, *Mitt. Münch. Ent. Ges.* **40** (1): 76, pl. 5, f. 14. (TL: Li-kiang)

1998. *Mniotype olivascens*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 191, pl. 150, f. 22.

Material examined: AS4216A(1)

Diagnosis: Wing expanse: 34–36 mm. The species can be identified by its typical olivaceous forewing ground colour dark olive-brown markings. Reniform and orbicular stigmata olive-brown with upper part open, and some white speckled; hindwing whitish-fuscous with obscure medial line. The male genitalia is characterized by roundish cucullus and very long, acute harpe. Aedeagus vesica with a short spine and a small sclerotized patch.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal, China.

Genus *Parabole* Hreblay & Ronkay, 1998

99. *Parabole rectilinea* Hreblay & Ronkay, 1998 (H.P 7.9; G.P 9.3)

1998. *Parabole rectilinea* Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 216, pl. 152, f. 6. (TL: Ganesh Himal, near Godlang)

Material examined: AS2442B(1)

Diagnosis: Wing expanse: 24–26 mm. The species is characterized by the elongated, deep red-brown forewing with pointed apex. The orbicular and

reniform stigmata pale, outlined with white; claviform often absent or a small, dark patch. Hindwing dark brown with small discal spot. In the male genitalia uncus very broad, harpe short, vesica with wide-based strong cornutus.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Note: The species is being reported for the first time from India.

Genus *Sydiva* Moore, 1882

100. *Sydiva stoliczkae* (Felder & Rogenhofer, 1874) (H.P 7.10)

1874. *Mamestra stoliczkae* Felder & Rogenhofer, *Reise Fregatte Novara, Bd 2* (Abth. 2) (4): pl. 109, f. 32. TL: (Himalaya)

1882. *Sydiva nigrogrisea* Moore, *Descr. Indian lep. Atkinson* (2): 96.

1894. *Euplexia stoliczcae* Hampson, *Fauna Br. India (Moths)* **2**: 214.

1908. *Trachea stoliczcae* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **7**: 120, f. 22.

1995. *Sydiva nigrogrisea*; Yoshimoto, *Tinea* **14** (suppl. 2): 61, pl. 112, f. 11.

1998. *Sydiva stoliczkae*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 179.

Material examined: AS4216A(1)

Diagnosis: Wing expanse: 50–54 mm. A large species with fuscous-grey forewing with a tinge of olive-green in the medial area except towards costa. Claviform small and defined by black; reniform and orbicular whitish,

defined by black; postmedial line dentate, defined by grey in outer side; hindwing fuscous with basal half paler.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand.

Elsewhere: Pakistan, Nepal.

101. *Sydiva meissneri warreni* (Plante, 1990) (H.P 7.11; G.P 9.4)

1990. *Trichoridia warreni* Plante, *Nota lepid.* **13** (4): 219. (TL: West Bengal, Tiger Hill)

1998. *Sydiva meissneri warreni*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 179.

Material examined: AS4216A(1)

Diagnosis: Wing expanse: 50–52 mm. This species characterized by overall greyish forewing with lighter reniform and orbicular, marked with small white dots in the outer area; claviform absent. Obscure antemedial and postmedial line and a medial zigzag line and three distinct tornal white dots. Hindwing with postmedial line and discal dot is absent. Male genitalia is characterized by a triangular cucullus, clasper thumb-shaped; aedeagus vesica long with a sclerotized patch bearing minute spines.

Distribution: India: Uttarakhand, West Bengal. **Elsewhere:** Nepal.

Genus *Xanthia* Ochsenheimer, 1816

102. *Xanthia approximata* (Hampson, 1906) (H.P 7.12; G.P 9.5)

1906. *Cosmia approximata* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **6**: 511, pl. 106, f. 22. (TL: Kashmir, Dugi Pass)

1989. *Xanthia approximata*; Poole, *Noctuidae Lepid. cat.* (n.s.) **118**: 1120.

Material examined: AS3015A(1), AS3150A(2)

Diagnosis: Wing expanse: 28–30 mm. The species is identified by the rufous forewing with dark brown veins and large rufous stigmata. The male genitalia is characterized by narrow, long uncus and valvae with a finger-like harpe and long, acute ampulla.

Distribution: India: Jammu & Kashmir, Uttarakhand.

Subfamily **HADENINAE** Guenée, 1837

Tribe **HADENINI** Guenée, 1837

Genus *Dictyestra* Sugi, 1982

103. *Dictyestra dissectus* (Walker, 1865) (H.P 7.13; G.P 9.6)

1865. *Heliophobus dissectus* Walker, *List Spec. Lepid. Insects Colln Br.*

Mus. **32**: 656. (TL: Sri Lanka)

1989. *Dictyestra dissectus*; Holloway, *Malayan Nature J.* **63** (1-2): 78, pl. 1, f. 75, 78.

Material examined: AS1843A(1)

Diagnosis: Wing expanse: 38–40 mm. The species is characterized by the fine pale cross markings all over the dark brown forewing. The male genitalia is characterized by the beak-shaped uncus and the small claw-like harpe.

Distribution: India: Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh.

Elsewhere: Nepal, Sri Lanka, Myanmar, China, Taiwan, Vietnam, Thailand, Indonesia (Borneo, Maluku, Sulawesi), Philippines, New Guinea, Japan, Korea.

Note: The species is being reported for the first time from Uttarakhand.

Genus *Kollariana* Hacker, 1996

104. *Kollariana scotochlora* (Kollar, [1844]) (H.P 7.14; G.P 9.7)

1844. *Polia scotochlora* Kollar, in *Hills, Kashmir, and the Kingdom of Sikkim* **4**: 482. (TL: Massuri)

1894. *Hadena scotochlora* Hampson, *Fauna Br. India (Moths)* **2**: 203.

1994. *Polia scotochlora*; Yoshimoto, *Tinea* **14** (Suppl. 1): 101, pl. 83, f. 29.

1996. *Kollariana scotochlora*; Hacker & Kautt, *Esperiana* **4**: 381-394.

2017. *Kollariana scotochlora*; Varga, Ronkay & Ronkay, *Dt. Ent. Issue* **64** (2): 156.

Material examined: AS3700A(3)

Diagnosis: Wing expanse: 50–55 mm. The species can be identified by its dark olive green and white contrasting pattern in the forewing with almost round orbicular which is bordered with black. The male genitalia is characterized by the bulbous club-shaped cucullus with strong corona and spatulate uncus and the aedeagus with two short spines, one in the carinal region and the other in the vesica.

Distribution: India: Jammu & Kashmir, Uttarakhand, Sikkim. **Elsewhere:** Pakistan, Nepal, Sri Lanka, China (Tibet).

Genus *Odontestra* Hampson, 1905

105. *Odontestra submarginalis* (Walker, 1869) (H.P 7.15; G.P 9.8)

1869. *Heliophobus submarginalis* Walker, *Char. Undescr. Het.* **1869**: 32.

1994. *Odontestra submarginalis*; Yoshimoto, *Tinea* **14** (Suppl. 1): 101, pl. 83, f. 34.

2000. *Odontestra submarginalis*; Hreblay & Ronkay, *Insecta Koreana* **17** (1/2): 15.

Material examined: AS1843B(1)

Diagnosis: Wing expanse: 32–35 mm. The species is recognized by its ochreous submarginal lines and a typical white transverse line originating from median nervure and continued up to postmedial line. In the male genitalia, the cucullus is club-shaped with strong corona and juxta is heavily sclerotized.

Distribution: India: Himachal Pradesh, Uttarakhand. **Elsewhere:** Pakistan, Nepal.

Genus *Polia* Ochseneimer, 1816

106. *Polia culta* (Moore, 1881) (H.P 8.1; G.P 9.9)

1881. *Mamestra culta* Moore, *Proc. zool. Soc. Lond.* **1881**: 347. (TL: Dalhousie)

1894. *Hadena culta* Hampson, Fauna Br. India (Moths) **2**: 204.

1994. *Haderonia culta*; Yoshimoto, *Tinea* **14** (Suppl. 1): 101, pl. 83, f. 31.

1998. *Haderonia culta*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 151, pl. 146, f. 6.

1996. *Polia culta*; Hacker & Kautt, *Esperiana* **4**: 381-394.

Material examined: AS3166A(1)

Diagnosis: Wing expanse: 55–58 mm. This species can be readily identified by its dark purple-brown forewing ground colour and double, black antemedial zigzag lines. The male genitalia is characterized by thin and long uncus, broad juxta and aedeagus vesica with continuous ridge of small spines.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim. **Elsewhere:** Pakistan, Nepal, China (Tibet).

Note: The species has been recorded for the first time from Uttarakhand.

Genus *Tricheurois* Hampson, 1905

107. *Tricheurois cuprina* (Moore, 1881) (H.P 8.2; G.P 9.10)

1881. *Apamea cuprina* Moore, *Proc. zool. Soc. Lond.* **1881**: 345, pl. 38, f. 2.
(TL: Sikkim)

1894. *Hadena cuprina* Hampson, Fauna Br. India (Moths) **2**: 202.

1992. *Anartomorpha albistigma* Chen, *Acta Ent. Sinica* **35** (1): 92, 94.

1998. *Tricheurois cuprina*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 151, pl. 146, f. 9.

2017. *Tricheurois cuprina*; Varga, Ronkay & Ronkay, *Dt. Ent. Zs.* **64** (2): 154.

Material examined: AS4216A(3)

Diagnosis: Wing expanse: 40–42 mm. The species is characterized by its dark cupreous-brown forewings with grey speckled costal and medial veins and grey stigmata. The male genitalia is characterized by the ventral margin of the cucullus which consist two distinct semi-circular portion and with presence of strong corona.

Distribution: India: Uttarakhand, Sikkim. **Elsewhere:** Nepal, China.

Tribe **LEUCANIINI** Guenée, 1837

Genus *Anapoma* Berio, 1980

108. *Anapoma albicosta* (Moore, 1881) (H.P 8.3; G.P 10.1)

1881. *Leucania albicosta* Moore, *Proc. zool. Soc. Lond.* **1881**: 338, pl. 37, f. 10. (TL: Darjeeling)

1894. *Leucania albicosta* Hampson, *Fauna Br. India* (Moths) **2**: 279.

1989. *Mythimna (Pseudaletia) albicosta*; Holloway, *Malayan Nature J.* **42** (2-3): 88, pl. 2, 91-92.

1951. *Pseudaletia albicosta*; Franclemont, *Proc. Ent. Soc. Wash.* **53** (2): 64.

1994. *Aletia albicosta*; Yoshimoto, *Tinea* **14** (Suppl. 1): 106, 129, pl. 84, f. 16.

1996. *Analetia (Anapoma) albicosta*; Hreblay, Legrain & Yoshimatsu, *Ann. Hist.-nat. Mus. Nat. Hung.* **88**: 116.

2002. *Anapoma albicosta*; Hacker, Ronkay & Hreblay, *Noct. Eur.* **4**: 166.

Material examined: AS2061B(2), AS2195A(2), AS4216A(1)

Diagnosis: Wing expanse: 38–40 mm. This and the next species are similar in both appearance and genital morphology but can be separated by the more yellowish forewing colouration of *A. albicosta* which is more of reddish in case of *A. duplicata*. Also, the costal stripe is pinkish red instead of yellowish-white in case of *duplicata*. The male genitalia of both the species are quite similar but can be differentiated by presence of an acute spine in the cucullus, the subapical protrusion of the cucullus and the oval shaped juxta which is tongue-like in case of *A. duplicata*.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Meghalaya, Nagaland. **Elsewhere:** Nepal, Bhutan, Sri Lanka, China (Tibet), Japan.

109. *Anapoma duplicata* (Butler, 1889) (H.P 8.4; G.P 10.2)

1889. *Leucania duplicata* Butler, *Ill. typical Spec. Lep. Het. Colln Br. Mus.*

7: 8 (TL: Darjiling; [Meghalaya] Cherra)

1894. *Leucania rufipennis* Hampson, *Fauna Br. India (Moths)* **2**: 276.

1994. *Aletia duplicata*; Yoshimoto, *Tinea* **14** (Suppl. 1): 106, pl. 15, f. 4.

1995. *Mythimna (Mythimna) duplicata*; Yoshimoto, *Tinea* **14** (suppl. 2): 59.

1996. *Analetia (Anapoma) duplicata*; Hreblay, Legrain & Yoshimatsu, *Ann. Hist.-nat. Mus. Nat. Hung.* **88**: 116.

2002. *Anapoma duplicata*; Hacker, Ronkay & Hreblay, *Noct. Eur.* **4**: 166.

Material examined: AS1714A(1)

Diagnosis: Wing expanse: 36–38 mm. Discussed under the previous species.

Distribution: India: Uttarakhand, West Bengal, Meghalaya, Manipur.

Elsewhere: Nepal, Taiwan.

110. *Anapoma unicorna* (Berio, 1973) (H.P 8.5; G.P 10.3)

1973. *Mythimna unicorna* Berio, *Ann. Mus. nat. Giacomo Doria* **79**: 134;
(TL: Burma, Kambaiti)

1996. *Analetia (Anapoma) grisea* Hreblay & Yoshimatsu, *Ann. Hist.-nat. Mus. Nat. Hung.* **88**: 122.

1996. *Analetia (Anapoma) unicorna*; Hreblay, Legrain & Yoshimatsu, *Ann. Hist.-nat. Mus. Nat. Hung.* **88**: 116.

1998. *Mythimna (Anapoma) unicorna*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 168, pl. 148, f. 6.

2002. *Anapoma unicorna*; Hacker, Ronkay & Hreblay, *Noct. Eur.* **4**: 166.

Material examined: AS3225B(1), AS4216A(1)

Diagnosis: Wing expanse: 34–38 mm. The species is readily identifiable by the presence of a black streak along the median nervure and whitish hindwing with dark veins. In the male genitalia, the distinguishing characters are the simple club-shaped cucullus with strong corona and aedeagus vesica with a single strong cornutus and a short ridge of small spines.

Distribution: India: Uttarakhand, Assam. **Elsewhere:** Nepal, Myanmar, Vietnam.

Note: The species is being reported for the first time from Uttarakhand.

Genus *Leucania* Ochsenheimer, 1816

111. *Leucania simillima* Walker, 1862 (H.P 8.6; G.P 10.4)

1862. *Leucania simillima* Walker, *J. Proc. Linn. Soc. (Zool.)* **6**: 179. (TL: Borneo, Sarawak)

1966. *Leucania simillima*; Calora, *Philippine Agriculturist*, **50**: 663.

1989. *Mythimna (Leucania) simillima*; *Malayan Nature J.* **42** (2-3): 92, pl. 2, f. 119-120.

2002. *Leucania (Xipholeucania) simillima*; Hacker, Ronkay & Hreblay, *Noct. Eur.* **4**: 167.

Material examined: AS632C(2), AS749A(1), AS1029A(1)

Diagnosis: Wing expanse: 24–30 mm. The is closely related to *L. nabalua* from Borneo in looks very much similar in the outer morphology except it is lighter greyish-ochreous forewing. The main difference is in the male

genitalia where the size of the cucullus is almost double in case of *L. simillima* compared to *L. nabalua* and also the costal process of the harpe is sinuous instead of evenly curved in case of *nabalua*.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal, China, Taiwan, Indonesia (Borneo, Bali, Sulawesi), Philippines, Japan.

Genus *Mythimna* Ochsenheimer, 1816

112. *Mythimna bifasciata* (Moore, 1888) (H.P 8.7; G.P 10.5)

1888. *Leucania bifasciata* Moore, *Proc. zool. Soc. Lond.* **1888**: 410. (TL: Kangra)

1894. *Leucania bifasciata* Hampson, *Fauna Br. India* (Moths) **2**: 279.

1994. *Aletia bifasciata*; Yoshimoto, *Tinea* **14** (Suppl. 1): 106, pl. 15, f. 8.

1998. *Mythimna (Sablia) bifasciata*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 165, pl. 147, f. 25.

Material examined: AS1843B(3), AS2462A(1)

Diagnosis: Wing expanse: 24–30 mm. The species is easily identified by the ochreous-brown forewing with small, prominent, black cell spot and whitish hindwing with dark veins. The male genitalia is characterized by the elongated apical process of the cucullus, a very long clasper and short, finger-like harpe.

Distribution: India: Himachal Pradesh, Uttarakhand. **Elsewhere:** Nepal.

Note: The species has been recorded for the first time from Uttarakhand.

113. *Mythimna decisissima* (Walker, 1865) (H.P 8.8; G.P 10.6)

1865. *Leucania decisissima* Walker, *List Spec. Lepid. Insects Colln Br. Mus.*

32: 624. (TL: Sikkim)

1874. *Leucania nareda* Felder & Rogenhofer, *Reise Fregatte Novara, Bd 2*

(Abth. 2) (4): pl. 109.

1881. *Leucania lanceata* Moore, *Proc. zool. Soc. Lond.* **1881:** 340.

1890. *Leucania aureola* Lucas, *Proc. Linn. Soc. N.S.W.* (2) **4** (4): 1097.

1894. *Leucania decisissima* Hampson, *Fauna Br. India* (Moths) **2:** 269.

1994. *Aletia decisissima*; Yoshimoto, *Tinea* **14** (Suppl. 1): 105, pl. 84, f. 10.

1998. *Mythimna (Hyphilare) decisissima*; Hreblay & Ronkay, *Tinea* **15**

(suppl. 1): 167, pl. 147, f. 27.

Material examined: AS632C(3), AS749A(3), AS825A(1)

Diagnosis: Wing expanse: 28–32 mm. This species is recognized by the reddish-ochreous forewing with a prominent, short white streak on the median nervure and dark fuscous hindwings with obscure cell dots. The male genitalia is characterized by the roundish valvae with short, semi-circular harpe-ampulla complex and aedeagus vesica with a small bunch of cornuti.

Distribution: India: Uttarakhand, Sikkim, West Bengal. **Elsewhere:** Nepal, Sri Lanka.

Note: The species has been recorded for the first time from Uttarakhand.

114. *Mythimna modesta* (Moore, 1881) (H.P 8.9; G.P 10.7)

1881. *Leucania modesta* Moore, *Proc. zool. Soc. Lond.* **1881**: 335, pl. 37, f.

11. (TL: Darjeeling)

1894. *Leucania modesta* Hampson, *Fauna Br. India* (Moths) **2**: 274.

1993. *Aletia modesta*; Yoshimoto, *Tinea* **13** (Suppl. 3): 130, pl. 62, f. 1.

1996. *Mythimna (Hyphilare) modesta*; Hreblay, Legrain & Yoshimatsu, *Ann. Hist.-nat. Mus. Nat. Hung.* **88**: 108.

Material examined: AS1714A(1), AS4216A(1)

Diagnosis: Wing expanse: 38–44 mm. The species can be distinguished from its congeners by the light ochreous-brown forewing with prominent black-speckled postmedial line and pale fuscous hindwing with black cell dots. The male genitalia is characterized by the club-shaped cucullus with strong corona and extremely broad medio-ventral area of valvae having a long, tick ampulla and a short harpe; aedeagus vesica with bunch of apical cornuti.

Distribution: India: Uttarakhand, West Bengal. **Elsewhere:** Nepal.

115. *Mythimna nepos* (Leech, 1900) (H.P 8.10; G.P 10.8)

1900. *Leucania nepos* Leech, *Trans. Ent. Soc. Lond.* **1900** (1): 124. (TL:

[Sichuan] Omei-shan; [India] Sultanpore, Kulu)

1996. *Mythimna (Hyphilare) nepos*; Hreblay, Legrain & Yoshimatsu, *Ann. Hist.-nat. Mus. Nat. Hung.* **88**: 102.

1998. *Mythimna (Hyphilare) nepos*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 166, pl. 148, f. 6.

Material examined: AS1843B(3), AS3150A(1), AS4216A(1)

Diagnosis: Wing expanse: 36–38 mm. The species can be readily identified by its greyish-brown forewing without any transverse lines and a small white dot-like reniform stigma. The hindwing is greyish, suffused with fuscous especially in the terminal areas and with black discal spot. Underside of forewing has a conspicuous black spot on the costa towards apex.

Distribution: India: Himachal Pradesh, Uttarakhand. **Elsewhere:** Nepal, China.

Note: The species is being reported for the first time from Uttarakhand.

116. *Mythimna pallidicosta* (Hampson, 1894) (H.P 8.11)

1894. *Leucania pallidicosta* Hampson, *Fauna Br. India* (Moths) **2**: 276.

(TL: Darjiling; Guhrwal; Dharmsala)

1882. *Aletia albicosta* Moore, *Descr. Indian lep. Atkinson* (2): 97.

1994. *Pseudaletia pallidicosta*; Yoshimoto, *Tinea* **14** (Suppl. 1): 107, pl. 15, f. 7.

1995. *Mythimna (Pseudaletia) pallidicosta*; Yoshimoto, *Tinea* **14** (suppl. 2): 59.

2001. *Mythimna (Pseudaletia) pallidicosta*; Yoshimatsu & Legrain, *Ent. Sci.* **4** (4): 436.

Material examined: AS2547A(1), AS3390A(1)

Diagnosis: Wing expanse: 42–46 mm. A comparatively large species related to its congeners and can be easily identified by its reddish-brown forewing with white, dot-like reniform and fuscous-white hindwing with dark veins.

Distribution: India: Himachal Pradesh, Uttarakhand, West Bengal.

Elsewhere: Nepal.

Genus *Tiracola* Moore, 1881

117. *Tiracola aureata* Holloway, 1989 (H.P 8.12; G.P 10.9)

1989. *Tiracola aureata* Holloway, *Malayan Nature J.* **42** (2-3): 94, pl. 1, f. 77, 83. (TL: Sarawak, Gunong Mulu Nat. Park)

1994. *Tiracola aureata*; Yoshimoto, *Tinea* **14** (Suppl. 1): 104, pl. 14, f. 27.

2019. *Tiracola aureata*; Keegan, Lafontaine, Wahlberg & Wagner, *Syst. Ent.* **44**: 458.

Material examined: AS632D(1), AS1843B(1)

Diagnosis: Wing expanse: 55–60 mm. Very similar to the common *T. plagiata* but differs being slightly larger and golden-fawn colour instead of greyish-brown. The male genitalia differ in the cucullus being triangular and the ventral angle almost level with the dorsal one, whereas in *plagiata* the dorsal angle is more rounded and strongly produced.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal, China, Philippines, New Guinea.

Subfamily **NOCTUINAE** Latreille, 1809

Tribe **NOCTUINI** Latreille, 1809

Genus *Anaplectoides* McDunnough, [1929]

118. *Anaplectoides inexpectata* Dierl, 1993 (H.P 8.13; G.P 10.10)

1983. *Anaplectoides inexpectata* Dierl, *Spixiana* **6** (2): 146, f. 10. (TL: E. Nepal, Jumbesi)

1995. *Anaplectoides secreta* Hreblay & Plante, *Lambillionea* **95** (1, 2): 136.

1998. *Anaplectoides inexpectata*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 146, pl. 145, f. 24.

Material examined: AS3166A(1)

Diagnosis: Wing expanse: 60–64 mm. Very much similar in size and colour with female *A. tamsi* and can be distinguished by the male genitalia characters such as the shape of cucullus which is acute in case of *inexpectata* where as it is hook-shaped in *A. tamsi*.

Distribution: India: Uttarakhand, West Bengal. **Elsewhere:** Nepal.

Note: The species has been recorded for the first time from Uttarakhand.

Genus *Axylia* Hübner, [1821]

119. *Axylia putris* (Linnaeus, 1761) (H.P 8.14; G.P 11.1)

1761. *Phalaena putris* Linnaeus, *Fauna Suecica* (Edn 2): 315. (TL: Sweden)

1766. *Phalaena subcorticalis* Hufnagel, *Berlin. Magazin*, **3** (3): 308.

1803. *Noctua lignosa* Hübner, *Samml. eur. Schmett.* [4]: pl. 50, f. 245.

1888. *Axylia triseriata* Moore, *Proc. zool. Soc. Lond.* **1888**: 409.

1894. *Agrotis putris* Hampson, *Fauna Br. India* (Moths) **2**: 186.

1994. *Axylia putris triseriata*; Yoshimoto, *Tinea* **14** (Suppl. 1): 112, pl. 15, f. 17.

2016. *Axylia putris*; Leley, *Cat. ins. Russian Far East.* **2**: 499.

Material examined: AS632D(3), AS1121A(1), AS1630B(3), AS1692A(3), AS1843B(4), AS2195A(1)

Diagnosis: Wing expanse: 38–40 mm. Type species of the genus and can be easily differentiated from the next species by the absence of dark streak along the reniform which is the most important diagnostic character of *A. renalis*. Also, in male genitalia, *A. putris* differs from *renalis* in the basal part of the harpe being blunt and the ventro-medial extension of valvae being absent.

Distribution: India: Himachal Pradesh, Uttarakhand. **Elsewhere:** Pakistan, Nepal, Taiwan, Indonesia (Java), Japan, Korea, Russia, Mongolia, Kazakhstan, Armenia, Sweden, Ukraine, United Kingdom, Netherlands, Austria, Finland, Denmark, France, Spain, Norway, Germany.

120. *Axylia renalis* (Moore, 1867) (H.P 8.15; G.P 11.2)

1881. *Axylia renalis* Moore, *Proc. zool. Soc. Lond.* **1881**: 341. (TL: Kashmir, Sind Valley; Solon)

1882. *Axylia renalis* Moore, *Descr. Indian lep. Atkinson* (2): 103.

1894. *Agrotis renalis* Hampson, *Fauna Br. India* (Moths) **2**: 187.

1998. *Axyliia renalis*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 146, pl. 145, f. 25.

Material examined: AS2547A(1)

Diagnosis: Wing expanse: 36–38 mm. Discussed under *A. putris*.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Nagaland, Punjab, Maharashtra. **Elsewhere:** Pakistan, Nepal, China, Thailand, South Africa.

Genus *Diarsia* Hübner, [1821]

121. *Diarsia cerastioides* (Moore, 1867) (H.P 9.1; G.P 11.3)

1867. *Graphiphora cerastioides* Moore, *Proc. zool. Soc. Lond.* **1867**: 54.

(TL: Darjeeling)

1994. *Diarsia cerastioides*; Yoshimoto, *Tinea* **14** (Suppl. 1): 100, pl. 83, f. 23.

2007. *Diarsia cerastioides*; Varga & Ronkay, *Acta zool. Hung.* **53** (suppl. 1): 162.

Material examined: AS2195A(1), AS3065A(1), AS3343A(1)

Diagnosis: Wing expanse: 28–32 mm. Member of the *basistriga-cerastioides-tincta*-group and bears similar outer morphological and genitalia characters. The species is characterized by the yellowish anal tufts of males and the black cell dots in the hindwing. In the male genitalia, the broad,

bifurcated caudal process of the juxta and the basal region of aedeagus vesica with a patch of small spines.

Distribution: India: Uttarakhand, West Bengal. **Elsewhere:** Nepal.

122. *Diarsia claudia* Boursin, 1963 (H.P 9.2; G.P 11.4)

1963. *Diarsia claudia* Boursin, *Bull. Mens. Soc. Linn. Lyon* **33**: 20. (TL: Nepal, Sarkori Pati)

1995. *Diarsia claudia*; Yoshimoto, *Tinea* **14** (suppl. 2): 52, 70, pl. 109, f. 19.

2007. *Diarsia claudia*; Varga & Ronkay, *Acta zool. Hung.* **53** (suppl. 1): 154.

Material examined: AS3065A(1), AS3150A(1), AS3150A(1), AS4216A(14)

Diagnosis: Wing expanse: 36–38 mm. Member of the *hoenei*-group. Can be easily identified by its reddish-brown forewing colour with yellowish-stigmata markings. The male genitalia is characterized by the shape of juxta which is heart-shaped with strong sclerotization in the middle and the ampullar arm being extended beyond the costal margin of the valvae.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Note: The species has been recorded for the first time from India.

123. *Diarsia erubescens* (Butler, 1880) (H.P 9.3; G.P 11.5)

1880. *Orthosia erubescens* Butler, *Ann. Mag. Nat. Hist.* **1880**: 224. (TL: Nilgiris)

1994. *Diarsia erubescens*; Yoshimoto, *Tinea* **14** (Suppl. 1): 99, pl. 14, f. 15.

2007. *Diarsia erubescens*; Varga & Ronkay, *Acta zool. Hung.* **53** (suppl. 1): 164.

Material examined: AS1843B(1), AS2061A(1), AS2195A(7), AS2248A(1), AS3150A(2), AS3226A(4)

Diagnosis: Wing expanse: 28–30 mm. The species can be differentiated from its congeners by its brownish-ochreous forewing ground colour and black cell-dots of the hindwing. The main characteristics of the male genitalia are, thumb-like harpe, spatulate uncus, triangular juxta with two distinct horn-like caudal process and aedeagus vesica with sclerotized patch with ridge of small spines.

Distribution: India: Uttarakhand, Tamil Nadu. **Elsewhere:** Nepal.

124. *Diarsia griseithorax* (Warren, 1912) (H.P 9.4; G.P 11.6)

1912. *Rhyacia griseithorax* Warren, Novit. Zool. **19**: 7. (TL: Khasia Hills)

2007. *Diarsia griseithorax*; Varga & Ronkay, *Acta zool. Hung.* **53** (suppl. 1): 162.

Material examined: AS2248A(3)

Diagnosis: Wing expanse: 28–30 mm. Very closely related to *D. basistriga* and can be differentiated by the male genitalia characters such as the valvae which is much dilated medially and the shape of juxta being square with two separate lobes apically. The clasper is long and extends beyond the costal

margin of the valvae but the ampulla is short and confined within valval margins.

Distribution: India: Uttarakhand, Assam.

125. *Diarsia metadichroa* Varga & Ronkay, 2007 (H.P 9.5)

2007. *Diarsia metadichroa* Varga & Ronkay, *Acta zool. Hung.* **53** (suppl. 1): 191. (TL: Vietnam, Lao Cai, Fan-si-pan Mts, Frontier Satellite Camp)

Material examined: AS2655B(1)

Diagnosis: Wing expanse: 24–28 mm. The species is a member of *D. chalcea* group and can be separated from its closely related species by its paler forewing ground colouration with diffused markings. The male genitalia is more similar with *D. dichroa* but can be separated by broader, medially less constricted juxta with significantly deeper apical incision and distally less curved ampulla.

Distribution: India: Uttarakhand. **Elsewhere:** Vietnam.

126. *Diarsia nigrosigna* (Moore, 1881) (H.P 9.6; G.P 11.7)

1881. *Graphiphora nigrosigna* Moore, *Proc. zool. Soc. Lond.* **1881**: 352, pl. 38, f. 4. (TL: Sikkim, Tonglo)

1891. *Chera efflorescens* Hampson, *Ill. typical Spec. Lep. Het. Colln Br. Mus.* **8**: 14, 78, pl. 145, f. 7.

1891. *Chera erubescens* Hampson, *Ill. typical Spec. Lep. Het. Colln Br. Mus.* **8**: 14, 78, pl. 145, f. 14.

1933. *Rhyacia subochracea* Corti & Draudt, *Gross-Schmett. Erde* (Suppl. 3): 75, pl. 11 e.

1989. *Diarsia nigrosigna*; Holloway, *Malayan Nature J.* **42** (2-3): 71, pl. 1, f. 53-54.

1994. *Diarsia nigrosigna*; Yoshimoto, *Tinea* **14** (Suppl. 1): 100, pl. 14, f. 12.

2007. *Diarsia nigrosigna*; Varga & Ronkay, *Acta zool. Hung.* **53** (suppl. 1): 169.

Material examined: AS2462B(2)

Diagnosis: Wing expanse: 38–40 mm. Very common species and can be readily identified by the presence of a black dot posterior to the orbicular stigma. The male genitalia is characterized by cucullus with strong corona, triangular harpe and apically bifurcated juxta.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh, Tamil Nadu. **Elsewhere:** Pakistan, Nepal, Bhutan, Myanmar, China, Taiwan, Hong Kong, Vietnam, Thailand, Indonesia (Sulawesi), Philippines.

127. *Diarsia postpallida* (Prout, 1928) (H.P 9.7)

1928. *Agrotis nigrosigna postpallida* Prout, *Bull. Hill Mus.* **2**: 64. (TL: Sumatra, North Korintji Valley)

2007. *Diarsia postpallida*; Varga & Ronkay, *Acta zool. Hung.* **53** (suppl. 1): 169.

Material examined: AS2248A(1)

Diagnosis: Wing expanse: 35–38 mm. Very similar to typical *D. nigrosigna* but differs being more ochreous and brighter, the orbicular and reniform being concolorous with forewing and very weakly marked. The orbicular is much larger and more quadrate in shape than in *nigrosigna*.

Distribution: India: Uttarakhand, Sikkim, Arunachal Pradesh, Tamil Nadu.

Elsewhere: Malaysia, Thailand, Indonesia (Borneo, Sumatra, Java, Sulawesi), Philippines.

128. *Diarsia stictica* (Poujade, 1887) (H.P 9.8; G.P 11.8)

1887. *Agrotis stictica* Poujade, *Bull. Soc. Ent. Fr.* (6) **7**: lxxviii. (TL: Tibet, Mou-pin)

1889. *Graphiphora viaria* Swinhoe, *Proc. zool. Soc. Lond.* **1889** (4): 412.

1994. *Diarsia stictica*; Yoshimoto, *Tinea* **14** (Suppl. 1): 99, pl. 83, f. 28.

2007. *Diarsia stictica*; Varga & Ronkay, *Acta zool. Hung.* **53** (suppl. 1): 167.

Material examined: AS2279A(2), AS3150A(9), AS3343A(5), AS3427A(5)

Diagnosis: Wing expanse: 28–30 mm. The species can be easily identified by the bipectinated antennae of males and presence of black patches in the cell adjacent to the stigmata. The male genitalia is characterized by the typical harpe-ampulla complex structure with thumb-like clasper and bell-shaped juxta; the aedeagus vesica has a small spinous patch at the base.

Distribution: India: Uttarakhand, Punjab. **Elsewhere:** Nepal, China (Tibet), Borneo.

Note: The species is being reported for the first time from Uttarakhand.

129. *Diarsia vulpina* (Moore, 1882) (H.P 9.9; G.P 11.9)

1882. *Graphiphora vulpina* Moore, *Descr. Indian lep. Atkinson* (2): 118.
(TL: Darjiling)

1998. *Diarsia vulpina*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 143.

2007. *Diarsia vulpina*; Varga & Ronkay, *Acta zool. Hung.* **53** (suppl. 1):
154.

Material examined: AS2279A(1), AS2442A(1), AS2547A(2),
AS3150A(3), AS3427A(2)

Diagnosis: Wing expanse: 38–40 mm. Member of the *hoenei*-group and can be identified by its comparatively larger size, dark chestnut-brown forewing colour and a less distinct, yellowish quadrate reniform mark. In the male genitalia, the juxta is heart-shaped, harpe and ampulla both straight and extends beyond margins of the valvae.

Distribution: India: Uttarakhand, West Bengal. **Elsewhere:** Nepal.

Note: The species has been recorded for the first time from Uttarakhand.

Genus *Hermonassa* Walker, 1865

130. *Hermonassa chagyabensis* Chen, 1983 (H.P 9.10; G.P 11.10)

1983. *Hermonassa chagyabensis* Chen, *Acta ent. Sinica* **26** (3): 334, 335.

(TL: Xizang, Chagyab, Gyitan)

1995. *Hermonassa chagyabensis*; Sugi, *Tinea* **14** (suppl. 2): 98, pl. 117, f. 43–44.

1998. *Hermonassa chagyabensis*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 132.

Material examined: AS4216A(1)

Diagnosis: Wing expanse: 26–28 mm. *H. chagyabensis* typically differs from its congeners by having fuscous-grey hindwing with a prominent dark discoidal patch. In male genitalia, the apically bifid valvae and heart-shaped juxta distinguishes the species from the other group members.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal, China.

Note: The species is being reported for the first time from Uttarakhand.

131. *Hermonassa consignata* Walker, 1865 (H.P 9.11; G.P 12.1)

1865. *Hermonassa consignata* Walker, *List Spec. Lepid. Insects Colln Br.*

Mus. **32**: 632. (TL: Darjeeling)

1881. *Hermonassa chalybeata* Moore, *Proc. zool. Soc. Lond.* **1881**: 353, pl. 38, f. 17.

1882. *Hermonassa chalybeata*; Moore, *Descr. Indian lep. Atkinson* (2): 119.

1894. *Hermonassa consignata*; Hampson, *Fauna Br. India (Moths)* 2: 196.

1995. *Hermonassa chalybeata*; Sugi, *Tinea* 14 (suppl. 2): 94, pl. 117, f. 15-16.

1995. *Hermonassa consignata*; Sugi, *Tinea* 14 (suppl. 2): 94, pl. 117, f. 19-20.

1999. *Hermonassa consignata*; Hreblay, Peregovits & Ronkay, *Acta zool. Acad. Sci. hung.* 45 (1): 2.

Material examined: AS3166A(1)

Diagnosis: Wing expanse: 26–30 mm. This is the type species of the genus and can readily be differentiated from the closely related species *H. rufa* by the harpe in male genitalia not extending beyond the margin of the valvae.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Nagaland, Tamil Nadu. **Elsewhere:** Pakistan, Nepal, Bhutan, China (Tibet), Thailand.

132. *Hermonassa cuprina* Moore, 1882 (H.P 9.12; G.P 12.2)

1882. *Hermonassa cuprina* Moore, *Descr. Indian lep. Atkinson* (2): 120.

(TL: Darjiling)

1894. *Hermonassa sinuata*; Hampson, *Fauna Br. India (Moths)* 2: 197.

1995. *Hermonassa cuprina*; Sugi, *Tinea* 14 (suppl. 2): 90, pl. 117, f. 1.

Material examined: AS3225A(1)

Diagnosis: Wing expanse: 42–44 mm. An unmistakable species. Largest among all its congeners and can be identified by the unique cupreous forewing ground colour. Also, in male genitalia the spatulate uncus and hook-like harpe makes it easily separable from other group members.

Distribution: India: Uttarakhand, West Bengal. **Elsewhere:** Nepal.

133. *Hermonassa divida* Hreblay & Ronkay, 1998 (H.P 9.13; G.P 12.3)

1998. *Hermonassa divida* Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 132. (TL: Nepal, Ganesh Himal, 1 km E of Yurekharka)

Material examined: AS2279A(1), AS2932A(3), AS3150A(1), AS3225A(1), AS4216A(1)

Diagnosis: Wing expanse: 32–35 mm. Similar to *H. orbicularis* in outer morphology but forewing uniformly dark and stigmata bordered with ochreous-white. The male genitalia is characterized by distally tapered valvae and long, arcuate harpe.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Note: The species has been recorded for the first time from India.

134. *Hermonassa incisa* Moore, 1882 (H.P 9.14; G.P 12.4)

1882. *Hermonassa incisa* Moore, *Descr. Indian lep. Atkinson* (2): 120. (TL: Darjiling)

1894. *Hermonassa incisa*; Hampson, *Fauna Br. India (Moths)* **2**: 197.

1994. *Hermonassa incisa*; Yoshimoto, *Tinea* **14** (Suppl. 1): 99, pl. 14, f. 14.

1995. *Hermonassa incisa*; Sugi, *Tinea* **14** (suppl. 2): 91, pl. 117, f. 5.

Material examined: AS3015A(1), AS3150A(1)

Diagnosis: Wing expanse: 28–30 mm. The species is similar to *H. sherpae* in outer morphology but differs in having reddish tinge in the forewing. The species can be readily distinguished by male genitalia which is characterized by long spindle-shaped valvae having acute apex and aedeagus vesica with a bunch of short, strong cornuti.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Nagaland. **Elsewhere:** Nepal, Bhutan, China (Tibet), Thailand.

135. *Hermonassa marginata* Hreblay & Ronkay, 1998 (H.P 9.15; G.P 12.5)

1998. *Hermonassa marginata* Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 131. (TL: Nepal, Solu Khumbu Himal, 14 km E of Lukla)

Material examined: AS3166A(1)

Diagnosis: Wing expanse: 28–30 mm. *H. marginata* closely resemble *H. chagyabensis* in outer and genital morphology but differs in being paler in outer marginal area and having narrower valvae with less arcuate bifurcation of the apical area.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal, China.

Note: The species has been recorded for the first time from India.

136. *Hermonassa oxyspila* Boursin, 1968 (H.P 10.1)

1968. *Hermonassa oxyspila* Boursin, *Khumbu Himal* **3** (1): 144, pl. 1, f. 15.

(TL: Nepal, Junbesi)

1995. *Hermonassa oxyspila*; Sugi, *Tinea* **14** (suppl. 2): 97, pl. 117, f. 33.

Material examined: AS2800A(3)

Diagnosis: Wing expanse: 26–28 mm. A small species compared to its relatives and can be identified small forewing stigmata. The male genitalia is characterized by spindle-shaped valvae with a ventro-medial protrusion and with a long, curved harpe.

Distribution: India: Himachal Pradesh, Uttarakhand. **Elsewhere:** Nepal.

Note: The species is being reported for the first time from India.

137. *Hermonassa phenax* Boursin, 1968 (H.P 10.2; G.P 12.6)

1968. *Hermonassa phenax* Boursin, *Khumbu Himal* **3** (1): 135, pl. 1, f. 1-2.

(TL: Nepal, Thodung)

1994. *Hermonassa phenax*; Yoshimoto, *Tinea* **14** (Suppl. 1): 99, pl. 83, f. 18.

1995. *Hermonassa phenax*; Sugi, *Tinea* **14** (suppl. 2): 90, pl. 117, f. 2.

Material examined: AS2279A(1), AS2800A(1), AS4216A(1)

Diagnosis: Wing expanse: 32–35 mm. This species is characterized by prominent broad *Hermonassa* markings on a cupreous-olive forewing and

fuscous hindwing with no cell spot. The main characteristics of the male genitalia is the blunt spindle-shaped valvae with comparatively long, apically curved harpe and aedeagus vesica with no bunch of spines or cornuti.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

138. *Hermonassa renifera* Chen, 1991 (H.P 10.3; G.P 12.7)

1991. *Hermonassa renifera* Chen, *Acta ent. Sinica* **34** (3): 353, 355. (TL: Xizang, Cona)

1995. *Hermonassa shizukoe* Sugi, *Tinea* **14** (suppl. 2): 92, pl. 117, f. 17-18.

1998. *Hermonassa renifera*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 133.

Material examined: AS2195A(1), AS3225A(1)

Diagnosis: Wing expanse: 28–30 mm. Very close looking to *H. chersotidia* but differs in the forewing with much less striation and bar-like claviform. The male genitalia differ in having a much blunt cucullus and the harpe is more curved having a bulge at the basal plate; the aedeagus also lacks the carinal spines present in *H. chersotidia*.

Distribution: India: Uttarakhand, West Bengal. **Elsewhere:** Nepal, China.

139. *Hermonassa selecta* Hreblay & Plante, 1995 (H.P 10.4; G.P 12.8)

1995. *Hermonassa selecta* Hreblay & Plante, *Lambillionea* **95** (4, 1): 540.

1998. *Hermonassa selecta*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 131.

Material examined: AS3390B(1)

Diagnosis: Wing expanse: 30–35 mm. The species can be readily identified by its unique male genitalia characters which includes acute cucullus, spine-like protrusion of juxta and long, strong, curved harpe which crosses the costal margin of the valvae.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

140. *Hermonassa sherpae* Sugi, 1995 (H.P 10.5; G.P 12.9)

1995. *Hermonassa sherpae* Sugi, *Tinea* **14** (suppl. 2): 92, pl. 117, f. 36. (TL: Nepal, Langtang Himal, Langtang)

Material examined: AS3390B(1)

Diagnosis: Wing expanse: 36–38 mm. This species is characterized by olive-brown forewing with relatively small stigmata and an obscure claviform. In male genitalia, the valvae is spindle-shaped, cucullus blunt and harpe is long, curved apically.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Note: The species is being reported for the first time from India.

141. *Hermonassa stigmatica* Warren, 1912 (H.P 10.6; G.P 12.10)

1912. *Hermonassa stigmatica* Warren, *Novit. zool.* **19**: 8. (TL: Bhutan)

1994. *Hermonassa stigmatica*; Yoshimoto, *Tinea* **14** (Suppl. 1): 98, pl. 14, f. 13.

1995. *Hermonassa stigmatica*; Sugi, *Tinea* **14** (suppl. 2): 93, pl. 117, f. 9-10.

Material examined: AS1630B(1), AS3225B(1)

Diagnosis: Wing expanse: 30–34 mm. The species can be identified by its dark olive-brown coloration and large black stigmata. In male genitalia, it is differentiated from its congeners by having narrow valvae with long, excurved, blunt harpe; aedeagus vesica with a single, short cornuti.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal, Bhutan.

Genus *Protognorisma* Ronkay & Varga, 1999

142. *Protognorisma fusca* (Hreblay & Ronkay, 1998) (H.P 10.7; G.P 13.1)

1998. *Eugnorisma fusca* Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 142, pl. 145, f. 12. (TL: Nepal, Ganesh Himal, near Godlang)

1999. *Protognorisma fusca*; Ronkay & Varga, *Acta Zool. Acad. Sci. Hung.* **45** (4): 359.

Material examined: AS3427A(2)

Diagnosis: Wing expanse: 30–34 mm. The species can be easily identified by its dark red-brown forewing ground colour with large reniform and orbicular stigmata bordered with dark brown. The male genitalia is characterized by spindle-shaped valvae with concave outer margin and aedeagus vesica with a bundle of small spines and a strong cornutus.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Genus *Xestia* Hübner, 1818

143. *Xestia angara* Hacker & Pecks, 1990 (H.P 10.8; G.P 13.2)

1990. *Xestia angara* Hacker & Pecks, *Esperiana* **1**: 297, pl. C, f. 11.

1995. *Xestia angara*; Yoshimoto, *Tinea* **14** (suppl. 2): 55, pl. 110, f. 25-26.

Material examined: AS2248A(1), AS2655A(1), AS2655B(2),
AS2800A(10), AS3065A(10), AS3166A(1), AS3390B(1), AS3700A(4),
AS4216A(1)

Diagnosis: Wing expanse: 26–30 mm. *X. angara* can easily be differentiated from other *Xestia* species by its pale-yellow head and thorax and straw-yellow forewing with prominent brown reniform marks. In the male genitalia, the species differs from its congeners by the absence of the lower process of the cucullus which is the unique diagnostic feature to this species.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Note: The species is being reported for the first time from India.

144. *Xestia bdelygma* (Boursin, 1963) (H.P 10.9; G.P 13.3)

1963. *Amathes bdelygma* Boursin, *Forsch. Nordrhein-Westfalen* **1170**: 59, pl. 3, f. 54-55. (TL: Yunnan, Li-kiang)

1995. *Xestia bdelygma*; Yoshimoto, *Tinea* **14** (suppl. 2): 54, pl. 110, f. 15-16.

Material examined: AS3065A(2), AS3225B(1), AS3700A(28),
AS4216A(41)

Diagnosis: Wing expanse: 28–32 mm. This species is mostly similar to *X. nepalensis* in both external morphology and male genitalia but it can be easily recognised by its more red-brown colouration, reddish hindwing cilia and prominent hindwing cell spots. In male genitalia *X. bdelygma* differs from *X. nepalensis* in having shorter thumb-like harpe smaller uncus and blunt cucullus.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal, China.

Note: The species has been recorded for the first time from India.

145. *Xestia brunneago* (Staudinger, 1895) (H.P 10.10; G.P 13.4)

1895. *Hiptelia brunneago* Staudinger, *Dt. Ent. Z. Iris* **8** (2): 326. (TL: between Lob Noor and Kuku Noor)

1998. *Xestia brunneago*; Hreblay & Ronkay, *Tinea* 15 (suppl. 1): 137.

Material examined: AS1714A(1), AS3150A(5)

Diagnosis: Wing expanse: 30–35 mm. The species is similar in appearance with its congeners but can be distinguished by its distinct male genitalia characters such as spatulate uncus, long, curved harpe and flap like basal saccular protrusion; aedeagus vesica with a small cornutus.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

146. *Xestia clavata* (Hampson, 1907) (H.P 10.11; G.P 13.5)

1907. *Episilia clavata* Hampson, *Ann. Mag. nat. Hist.* (7) **19** (111): 244. (TL: Punjab, Kulu)

1995. *Estimata clavata*; Yoshimoto, *Tinea* **14** (suppl. 2): 56, pl. 110, f. 30-32.

1998. *Estimata clavata*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 139, pl. 145, f. 6.

2012. *Xestia (Raddea) clavata*; Kononenko, Volynkin & Matov, *Zootaxa* **3590**: 53.

Material examined: AS3065A(9), AS3700A(34)

Diagnosis: Wing expanse: 25–28 mm. A relatively small species with prominent dark stigmata on a light brown forewing. The male genitalia is very unique with a broad spatulate uncus and bifurcated cucullus and a finger-like harpe.

Distribution: India: Himachal Pradesh, Uttarakhand. **Elsewhere:** Nepal.

147. *Xestia c-nigrum* (Linnaeus, 1758) (H.P 10.12; G.P 13.6)

1758. *Phalaena (Noctua) c-nigrum* Linnaeus, *Syst. Nat.* (Edn. 10) **1**: 516.
(TL: Europe)

1889. *Agrotis degenerata* Staudinger, *Stettin Ent. Ztg* **50** (1-3): 26.

1942. *Diarsia c-nigrum kurilana* Bryk, *Dt. Ent. Z. Iris* **56**:38.

1993. *Xestia (Megasema) c-nigrum*; Fibiger, *Noct. Eur.* **2**: 156, pl. 8, f. 21-22.

1994. *Xestia c-nigrum*; Yoshimoto, *Tinea* **14** (Suppl. 1): 100, pl. 14, f. 17.

Material examined: AS1692A(1), AS1714A(1)

Diagnosis: Wing expanse: 35–38 mm. Very common and large species compared to its congeners. It can be readily identified by the apical black patch and the ‘M’-shaped black patch between reniform and orbicular. In the male genitalia, the bell-shaped juxta and valvae with small blunt harpe are unique to this species.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Puducherry. **Elsewhere:** Pakistan, China, Japan, Korea, Russia, Turkey, Germany, United Kingdom, Italy, Austria, Norway, Portugal, France, Netherlands, Spain, Finland, Canada, USA, Mexico.

Note: The species has been recorded for the first time from Uttarakhand.

148. *Xestia forsteri* (Boursin, 1964) (H.P 10.13; G.P 13.7)

1964. *Amathes forsteri* Boursin, *Veröff. zool. Staatssamml. Munchen* **8**: 16, pl. 1, f. 19. (TL: Nepal, Gunsa, Nanangbhot)

1995. *Xestia forsteri*; Yoshimoto, *Tinea* **14** (suppl. 2): 54, pl. 110, f. 5-6.

Material examined: AS3225B(2), AS3390A(1), AS3700A(10), AS4216A(49)

Diagnosis: Wing expanse: 25–28 mm. Similar to *X. basistriga* in both outer and male genitalia morphology but differs being smaller in size and more reddish-brown. In male genitalia, it has only one caudal process of juxta instead of a bifurcated one in *X. basistriga*.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

149. *Xestia gandakiensis* Yoshimoto, 1995 (H.P 10.14; G.P 13.8)

1995. *Xestia gandakiensis* Yoshimoto, *Tinea* **14** (suppl. 2): 54, pl. 110, f. 19-20. (TL: Gandaki, Churi Lattar)

Material examined: AS3390B(1), AS3700A(6), AS4216A(1)

Diagnosis: Wing expanse: 25–28 mm. This and the next species are very closely similar both in terms of outer and genital morphology. *X. gandakiensis* differs from *X. isochroma* in the forewing being more reddish-brown rather than pale brown and the stigmata, especially the reniform is more prominent and darker. While in male genitalia, the harpe of *X. gandakiensis* plane and smooth instead of irregularly curved as in *X. isochroma*.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Note: The species is being reported for the first time from India.

150. *Xestia isochroma* (Hampson, 1903) (H.P 10.15; G.P 13.9)

1903. *Episilia isochroma*, *Cat. Lepid. Phalaenae Br. Mus.* **4**: 502, pl. 73, f. 20. (TL: Tibet, Yatung)

1995. *Xestia isochroma*; Yoshimoto, *Tinea* **14** (suppl. 2): 54, pl. 110, f. 17-18.

Material examined: AS3150A(2)

Diagnosis: Wing expanse: 25–30 mm. The diagnosis is discussed under the previous species.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal, China (Tibet).

Note: The species has been recorded for the first time from India.

151. *Xestia janakpura* Yoshimoto, 1995 (H.P 11.1)

1995. *Xestia janakpura* Yoshimoto, *Tinea* **14** (suppl. 2): 55, pl. 110, f. 21-22.

(TL: Janakpur, Daldung)

Material examined: AS3065A(1)

Diagnosis: Wing expanse: 26–28 mm. Somewhat similar to *X. isochroma* in outer morphology but differs paler and having a dark, bent reniform with an obsolete grey bar in it; orbicular represented by a black dot. In male genitalia, the harpe is sickle-shaped with a very wide base.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

152. *Xestia lobbichleri* (Boursin, 1964) (H.P 11.2; G.P 13.10)

1964. *Amathes lobbichleri* Boursin, *Veröff. zool. Staatssamml. Munchen* **8**: 15, pl. 1, f. 16.

1995. *Xestia lobbichleri*; Yoshimoto, *Tinea* **14** (suppl. 2): 52, pl. 109, f. 23.

Material examined: AS3150A(3)

Diagnosis: Wing expanse: 36–40 mm. A comparatively big species with an unmistakable yellow costal margin with a short black apical streak. The male genitalia is characterized by bifurcated cucullus and short, strong harpe.

Distribution: India: Uttarakhand. **Elsewhere:** Nepal.

Note: The species has been recorded for the first time from India.

153. *Xestia nepalensis* (Boursin, 1964) (H.P 11.3; G.P 14.1)

1964. *Amathes tenuis nepalensis* Boursin, *Veröff. zool. Staatssamml. Munchen* **8**: 16, pl. 1, f. 17. (TL: Nepal, Penga, Ustangbhot)

1995. *Xestia tenuis nepalensis*; Yoshimoto, *Tinea* **14** (suppl. 2): 54, pl. 110, f. 13-14.

1998. *Xestia nepalensis*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 134.

Material examined: AS3225B(2), AS4216A(11)

Diagnosis: Wing expanse: 32–35 mm. Very similar to sympatric sister species *X. tenuis* and earlier considered as a subspecies of the same. Differs mainly in the male genitalia, typically in the harpe being much shorter and wider than its sister species.

Distribution: **India:** Uttarakhand. **Elsewhere:** Nepal.

154. *Xestia renalis* (Moore, 1867) (H.P 11.4; G.P 14.2)

1867. *Ochropleura renalis* Moore, *Proc. zool. Soc. London*. **1867**: 55. (TL: Bengal)

1900. *Ochropleura subpurpurea* Leech, *Trans. Ent. Soc. London*. **1900** (1): 35.

1994. *Xestia renalis*; Yoshimoto, *Tinea* **14** (Suppl. 1): 100, pl. 14, f. 19.

1995. *Xestia renalis*; Yoshimoto, *Tinea* **14** (suppl. 2): 52.

Material examined: AS2462A(1)

Diagnosis: Wing expanse: 38–40 mm. A large species compared to its congeners with a dark brown costal streak and dark fuscous hindwing. The species can be readily separated from the other *Xestia* species by the male genitalia having typical characteristics like extended, blunt, spine-like cucullus and medio-ventral bulge of valvae.

Distribution: India: Uttarakhand, West Bengal. **Elsewhere:** Nepal.

Note: The species is being reported for the first time from Uttarakhand.

155. *Xestia retracta* (Hampson, 1903) (H.P 11.5)

1903. *Episilia retracta* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **4**: 489, pl. 73, f. 7. (TL: Sikkim)

1995. *Xestia retracta*; Yoshimoto, *Tinea* **14** (suppl. 2): 53, pl. 110, f. 1-2.

Material examined: AS3700A(10), AS4216A(1)

Diagnosis: Wing expanse: 24–28 mm. A small species with ochreous-yellow costal margin and black cell spot in whitish hindwing. The male genitalia is characterized by the basally roundish and wide juxta with two apically curved caudal process.

Distribution: India: Uttarakhand, Sikkim. **Elsewhere:** Nepal.

156. *Xestia tenuis* (Butler, 1889) (H.P 11.6; G.P 14.3)

1889. *Anchocelis tenuis* Butler, *Ill. typical Spec. Lep. Het. Colln Br. Mus.* **7**: 57, pl. 127, f. 12. (TL: Laka)

1903. *Episilia homochroma* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **4**: 493, pl. 73, f. 14.

1998. *Xestia tenuis*; Hreblay & Ronkay, *Tinea* **15** (suppl. 1): 134.

Material examined: AS2655B(1)

Diagnosis: Wing expanse: 32–35 mm. Discussed under *X. nepalensis*.

Distribution: **India:** Uttarakhand. **Elsewhere:** Nepal, China (Tibet).

Tribe **AGROTINI** Rambur, 1848

Genus *Agrotis* Ochsenheimer, 1816

157. *Agrotis fraterna* Moore, 1882 (H.P 11.7; G.P 14.4)

1882. *Agrotis fraterna* Moore, *Descr. Indian lep. Atkinson* (2): 116. (TL: Darjiling; Punjab Hills)

1894. *Agrotis corticea* Hampson, *Fauna Br. India (Moths)* **2**: 182.

1994. *Agrotis fraterna*; Yoshimoto, *Tinea* **14** (Suppl. 1): 98, pl. 83, f. 11.

1995. *Agrotis fraterna*; Yoshimoto, *Tinea* **14** (suppl. 2): 49, pl. 109, f. 5.

Material examined: AS2195A(2), AS3015A(1), AS3150A(1)

Diagnosis: Wing expanse: 40–42 mm. The species is characterized by dark brown forewing with black-filled claviform and dot-like orbicular with black circular outline. The male genitalia is similar like all its congeners but can be differentiated by the larger harpe and broad juxta with acute protrusion in the base of juxta.

Distribution: India: Uttarakhand, West Bengal. **Elsewhere:** Nepal.

Note: The species has been recorded for the first time from Uttarakhand.

158. *Agrotis ipsilon* (Hufnagel, 1766) (H.P 11.8; G.P 14.5)

1766. *Phalaena ipsilon* Hufnagel, *Berlin. Magazin.* **3** (4): 416. (TL:

Germany, Berlin district)

1776. *Phalaena ypsilon*; Rottemburg, *Der Naturforscher* **9**: 141.

1786. *Bombyx spinula* Esper, *Die. Schmett., Th. III* (25): pl. 63, f. 6-7.

1789. *Phalaena (Bombyx) spinifera* Villers, *Caroli Linn. Ent.* **2**: 174.

1860. *Agrotis frivola* Wallengren, *Wien ent. Monats.* **4** (6): 169.

1889. *Agrotis ypsilon*; Godman & Salvin, *Biol. centr.-amer., Lep.*

Heterocera **1**: 281.

1894. *Agrotis ypsilon* Hampson, *Fauna Br. India (Moths)* **2**: 182.

1898. *Agrotis aureolum* Schaus, *J. N.Y. Ent. Soc.* **6**: 107.

2014. *Agrotis ipsilon*; San Blas, *Zootaxa* **3771** (1): 47.

Material examined: AS3166A(2)

Diagnosis: Wing expanse: 42–56 mm. This species is readily identified by the black, dart-shaped patch pointing outwards from the middle of the reniform and two small dart shaped patches in the subterminal area which are unique to this species only. In the male genitalia, the valvae is wider and harpe is shorter than the congeners.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, West Bengal, Arunachal Pradesh, Assam, Meghalaya, Bihar, Jharkhand, Uttar Pradesh, Punjab, Rajasthan. **Elsewhere:** Pakistan, Nepal, Myanmar, China, Taiwan, Thailand, Australia, New Zealand, Japan, Korea, Russia, Iran, Turkey, Tajikistan, United Kingdom, Romania, Denmark, Portugal, Ireland, Israel, Poland, Malta, Jordan, Cyprus, Austria, Galapagos, Egypt, Namibia, United States, Canada, Mexico, Ecuador, Brazil, Argentina, Costa Rica, Ecuador.

159. *Agrotis segetum* (Denis & Schiffermüller, 1775) (H.P 11.9; G.P 14.6)

1775. *Noctua segetum* Denis & Schiffermüller, *Ank. syst. Schmett. Wienergegend*: 81. (TL: Vienna region)

1794. *Noctua segetis* Fabricius, *Ent. Syst.* **3** (2): 61.

1789. *Phalaena nigricornis* Villers, *Caroli Linn. Ent.* **2**: 175.

1803. *Bombyx subatratus* Haworth, *Lepid. Britannica* (1): 116.

1840. *Agrotis sicula* Boisduval, *Genera Index Eur. Lepid.*: 109.

1847. *Agrotis dimidia* Zeller, *Isis von Oken* **1847** (6): 439.

1878. *Agrotis ingrata* Butler, *Ann. Mag. Nat. Hist.* (5) **1** (2): 162.

1994. *Agrotis segetum*; Yoshimoto, *Tinea* **14** (Suppl. 1): 98, pl. 14, f. 5.

2013. *Agrotis segetum*; Ronkay, Ronkay, László, Fu & Wu, *Fibigeriana* (Suppl. 1): 19.

Material examined: AS2462A(1)

Diagnosis: Wing expanse: 32–35 mm. Closely related to *A. trux* but can be separated by the antennae of the male which are more pectinated in *A. segetum* and apical sign on the costal margin of the forewing is less distinct. The male genitalia is characterized by long pointed valvae with short and thick clasper.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Assam, Nagaland, Punjab, Jharkhand, Chhattisgarh, Madhya Pradesh, Maharashtra. **Elsewhere:** Pakistan, Nepal, Sri Lanka, China, Taiwan, Thailand, Indonesia (Java), Philippines, New Guinea, Japan, Korea, Iran, Turkey, United Kingdom, Austria, Italy, France, Norway, Spain, Netherland, Germany, Portugal, Bulgaria, UAE, Africa, Kenya, Madagascar.

Genus *Dichagyris* Lederer, 1857

160. *Dichagyris triangularis* (Moore, 1867) (H.P 11.10; G.P 14.7)

1867. *Ochropleura triangularis* Moore, *Proc. zool. Soc. Lond.* **1867**: 55. (TL: India, Darjeeling)

1894. *Agrotis triangularis* Hampson, *Fauna Br. India (Moths)* **2**: 189.

1994. *Ochropleura triangularis*; Yoshimoto, *Tinea* **14** (Suppl. 1): 98, pl. 14, f. 8.

2013. *Albocosta triangularis*; Ronkay, Ronkay, László, Fu & Wu, *Fibigeriana* (Suppl. 1): 17.

2013. *Albocosta triangularis*; Wu & Chang, *Japan Heter. J.* **269**: 472.

2016. *Dichagyris triangularis*; Leley, *Cat. ins. Russian Far East.* **2**: 495.

Material examined: AS2061B(1)

Diagnosis: Wing expanse: 44–48 mm. The species is characterized by the prominent triangular dark subapical small patch of the forewing and the uniform fuscous-brown hindwing. In male genitalia, *D. triangularis* differs from other closely related *Dichagyris* spp. by having excessively out curved costal margin of the valvae.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Assam, Nagaland, Maharashtra. **Elsewhere:** Afghanistan, Pakistan, Nepal, Bhutan, Myanmar, China (Tibet), Taiwan, Thailand, Japan, Korea, Russia, Mongolia, Iran.

Genus *Euxoa* Hübner, [1821]

161. *Euxoa adumbrata* (Eversmann, 1842) (H.P 11.11)

1842. *Agrotis adumbrata* Eversmann, *Bull. Soc. imp. Nat. Moscou* **1842** (3):

543. (TL: U.S.S.R, Kasan district)

1861. *Agrotis norwegica* Staudinger, *Stettin Ent. Ztg* **22** (10-12): 383.

1874. *Agrotis polygonides* Staudinger, *Stettin Ent. Ztg* **35** (1-3): 94.

1980. *Euxoa (Chorizagrotis) friedeli* Pinker, *Zeit. Arb. Öst. Ent.* **31**: 65, pl. 1.

1989. *Euxoa adumbrata*; Poole, *Noctuidae Lepid. cat.* (n.s.) **118**: 425.

Material examined: AS1714A(1), AS3150A(1), AS3390A(1)

Diagnosis: Wing expanse: 34–38 mm. This species and the next species are very close looking in terms of outer morphology but can be easily differentiated by male genitalia. The distinct features of the male genitalia of *E. adumbrata* is the blunt tip of the long harpe which almost reaches the length of valvae.

Distribution: India: Jammu & Kashmir, Uttarakhand. **Elsewhere:** China (Tibet), Japan, Russia, Mongolia, Turkey, Iran, Tajikistan, Kazakhstan, Sweden, Finland, Greenland, Norway, Denmark, Canada, USA.

Note: The species is being reported for the first time from Uttarakhand.

162. *Euxoa ochrogaster* (Guenée, 1852) (H.P 11.12; G.P 14.8)

1852. *Noctua ochrogaster* Guenée, *Hist. nat. Ins., Spec. gén. Lépid.* **5** (Noct. 1): 327. (TL: North America)

1989. *Euxoa ochrogaster*; Poole, *Noctuidae Lepid. cat.* (n.s.) **118**: 438.

Material examined: AS3427A(1)

Diagnosis: Wing expanse: 35–38 mm. This species is typically characterized by the prominent coil in the aedeagus vesica; the subbasal diverticulum pointing away from aedeagus; the harpe is also acute and large compared to the previous species.

Distribution: India: Jammu & Kashmir, Uttarakhand. **Elsewhere:** Japan, Russia, Mongolia, Tajikistan, Kyrgyzstan, Kazakhstan, Iceland, Finland, Denmark, USA, Canada.

Note: The species has been recorded for the first time from Uttarakhand.

Genus *Perissandria* Warren, 1909

163. *Perissandria sikkima* (Moore, 1867) (H.P 11.13; G.P 14.9)

1867. *Mamestra sikkima* Moore, *Proc. zool. Soc. Lond.* **1867**: 53. (TL: Darjeeling)

1903. *Lycophotia sichima* Hampson, *Cat. Lepid. Phalaenae Br. Mus.* **4**: 519.

1993. *Perissandria sikkima*; Yoshimoto, *Tinea* **13** (Suppl. 3): 124, pl. 61, f. 13.

1995. *Perissandria sikkima*; Yoshimoto, *Tinea* **14** (suppl. 2): 51, pl. 109, f. 13-14.

Material examined: AS3166A(1)

Diagnosis: Wing expanse: 34–38 mm. *P. sikkima* is very closely allied to *P. subfusca* in outer morphology but is larger in size and the hindwing is less grey compared to *P. subfusca*. In male genitalia, the costal margin of the valvae is undulating which is plane and acute at apex in case of *P. subfusca*.

Distribution: India: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh. **Elsewhere:** Nepal, China (Tibet)

Note: The species has been recorded for the first time from Uttarakhand.

Tribe *Unassigned*

Genus *Paraxestia* Hampson, 1903

164. *Paraxestia flavicaudata* (Warren, 1888) (H.P 11.14; G.P 14.10)

1888. *Amphipyra flavicaudata* Warren, *Proc. zool. Soc. Lond.* **1888**: 312.

(TL: Thundiani)

1989. *Paraxestia flavicaudata*; Poole, *Noctuidae Lepid. cat.* (n.s.) **118**: 778.

Material examined: AS3166A(1)

Diagnosis: Wing expanse: 48–52 mm. *P. flavicaudata* differs from its allopatric sibling *P. altissima* in the forewing having less dark and contrasting ground colour and more prominent crosslines. In male genitalia, the apical process of *P. flavicaudata* is broad, short, less curved and the uncus is also shorter than in *P. altissima*.

Distribution: India: Jammu & Kashmir, Himachal Pradesh, Uttarakhand.

Elsewhere: Pakistan, Nepal.

Table 3.1 List of identified moth species/subspecies of Askot WLS

Abbreviations/Signs used: **AN**- Andaman and Nicobar Islands, **AP**- Andhra Pradesh, **AR**- Arunachal Pradesh, **AS**- Assam, **BH**- Bihar, **CH**- Chandigarh, **CT**- Chhattisgarh, **DL**- Delhi, **GA**- Goa, **GJ**- Gujarat, **HR**- Haryana, **HP**- Himachal Pradesh, **JK**- Jammu and Kashmir, **JH**- Jharkhand, **KA**- Karnataka, **KL**- Kerala, **LD**- Lakshadweep, **MP**- Madhya Pradesh, **MH**- Maharashtra, **MN**- Manipur, **ME**- Meghalaya, **MI**- Mizoram, **NL**- Nagaland, **OD**- Odisha, **PY**- Pondicherry, **PB**- Punjab, **RJ**- Rajasthan, **SK**- Sikkim, **TN**- Tamil Nadu, **TS**- Telangana, **TR**- Tripura, **UP**- Uttar Pradesh, **UT**- Uttarakhand, **WB**- West Bengal, *-New Record to India, #- New Record to Uttarakhand.

Sl. No.	Scientific Name	Material Examined	Distribution	
			India	Elsewhere
Superfamily: Cossoidea Leach, [1815]				
Family: Cossidae Leach, 1815				
Subfamily: Zeuzerinae Boisduval, [1828]				
1	<i>Polyphagozeira coffeae</i> (Niether, 1861)	AS632D(1)	UT, SK, WB, NL, CT, KA, TN, OD, AN	Bangladesh, Sri Lanka, Myanmar, China, Thailand, Malaysia, Indonesia (Borneo, Maluku), Papua New Guinea
2	<i>Zeuzera multistrigata</i> Moore, 1881	AS1692A(1)	JK, HP, UT, SK, WB, AR, NL, KL, AN	Pakistan, Bangladesh, Sri Lanka, Myanmar, China (Tibet), Taiwan, Vietnam, Cambodia, Thailand, Malaysia, Japan, Korea, Mongolia, Russia
Superfamily: Zygaenoidea Latreille, 1809				

Family: Limacodidae Duponchel, 1845				
Subfamily: Limacodinae Duponchel, 1845				
3	<i>Aphendala cana</i> (Walker, 1865)	AS632C(1), AS749A(1), AS1121A(1), AS1222A(4), AS1430A(1), AS1630A(2)	UT	Afghanistan, Pakistan, Nepal, Sri Lanka, Taiwan
4	<i>Aphendala unicolor</i> (Moore, 1859)	AS632C(3), AS749A(2)	UT	Nepal
5	<i>Miresa bracteata</i> Butler, 1880	AS1692A(2)	UT, SK, WB, NL, KL	Nepal, China, Laos, Thailand, Malaysia, Indonesia
6	<i>Narosa conspersa</i> Walker, 1855	AS1692A(1)	UT	Sri Lanka
7	<i>Scopelodes testacea</i> Butler, 1886	AS749A(1), AS1692A(1)	UT, WB, AR, AS, CT	Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, China, Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia (Sumatra, Java)
8	<i>Scopelodes venosa</i> Walker, 1855	AS1692A(1)	UT, SK, WB, AR, KL	Nepal, Bhutan, Bangladesh, Sri Lanka, China, Laos
9	<i>Thosea sinensis</i> (Walker, 1855) #	AS632C(2), AS1630A(2)	UT, AS	Myanmar, China, Taiwan, Hong Kong, Laos, Indonesia (Java), Korea
Subfamily: Unassigned				
10	<i>Abaciscus tristis</i> Butler, 1889	AS1029A(1)	UT	Nepal, China, Taiwan, Indonesia (Borneo)
11	<i>Cheromettia lohor</i> (Moore, 1859) #	AS632D(1)	UT, SK, AS	Sri Lanka, Indonesia (Java, Sumatra)

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12	<i>Phocoderma velutina</i> (Kollar, 1844)	AS632C(1)	JK, UT, SK, WB, AR, AS, MN, TR, BH, CT, MH, KL	Pakistan, Nepal, Bhutan, Myanmar, China, Vietnam, Thailand, Malaysia, Indonesia (Borneo, Sumatra)
13	<i>Setora postornata</i> (Hampson, 1900) #	AS632C(1)	UT, AR	Nepal, Bhutan, China, Taiwan, Vietnam
Family: Zygaenidae Latreille, 1809				
Subfamily: Chalcosiinae Walker, 1865				
14	<i>Campylotes histrionicus</i> Westwood, 1839	AS2009A(1)	JK, HP, UT, SK, AR, ME	Afghanistan, Nepal, China, Taiwan
15	<i>Chalcosia pectinicornis</i> (Linnaeus, 1758)	AS1121A(1)	UT	Taiwan
16	<i>Eterusia aedea</i> (Clerck, 1759) #	AS632C(1)	UT, SK, WB, AS, ME, MN, NL, MH, KA, KL	Nepal, Bangladesh, Sri Lanka, China, Taiwan, Hong Kong, Thailand, Japan
17	<i>Pidorus glaucopis</i> (Drury, 1773) #	AS632D(1), AS1630A(1)	UT, SK, WB, AR, AS, ME, MN, NL	Nepal, Bangladesh, Myanmar, Taiwan, Hong Kong, Vietnam, Japan, Korea
Superfamily: Thyridoidea Herrich-Schäffer, 1846				
Family: Thyrididae Herrich-Schaffer, 1846				
Subfamily: Siculodinae Meyrick, 1884				
18	<i>Mellea taeniata</i> (Warren, 1908) #	AS632C(1), AS1272A(1)	UT, SK, AS, ME	Nepal, Vietnam, Thailand
19	<i>Rhodoneura pallida</i> (Butler, 1879)	AS1843B(1)	UT	China, Japan, Korea
Subfamily: Striglininae Whalley, 1964				

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20	<i>Banisia fenestrifera</i> Walker, 1863 #	AS632C(1)	UT, SK, AN	Nepal, China, Vietnam, Thailand, Mayasia, Indonesia (Bali, Java, Sulawesi, Sabah, Sarawak, Sumatra), Papua New Guinea, Australia
Subfamily: Unassigned				
21	<i>Telchines vialis</i> (Moore, 1883)	AS632D(1)	UT, WB, AR, ME	Nepal, Bangladesh, China, Vietnam, Thailand, Malaysia, Indonesia (Borneo, Java, Sabah, Sumatra)
Superfamily: Calliduloidea Moore, 1877				
Family: Callidulidae Moore, 1877				
Subfamily: Callidulinae Moore, 1877				
22	<i>Pterodecta anchora</i> Moore, 1887	AS1356A(1)	JK, HP, UT, SK	Nepal, Bhutan
Superfamily: Pyraloidea Latreille, 1809				
Family: Pyralidae Latreille, 1809				
Subfamily: Epipaschiinae Meyrick, 1884				
23	<i>Canipsa atkinsonii</i> (Moore, 1888)	AS1714A(1), AS1843B(2), AS2061(1), AS2248A(2), AS2462C(3)	UT, WB	
24	<i>Lista haraldusalis</i> (Walker, 1858)	AS1356A(1)	HP, UT, SK, WB	Nepal, China, Malaysia, Indonesia (Sarawak, Borneo), Japan
25	<i>Locastra muscosalis</i> (Walker, 1866) #	AS632D(1), AS1692A(1)	UT, SK, WB, AR, AS, MI, NL, TN, AN	Sri Lanka, Myanmar, China (Tibet), Taiwan, Hong Kong, Malaysia, Indonesia (Borneo)

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26	<i>Orthaga euadrusalis</i> Walker, 1859	AS1121A(1)	UT, SK, WB, AR, MH, AD, AN	Sri Lanka, Thailand, Malaysia, Indonesia (Borneo, Java), Japan, Korea
27	<i>Teliphasa similalbifusa</i> Li, 2016 *	AS632D(1)	UT, WB, AR	China
Subfamily: Pyralinae Latreille, 1809				
28	<i>Diloxia fimbriata</i> Hampson, 1896	AS1029A(2), AS1630B(2), AS1843B(2)	UT, TN	
29	<i>Endotricha minialis</i> (Fabricius, 1794)	AS1843B(1)	UT	Indonesia (Borneo, Java, Sumatra), Japan
30	<i>Endotricha olivacealis</i> (Bremer, 1864)	AS1843B(1)	UT, TN	Pakistan, China, Taiwan, Hong Kong, Malaysia, Indonesia (Java), Japan, Korea, Russia
31	<i>Heterocrasa expansalis</i> Warren, 1896	AS2547A(1)	HP, UT, AS, ME	Indonesia (Sumatra)
32	<i>Hypsopygia igniflualis</i> (Walker, 1859)	AS1843B(2)	UT, WB, AR, MH, TN	Pakistan, Nepal, Sri Lanka, Myanmar, China, Hong Kong, Indonesia (Borneo), Japan
33	<i>Orybina flaviplaga</i> Walker, 1863	AS1692A(2)	HP, UT, SK, WB, AR	Nepal, Bhutan, Myanmar, China, Taiwan, Thailand, Malaysia, Brunei, Indonesia
34	<i>Sacada discinota</i> (Moore, 1865)	AS1356A(1), AS1692A(1), AS2061A(1)	UT, SK, WB, AR, NL	Taiwan
Family: Crambidae Latreille, 1810				
Subfamily: Acentropinae Stephens, 1836				
35	<i>Eoophyla melanops</i> (Hampson, 1896)	AS632D(1)	UT, SK	
36	<i>Eoophyla ochripicta</i> (Moore, 1888)	AS1029A(1)	UT, ME	

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37	<i>Eoophyla peribocalis</i> (Walker, 1859)	AS1029A(1)	HP, UT, SK, MN, CT, KL, TN	Nepal, Bhutan, Sri Lanka, Myanmar, China, Vietnam, Philippines, Yemen
38	<i>Oligostigma ustalis</i> Walker, 1866	AS2061A(1)	UT, ME	Indonesia (Java)
39	<i>Paracymoriza rivularis</i> (Moore, 1888) #	AS1121A(2)	UT, WB, AR	Nepal, China, Indonesia (Borneo)
40	<i>Strepsinoma croesusalis</i> (Walker, 1859) #	AS1029A(14)	UT, AS, ME, AN	Bhutan, China, Taiwan, Hong Kong, Thailand, Malaysia, Indonesia (Borneo), Australia
Subfamily: Crambinae Latreille, 1810				
41	<i>Ancylolomia chrysographellus</i> Kollar, 1844	AS1843B(1)	UT, MP	Pakistan, Nepal, Sri Lanka, Myanmar, China (Taiwan), Indonesia, Philippines, Japan, Korea, Kenya, Uganda, Yemen, Cyprus
42	<i>Calamotropha latellus</i> (Snellen, 1890)	AS1430A(1), AS1843B(1)	UT, WB	
Subfamily: Glaphyriinae Forbes, 1923				
43	<i>Evergestis forficalis</i> (Linnaeus, 1758) #	AS1630B(1), AS2061A(2), AS2195A(1), AS2279A(1), AS2932A(1)	UT, HP, SK	China, Japan, Korea, Russia, North America
Subfamily: Odontiinae Guenée 1854				
44	<i>Heortia vittessoides</i> (Moore, 1885) #	AS1843B(1)	UT, SK, WB, AR, AS, TR, ME, NL, AD, KL	Bhutan, Sri Lanka, China, Taiwan, Hong Kong, Thailand, Malaysia, Indonesia, Australia
Subfamily: Pyraustinae Meyrick, 1890				
45	<i>Anania dichroma</i> (Moore, 1888)	AS3065A(1)	UT, WB	

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46	<i>Hyaloplaga pulchralis</i> Moore, 1867	AS1630A(1)	UT, SK	Nepal, Bhutan
47	<i>Parbattia vialis</i> Moore, 1888	AS2061A(5), AS2248A(9), AS2462C(3)	UT, WB	
48	<i>Pyrausta signatalis</i> (Walker, 1866)	AS1356A(1)	HP, UT, TN	Sri Lanka, Indonesia (Java)
49	<i>Spinuncus</i> <i>praepandalis</i> (Snellen, 1890)	AS1121A(1), AS1843B(1), AS2061A(1)	UT, WB	
Subfamily: Schoenobiinae Duponchel, 1846				
50	<i>Patissa fulvosparsa</i> (Butler, 1881)	AS1222A(1)	UT, MH	Japan, Myanmar, Indonesia
Subfamily: Spilomelinae Guenée, 1854				
51	<i>Agathodes ostentalis</i> (Hubner, 1837)	AS632C(1)	UT, WB, AN	Sri Lanka, Myanmar, Indonesia (Java, Sumbawa)
52	<i>Agrotera scissalis</i> Walker, 1865	AS1222A(1)	UT	Indonesia (Java)
53	<i>Analyta apicalis</i> (Hampson, 1896)	AS1222A(1)	HP, UT	Sri Lanka, Taiwan
54	<i>Bradina diagonalis</i> (Guenée, 1854)	AS632C(1), AS749A(1)	HP, UT, AR	Myanmar, Indonesia (Sumatra, Java, Sumbawa)
55	<i>Cirrhochrista brizoalis</i> (Walker, 1859)	AS1714A(2), AS1843A(1)	HP, UT, MH, TN	China, Taiwan, Indonesia (Borneo), New Guinea, Australia, Japan
56	<i>Cirrhochrista</i> <i>fumipalpis</i> (Felder & Rogenhofer, 1875) #	AS1029A(1)	UT, SK, AR, NL	Myanmar, Indonesia (Maluku)

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57	<i>Cnaphalocrocis medinalis</i> Guenée, 1854 #	AS1714A(1), AS2442A(4)	UT, HP, SK, AR, ME, MH	Sri Lanka, Myanmar, China, Taiwan, Vietnam, Malaysia, Indonesia (Borneo, Java, Sumatra), New Guinea, Australia, Japan, Korea, Russia, North America
58	<i>Conogethes punctiferalis</i> (Guenée, 1854)	AS1222A(1), AS1430A(1)	UT, SK, AR, AS, ME	Sri Lanka, Myanmar, China, Hong Kong, Thailand, Malaysia, Indonesia, Australia, Japan, Korea
59	<i>Diaphania indica</i> (Stauders, 1851) #	AS1714A(1)	UT, WB, AN	Nepal, Bhutan, China, Hong Kong, Japan, Korea, Africa, Madagascar, Arabia, Central America
60	<i>Dichocrocis definita</i> (Butler, 1889)	AS825A(2), AS1029A(2), AS1222A(2), AS1630A(3)	HP, UT, SK, AR, AS	Nepal, Bhutan
61	<i>Endocrossis flavibasalis</i> (Moore, 1867)	AS632B(3), AS1029A(4)	UT, SK, WB, AR, AS, NL, MH	Nepal, Bhutan, Myanmar, China, Vietnam, Thailand, Malaysia, Indonesia (Sumatra), Philippines, New Guinea
62	<i>Glyphodes lacustralis</i> Moore, 1867 #	AS2655B(1)	UT, SK, WB, ME	Nepal

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63	<i>Haritalodes derogata</i> (Fabricius, 1775)	AS1029A(1), AS1121A(1)	HP, UT, AR, MP, KL, AN	Nepal, China, Taiwan, Hong Kong, Thailand, Malaysia, Indonesia (Bali), New Guinea, Australia, Samoa, Fiji, Japan, Russia, West Africa
64	<i>Herpetogramma licarsisalis</i> (Walker, 1859)	AS2547A(1)	UT	China, Sri Lanka, Malaysia, Indonesia, Australia
65	<i>Herpetogramma luctuosalis</i> (Guenée, 1854)	AS632C(1), AS1121A(2)	HP, UT, AR, MP, AN	China, Taiwan, Indonesia (Borneo), Japan, Korea, Russia
66	<i>Lamprosema tampiusalis</i> (Walker, 1859)	AS2061A(2)	UT, TN	Malaysia, Indonesia (Borneo, Sulawesi)
67	<i>Leucinodes orbonalis</i> Guenée, 1854	AS2248A(1)	HP, UT, AS, MH, AN	Pakistan, Sri Lanka, Myanmar, Indonesia (Java), Australia, Papua New Guinea, Russia, South Africa
68	<i>Marasmia poeyalis</i> (Boisduval, 1833)	AS632D(1), AS1714A(1)	UT	Burundi, Cameroon, Comoros, Congo, Equatorial Guinea, Gambia, Ivory Coast, Kenya, La Reunion, Madagascar, Mali, Mauritius, Mozambique, Namibia, Nigeria, Seychelles, Sierra Leone, Tanzania

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69	<i>Marasmia trapezalis</i> (Guenée, 1854)	AS1714A(1)	UT	Sri Lanka, Indonesia, Cameroon, Congo, Egypt, Gambia, Kenya, La Reunion, Madagascar, Mali, Mauritius, Nigeria, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, Uganda, Zambia, Zimbabwe
70	<i>Maruca vitrata</i> (Fabricius, 1787)	AS632B(1)	HP, UT, WB, AR, CT, AN	Nepal, Bhutan, Sri Lanka, China, Taiwan, Malaysia, Philippines, Laos, Australia, Japan, Korea, Africa, Tanzania, Madagascar, North America, Mexico, Brazil, Colombia, Costa Rica
71	<i>Nomophila noctuella</i> (Denis & Schifferrmüller, 1775)	AS3427A(1)	HP, UT	Pakistan, Nepal, China, Australia, Iran, Yemen, Turkey, UAE, Denmark, Netherlands, France, Finland, Portugal, Germany, Sweden, Norway, Austria, Bulgaria, Greece, Norway, Kenya, South Africa, USA, Canada, Argentina
72	<i>Notarcha aurolinealis</i> (Walker, 1859) #	AS1222A(1)	UT, AR, MH, TN	Pakistan, Sri Lanka, Hong Kong, Thailand, Philippines, Australia

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73	<i>Omiodes diemenalis</i> (Guenée, 1854)	AS749A(1)	HP, UT, WB	Hong Kong, Sri Lanka, Thailand, Australia
74	<i>Omiodes pernitescens</i> (Swinhoe, 1894)	AS1272A(2)	UT, AR, ME	
75	<i>Pardomima amyntusalis</i> (Walker, 1859)	AS825A(1)	UT, AN	Sri Lanka, Myanmar, Java
76	<i>Parotis marginata</i> (Hampson, 1893)	AS2248A(1)	UT, WB, AR, CT, AN	Sri Lanka, Myanmar, Thailand, Malaysia, Indonesia (Borneo, Celebes), Fiji, Australia
77	<i>Patania ruralis</i> (Scopoli, 1763)	AS1121A(1), AS1222A(1), AS1714A(3), AS2279A(3)	HP, UT, SK, AR, ME, MH, TN	Pakistan, Indonesia (Borneo, Java), Fiji, New Guinea, Solomon Islands, Russia, Finland, Sweden, Germany, Estonia, United Kingdom, Italy, Denmark, Austria, Norway
78	<i>Polygrammodes sabelialis</i> (Guenée, 1854)	AS632C(1)	HP, UT, WB, AR, MH, AN	Nepal, Myanmar, China, Taiwan, Hong Kong, Japan, Africa
79	<i>Protonoceras capitalis</i> (Fabricius, 1794)	AS1843B(1)	UT, TN	Sri Lanka
80	<i>Pycnarmon cribrata</i> (Fabricius, 1794)	AS1029A(1), AS1630A(1), AS1692A(1)	UT, WB	Congo, Kenya, Madagascar, Malawi, Mozambique, Sierra Leone, South Africa, Zambia, Zimbabwe

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81	<i>Spoladea recurvalis</i> (Fabricius, 1775)	AS632C(1), AS1121A(1)	HP, UT, SK, WB, AR, HR, CT, MP, MH, KA, TN, AN	Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka, China, Taiwan, Hong Kong, Vietnam, Philippines, Fiji, Australia, Japan, Korea, Syria, UAE, Spain, Portugal, Greece, Germany, South Africa, Nigeria, Kenya, Madagaskar, Canada, USA, Mexico, Cuba, Brazil, Costa Rica
82	<i>Syllepte sellalis</i> (Guenée, 1854)	AS4216A(1)	UT, WB	Bangladesh
83	<i>Synclera tibialis</i> Moore, 1888 #	AS632C(1)	UT, SK, WB, AS, ME, TN	Thailand
84	<i>Syngamia falsidicalis</i> (Walker, 1859)	AS1630A(1)	HP, UT, WB, AR, AS, ME, MI, TN, KL	Pakistan, Nepal, Sri Lanka, China, Taiwan, Hong Kong, Congo, Zimbabwe
85	<i>Udea ferrugalis</i> (Hubner, 1798)	AS3150A(1)	HP, UT, SK, TN	Afghanistan, Pakistan, Nepal, Sri Lanka, Myanmar, China, Japan, Denmark, Finland, Portugal, Spain, Greece, Italy, Austria, Norway, Germany, United Kingdom, Belgium, UAE, Kenya, South Africa
86	<i>Udea stigmatalis</i> (Wileman, 1911) *	AS2723A(1)	HP, UT	Japan, Taiwan, Russia
Superfamily: Drepanoidea Boisduval, 1828				
Family: Drepanidae Boisduval, 1828				
Subfamily: Cyclidiinae Warren, 1922				

87	<i>Cyclidia substigmara</i> (Hubner, 1825)	AS632C(1)	JK, HP, UT, SK, WB, AR, AS, NL	Nepal, Bangladesh, Myanmar, China (Tibet), Taiwan, Vietnam, Thailand, Japan, Korea
Subfamily: Drepaninae Boisduval, 1828				
88	<i>Agnidra discipilaria</i> Moore, [1868]	AS1356A(1)	HP, UT, SK, WB, AR	Nepal, Bhutan, Thailand, Japan
89	<i>Agnidra vinacea</i> (Moore, 1879)	AS1630B(1)	UT, SK, WB, AR, ME, NL	Nepal, Myanmar, Thailand
90	<i>Auzata semipavonaria</i> Walker, 1862	AS2195A(1)	JK, HP, UT, SK	Nepal, China, Ghana, Cameroon
91	<i>Canucha duplexa</i> (Moore, 1865) #	AS2800A(1)	UT, WB	Nepal, Bhutan, Myanmar
92	<i>Derocha inconclusa</i> (Walker, 1856)	AS1222A(1), AS1843A(1), AS2009A(1)	UT	China (Szechwan, Yunnan), Myanmar
93	<i>Ditrigona diana</i> Wilkinson, 1968 #	AS1356A(1)	HP, UT, WB, ME, NL	Bhutan, Nepal
94	<i>Ditrigona sericea</i> (Leech, 1898)	AS1714A(1), AS2195A(1), AS2462C(5)	UT, WB, AR	China, Myanmar
95	<i>Ditrigona triangularia</i> (Moore, 1867)	AS2061A(1), AS2655B(3)	HP, UT, SK, WB, AR, ME	Nepal, China, Taiwan, Vietnam
96	<i>Drepana dispilata</i> Warren, 1922	AS2248A(1)	UT, SK, AR	Nepal, Bhutan, Myanmar, China
97	<i>Drepana pallida</i> Moore, 1879	AS2248A(1)	HP, UT, SK, WB, AR, NL, MN	Nepal, Bhutan, Myanmar, China, Taiwan
98	<i>Hyalospectra hyalinata</i> Moore, 1867	AS2655B(1)	HP, UT, SK, WB	Nepal, Bhutan, Sri Lanka, Myanmar, China, Thailand
99	<i>Macroauzata fenestraria</i> (Moore, 1867)	AS1843B(1)	HP, UT, SK, WB, AR	Pakistan, Nepal, Taiwan, Vietnam, Thailand, Malaysia, Japan
100	<i>Macrocilix mysticata</i> (Walker, 1863)	AS2248A(1)	HP, UT, SK, WB, AR,	Pakistan, Nepal, Bhutan, Myanmar, China, Taiwan, Vietnam, Japan, Korea

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101	<i>Nordstromia vira</i> (Moore, 1855) #	AS1630B(1)	UT, WB, AR, AS, ME	Nepal, Myanmar, China
102	<i>Oreta pavaca</i> Moore, 1865 #	AS2248A(1), AS2655B(3), AS2547A(1)	UT, SK, WB, ME	Nepal, China (Tibet)
103	<i>Oreta sanguinea</i> Moore, 1879	AS2547A(3)	HP, UT, SK, WB, AR	Nepal, Bhutan, China (Tibet)
104	<i>Oreta vatama</i> Moore, 1866	AS1356A(1)	JK, HP, UT, SK, WB, AR, MN	Pakistan, Nepal, Bhutan, Bangladesh, Myanmar, China
105	<i>Strepsigonia diluta</i> (Warren, 1897)	AS632D(2)	UT, WB, AR	China, Taiwan, Java, Sumatra
106	<i>Thymistida tripunctata</i> Walker, 1865 #	AS1843B(1), AS2655B(3), AS2800A(2)	UT, SK, WB, AR	Nepal, Myanmar, China
107	<i>Tridrepana finita</i> Watson, 1957	AS2061A(2), AS2248A(2), AS2655B(1), AS3065A(1)	UT	China (Tibet, Szechwan, Yunnan), Taiwan
108	<i>Tridrepana sadana</i> (Moore, 1865)	AS2655B(3)	UT, SK, WB, AR	Nepal, Bhutan, Myanmar
109	<i>Tridrepana unispina</i> Watson, 1957	AS632D(2)	UT	China, Japan
Subfamily: Thyatirinae Smith, 1893				
110	<i>Epipsestis bilineata</i> (Warren, 1915)	AS2061B(1)	UT, SK, WB	Nepal
111	<i>Epipsestis dubia</i> (Warren, 1888)	AS3226A(2)	UT, SK	Nepal
112	<i>Epipsestis renalis</i> (Moore, 1888)	AS2061B(1)	HP, UT	Nepal
113	<i>Gaurena florens</i> Walker, 1865	AS2248A(1)	HP, UT, SK, WB, AR, MN	Nepal, Bhutan, Myanmar, China, Vietnam, Thailand
114	<i>Gaurena florescens</i> Walker, 1865	AS2061A(2), AS2248A(2), AS2462C(4), AS2655B(1), AS4216A(1)	HP, UT, SK, WB, AR, NL	Nepal, Bangladesh, Myanmar, China, Cambodia

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115	<i>Gaurena forsteri</i> Werny, 1966	AS3065A(2), AS3225B(4), AS3700A(8), AS4216A(3)	UT	Nepal, China (Tibet)
116	<i>Gaurena sinuata dierli</i> Werny, 1966 *	AS2800A(1), AS3065A(2)	UT, WB, AR	China (Tibet), Nepal
117	<i>Habrosyne indica</i> (Moore, 1867) #	AS1843B(1)	JK, HP, UT, SK, WB, AR	Nepal, Myanmar, China (Tibet), Taiwan, Vietnam, Thailand, Japan
118	<i>Paragnorima</i> <i>fuscescens</i> (Hampson, 1893) #	AS2248A(4), AS2462C(2)	HP, UT, SK, NL	China, Nepal, Myanmar, Vietnam, Thailand
119	<i>Spica luteola</i> Swinhoe, 1889	AS2462C(1)	HP, UT	Nepal, Myanmar, China, Taiwan, Malaysia, Indonesia (Sumatra), Japan, Korea, Russia
120	<i>Tethea consimilis</i> (Warren, 1912)	AS632D(1)	UT, WB, AR	Russia, Korea, Japan
121	<i>Thyatira batis</i> (Linnaeus, 1758)	AS632D(1)	HP, UT, SK, AR	Nepal, China, Taiwan, Malaysia, Indonesia (Sumatra, Java), Japan, Korea, Russia, Mongolia, Turkey, Iran, Germany, Portugal, United Kingdom, Finland, Norway, Austria, Italy, France, Netherlands, Algeria
Superfamily: Lasiocampoidea Harris, 1841				
Family: Lasiocampidae Harris, 1841				
Subfamily: Gastropachinae Neumoegen & Dyar, 1894				

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122	<i>Gastropacha pardale</i> (Walker, 1855) #	AS1692A(1)	UT, WB, ME, JH, MH, KA, AN	Pakistan, Nepal, Bhutan, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Thailand, Malaysia, Indonesia (Java, Sumatra)
Subfamily: Lasiocampinae Harris 1841				
123	<i>Euthrix imitatrix</i> (de Lajonquière, 1978) *	AS1356A(4)	UT	Myanmar, China
124	<i>Euthrix improvisa</i> de Lajonquière, 1978	AS2061A(1), AS2442A(2), AS2462C(2), AS3065A(2)	UT, MN	Thailand, Vietnam
125	<i>Euthrix laeta</i> Walker, 1855	AS632D(1), AS2009A(1)	HP, UT, SK, WB, AR, AS, MH, TN	Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Vietnam, Laos, Thailand, Malaysia, Indonesia (Borneo, Java), Philippines, Japan, Korea, Russia
126	<i>Euthrix vulpes</i> Zolotuhin, 2001 #	AS1843A(2)	UT, SK	Nepal, Bhutan
127	<i>Kunugia latipennis</i> (Walker, 1855) #	AS632B(2), AS632C(2), AS632D(1)	UT, SK, WB, AS, ME	Nepal, Sri Lanka, Myanmar, China, Cambodia, Laos, Vietnam, Malaysia, Thailand, Indoneisa (Sumatra, Borneo), Philippines

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128	<i>Paralebeda plagifera</i> (Walker, 1855)	AS2248A(1)	HP, UT, SK, WB, AS, ME	Nepal, Bhutan, Myanmar, China, Vietnam, Laos, Thailand, Indonesia (Java), Philippines, Korea
129	<i>Trabala pallida</i> (Walker, 1855)	AS632D(3)	UT	China, Indonesia (Sundaland)
130	<i>Trabala vishnou</i> (Lefèbvre, 1827)	AS632C(1)	HP, UT, SK, WB, AR, AS, ME, MN, BH, DL, JH, MH, KA, TN, AN	Pakistan, Nepal, Bhutan, Sri Lanka, Myanmar, China (Tibet), Taiwan, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Indonesia (Java, Sumatra), Japan
Superfamily: Bombycoidea Latreille, 1802				
Family: Eupterotidae Swinhoe, 1892				
Subfamily: Eupterotinae Forbes, 1955				
131	<i>Apona caschmirensis</i> (Kollar, 1844)	AS2462A(1)	JK, UT, SK, AR, ME, NL	Pakistan, Nepal
132	<i>Eupterote fabia</i> (Cramer, [1779])	AS632C(1), AS632D(2)	UT	Nepal, Sri Lanka, Myanmar
133	<i>Eupterote undata</i> Blanchard, [1844]	AS632C(2)	HP, UT, WB, AR, PB, JH, CT, AD, MP, MH, KA, TN, KL	Pakistan, Nepal, Bhutan, Sri Lanka, Myanmar, Malaysia, Indonesia (Sumatra, Java), Philippines
Family: Brahmaeidae Swinhoe, 1892				
Subfamily: Unassigned				
134	<i>Brahmaea wallichi</i> (Gray, 1831)	AS2248A(1)	JK, HP, UT, SK, WB, AR, AS, ME	Pakistan, Nepal, Bhutan, Myanmar, China, Taiwan, Vietnam, Laos, Thailand, Philippines, Japan
Family: Endromidae Boisduval, 1828				
Subfamily: Unassigned				

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135	<i>Mustilia castanea</i> Moore, 1879	AS2061A(1), AS2547A(4)	HP, UT, SK, WB, AR	Nepal, Bhutan, Myanmar, China, Vietnam, Thailand, Malaysia
136	<i>Mustilia falcipennis</i> Walker, 1865 #	AS1692A(1), AS2061A(1)	UT, WB	Nepal, Bhutan, China, Taiwan
137	<i>Mustilizans hepatica</i> (Moore, 1879)	AS1843B(1)	HP, UT, SK, WB, AR	Pakistan, Nepal, Bhutan, China, Taiwan, Vietnam, Laos, Malaysia, Indonesia (Borneo, Sumatra)
Family: Bombycidae Latreille, 1802				
Subfamily: Bombycinae Latreille, 1802				
138	<i>Penicillifera apicalis</i> (Walker, 1862)	AS632D(1)	UT, WB, AS, KL	Bhutan, Myanmar, Vietnam, Thailand, Malaysia, Indonesia (Sumatra, Java), Brunei, Philippines
139	<i>Trilocha varians</i> (Walker, 1855)	AS632C(1), AS632D(1), AS749A(1), AS1222A(1)	UT, WB, AR, AS, HR, PB, MH, KA, TN, KL, AN	Nepal, Sri Lanka, China, Hong Kong, Taiwan, Vietnam, Thailand, Malaysia, Indonesia (Sulawesi, Java), Philippines, Japan, Brazil
Family: Saturniidae Boisduval, 1837				
Subfamily: Saturniinae Boisduval, 1837				

140	<i>Actias selene</i> (Hübner, 1806)	AS632D(1), AS2248A(1)	JK, HP, UT, SK, WB, AR, AS, ME, MI, MN, NL, BH, UP, MP, CG, MH, OD, GA, KA, TN, KL, AN	Afghanistan, Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, China, Laos, Cambodia, Malaysia, Indonesia (Borneo, Java, Sumatra), Philippines, Japan, Korea, Russia
141	<i>Saturnia bonita</i> (Jordan, 1911)	AS3065A(1)	UT, SK, WB	China, Bhutan
Family: Spingidae Latreille, 1802				
Subfamily: Macroglossinae Harris, 1839				
142	<i>Acosmeryx anceus subdentata</i> Rothschild & Jordan, 1903	AS632D(1)	HP, UT, SK, WB, AR, ME, JH, TN, KA, KL	Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Indonesia (Java, Borneo, Sumatra, Kalimantan, Sumbawa), New Guinea, Philippines, Australia, Japan
143	<i>Acosmeryx naga</i> (Moore, [1858])	AS1843B(1)	UT	Tajikistan, Uzbekistan, Afghanistan, Pakistan, Nepal, Myanmar, Thailand, Laos, Vietnam
144	<i>Cechetra minor</i> (Butler, 1875)	AS1692A(1), AS1843B(1)	UT	Nepal, Bhutan, Thailand, China, Taiwan, Japan, Vietnam
145	<i>Cechetra scotti</i> (Rothschild, 1920)	AS1692A(2), AS1843B(3)	HP, UT, NL	Pakistan, Nepal, Bhutan, China, Laos, Vietnam

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146	<i>Eupanacra perfecta</i> (Butler, 1875)	AS1843B(1)	UT	Bhutan, Myanmar, China, Thailand, Vietnam
147	<i>Hippotion boerhaviae</i> (Fabricius, 1775)	AS632A(1)	JK, HP, UT, SK, WB, AR, AS, AD, JH, PB, GJ, MP, CG, MH, KA, TN, OD, AN	Pakistan, Nepal, Bhutan, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia (Java, Borneo), Papua New Guinea, Philippines, Fiji, Australia, New Zealand, Japan
148	<i>Macroglossum nycteris</i> Kollar, 1844	AS3497A(1)	UT	Afghanistan, Pakistan, China, Myanmar, Japan
149	<i>Nephele hespera</i> (Fabricius, 1775)	AS632A(6)	JK, HP, UT, SK, WB, AR, AS, ME, NL, MN, MI, PB, GJ, JH, MP, AD, MH, KA, TN, PY, KL, AN	Afghanistan, Pakistan, Nepal, Bhutan, Sri Lanka, Myanmar, China, Hong Kong, Vietnam, Thailand, Malaysia, Indonesia (Sumatra), Papua New Guinea, Australia, Iran, Ecuador
150	<i>Pergesa acteus</i> (Cramer, 1779)	AS632D(2)	JK, HP, UT, SK, WB, AR, AS, ME, TR, NL, MN, MI, JH, PB, MH, KA, TN, AN	Nepal, Bhutan, Bangladesh, Sri Lanka, China, Myanmar, China, Taiwan, Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia (Borneo, Java), Philippines, Japan
151	<i>Rhagastis castor</i> (Walker, 1856)	AS1843B(1)	UT	Sumatra, Java, Borneo

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152	<i>Rhagastis olivacea</i> (Moore, 1872)	AS1692A(1)	HP, UT, SK, WB, AR, AS, ME	Pakistan, Nepal, Bhutan, Bangladesh, Myanmar, China, Vietnam, Laos, Thailand, Malaysia, Indonesia (Borneo), Korea
153	<i>Rhagastis velata</i> (Walker, 1866)	AS1692A(1)	UT, WB	
154	<i>Theretra clotho</i> (Drury, 1773)	AS632D(1), AS632B(1)	JK, HP, UT, SK, WB, AR, AS, ME, NL, MN, MI, JH, PB, GJ, MH, CT, MH, TN, KA, KL, AN	Pakistan, Nepal, Bhutan, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Indonesia (Borneo), Philippines, Papua New Guinea, Australia, Japan, Korea
155	<i>Theretra lycetus</i> (Cramer, 1775)	AS632D(2), AS632C(1)	JK, HP, UT, SK, WB, AR, AS, ME, NL, MN, MI, BH, GJ, MH, KA, TN	Nepal, Bhutan, Sri Lanka, Myanmar, China, Vietnam, Laos, Thailand, Malaysia, Indonesia
156	<i>Theretra nessus</i> (Drury, 1773)	AS632B(1)	JK, HP, UT, SK, WB, AR, AS, ME, NL, MN, MI, TR, JH, PB, GJ, MP, MH, GA, CG, AD, KA, TN, AN	Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Indonesia (Borneo), Philippines, Papua New Guinea, Australia, Fiji, Japan, Korea, USA

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157	<i>Theretra oldenlandiae</i> (Fabricius, 1775)	AS632D(3), AS632D(2)	JK, HP, UT, SK, WB, AR, AS, ME, MN, MI, NL, JH, UP, GJ, PB, MP, MH, CG, KA, KL, TN, AN	Afghanistan, Pakistan, Nepal, Bhutan, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Indonesia (Java), Philippines, Papua New Guinea, Australia, Fiji, Japan, Korea, Russia
Subfamily: Smerinthinae Grote & Robinson, 1865				
158	<i>Ambulyx sericeipennis</i> Butler, 1875	AS1843B(1)	UT	China, Japan, Nepal, Thailand, Korea, Java, Philippines (Luzon)
159	<i>Clanidopsis exusta</i> (Butler, 1875)	AS632C(1)	HP, UT, PB	Pakistan, Nepal, Bhutan, China
160	<i>Leucophlebia lineata</i> Westwood, 1847	AS1692A(5)	HP, UT, WB, AR, AS, ME, MH, KA, TN, KL	Pakistan, Nepal, Bhutan, Sri Lanka, China, Taiwan, Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia (Java, Borneo), Philippines, Papua New Guinea
161	<i>Marumba cristata</i> (Butler, 1875)	AS1692A(3)	HP, UT, SK, WB, AR, PB	Nepal, Bhutan, Myanmar, China, Taiwan, Vietnam, Laos, Thailand, Malaysia, Indonesia (Borneo)
Subfamily: Sphinginae Latreille, 1802				

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162	<i>Acherontia lachesis</i> (Fabricius, 1798)	AS632D(1)	JK, HP, UT, SK, WB, AR, AS, ME, NL, MN, MI, JH, GJ, AD, MP, MH, GA, CG, KA, TN, KL, OD, AN	Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Indonesia (Borneo, Sumatra, Java, Maluku), Philippines, Papua New Guinea, Australia, Japan, Russia
163	<i>Agrius convolvuli</i> (Linnaeus, 1758)	AS632D(1)	JK, HP, UT, SK, WB, AR, AS, ME, NL, MN, MI, TR, UP, JH, GJ, CT, MP, MH, KA, TN, OD, AN	Pakistan, Sri Lanka, Myanmar, China, Taiwan, Thailand, Malaysia, Indonesia, Papua New Guinea, Australia, New Zealand, Japan, Korea, Russia, Mongolia, Germany, France, Finland, Netherlands, United Kingdom, Ireland, Norway, Sweden, Portugal, South Africa, Tanzania, Zambia, Kenya
164	<i>Psilogamma discistriga</i> (Walker, 1856)	AS632D(1), AS749A(1)	UT	Bangladesh, Thailand, Vietnam

165	<i>Psilogramma menephron</i> (Cramer, 1780)	AS632D(1)	JK, HP, UT, SK, WB, AR, AS, ME, NL, MN, MI, JH, DL, GJ, CT, MP, MH, AN	Nepal, Bhutan, Bangladesh, Myanmar, China, Taiwan, Vietnam, Laos, Thailand, Malaysia, Indonesia (Sumatra), Philippines, Papua New Guinea, Australia
Superfamily: Geometroidea Leach, 1815				
Family: Uraniidae Leach, 1815				
Subfamily: Auzeinae Minet, 1994				
166	<i>Auzea reticulata</i> Moore, 1888	AS1029A(1)	UT	
Subfamily: Epipleminae Hampson, 1892				
167	<i>Epiplema adamantina</i> Inoue, 1998 *	AS2655B(1)	HP, UT	Nepal
168	<i>Epiplema bicaudata</i> Moore, 1867	AS1029A(5)	JK, HP, UT, SK, WB, AR, ME	Nepal, Bhutan, China, Japan, Korea
169	<i>Epiplema reticulata</i> (Kollar, [1844])	AS1692A(1)	UT, WB, AR	
170	<i>Monobolodes simulans</i> (Butler, 1889)	AS1714A(1), AS1843B(1)	UT	Borneo, Philippines
171	<i>Sylviptelema bicaudata</i> (Moore, 1867)	AS1121A(5), AS2462C(1), AS2655B(1), AS3065A(1)	HP, UT, SK, ME	Nepal
Family: Geometridae Leach, 1815				
Subfamily: Ennominae Duponchel, 1845				
172	<i>Abaciscus tristis</i> Butler, 1889	AS1430A(1), AS1843B(1)	HP, UT	China, Taiwan, Borneo
173	<i>Abraxas antipusilla</i> Inoue, 1995	AS4216A(2)	HP, UT, SK, WB, AR	Nepal
174	<i>Abraxas martaria</i> Guenée, 1857	AS4216A(2)	HP, UT, SK, WB, AR, AS, ME	Nepal, Bhutan, Bangladesh, Myanmar, China, Vietnam, Japan
175	<i>Abraxas metamorpha</i> Warren, 1893	AS2462A(4)	UT, SK, WB	Nepal

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176	<i>Abraxas neomartaria</i> Inoue, 1970	AS2655B(2)	HP, UT, SK, WB, AR	Nepal
177	<i>Abraxas nigrivena</i> Warren, 1893 #	AS2279A(5), AS2547A(4), AS2061A(1), AS2655B(1), AS3225B(1), AS3015A(1)	UT, SK, AS	Nepal
178	<i>Abraxas peregrina</i> Inoue, 1995	AS1843B(2)	HP, UT	Nepal, Bhutan, Vietnam
179	<i>Abraxas pusilla</i> Butler, 1880	AS4216A(2)	UT, SK, WB, AR	Nepal
180	<i>Alcis admissaria</i> <i>admissaria</i> (Guenée, [1858])	AS632E(1), AS1630B(1), AS1714A(1), AS2009A(2), AS2195A(9), AS2279A(2), AS2932A(3)	JK, HP, UT, ME	Afghanistan, Bhutan, Taiwan, Japan, Kyrgyzstan
181	<i>Alcis admissaria</i> <i>undularia</i> Wileman, 1911	AS1630B(1), AS2195A(2), AS2732A(1)	JK, HP, UT, ME, KA, TN, KL	Kyrgyzstan, Afghanistan, Bhutan, China, Tibet, Taiwan, Japan
182	<i>Alcis albifera</i> Moore, 1888	AS2061A(1), AS2248A(1), AS2462C(1)	UT, SK, WB, AR	Nepal, Japan, Korea
183	<i>Alcis amica</i> Sato, 1993	AS2932A(1)	UT, WB, AR	
184	<i>Alcis latifasciata</i> (Warren, 1893)	AS2655A(1)	UT, SK, WB, AR	
185	<i>Alcis limbui</i> Sato, 1994	AS2061B(1), AS2442A(1)	HP, UT, AR	
186	<i>Alcis macroclarata</i> Sato, 1993	AS2195A(2), AS2279A(1), AS2442A(2), AS2462(1), AS2932A(1), AS3015A(1)	HP, UT, SK, WB	Thailand
187	<i>Alcis neoclarata</i> Sato, 1993	AS2195A(3), AS2547A(1)	HP, UT, WB	Nepal
188	<i>Alcis nigralbata</i> Warren, 1893	AS3150A(1), AS3225A(8), AS3390A(9)	HP, UT, SK	Nepal

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189	<i>Alcis nigradorsaria</i> (Guenée, [1858])	AS1843B(1), AS2248A(23), AS2462B(1), AS2462C(1), AS2655B(7), AS2800A(4), AS2932A(1), AS3065(2)	HP, UT, SK	Nepal, China (Tibet)
190	<i>Alcis nudipennis</i> Warren, 1888	AS1630A(1), AS1843B(2), AS1714A(2), AS2061A(1), AS2061B(1), AS2195A(2), AS2279A(1)	HP, UT	Pakistan
191	<i>Alcis perspicuata</i> (Moore, 1868)	AS1630B(3), AS1714A(2), AS2061B(5), AS2195A(4), AS2723A(1), AS2932A(2), AS3150A(1)	HP, UT, WB, ME	Nepal
192	<i>Alcis quadrifera</i> (Walker, 1866)	AS2009A(1), AS2195A(1), AS2462A(3), AS2547A(1), AS2932A(2), AS3225A(1)	HP, UT, SK, WB	Nepal, Bhutan
193	<i>Alcis semialba</i> (Moore, 1888)	AS1356A(1), AS1714A(1)	HP, UT, SK	
194	<i>Alcis subnitida</i> Warren, 1893	AS1714A(1), AS2279A(1), AS3150A(3), AS3225A(2), AS3225B(1), AS3390B(2), AS4216A(2)	HP, UT, SK	Nepal
195	<i>Alcis trikotaria</i> (Felder & Rogenhofer, 1875) *	AS3225A(1), AS3390A(1), AS3700A(1)	JK, UT	Pakistan, Kyrgyzstan, Tajikistan
196	<i>Alcis variegata</i> (Moore, 1888)	AS1843B(2), AS2195A(1)	HP, UT, SK, ME	Nepal, Myanmar, China, Taiwan, Laos, Java, Vietnam, Thailand, Malaysia, Sumatra

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197	<i>Amblychia angeronaria</i> Guenée, 1858	AS1222A(1), AS1692A(1)	UT, SK, WB, AR, AS, BH, AN	Nepal, Sri Lanka, China, Taiwan, Thailand, Malaysia, Indonesia (Borneo), Brunei, Philippines, Papua New Guinea, Australia, Japan
198	<i>Amblychia pardicelata</i> Walker, 1862	AS2248A(2)	UT, SK, WB, AR, ME	Nepal, Bhutan, Bangladesh, Myanmar, Vietnam, Laos
199	<i>Anonychia diversilinea</i> Warren, 1897	AS2655B(1)	UT, SK, WB, AR	
200	<i>Anonychia grisea</i> (Butler, 1893)	AS1356A(2), AS1630A(1), AS2655B(1)	HP, UT, SK, AR, ME	Nepal, Myanmar, China
201	<i>Anonychia lativitta</i> (Moore, 1888)	AS1843A(2), AS2195A(2), AS3150A(1), AS3166A(3)	HP, UT, SK, WB	Nepal
202	<i>Anonychia pallida</i> Warren, 1897	AS1630B(1), AS1714A(2)	HP, UT, SK, WB, AR	
203	<i>Anonychia violacea</i> Moore, 1888	AS1843A(1), AS2195A(1)	UT, SK, WB	Bhutan
204	<i>Antipercnia belluararia</i> (Guenée, 1858)	AS1029A(1), AS1356A(1)	JK, HP, UT, SK, WB, AR, AS, ME, NL, MI	Nepal, Bhutan, China, Thailand, Malaysia
205	<i>Aplochloa dentisignata</i> (Moore, 1868)	AS1692A(2), AS2061A(2), AS2655B(1)	HP, UT, SK, WB, AR	Nepal, Bhutan, Myanmar, Vietnam
206	<i>Apoheterolocha patalata</i> (Felder & Rogenhofer, 1875)	AS3150A(1)	HP, UT, SK, AR, ME	Nepal, Bhutan, Myanmar, China, Taiwan, Indonesia (Borneo)
207	<i>Apoheterolocha quadraria</i> (Leech, 1897)	AS2279A(1), AS2462A(2), AS3700A(1)	HP, UT	China
208	<i>Arichanna albolineata</i> Inoue, 1988	AS2800A(1)	UT, WB, AR	

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209	<i>Arichanna albovittata</i> Moore, 1888	AS2655B(1), AS3065A(3)	UT, SK	
210	<i>Arichanna commixta</i> (Warren, 1893)	AS4216A(1)	UT, SK, ME	
211	<i>Arichanna consocia</i> (Butler, 1880)	AS2462A(1)	UT, SK, AR, ME	
212	<i>Arichanna conspersa</i> (Butler, 1880)	AS2061A(1), AS2248A(5), AS2462C(1), AS2655B(1), AS4216A(1)	UT, SK, AR, ME	
213	<i>Arichanna flavinigra</i> Hampson, 1907	AS2009A(1), AS2442A(2)	JK, HP, UT, SK, PB	Nepal, Bhutan, Myanmar, China (Tibet)
214	<i>Arichanna furcifera</i> Moore, 1888	AS2462B(1)	UT, SK, AR, ME	
215	<i>Arichanna interplagata</i> (Guenee [1858])	AS2061A(1), AS2248A(2), AS2442A(1), AS2462C(1), AS2655B(4)	UT, SK, AR	Nepal, China
216	<i>Arichanna marginata</i> Warren, 1893	AS2061B(1)	UT, AR, ME, NL	Bhutan
217	<i>Arichanna schnitzleri</i> Stuning, 2000	AS4216A(1)	UT, AR	
218	<i>Arichanna sparsa</i> (Butler, 1890)	AS2248A(1), AS3065A(1), AS3150A(1)	HP, UT	
219	<i>Arichanna tenebraria</i> Moore, 1867	AS2462C(3), AS2655B(3), AS2800A(9), AS3065A(20), AS4216A(28)	HP, UT, SK, ME	Nepal, China, Taiwan
220	<i>Arichanna tramesata</i> Moore, 1868	AS2462A(1), AS2655B(1), AS2932A(2)	UT, SK, WB, AR	
221	<i>Arichanna transfasciata</i> Warren, 1893	AS1029A(3), AS1222A(1), AS1630A(3), AS1843B(1)	UT, SK, WB, AR, ME, NL	Nepal, Bhutan, Myanmar, China, Laos, Thailand

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222	<i>Ascotis selenaria</i> (Denis & Schiffermuller, 1775)	AS632C(3), AS632D(9), AS825A(1), AS1843B(1)	HP, UT, AR, ME, GJ, MH, HR	Austria, France, Germany, Greece, Hungary, Serbia, Russia, Italy, Poland, Amur, Japan, China, Nepal, Congo, South Africa
223	<i>Biston falcata</i> (Warren, 1893)	AS1692A(3), AS2547A(1), AS3166A(1)	HP, UT, SK, AR	Nepal, Bhutan, China (Tibbet)
224	<i>Biston pustulata</i> (Warren, 1896)	AS632C(1), AS632D(2)	UT, AR, CT	China, Thailand, Malaysia, Indonesia (Borneo), Philippines
225	<i>Biston regalis</i> (Moore, 1888)	AS1692A(1), AS1843B(1), AS2061A(1), AS2248A(1)	JK, HP, UT, SK, WB, AR, ME	Pakistan, Nepal, Myanmar, China, Taiwan, Thailand, Malaysia, Russia, Japan, North Korea, South Korea, Philippines, USA
226	<i>Biston suppressaria</i> (Guenée [1858])	AS632B(4), AS632C(5)	HP, UT, SK, WB, AR, AS, TR, NL, JH, CT, MP, MH, KA, TN	Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, China, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Japan
227	<i>Calichodes ochrifasciata</i> (Moore, 1888)	AS1222A(2), AS1630A(1), AS1692A(1), AS1843B(11), AS2655B(4)	HP, UT, SK, WB, ME	Nepal
228	<i>Chiasmia azataria</i> (Swinhoe, 1893)	AS1430A(2), AS1630A(1), AS1843B(2)	HP, UT, ME	Nepal
229	<i>Chiasmia effusata</i> (Guenée, 1858)	AS749A(2), AS1029A(5), AS1121A(4), AS1222A(4), AS1272A(2), AS1630A(2)	HP, UT, SK, ME	
230	<i>Chiasmia eleonora</i> (Cramer, [1780])	AS632D(1)	UT, WB, AR	Sri Lanka, Myanmar

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231	<i>Chiasmia fidoniata</i> (Guenée, 1858)	AS1029A(1), AS1222A(1), AS1630B(1), AS1714A(3), AS1843B(1), AS2009A(1)	HP, UT	Pakistan
232	<i>Chiasmia nora</i> (Walker, 1861)	AS632C(1)	HP, UT	Sri Lanka
233	<i>Chiasmia xanthonora</i> (Walker, 1861)	AS632C(3)	UT, SK, ME	Bhtan, Nyanmar
234	<i>Chorodna creataria</i> (Guenée, 1858)	AS632D(1), AS632E(1), AS1121A(1), AS1714A(2)	UT, SK, WB, AR, AS, ME	Nepal, Bangladesh, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand
235	<i>Chorodna fulgurita</i> (Walker, 1860)	AS2195A(2)	UT, SK, WB, AR, AS, ME, MN	Nepal, China
236	<i>Cleora contiguata</i> (Moore, 1868)	AS632D(2)	UT, SK, AR	china, Taiwan, Sri Lanka, Myanmar, Borneo, South Africa, Madagascar, Australia
237	<i>Cleora fraterna</i> (Moore, 1888)	AS1121A(2), AS1630A(4), AS1630B(1), AS1692A(1), AS1843B(3), AS2248A(4), AS2462C(3)	HP, UT, SK, AR, ME	Sri Lanka, Borneo
238	<i>Corymica arnearia</i> (Walker, 1860)	AS632D(1)	HP, UT, SK, WB, AS, ME, KA	Bhutan, Sri Lanka, Myanmar, China (Tibet), Taiwan, Hong Kong, Thailand, Malaysia Indonesia (Borneo), Japan, Korea

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239	<i>Corymica pryeri</i> (Butler, 1878)	AS1692A(2)	HP, UT, AR, AS	Taiwan, Thailand, Indonesia (Sumatra, Borneo), Papua New Guinea, Australia, Japan, Korea
240	<i>Corymica specularia</i> (Moore, 1888)	AS2061A(1)	HP, UT, WB, SK, AS, TN	Nepal, Bhutan, Sri Lanka, Myanmar, China, Taiwan, Thailand, Japan, Korea
241	<i>Ctenognophos altissimus</i> Herbulot, 1995	AS2547A(1), AS3015A(1), AS3150A(1)	HP, UT	
242	<i>Ctenognophos eolaria</i> (Guenée, [1858])	AS1714A(6)	JK, HP, UT, SK, WB, ME, PB	China (Tibet), Tajikistan, Kyrgyzstan
243	<i>Ctenognophos methoria</i> Prout, 1926	AS1356A(1), AS1630B(2), AS2061B(2), AS2195A(6)	HP, UT	Nepal, Myanmar
244	<i>Cusiala boarmoides</i> Moore, 1887	AS632C(1), AS632D(3), AS825A(1)	UT, WB, AR	Borneo, Sumatra, Malaysia
245	<i>Dalima apicata</i> (Moore, 1868) #	AS2248A(1)	HP, UT, SK, WB, AR, NL	Nepal, Bhutan, Vietnam
246	<i>Dalima metachromata</i> (Walker, 1862)	AS2195A(1)	HP, UT, SK, WB, AR	Nepal, Vietnam
247	<i>Dalima patularia</i> (Walker, 1860)	AS1843B(2)	HP, UT, SK, WB, AR, ME	Nepal, Thailand, China, Indonesia (Borneo, Sumatra, Sulawesi)
248	<i>Dalima schistacearia</i> Moore, 1868 #	AS2195A(2)	HP, UT, SK, WB, AR, ME, NL	Nepal, Bhutan, Japan
249	<i>Dalima truncataria</i> (Moore, 1868) #	AS2248A(1)	UT, SK, WB, AR, ME	Nepal, Bhutan, Vietnam
250	<i>Darisa firmilinea</i> (Prout, 1926) #	AS1692A(1), AS1843B(1)	UT, AR, ME	Nepal
251	<i>Darisa mucidaria</i> (Walker, 1866) #	AS1356A(2), AS2248A(3)	UT, SK, WB, AR, ME	Nepal, Thailand

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252	<i>Dasyboarmia subpilosa</i> (Warren, 1894)	AS632B(1)	HP, UT, WB, ME	Thailand, Malaysia, Sumatra, Borneo, Philippines, Sulawesi, Buru
253	<i>Doratoptera nicevillei</i> (Hampson, 1895) #	AS1843B(1)	UT, SK, WB, AR	Nepal, Japan, Korea
254	<i>Ectropidia shoreae</i> (Prout, 1934)	AS632C(1), AS632D(2), AS749A(1), AS2655A(1)	UT	
255	<i>Ectropis dentilineata</i> (Moore, 1868)	AS2061A(1), AS2248A(3), AS2462C(1), AS2655B(1)	HP, UT, SK, WB, ME	Nepal, Myanmar, China, Japan
256	<i>Eilicrinia cordiaria</i> <i>signigera</i> Butler, 1889 #	AS2248A(1)	JK, HP, UT	Japan, Russia, Tajikistan, Kyrghistan, Kazakhstan, Iran, Turkey, Azerbaijan, Armenia, Bulgaria, Georgia, Romania, Syria, Hungary, Austria
257	<i>Fascellina plagiata</i> (Walker, 1866)	AS632D(2)	HP, UT, SK, WB, AR, AS, ME, KA, TN	Nepal, Bhutan, Myanmar, China, Taiwan, Hong Kong, Vietnam, Thailand, Malaysia, Indonesia (Borneo)
258	<i>Fascellina</i> <i>porphyreofusa</i> Hampson, 1895	AS1029A(1)	UT, SK, AR, NL	Nepal, China
259	<i>Garaeus apicata</i> (Moore, 1868)	AS2655B(1)	HP, UT, SK	Nepal, Myanmar, Taiwan, Malaysia, Indonesia (Sumatra, Borneo), Philippines
260	<i>Harutaea flavizona</i> Sato, 2000	AS2655B(4), AS2800A(1), AS3065A(1)	UT, SK, WB, AR	Taiwan, Thailand, Indonesia

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261	<i>Heterolocha falconaria</i> (Walker, 1866)	AS2009A(1), AS2462C(1)	HP, UT, SK, WB, PB	Nepal
262	<i>Heterolocha phoenicotaeniata</i> (Kollar, 1844)	AS2061A(1)	JK, HP, UT, SK, WB, AR	Pakistan, Nepal, Bhutan, Vietnam
263	<i>Heterostegane subtessellata</i> (Walker, 1863)	AS632D(1), AS1843B(1)	HP, UT, SK, WB, AR, AS, ME, MH, KA, TN, KL, AN	Nepal, Bhutan, Myanmar, China, Taiwan, Hong Kong, Vietnam, Thailand, Malaysia, Indonesia (Java, Borneo, Sumatra, Bali), Australia
264	<i>Hirasa approximaria</i> (Leech, 1897)	AS2248A(1), AS2800A(4)	UT	Nepal, China
265	<i>Hirasa imaginata</i> (Prout, 1931)	AS2248A(8)	UT	
266	<i>Hirasa muscosaria</i> (Walker, 1866)	AS1843A(7), AS2009A(3), AS2195A(3)	HP, UT, SK, WB, AR	Nepal
267	<i>Hypephyra terrosa</i> Butler, 1889	AS1843B(1)	HP, UT	Nepal, Bhutan, China, Malaysia, Japan, Korea
268	<i>Hyperythra lutea</i> (Stoll, 1781)	AS632C(4)	HP, UT, SK, WB, AR, ME, AS, BH, JH, PB, CT, MH, KA, TN, KL, AN	Nepal, Bangladesh, Sri Lanka, Myanmar, China, Hong Kong, Laos, Cambodia, Thailand, Malaysia, Indonesia (Java, Sumatra, Borneo), Philippines, Papua New Guinea, Australia, Africa
269	<i>Hypochrosis abstractaria</i> (Walker, 1862) #	AS1430A(1)	HP, UT, ME, KL	Nepal, Bhutan, Myanmar, China, Thailand
270	<i>Hypomecis fasciata</i> (Swinhoe, 1894) #	AS1714A(2), AS2061A(1), AS2248A(7), AS2462C(1)	UT, WB, SK, AR, ME	Nepal, Thailand

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271	<i>Hypomecis nepalensis</i> (Hampson, 1902)	AS1430A(1)	UT, AR	Nepal
272	<i>Hyposidra aquilaria</i> (Walker, 1862)	AS1692A(1)	UT, SK, WB, AR, ME	China
273	<i>Krananda semihyalina</i> Moore, 1868	AS1843B(1)	HP, UT, SK, WB, AR, AS, ME, TR	Nepal, Bhutan, China, Taiwan, Thailand, Malaysia, Vietnam, Indonesia (Borneo), Philippines, Japan, Korea
274	<i>Lassaba albidaria</i> (Walker, 1866)	AS1714A(2)	HP, UT, SK, WB, AR, ME	Pakistan, Nepal, Myanmar, China, Taiwan, Vietnam, Thailand
275	<i>Lassaba cervina</i> (Warren, 1893)	AS3166A(1)	JK, UT, SK, AR	Nepal, Bhutan
276	<i>Lassaba stolidaria</i> (Leech, 1897)	AS2462C(2), AS2655B(8), AS2800A(3), AS3065A(7), AS3225B(1)	HP, UT, AR	Nepal
277	<i>Leptomiza calcearia</i> (Walker, 1860)	AS1356A(1), AS1630B(2), AS2061B(1)	HP, UT, SK, WB, AR, AS	Nepal, Bhutan, Myanmar, China, Taiwan, USA
278	<i>Ligdia coctata</i> (Guenée, [1858]) #	AS1356A(1)	HP, UT, PB, MP	Pakistan, Nepal, Kyrgyzstan, Kazakhstan, Uzbekistan, Tajikistan, Bulgaria
279	<i>Lomographa platyleucata</i> (Walker, 1866) #	AS2462C(1)	JK, HP, UT, SK, WB, ME	Nepal, Bhutan, China, Taiwan
280	<i>Loxaspilates hastigera</i> (Butler, 1889)	AS3225B(1), AS3015A(5), AS3150A(19), AS3166A(19)	JK, HP, UT, SK	Afghanistan, Nepal, China (Tibet)
281	<i>Loxaspilates obliquaria</i> (Moore, 1868)	AS2279A(1), AS2442A(2), AS3225A(1)	HP, UT, SK	Afghanistan, Nepal

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282	<i>Luxiaria amasa</i> (Butler, 1878)	AS1356A(1), AS2248A(1)	HP, UT, WB, AR, MI	Nepal, Bhutan, China (Tibet), Taiwan, Vietnam, Malaysia, Indonesia (Sumatra, Borneo, Java), Japan, Korea, Russia
283	<i>Luxiaria tephrosaria</i> (Moore, 1868)	AS2248A(2)	HP, UT, SK, WB, AS, ME	Bhutan, Myanmar, China (Tibet), Malaysia, Indonesia (Borneo)
284	<i>Menophra senelis</i> (Butler, 1878)	AS1843B(3), AS2248A(1)	UT, WB	China, Japan, Borneo
285	<i>Micrabraxas grandis</i> Yazaki, 1995	AS3700A(1)	HP, UT	Nepal
286	<i>Micrabraxas melanodonta</i> (Hampson, 1907)	AS2655B(1), AS3065A(2), AS3225B(2), AS3390B(2), AS3700A(12)	HP, UT, SK	Nepal
287	<i>Microcalicha fumosaria</i> (Leech, 1901)	AS2248A(1), AS2462C(1)	UT, SK, WB	Nepal, China, Taiwan, Japan
288	<i>Micronidia simpliciata</i> (Moore, 1868) #	AS2655B(1)	UT, SK, WB, AR, ME	Nepal
289	<i>Mimomiza cruentaria</i> Moore, 1867	AS1692A(1), AS2248A(1)	HP, UT, WB, AR, ME	Bhutan, Myanmar, China, Vietnam, Thailand
290	<i>Monocerotesa strigata</i> (Warren, 1893)	AS1222A(1), AS1843B(1)	UT, SK, WB, ME, NL	
291	<i>Myrioblephara albibasis</i> (Hampson, 1895)	AS1692A(1), AS1843B(2), AS2248A(7)	HP, UT, SK, WB, AR, AS	Nepal, Taiwan
292	<i>Myrioblephara duplexa</i> (Moore, 1888)	AS1714A(3), AS2462A(3)	HP, UT, WB	Nepal, China
293	<i>Myrioblephara gandakiensis</i> Sato, 1998	AS2248A(3), AS2932A(1)	HP, UT	Nepal
294	<i>Myrioblephara idaoides</i> (Moore, 1888)	AS2462C(2)	HP, UT, SK, WB, ME, NL	Nepal, Myanmar

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295	<i>Myrioblephara planaria</i> (Swinhoe, 1894)	AS2655B(1)	HP, UT, SK, WB, ME	
296	<i>Myrioblephara sikkimensis</i> Orhant, 2000	AS1356A(1), AS2061A(1), AS2248A(2), AS2462A(1)	UT, SK, WB, AR	
297	<i>Myrioblephara xanthozonea</i> (Hampson, 1907)	AS2248A(4), AS2462A(1), AS2462C(10), AS2655B(12), AS2800A(9), AS2932A(1), AS3065A(2)	HP, UT	Nepal, China (Tibet)
298	<i>Nadagara inordinata</i> Walker, 1862	AS632D(1), AS1692A(1)	UT, SK, ME	Borneo
299	<i>Nothomiza costinotata</i> (Warren, 1893) *	AS2248A(5), AS2009A(1)	UT	Nepal, Bhutan
300	<i>Nothomiza peralba</i> (Swinhoe, 1894)	AS1843B(1), AS2462C(7), AS2655B(5)	UT, WB, AR, ME	
301	<i>Odontopera bilinearia</i> (Swinhoe, 1890)	AS2442A(1), AS2800A(1)	HP, UT, SK, AR	Nepal, Bhutan, China, Taiwan
302	<i>Odontopera cervinaria</i> (Moore, 1868) #	AS2655B(1)	UT, SK, WB, AR, NL	Nepal
303	<i>Odontopera heydena</i> (Swinhoe, 1894)	AS2195A(1)	UT, AR, ME	Nepal, Bhutan
304	<i>Odontopera kanchai</i> Yazaki, 1994	AS1714A(2)	HP, UT	Nepal
305	<i>Odontopera similaria</i> (Moore, 1888)	AS1714A(1), AS2195A(2), AS2442B(2), AS2547A(1), AS3226A(1)	UT, WB, AR	Nepal, Bhutan
306	<i>Ophthalmitis cordularia</i> (Swinhoe, 1893)	AS1843B(1)	UT, SK	
307	<i>Ophthalmitis pertusaria</i> (Felder & Rogenhofer, 1875)	AS632D(1), AS1272A(1), AS1692A(1)	HP, UT, SK, WB, AR	Nepal, China, Thailand, Malaysia

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308	<i>Opisthograptis inornataria</i> (Leech, 1897)	AS3225B(1), AS3700A(2), AS4216A(1)	UT	
309	<i>Opisthograptis luteolata</i> (Linnaeus, 1758)	AS3225B(1)	JK, HP, UT	Pakistan, Kyrgyzstan, Russia, Iran, Turkey, Syria, Georgia, United Kingdom, Germany, Italy, France, Spain, Norway, Netherlands, Austria, Poland, Finland, Lebanon
310	<i>Opisthograptis sulphurea</i> (Butler, 1880)	AS3150A(1)	UT, SK, WB, AR	Nepal, Bhutan, China
311	<i>Opisthograptis tridentifera</i> (Moore, 1888)	AS3166A(1)	HP, UT, SK, AR, WB	Nepal, Bhutan, China (Tibet)
312	<i>Ourapteryx chrisbahri</i> Stuning, 2000	AS2061A(1)	HP, UT, WB	Nepal
313	<i>Ourapteryx clara</i> (Butler, 1880)	AS1630A(1)	HP, UT, SK, WB, AS	Nepal, Malaysia, Sumatra
314	<i>Ourapteryx consociata</i> Inoue, 1993	AS632D(1), AS1714A(1), AS1843B(12), AS2442A(1), AS2462A(1), AS4216A(1)	HP, UT, SK	Nepal, Thailand
315	<i>Ourapteryx ebuleata</i> <i>ebuleata</i> (Guenée [1858])	AS2061A(1), AS4216A(1)	JK, HP, UT, SK, WB, AR, ME, MH, TN	Pakistan, Nepal, Bhutan, Myanmar, China, Kyrgyzstan
316	<i>Ourapteryx kantalaria</i> (Felder & Rogenhofer, 1875)	AS1843B(1), AS2195A(1)	JK, HP, UT	Nepal
317	<i>Ourapteryx multistrigaria</i> (Walker, 1866)	AS1714A(1), AS2061A(1)	HP, UT	Pakistan, Nepal
318	<i>Ourapteryx pallistrigaria</i> Stuning, 1994	AS1692A(1)	UT, WB, AR	Nepal

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319	<i>Ourapteryx postflavata</i> Stuning, 1994	AS1843B(3)	UT, WB, AR	Nepal
320	<i>Ourapteryx yerburii</i> (Butler, 1886)	AS2195A(2), AS2248A(3)	HP, UT	Pakistan, Nepal, China
321	<i>Oxymacaria maculosata</i> (Warren, 1896) #	AS2248A(1)	HP, UT, ME	Nepal, Africa
322	<i>Oxymacaria penumbrata</i> (Warren, 1896) #	AS632B(1)	UT, AR, NL, ME	Nepal, Bhutan
323	<i>Paradarisa comparataria</i> (Walker, 1866)	AS2195A(1), AS2248A(5), AS2462C(4), AS2547A(1)	UT, SK, WB, AR	
324	<i>Parectropis conspurcata</i> (Walker, 1866)	AS2248A(6), AS2462C(10), AS2655B(6), AS2800A(1)	HP, UT, SK, WB	Nepal
325	<i>Peetula stramineata</i> (Warren, 1888)	AS2279A(1), AS2442A(1), AS3015A(7), AS3150A(2), AS3427A(3)	JK, UT	Pakistan
326	<i>Phthonandria atrilineata indica</i> Inoue, 1990	AS632A(1), AS632D(1)	HP, UT, SK	Nepal, Bhutan, China, Japan, Korea
327	<i>Plagodis inustaria</i> (Moore, 1867)	AS1692A(1), AS2248A(1)	HP, UT, SK, WB, AR, ME	Nepal
328	<i>Pseudomiza cervina</i> (Warren, 1893)	AS1843B(2)	UT, SK, WB, AR	
329	<i>Pseudopanthera himaleyica</i> (Kollar, 1844)	AS1692A(1)	HP, UT, SK, WB	Nepal
330	<i>Psilalsis breta</i> (Swinhoe, 1890)	AS632D(1), AS1692A(1), AS1714A(1), AS1843B(1)	UT, SK, WB, AR, TN	Sri Lanka, Myanmar
331	<i>Psilalsis conspicuata</i> (Moore, 1888)	AS2061A(2)	UT, SK, WB, AR	
332	<i>Psilalsis dielri</i> Sato, 1995	AS1630A(1), AS1843B(1)	UT, SK, WB, AR	
333	<i>Psyra angulifera</i> (Walker, 1866)	AS2195A(1), AS2279A(1)	HP, UT, SK, WB, AR, AS	Nepal, China (Tibet)

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334	<i>Psyra crypta</i> Yazaki, 1994	AS1714A(1), AS2655B(1)	UT, WB, AR	Nepal
335	<i>Psyra similaria</i> Moore, 1868 #	AS2655B(1), AS2279A(3)	HP, UT, SK, WB, ME	Nepal, China (Tibet), Vietnam
336	<i>Psyra spurcataria</i> (Walker, 1863)	AS1692A(1), AS2248A(2)	HP, UT, SK, WB, AR, AS, ME	Nepal, Bhutan, China (Tibet), Taiwan, Thailand
337	<i>Psyra szetschwana</i> Wehrli, 1953	AS2442A(1)	UT, AR	China
338	<i>Satoblephara nepalensis</i> Sato, 1993	AS1222A(2)	UT, SK, WB	Nepal
339	<i>Sinameda basistrigaria</i> (Moore, 1868) #	AS2009A(1), AS2932A(1)	UT, SK, WB, ME	Nepal, Myanmar, Thailand
340	<i>Sirinopteryx duplicilinea</i> (Hampson, 1895)	AS3700A(10), AS4216A(1)	HP, UT	
341	<i>Sirinopteryx harutai</i> Yazaki, 1998	AS3390B(1), AS3700A(3), AS4216A(2)	HP, UT	Nepal
342	<i>Sirinopteryx longipennis</i> (Warren, 1893) #	AS3065A(1), AS3225B(3), AS3390B(1)	HP, UT, SK	
343	<i>Sirinopteryx quadripunctata</i> (Moore, 1868)	AS1714A(1)	UT, SK, WB, AR, NL, ME	
344	<i>Sirinopteryx rufivinctata</i> (Walker, 1863)	AS2655B(1)	HP, UT, SK, WB, AR, ME, NL	Nepal, Bhutan, Myanmar, China, Vietnam
345	<i>Sirinopteryx undulifera</i> Warren, 1893 #	AS1692A(2)	UT, SK, WB	Nepal
346	<i>Systema longiplaga</i> Prout, 1923	AS2655B(2)	UT, SK, WB, AS, NL	
347	<i>Tanaoctenia dehaliaria</i> (Wehrli, 1936)	AS2655B(3), AS3065A(3)	HP, UT	Nepal
348	<i>Tanaoctenia haliaria</i> (Walker, 1861)	AS1714A(2), AS2248A(2)	UT, SK, WB, AR, ME	Nepal, Bhutan, Myanmar, China, Taiwan, Vietnam, Japan

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349	<i>Thinopteryx crocoptera</i> (Kollar, 1844)	AS1692A(1)	JK, HP, UT, SK, WB, AR, AS, ME, AN	Pakistan, Nepal, Bhutan, Bangladesh, China, Taiwan, Hong Kong, Vietnam, Malaysia, Indonesia (Java, Sumatra), Japan, Korea, Russia
350	<i>Uliura combustaria</i> (Walker, 1866)	AS1714A(1), AS2462A(2), AS2462C(1), AS2655B(1)	UT, SK, AR	Thailand
351	<i>Xandrames dholaria</i> (Moore, 1868)	AS2248A(4)	HP, UT, SK, WB, AS, NL	Nepal, China, Taiwan, Thailand, Japan, Korea
352	<i>Xenoplia foraria</i> (Guenée, 1858)	AS1843B(2), AS2061A(1), AS2462C(1)	HP, UT, SK, WB	
353	<i>Xenoplia maculata</i> (Moore, 1868)	AS1272A(1), AS1843B(1), AS2061A3), AS2462C(1)	HP, UT, SK, WB, AR, ME	Nepal
Subfamily: Geometrinae Leach, 1815				
354	<i>Chlorissa distinctaria</i> (Walker, 1866)	AS4216A(1)	HP, UT, SK, JH	Bhutan
355	<i>Chlorissa gelida</i> (Butler, 1889)	AS825A(1), AS1714A(1), AS1843B(1), AS2655B(1)	HP, UT, AR	
356	<i>Chlorodontopera discospilata</i> (Moore, 1867)	AS2462B(2)	UT, SK, ME	Myanmar, Taiwan
357	<i>Chloroglyphica variegata</i> (Butler, 1889)	AS1843B(1), AS2248A(1)	HP, UT	
358	<i>Chlororithra fea</i> (Butler, 1889)	AS1222A(1), AS1843B(2)	HP, UT, SK, WB, AR, ME	Pakistan, Nepal, Bhutan, Myanmar, China (Tibet)
359	<i>Comibaena delineata</i> (Warren, 1893)	AS3065A(2)	UT, AS	Nepal
360	<i>Comostola maculata</i> (Moore, 1868)	AS4216A(1)	HP, UT, SK, TN	Sri Lanka, Japan, Australia

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361	<i>Comostola subtiliaria</i> (Bremer, 1864)	AS1029A(1)	HP, UT, SK, AR, TN	Nepal, Bangladesh, Sri Lanka, China, Taiwan, Malaysia, Indonesia, Australia, Japan, Korea, Russia
362	<i>Dindica polyphaenaria</i> (Guenée, 1858)	AS632D(1)	HP, UT, SK, WB, AR, ME	Nepal, Bhutan, China, Taiwan, Vietnam, Thailand, Malaysia, Indonesia, Japan
363	<i>Dindicodes crocina</i> (Butler, 1880)	AS1692A(1)	UT, SK, WB, AR, MN	China, Vietnam, Thailand
364	<i>Episothalma robustaria</i> (Guenée, [1858])	AS632D(3)	UT, SK, AS, TN	
365	<i>Eucyclodes albisparsa</i> (Walker, 1861) *	AS632A(1)	UT	Thailand, Malaysia, Indonesia, Philippines
366	<i>Eucyclodes gavissima</i> (Walker, 1861)	AS1222A(1), AS1630A(1)	HP, UT, SK, AR, AS, MH	Nepal, Bhutan, Sri Lanka, China, Taiwan, Malaysia, Indonesia (Borneo)
367	<i>Geometra flavifrontaria</i> Guenée, 1858	AS1630A(1), AS1692A(1), AS2248A(1), AS2462C(1), AS2800A(6)	HP, UT	Nepal, China, Pakistan
368	<i>Hemistola rubrimargo</i> Warren, 1893	AS1843B(1), AS3225B(1)	UT, WB	
369	<i>Herochroma usneata</i> (Felder & Rogenhofer, 1875)	AS2462C(3)	UT, SK	China
370	<i>Jodis argutaria</i> (Walker, 1866)	AS2248A(1)	UT, SK, WB, AR, ME	
371	<i>Linguisaccus subhyalina</i> (Warren, 1899)	AS1843B(4), AS2248A(1)	UT, SK, WB, AR	Borneo
372	<i>Lophophelma varicoloraria</i> (Moore, 1868)	AS632D(1)	UT, SK, WB, AR	

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373	<i>Maxates glaucaria</i> (Walker, 1866)	AS1356A(1)	HP, UT, SK	Nepal
374	<i>Maxates iridescens</i> (Warren, 1896)	AS2462A(1)	HP, UT, AS	Nepal
375	<i>Neohipparchus vallata</i> (Butler, 1878)	AS1692A(1)	UT, SK, AR, AS	Bhutan, China, Taiwan, Japan, Korea
376	<i>Pachyodes haemataria</i> (Herrich-Schäffer, 1854)	AS1843B(1)	UT, SK, AR, AS, ME	Nepal, Thailand
377	<i>Pingasa crenaria</i> (Guenée, 1858)	AS825A(2)	UT, AR, ME, MH	Nepal, Sri Lanka, Myanmar, China, Taiwan, Malaysia, Indonesia, Papua New Guinea
378	<i>Pingasa pseudoterpinaria</i> (Guenée, 1858)	AS632C(1)	HP, UT, ME, NL	Nepal, China, Japan, Korea
379	<i>Pingasa ruginaria</i> (Guenée, 1858)	AS632D(1)	HP, UT, SK, WB, AR, AS, ME, MN, TR, CT, MH, AN	Nepal, China, Taiwan, Hong Kong, Laos, Thailand, Malaysia, Indonesia (Borneo, Java, Sumatra), Philippines, Japan, South Africa, Ghana, Ethiopia, Tanzania
380	<i>Rhomborista devexata</i> (Walker, 1861)	AS825A(1)	HP, UT, SK, ME, KA	Borneo
381	<i>Tanaorhinus kina</i> Swinhoe, 1893 #	AS1692A(1)	HP, UT, SK, WB, AR, ME, NL	Nepal, Bhutan, China, Taiwan, Laos
382	<i>Tanaorhinus reciprocata</i> (Walker, 1861)	AS1692A(1), AS2248A(1)	HP, UT, SK, WB, AR, ME	Nepal, Bhutan, China, Taiwan, Thailand, Japan, Korea
Subfamily: Larentiinae Duponchel, 1845				
383	<i>Agnibesa recurvilineata</i> Moore, 1888	AS2655B(1)	HP, UT, SK, WB, AR	Nepal, China

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384	<i>Amnesicoma bicolor</i> (Moore, 1888) #	AS3166A(5)	HP, UT, SK	Nepal, China (Tibet)
385	<i>Asthena albosignata</i> (Moore, 1888)	AS1222A(1), AS2655B(7), AS3065A(4), AS3390B(6)	UT, SK, WB, AR	
386	<i>Brabia artemidora</i> (Oberthur, 1884)	AS2009A(1), AS2462C(1)	UT, SK, WB	Russia, Japan, Korea, China, Taiwan, Myanmar, Nepal
387	<i>Brabira atkinsonii</i> Moore, 1888	AS4216A(1)	UT, WB, AR	
388	<i>Cidaria multistriata</i> Rothschild, 1914	AS1692A(1)	HP, UT, SK	China, Japan, Korea, Algeria
389	<i>Colostygia albigirata</i> (Kollar, 1844)	AS1630B(6), AS1714A(3), AS2061A(1), AS2061B(1), AS2279A(2), AS2547A(3), AS3700A(1)	JK, HP, UT, SK	Afghanistan, Nepal, Myanmar, China, Japan, Mongolia, Russia
390	<i>Cosmorhoe neelys</i> Prout, 1940	AS4216A(14)	UT	
391	<i>Docirava postochrea</i> (Hampson, 1893) #	AS1356A(1), AS2723A(1)	HP, UT	
392	<i>Docirava pudicata</i> (Guenée, [1858])	AS1356A(1), AS2195A(1)	HP, UT, SK, AR	Afghanistan, Nepal, Vietnam
393	<i>Dysstroma aquilum</i> Yazaki, 2000 #	AS3065A(2)	UT	Nepal
394	<i>Dysstroma dentifera</i> (Warren, 1896)	AS1630B(1)	HP, UT, WB	Nepal
395	<i>Dysstroma planifasciata</i> (Prout, 1914) *	AS3225B(1)	HP, UT	Nepal
396	<i>Dysstroma sikkimensis</i> (Heydemann, 1932)	AS3343A(1), AS3427A(1)	HP, UT, SK	Nepal

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397	<i>Dysstroma subapicaria</i> (Moore, 1868)	AS2061B(1)	UT, ME	
398	<i>Ecliptopera dentifera</i> (Moore, 1888)	AS1630B(1)	UT, SK, ME	Japan
399	<i>Ecliptopera fulvotincta</i> (Hampson, 1895)	AS2061A(1)	HP, UT	
400	<i>Ecliptopera postpallida</i> (Prout, 1938)	AS1430A(1), AS1692A(1), AS2279A(1), AS3065A(1), AS3225A(1)	HP, UT	Nepal, Bhutan, China
401	<i>Ecliptopera relata</i> (Butler, 1880)	AS1843B(1), AS2195A(1), AS2547A(1)	HP, UT, SK, ME	Nepal, Bhutan
402	<i>Ecliptopera substituta</i> (Walker, 1866)	AS1843B(1), AS3065A(2), AS3225B(8), aS3390B(5), AS3700A(17)	HP, UT, SK	Nepal, Vietnam
403	<i>Electrophaes aliena</i> (Butler, 1880)	AS2279A(1), AS2665B(1)	HP, UT, SK, WB, AR	Nepal, Bhutan
404	<i>Electrophaes niveonotata</i> (Warren, 1901)	AS1843A(1)	UT, SK, WB, AR	Bhutan
405	<i>Electrophaes recta</i> Yazaki, 1994	AS3065A(1)	HP, UT, WB, AR	Nepal
406	<i>Electrophaes zaphenges</i> (Prout, 1940)	AS2462C(1)	UT, WB, AR	Taiwan
407	<i>Euphyia biangulata</i> (Haworth, 1809)	AS2462C(1)	HP, UT	
408	<i>Euphyia cinnamifusa</i> Prout, 1939	AS3390B(1)	HP, UT	
409	<i>Euphyia subangulata</i> (Kollar, 1844)	AS632C(1)	JK, HP, UT	Afghanistan, Pakistan, Nepal, Bhutan
410	<i>Euphyia variegata</i> (Moore, 1868)	AS1630B(8), AS1714A(4), AS2061B(5), AS2279A(2), AS2442A(1), AS2547A(1)	HP, UT, SK, WB	Bhutan, China

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411	<i>Eupithecia rigida</i> Swinhoe, 1892	AS1222A(1)	UT, ME	Borneo, Caledonia, Madagascar
412	<i>Eustroma chalcoptera</i> (Hampson, 1895)	AS3065A(1), AS3225B(1), AS3700A(13), AS4216(6)	UT, SK	Nepal
413	<i>Eustroma elista</i> Prout, 1940	AS3390B(1), AS3700A(3)	UT	
414	<i>Heterophelps ocyptaria</i> (Swinhoe, 1893)	AS632C(1)	HP, UT, SK, AR, ME, NL	Nepal
415	<i>Horisme plurilineata</i> (Moore, 1888)	AS1714A(1)	HP, UT, ME	
416	<i>Hydrelia nepalensis</i> Inoue, 1987	AS2462A(2), AS3065A(1), AS3225B(11), AS3700A(61), AS4216(30)	HP, UT	Nepal
417	<i>Hydrelia rubricosta</i> Inoue, 1982	AS2655B(1), AS3700A(11), AS4216A(3)	HP, UT	Nepal, China
418	<i>Hydrelia rubrilinea</i> Inoue, 1987	AS3390B(1), AS3700A(1)	HP, UT	Nepal, China
419	<i>Hydrelia subobliquaria</i> (Moore, 1868)	AS2462C(1), AS3225B(2)	UT, SK	
420	<i>Laciniodes plurilinearia</i> (Moore, 1868)	AS2462C(3), AS2655B(4)	HP, UT, SK, WB, ME	Nepal, Myanmar, China, Japan, Korea, Russia
421	<i>Lampropteryx</i> <i>argenteolineata</i> (Moore, 1867)	AS2462C(1), AS2800A(1)	UT, SK	
422	<i>Lampropteryx</i> <i>siderifera</i> (Moore, 1888)	AS3225B(2), AS4216A(1)	HP, UT, SK, WB	Nepal
423	<i>Lobogonodes</i> <i>multistriata</i> (Butler, 1889)	AS1692A(1)	HP, UT, SK, ME	Nepal, China, Japan, Korea, Algeria
424	<i>Melanthia catenaria</i> (Moore, 1868)	AS1356A(1), AS2009A(1)	HP, UT, SK, WB, AR, ME	Nepal, Bhutan, China, Taiwan, Japan
425	<i>Neotephria ramalaria</i> (Felder & Rogenhofer, 1875)	AS3065A(14), AS3225B(7), AS3390B(11), AS3700A(66), AS4216A(13)	JK, HP, UT	

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426	<i>Parasthena flexilinea</i> Warren, 1902	AS2655B(3), AS3065A(8), AS3225B(2)	UT	Indonesia (Borneo), Philippines
427	<i>Parentephria stellata</i> (Warren, 1893)	AS3065A(2), AS3390B(9), AS4216A(70)	HP, UT, SK	Nepal
428	<i>Pasiphila palpata</i> (Walker, 1862)	AS1714A(2), AS2061A(2), AS2462C(1), AS2547A(1)	HP, UT, SK, TN	Nepal, China, Sri Lanka, Indonesia (Borneo), Japan
429	<i>Perizoma albofasciata</i> (Moore, 1888)	AS2655A(1)	HP, UT, SK, WB	Nepal, Myanmar, Taiwan
430	<i>Perizoma antisticta</i> (Prout, 1938)	AS2462C(1), AS3065A(1), AS4216A(2)	HP, UT	Pakistan, Nepal
431	<i>Perizoma bicolor</i> Warren, 1893	AS3700A(1), AS4216A(5)	HP, UT, SK	Nepal
432	<i>Perizoma constricta</i> Warren, 1901	AS3225B(7), AS3390B(8), AS3700A(4)	UT	China
433	<i>Perizoma fulvimacula</i> (Hampson, 1896)	AS1121A(1), AS2195A(1), AS2279A(4), AS2547A(2), AS2932A(8), AS3015A(6), AS3150A(4), AS3166A(1), AS3226A(1), AS3390A(5), AS3390B(2)	HP, UT, WB	Nepal
434	<i>Perizoma peculiare</i> Inoue, 2000	AS2195A(1), AS2462A(1), AS2462C(1), AS2655B(5), AS3065A(2), AS3225B(2), AS3390B(1), AS4216A(21)	JK, HP, UT, WB	Nepal, Thailand
435	<i>Perizoma schistacea</i> (Moore, 1888)	AS2195A(1)	HP, UT, SK, WB	Nepal

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436	<i>Perizoma seriata</i> (Moore, 1888)	AS1356A(1), AS2061B(1), AS2279A(1), AS2462A(2), AS2547A(1), AS2800A(1), AS2932A(1), AS3065A(1), aS3226A(1), AS3343A(1), AS3390A(2), AS3497A(2)	HP, UT, WB	Pakistan, Nepal
437	<i>Perizoma variabilis</i> Warren, 1893	AS2061B(1), AS2195A(1), AS3150A(1), AS3225A(1), AS3700A(4), AS4216A(19)	UT, SK	
438	<i>Photoscotosia amplicata</i> (Walker, 1862)	AS632D(1), AS2800A(1)	JK, HP, UT, SK, WB, AR, AS, ME	Pakistan, Nepal, Bhutan, Myanmar, China (Tibet)
439	<i>Photoscotosia dejuta</i> Prout, 1937 #	AS3166A(1)	HP, UT, SK, AR	Nepal, Bhutan
440	<i>Photoscotosia fulguritis</i> Warren, 1893 #	AS3015A(4), AS3150A(1), AS3166A(4)	UT, SK	Nepal
441	<i>Photoscotosia funebris</i> Warren, 1895 *	AS3700A(2)	UT	China, Vietnam
442	<i>Photoscotosia isosticta</i> Prout, 1940 #	AS3225B(1), AS3015A(1)	UT	China (Tibet)
443	<i>Photoscotosia miniosata</i> (Walker, 1862)	AS2800A(2)	HP, UT, SK, WB, AR, PB	Pakistan, Nepal, Bhutan, Bangladesh, China, Taiwan, Philippines
444	<i>Photoscotosia nitida</i> Inoue, 1982	AS3225B(6), AS3390B(1), AS4216A(1)	HP, UT	Nepal
445	<i>Photoscotosia pallidimaculata</i> Yazaki, 1995 *	AS3225B(1)	HP, UT	Nepal

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446	<i>Physetobasis dentifascia</i> Hampson, 1895 #	AS2061A(1), AS2061A(1)	HP, UT, ME, TN	Nepal, Sri Lanka, Taiwan, Hong Kong, Vietnam, Indonesia, Australia, Fiji, Japan
447	<i>Protonebula cupreata</i> (Moore, 1868)	AS2061A(1)	HP, UT, SK, WB	Nepal
448	<i>Rheumaptera cinerea</i> Yazaki, 1995	AS3015A(1), AS3150A(4), AS3343A(1), AS3427A(1), AS3497A(3)	HP, UT	Nepal
449	<i>Rheumaptera desolata</i> Yazaki, 1995 #	AS2800A(1), AS3065A(1)	UT	Nepal
450	<i>Rheumaptera dubiosata</i> (Walker, 1862)	AS1630A(1), AS2009A(1)	HP, UT, SK, PB, TN	Afghanistan, Nepal
451	<i>Rheumaptera tremulata multilinearia</i> (Leech, 1897) #	AS1430A(2)	UT	Nepal, China
452	<i>Trichoplites cuprearia</i> (Moore, 1868)	AS2442A(1)	UT, SK	
453	<i>Triphosa dubiosata</i> (Walker, 1862)	AS2800A(3), AS3225B(3)	HP, UT, SK, PB, TN	Afghanistan, Nepal
454	<i>Triphosa pallescens</i> Warren, 1896	AS2655B(1)	HP, UT	Nepal
455	<i>Triphosa rubrodota</i> (Walker, 1862) #	AS2195A(1)	HP, UT, SK, WB, AR, PB	Nepal, Taiwan
456	<i>Venusia crassisigna</i> Inoue 1987	AS3065A(2), AS3700A(4), AS4216A(1)	HP, UT, AR	Nepal, China
457	<i>Venusia roseicosta</i> Yazaki 1994 *	AS2248A(1)	HP, UT	Nepal
458	<i>Venusia sikkimensis</i> (Elwes, 1893)	AS3700A(3), AS4216A(2)	UT, SK	Nepal
459	<i>Xanthorhoe castanea</i> Warren, 1901	AS3390B(1)	JK, HP, UT	

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460	<i>Xanthorhoe griseiviridis</i> (Hampson, 1895)	AS2655A(1)	HP, UT	Bhutan
461	<i>Xanthorhoe hampsoni</i> Prout, 1925	AS2800A(1), AS3065A(5), AS3166A(2), AS3225B(6), AS3390B(4), AS3700A(29), AS4216(95)	HP, UT	Nepal
462	<i>Xanthorhoe saturata</i> (Guenée, [1858])	AS1121A(1), AS1272A(1), AS1714A(1), AS2462C(1)	HP, UT, WB, ME, TN	Pakistan, China, Vietnam, Taiwan, Japan, Korea
463	<i>Xenortholitha falcata</i> Yazaki, 1993 *	AS1714A(1)	HP, UT	Nepal
464	<i>Xenortholitha latifusata</i> (Walker, 1862)	AS2009A(1), AS2279A(11), AS2442A(1), AS2547A(1)	HP, UT	Pakistan, Taiwan
465	<i>Xenortholitha propinguata</i> Kollar, 1844	AS2279A(1)	HP, UT	Nepal, China, Japan, Korea, Mongoloia, Russia, Tajikistan
Subfamily: Sterrhinae Meyrick, 1892				
466	<i>Idaea falcipennis</i> Warren 1893	AS2061B(1), AS2547A(1)	HP, UT, SK	
467	<i>Lophophleps informis</i> (Warren, 1897)	AS1692A(1)	HP, UT, ME	Nepal, Taiwan
468	<i>Problepsis albidior</i> Warren, 1899	AS632B(1), AS2248A(1)	HP, UT, WB, AR, MI	Nepal, China (Tibet), Taiwan, Thailand, Indonesia, New Guinea, Japan, Korea
469	<i>Rhodostrophia cinerascens</i> (Moore, 1888)	AS1714A(1), AS1843B(1), AS2061A(2), AS2279A(3), AS3390A(1)	JK, HP, UT, SK, WB	Afghanistan
470	<i>Rhodostrophia pelloniaria</i> (Guenée, 1858)	AS3343A(1)	HP, UT, ME	Pakistan, China (Tibet)
471	<i>Rhodostrophia stigmatica</i> Butler, 1889	AS1121A(1), AS1356A(1), AS1714A(1), AS2195A(2)	HP, UT	Nepal

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472	<i>Rhodostrophia vinacearia</i> (Moore, 1868)	AS3390A(1), AS3497A(1)	HP, UT, SK, ME	Pakistan
473	<i>Rodometra sacraria</i> (Linnaeus, 1767)	AS749A(1), AS1029A(1)	UT, ME	Africa, Europe
474	<i>Scopula achrosta</i> Prout, 1935	AS1121A(1), AS1222A(1), AS1272A(1), AS2061A(1), AS2248A(1), AS2462C(1)	JK, HP, UT	Pakistan
475	<i>Scopula ferrilineata</i> (Moore, 1888)	AS1843B(2)	UT, WB	
476	<i>Scopula pallida</i> (Warren, 1888)	AS1121A(3), AS1630B(1)	HP, UT, SK	Pakistan
477	<i>Scopula pulchellata</i> (Fabricius, 1794)	AS1029A(1), AS1843B(2)	HP, UT, SK, WB, AS, GJ, CT, MH, GA, KA, TN, OD	Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Malaysia, Indonesia, Namibia, Botswana, Ethiopia, Kenya, Somalia, South Africa, Zimbabwe, Tanzania, Uganda, Madagascar
478	<i>Scopula remotata</i> (Guenée, 1858)	AS1029A(1)	JK, UT, WB	
479	<i>Synegiodes elasmlatus</i> Cui, Jiang & Han, 2018	AS1692A(1), AS1843B(5)	HP, UT, SK, AR	China
480	<i>Timandra convectoria</i> Walker, 1861	AS1430A(1), AS1630B(1), AS1843B(1), AS3390A(1)	UT, SK, WB, AS, MH, TN	Bangladesh, China (Tibet), Taiwan, Hong Kong, Vietnam, Indonesia, Philippines, Japan, Korea, Russia
481	<i>Timandra correspondens</i> Hampson, 1895	AS1714A(1)	HP, UT, WB, AR, ME, NL, MN, KL	Nepal, Bhutan, Myanmar, China (Tibet), Vietnam

Superfamily: Noctuoidea Latreille, 1809				
Family: Notodontidae Stephens, 1829				
Subfamily: Dudusiinae Matsumura, 1929				
482	<i>Tarsolepis (Megashachia) fulgurifera</i> (Walker, 1858)	AS1843B(2)	UT, SK, AR, AS, NL	China (Taiwan), Myanmar, Nepal
Subfamily: Heterocampinae Neumoegen & Dyer, 1894				
483	<i>Fentonia excurvata altitudinis</i> Kiriakoff, 1974	AS632D(1)	UT	Nepal, China (Guangdong, Guangxi, Hunan, Jiangxi), Taiwan
Subfamily: Notodontinae Stephens, 1829				
484	<i>Acmeshachia albifascia</i> (Moore, 1879)	AS1692A(2)	UT, SK, WB, AR	Nepal, Myanmar, China (Tibet), Taiwan, Vietnam, Japan
485	<i>Acmeshachia gigantea</i> (Elwes, 1890)	AS2248A(1)	HP, UT, SK, WB, AR, AS, ME	Pakistan, Nepal, Myanmar, China, Taiwan, Vietnam, Thailand
486	<i>Chlorostauropus alternus alternus</i> (Walker, 1855)	AS632D(2)	HP, UT, WB, AR, AS, ME, JH, CT, MH, KA, OD, AN	Bangladesh, Myanmar, China, Taiwan, Vietnam, Laos, Cambodia, Thailand, Indonesia (Borneo), Japan
487	<i>Cleapa latifascia</i> Walker, 1855	AS632C(1), AS1272A(3), AS1843B(2)	JK, UT, CT, MH	Pakistan, Nepal, Sri Lanka, Myanmar, China, Taiwan, Vietnam, Thailand, Indonesia
488	<i>Harpyia longipennis</i> (Walker, 1855)	AS2061A(1)	HP, UT, SK, WB, AR, S India	Pakistan, Nepal, China, Taiwan, Japan
489	<i>Hexafrenum sikkima</i> (Moore, 1879)	AS632D(1), AS1843B(1), AS2061A(1), AS2248A(1), AS2655B(1)	UT, SK, WB, ME, KA	Indonesia (Borneo)
490	<i>Hexafrenum unicolor</i> (Kiriakoff, 1974)	AS1630A(1), AS1692A(3), AS1843B(3)	UT, AR	Pakistan, Nepal, Bhutan, Myanmar, China (Tibet)

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491	<i>Hiradonta hannemanni</i> Schintlmeister, 1989	AS1692A(3)	UT	China
492	<i>Megaceramis lamprolepis</i> Hampson, 1892	AS3065A(1)	UT, SK	China (Taiwan), Nepal, Vietnam
493	<i>Neodrymonia canifusa</i> (Hampson, 1896)	AS1692A(1), AS1843B(1)	UT, ME	
494	<i>Nerice (Pseudonerice) pictibasis</i> (Hampson, 1897) #	AS2248A(1)	UT, AR, AS, ME	Nepal, Myanmar, China, Vietnam, Thailand
495	<i>Peridea moorei moorei</i> (Hampson, 1892) #	AS1843B(1), AS2248A(2), AS2061A(5), AS2655B(3)	UT, WB	Nepal, China (Tibet), Taiwan
496	<i>Peridea swata</i> Kiriakoff, 1974	AS2248A(1), AS2061A(1)	UT	Pakistan, Nepal
497	<i>Pheosiopsis (Suzukiana) niteria</i> (Schaus, 1928)	AS2248A(1)	UT, AS	Thailand
498	<i>Pseudofentonia (Pseudofentonia) argentifera</i> (Moore, 1866)	AS2248A(2)	UT, SK, WB	Nepal, Myanmar, China, Taiwan, Vietnam, Thailand, Indonesia (Sumatra)
499	<i>Ptilodon atrofusa</i> (Hampson, 1892)	AS3390B(1)	UT, WB, AR	China (Taiwan)
500	<i>Stauropus sikkimensis khasianus</i> Rothschild, 1917	AS1843B(1)	UT, AS, ME	China
501	<i>Stauropus sikkimensis sikkimensis</i> Moore, 1866 #	AS2462C(1), AS2655B(3), AS2800A(1), AS3065A(1)	UT, SK, WB, AS, ME	Nepal, Myanmar, China, Taiwan, Vietnam, Thailand
502	<i>Syntypistis umbrosa</i> (Matsumura, 1927)	AS2248A(1)	UT, WB, NL, UP	Pakistan, Nepal, Myanmar, China, Taiwan, Malaysia, Indonesia, Philippines

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503	<i>Viridifentonia plagiviridis plagiviridis</i> (Moore, 1879)	AS2061A(1), AS2462C(1), AS2655B(7), AS2800A(1)	UT, SK, WB, AR	Nepal
Subfamily: Periergosinae Kobayashi, 2016				
504	<i>Chadisra bipars</i> Walker, 1862	AS632D(4)	UT, AR, ME, MH	Nepal, Myanmar, China, Taiwan, Laos, Vietnam, Thailand, Malaysia
505	<i>Periergos kamadena</i> (Moore, 1866) #	AS2009A(2)	HP, UT, NE India	Nepal, Myanmar, China (Tibet), Taiwan, Vietnam, Laos, Thailand
506	<i>Rachia plumosa</i> Moore, 1879	AS2655B(2)	UT, SK, WB	Nepal, China (Tibet), Taiwan
Subfamily: Phalerae Butler, 1886				
507	<i>Phalera (Erconholda) torpida torpida</i> Walker, 1865 #	AS632C(2), AS749A(1)	UT, SK	Pakistan, Nepal, Bangladesh, Myanmar, China, Taiwan, Vietnam, Cambodia, Thailand
508	<i>Phalera (Phalera) goniophora</i> Hampson, 1910	AS2462C(1)	UT, SK, AR, AS, ME, PB	Nepal, Myanmar, China, Taiwan, Laos, Vietnam, Thailand, Indonesia (Borneo)
509	<i>Phalera (Phalera) parivala</i> Moore, 1860	AS632D(1), AS1692A(1), AS1843B(1)	UT, SK, WB, AR	Pakistan, Nepal, Bhutan, Myanmar, China, Taiwan
510	<i>Phalera (Phalera) raya</i> Moore, 1860	AS1843B(3)	HP, UT, SK, WB, NL, JH, CT, MP, MH, TN	Nepal, Sri Lanka, Myanmar, China, Vietnam, Laos, Cambodia, Thailand, Indonesia (Borneo)
Subfamily: Pygaerinae Duponchel, 1845				
511	<i>Clostera fulgurita fulgurita</i> (Walker, 1865)	AS632D(1)	HP, UT, UP, S India	Nepal, Sri Lanka, Myanmar, China, Indonesia (Borneo, Java, Sulawesi), Papua New Guinea

512	<i>Micromelalopha sitecta</i> Schintlmeister, 1989	AS4216A(1)	UT	China (Yunnan), Myanmar, Nepal
Subfamily: Spataliinae Matsumura, 1929				
513	<i>Bireta longivitta</i> <i>longivitta</i> Walker, 1856	AS1430A(1), AS1692A(6)	HP, UT, SK, NL, MH	Pakistan, Nepal, Myanmar, China, Taiwan
514	<i>Biula obliqua</i> (Hampson, 1897)	AS632C(1)	UT, AS, ME	China (Taiwan), Nepal
515	<i>Curuzza caii nepalensis</i> Kobayashi & Kishida, 2008	AS2655B(3), AS2800A(4), AS3065A(2)	UT, SK, AR	Nepal
516	<i>Curuzza crenelata</i> (Swinhoe, 1896)	AS2195A(1)	UT, AS, ME	China (Taiwan), Myanmar, Thailand, Vietnam
517	<i>Ginshachia baenzigeri</i> Schintlmeister, 2007	AS632D(1)	UT, SK	China, Laos, Myanmar, Nepal, Thailand, Vietnam
518	<i>Honveda nepalina</i> Nakamura, 1976 *	AS1430A(2), AS1630A(1), AS1843B(2)	UT	Nepal
519	<i>Mimopydna</i> <i>schintlmeisteri</i> <i>schintlmeisteri</i> Kobayashi & Kishida, 2007	AS2800A(3), AS3065A(2)	UT	Nepal
520	<i>Mimopydna sikkima</i> <i>sikkima</i> (Moore, 1879)	AS1843B(1), AS2061A(1), AS2248A(2)	UT, SK, WB, AS, ME	Nepal, Myanmar, China, Taiwan, Laos, Cambodia, Malaysia, Indonesia (Java)
521	<i>Ogulina eupatagia</i> (Hampson, 1892)	AS2655A(1), AS2800A(8), AS3065A(92)	UT, SK	China (Taiwan), Nepal
522	<i>Ogulina ochrocinerea</i> Sugi, 1995	AS1843B(1), AS2061A(2), AS2248A(1)	UT	Nepal
523	<i>Ramesa docilis docilis</i> (Walker, 1857)	AS2061A(1)	UT, SK, WB, AR, AS	
524	<i>Rosama plusioides</i> Moore, 1879	AS1272A(1), AS1430A(1)	HP, UT, SK, WB	Cambodia, China (Yunnan, Hainan), Laos, Myanmar, Nepal, Thailand, Vietnam

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525	<i>Spatalia (Celeia) sikkima</i> (Moore, 1879)	AS632C(1), AS632D(1), AS2932A(1), AS3166A(1)	UT, SK, AR, KA	Nepal, Myanmar, China, Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia (Sumatra, Borneo, Sulawesi), Philippines
526	<i>Spatalina ferruginosa</i> (Moore, 1879)	AS2061A(1)	UT, SK, WB	China (Taiwan, Yunnan)
Subfamily: Thaumetopoeinae Aurivillius, 1889				
527	<i>Gazalina apsara</i> (Moore, 1859)	AS1121A(1), AS1430A(1), AS1843B(12), AS2061A(3), AS2248A(11), AS2279A(1)	HP, UT, SK, WB, AR	Pakistan, Nepal, China
528	<i>Gazalina chrysolopha</i> (Kollar, 1844)	AS1272A(1), AS1843B(2), AS2009A(1), AS2061A(4), AS2248A(3), AS2655B(2), AS2462A(1), AS2547A(2), AS3225B(1), AS2723A(1)	JK, HP, UT, SK, WB, AR	Pakistan, Nepal, Myanmar, China, Taiwan, Thailand
Subfamily: Unassigned				
529	<i>Himalodontosia mahendra</i> (Sugi, 1993)	AS1630A(1)	UT	Nepal
Family: Erebidae Leach, 1815				
Subfamily: Aganainae Lafontaine & Fibiger, 2006				
530	<i>Asota caricae</i> Fabricius, 1775	AS632C(2), AS749A(1)	JK, HP, UT, WB, AS, NL, TR, RJ, MP, CT, MH, GA, KA, TN, KL, AN	Nepal, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Thailand, Malaysia, Indonesia (Borneo, Java, Sumatra), Philippines, Timor, Australia, Japan

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531	<i>Asota ficus</i> (Fabricius, 1775)	AS632C(2)	HP, UT, WB, AS, ME, JH, PB, CT, MP, MH, OD, TN	Pakistan, Nepal, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Thailand, Japan
532	<i>Asota producta</i> (Butler, 1875)	AS632C(4)	UT, SK, WB, AR, AS, TR, MH, TN	Nepal, Sri Lanka, Myanmar, China, Thailand, Malaysia, Indonesia
533	<i>Mecodina cineracea</i> (Butler, 1879)	AS1272A(1)	UT	Nepal, China, Taiwan, Japan
Subfamily: Anobinae Holloway, 2005				
534	<i>Plecoptera bilinealis</i> (Leech, 1889)	AS1692A(1)	UT	Nepal
Subfamily: Arctiinae Leach, 1815				
535	<i>Aglaomorpha plagiata</i> (Walker, 1855)	AS632C(1)	JK, HP, UT, SK, WB, AR, AS, ME, NL, BH	Afghanistan, Pakistan, Nepal, Bhutan, Bangladesh, Myanmar, China, Vietnam, Laos, Philippines, Korea
536	<i>Agrisius guttivitta</i> Walker, 1855	AS1843B(1)	UT, SK, AR, AS	Nepal
537	<i>Alphaea florescens</i> (Moore, 1879)	AS2061A(1)	UT, SK, WB, AS	Nepal
538	<i>Alphaea imbuta</i> (Walker, 1855) #	AS2800A(1)	JK, HP, UT, SK, WB, AS	Pakistan, Nepal, Bhutan
539	<i>Alphaea impleta</i> (Walker, [1865])	AS1692A(3), AS2248A(1)	JK, HP, UT, SK, WB, AR, AS, ME, NL	Nepal, China (Tibet)
540	<i>Amata cyseus</i> (Stoll [1782])	AS825A(1), AS1029A(1), AS1222A(1), AS1272A(2), AS1430A(2), AS1630A(4), AS1843A(4)	UT, SK, MH	Nepal, Sri Lanka

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541	<i>Ammatho cuneonotatus</i> Walker, 1855	AS1272A(1)	UT, SK, AS	Nepal, Sri Lanka, Cambodia, Thailand, Malaysia, Sumatra, Borneo, Philippines
542	<i>Areas galactina</i> (Hoeven, 1840)	AS1692A(2), AS2248A(1)	JK, HP, UT, SK, AR, AS, ME, NL, MN, AN	Nepal, Bhutan, Bangladesh, Myanmar, China, Taiwan, Vietnam, Thailand, Myalaysia, Indonesia (Sumatra, Borneo, Java), Philippines
543	<i>Areas imperialis</i> (Kollar, [1844])	AS2061A(1)	JK, HP, UT, SK, AS, NL	Pakistan, Nepal, Myanmar, China, Indonesia (Java)
544	<i>Argina astrea</i> (Drury, 1775)	AS632D(1)	JK, HP, UT, SK, WB, AR, AS, CT, JH, MH, KA, TN, AN	Nepal, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Indonesia, Philippines, New Guinea, Australia, Japan, Ghana, Madagascar, Brazil, Mexico, Peru
545	<i>Barsine defecta</i> Walker, 1854	AS1630A(10), AS1692A(1), AS2061A(1)	UT, WB	Nepal
546	<i>Barsine linga</i> Moore, 1859	AS632C(1), AS749A(1)	JK, HP, UT, SK, WB, AR, AS, ME. MI	Nepal, Bhutan, China, Laos, Thailand
547	<i>Barsine orientalis</i> <i>bigamica</i> Cerný, 2009	AS1121A(1)	JK, HP, UT, SK, WB, AR, AS, ME. MI	Nepal, Bhutan, China, Laos, Thailand
548	<i>Barsura nubifascia</i> (Walker, [1865])	AS2195A(5), AS2547A(2), AS2655B(2)	HP, UT, SK, WB	Pakistan, Nepal, China (Tibet)
549	<i>Brunia antica</i> (Walker, 1854)	AS632E(1), AS749A(1)	UT, AN, TN	Sri Lanka, Taiwan, Sundaland, Borneo

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550	<i>Callindra nepos</i> (Leech, 1899)	AS749A(1), AS1843B(4)	UT, SK	Nepal, China
551	<i>Callindra principalis</i> (Kollar, [1844])	AS1692A(1)	JK, HP, UT, SK, WB, AR	Afghanistan, Pakistan, Nepal, Bhutan, Myanmar, China
552	<i>Callindra similis</i> (Moore, 1879)	AS2655B(2)	HP, UT, SK, WB	Nepal, Bhutan, China (Tibet), Costa Rica
553	<i>Capissa alba</i> Kirti, Singh & Joshi, 2014	AS2462B(1), AS2655A(1), AS3166A(1)	JK, UT	
554	<i>Capissa vagesa innotata</i> (Butler, 1877)	AS1222A(1), AS1843B(1)	JK, UT	Nepal, Myanmar
555	<i>Capissa vagesa vagesa</i> (Moore, 1859)	AS1222A(1), AS1222A(1)	UT, SK, AS	Nepal
556	<i>Chrysorabdia bivitta</i> (Walker, 1856)	AS632B(1)	JK, HP, UT, SK, WB, AR, AS, ME, MN	Pakistan, Nepal, Bhutan, Myanmar
557	<i>Chrysorabdia viridata</i> (Walker, [1865])	AS749A(1)	HP, UT, SK, WB, AR, AS, ME	Pakistan, Bhutan, Bangladesh, Myanmar, China
558	<i>Churinga beema</i> (Moore, [1866])	AS2061A(1), AS2655B(1)	UT, SK, WB	Nepal
559	<i>Churinga metaxantha</i> (Hampson, 1895)	AS1630A(2)	UT	Nepal, Bhutan
560	<i>Churinga rufifrons</i> Moore, 1878	AS2248A(1)	HP, UT, SK, WB	Nepal, Bhutan
561	<i>Cladarctia bharmourensis</i> Kaleka, 2005	AS749A(1), AS1843B(2), AS4216A(3)	HP, UT	
562	<i>Cladarctia quadriramosa</i> (Kollar, [1844])	AS749A(1), AS2462B(1)	JK, HP, UT, SK, AR, AS, ME, MH	Pakistan, Nepal, Bhutan, China (Tibet)

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563	<i>Cretonotos transiens</i> (Walker, 1855)	AS632C(9)	HP, UT, SK, WB, AR, AS, CT, MP	Afghanistan, Pakistan, Nepal, Bhutan, Bangladesh, Myanmar, China, Vietnam, Thailand, Malaysia, Indonesia (Sumatra, Sulawesi, Borneo, Lombok), Philippines, Australia, Japan
564	<i>Cyana adita</i> (Moore, 1859)	AS1356A(2), AS1430A(1), AS2248A(2), AS2061A(3)	HP, UT, SK, WB, AR, AS, ME	Nepal, Bhutan, China, Vietnam, Thailand
565	<i>Cyana arama</i> (Moore, 1859)	AS1843B(1)	HP, UT, SK, WB, AR, AS, ME, NL, MI	
566	<i>Cyana chrysopeleia</i> Singh, Volynkin, Kirti & Datta, 2019	AS2009A(1), AS2061A(1)	UT, AR, AS, MZ	
567	<i>Cyana detrita</i> Walker, 1854	AS1272A(2)	JK, HP, UT, SK, WB, AR, AS, ME, NL	Afghanistan, Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, China, Indonesia (Java, Sumatra), Madagascar
568	<i>Cyana gazella</i> (Moore, 1872)	AS1843B(1)	JK, HP, UT, SK, WB, AS, ME	Nepal, China, Thailand, Vietnam
569	<i>Cyana gelida</i> (Walker, 1854)	AS2723A(1)	HP, UT, SK, AR, AS, ME, NL, UP	Nepal, Bangladesh, Thailand
570	<i>Cyana guttifera</i> (Walker, 1856)	AS1356A(3)	HP, UT, SK, WB, AS, NL, BH, JH, MH, KL, AN	Nepal, China, Thailand

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571	<i>Cyana intercomma</i> Cerný, 2009 #	AS632D(1)	JK, UT, SK, AS	Laos, Cambodia, Thailand, Malaysia
572	<i>Cyana khasiana</i> Hampson, 1897	AS1843B(3), AS2195A(1)	UT, SK, WB, AR, ME	China (Sichuan, Yunnan), Thailand, Vietnam
573	<i>Cyana puella</i> (Drury, 1773)	AS749A(1), AS1714A(1), AS1843B(1)	JK, HP, UT, SK, PB, JH, CT, MP, MH, KA, TN, OD	Pakistan, Nepal, Sri Lanka, Myanmar, China, Indonesia (Java), Madagascar, Kenya
574	<i>Cyana quadrinotata</i> (Walker, 1869)	AS1843B(2)	UT, SK, WB, AR, AS, ME, MZ	Nepal, China, Bhutan, Bangladesh, Myanmar, Vietnam, Thailand, Laos, Cambodia, Malaysia, Java
575	<i>Cyana signa</i> (Walker, 1854)	AS1356A(1), AS1692A(1), AS2248A(1)	JK, HP, UT, SK, WB, AR, AS, ME, MN, CT	Nepal, Bangladesh, Myanmar, China (Tibet), Vietnam, Thailand
576	<i>Dolgoma reticulata</i> (Moore, [1866]) #	AS2061A(1), AS2462C(1), AS2655B(2), AS2800A(2)	JK, HP, UT, SK, AR, KA	Thailand
577	<i>Eilema basinota</i> (Moore, 1866) #	AS2248A(1)	HP, UT, SK, WB	
578	<i>Fossia punicea</i> (Moore, 1878)	AS632C(1), AS1121A(7)	UT, SK, WB, AR, AS, MZ	Bhutan, Myanmar
579	<i>Ghoria postfusca</i> (Hampson, 1894) #	AS2655B(3)	HP, UT, SK, AR	China (Tibet), Japan
580	<i>Katha conformis</i> (Walker, 1854)	AS1029A(3), AS1222A(1), AS1843B(3)	JK, HP, UT, SK, WB, ME	Bhutan, China, Thailand, Japan
581	<i>Katha montana</i> Bucsek, 2012 #	AS1121A(2), AS1714(2)	HP, UT, AR	Malaysia
582	<i>Lemyra bimaculata</i> (Moore, 1879)	AS1692A(1)	HP, UT, WB	Nepal

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583	<i>Lemyra multivittata</i> (Moore, [1866]) #	AS1356A(1)	JK, HP, UT, SK, WB, AR, AS, ME, NL, UP	Nepal, Myanmar, China, Vietnam, Thailand
584	<i>Lemyra neglecta</i> (Rothschild, 1910) #	AS4216A(1)	HP, UT, SK, AS	Nepal, China, Myanmar
585	<i>Lemyra persephone</i> Salditis, Volynkin & Dubatolov, 2020 *	AS1714A(1)	UT	Nepal
586	<i>Lemyra punctilinea</i> (Moore, 1879)	AS1630A(10), AS2061A(1), AS3065A(4)	UT, AS	Pakistan, Nepal, China
587	<i>Lemyra rhodophila</i> (Walker, [1865]) #	AS1714A(1)	HP, UT, SK	Pakistan, China (Tibet), Nepal, Myanmar
588	<i>Lemyra stigmata</i> (Moore, [1866])	AS2279A(4), AS2442A(1), AS2655B(1), AS3015A(2), AS3065A(1)	JK, HP, UT, SK, WB, AR, AS	Pakistan, Nepal, Bhutan, Myanmar, China, Taiwan, Vietnam, Thailand
589	<i>Macotasa nubecula</i> (Moore, 1879)	AS632C(1), AS749A(1), AS1630A(1), AS1843B(1), AS2061A(1), AS2248A(4), AS2462C(1)	HP, UT, AR, NL, MN, KA, TN, AN	Nepal, Myanmar, Indonesia (Borneo)
590	<i>Macrobrochis albifascia</i> (Fang, 1982)	AS1843B(3), AS2248A(3)	UT	Nepal
591	<i>Macrobrochis gigas</i> (Walker, 1854)	AS749A(1)	HP, UT, SK, WB, AS, ME, JH, MP, MH, KA	Nepal, China, Taiwan, Hong Kong, Vietnam, Thailand, Malaysia
592	<i>Macrobrochis pallens</i> Hampson, 1894	AS2248A(2)	HP, UT	Nepal, Myanmar, China
593	<i>Macrobrochis prasena</i> (Moore, 1859)	AS1029A(1), AS1222A(4), AS1430A(1), AS1630A(1), AS1692A(2)	HP, UT, SK, AR, AS, ME, NL	Nepal, Bhutan, Thailand

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594	<i>Mangina argus</i> (Kollar, [1844])	AS632A(1)	JK, HP, UT, SK, WB, AR, ME, MN, JH, MH, KA, KL	Nepal, Bhutan, Sri Lanka, China, Taiwan, Hong Kong, Thailand, Philippines
595	<i>Miltochrista calamaria</i> (Moore, 1888) #	AS1843B(1)	HP, UT, AS, ME	Nepal, Indonesia (Borneo)
596	<i>Miltochrista dasara</i> (Moore, [1860]) #	AS2462B(1)	HP, UT, SK, AS, TN	Nepal, Indonesia (Sumatra, Java)
597	<i>Miltochrista dharma</i> (Moore, 1879) #	AS632C(3), AS1029A(1), AS2061A(1)	HP, UT	Japan
598	<i>Moorasura gloriosa</i> (Moore, 1878)	AS1630A(5), AS1692A(2)	UT, Sk, AR, AS, ME, MN	
599	<i>Nishada flabrifera</i> Moore, 1878	AS1630A(1), AS1843B(1)	UT, WB, TN, KL	Nepal
600	<i>Nyctemera adversata</i> (Schaller, 1788)	AS2009A(1)	HP, UT, SK, WB, AR, AS, ME, NL, MN, TR	Nepal, Bhutan, Bangladesh, Myanmar, China, Taiwan, Hong Kong, Vietnam, Thailand, Malaysia, Indonesia (Sumatra, Borneo), Philippines, Japan, Korea
601	<i>Oeonistis altica</i> (Linnaeus, 1768)	AS1430A(1)	UT, ME	China, Taiwan, Vietnam, Sundaland, Philippines
602	<i>Olepa ricini</i> (Fabricius, 1775)	AS632C(1)	UT, WB, AR, AS, PB, CT, MH, KA, TN, KL	Pakistan, Nepal, Bangladesh, Sri Lanka, Hong Kong, Thailand, Malaysia, Philippines
603	<i>Preparctia hannyingtoni</i> Hampson, 1910	AS3150A(2), AS3166A(3)	UT	Nepal
604	<i>Sidyma albifinis</i> Walker, 1856	AS1692A(1), AS2061A(1)	HP, UT, SK, AR, AS, NL	Nepal, Vietnam

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605	<i>Spilarctia eldorado</i> (Rothschild, 1910)	AS632C(1)	UT, AS	Sri Lanka
606	<i>Spilarctia multiguttata</i> (Walker, 1855)	AS632C(1), AS632D(2), AS749A91), AS825A(3), AS1121A(1), AS1272A(1)	JK, UT, SK, AS	Nepal, China (Tibet), Bhutan, Myanmar, Cambodia
607	<i>Spilarctia obliqua</i> (Walker, 1855)	AS2061A(2)	UT, SK, WB, AR, AS, BH, PB, CT, KA, TN, KL	Afghanistan, Pakistan, Nepal, Bhutan, Bangladesh, Myanmar, China, Australia, Russia
608	<i>Spilarctia sagittifera</i> Moore, 1888	AS2248A(1)	HP, UT	Nepal, China (Guangxi, Guangdong, Zhejiang, Shaanxi, Sichuan, Tibet, Yunnan, Jiangsu, Jiangxi, Fujian), Taiwan
609	<i>Stigmatophora palmata</i> (Moore, 1878)	AS632C(1), AS749A(1)	HP, UT, SK, AR, AS, ME	Nepal, China, Vietnam
610	<i>Syntomoides imaon</i> (Cramer, [1779])	AS1714A(1)	UT, SK, ME, AS, JH, TN	Nepal, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Thailand, Malaysia, Indonesia (Borneo), Maldives
611	<i>Teulisna protuberans</i> (Moore, 1878)	AS632E(1)	UT, SK, WB, AR	Bhutan
612	<i>Thysanoptyx tetragona</i> (Walker, 1854)	AS1029A(1), AS1843B(2)	UT, SK, WB, AR, AS, ME, NL, MN, TR, CT, TN, KL	Nepal, Bangladesh, China, Vietnam, Thailand
613	<i>Vamuna remelana</i> (Moore, 1866)	AS1356A(2), AS1714A(1), AS2195A(1)	HP, UT, SK, WB, AR, ME, NL, MI, TR	Nepal, Bhutan, Bangladesh, China, Malaysia, Indonesia (Borneo, Java)

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614	<i>Vamuna virilis</i> (Rothschild, 1913)	AS1714A(1)	UT	Taiwan, Malaysia
615	<i>Zadadra distorta</i> (Moore, 1872)	AS1714A(1), AS2462C(1), AS4216A(1)	UT, SK, AS	Nepal
Subfamily: Boletobiinae Guenée, [1858]				
616	<i>Ataboruza divisa</i> (Walker, 1862)	AS1843A(1)	UT	China, Sri Lanka, Australia, Ivory Coast, Ghana, Nigeria, Cameroon, Gabon, Kenya, Madagascar, Mauritius
617	<i>Tamba nigrilineata</i> (Wileman, 1915)	AS1029A(1)	UT	Nepal, Japan
Subfamily: Calpininae Boisduval, 1840				
618	<i>Calyptra fasciata</i> (Moore, 1882)	AS632D(1), AS1029A(1), AS1843B(2)	HP, UT, SK, WB, AR, ME, MH	Nepal, Myanmar, China, Vietnam, Thailand
619	<i>Calyptra ophideroides</i> (Guenée, 1852)	AS1121A(4)	HP, UT	Nepal, Singapore
620	<i>Oraesia emarginata</i> (Fabricius, 1794) #	AS632D(1), AS632A(1), AS632B(1), AS749A(1)	JK, HP, UT, WB, AR, AS, ME, PB, CT, MP, MH, KA, TN, KL	Pakistan, Nepal, Sri Lanka, Myanmar, China, Hong Kong, Taiwan, Vietnam, Thailand, Malaysia, Indonesia (Borneo, Sulawesi), Philippines, New Guinea, Australia, Japan, Korea, Africa
621	<i>Oraesia rectistria</i> Guenée, 1852 #	AS632D(1)	JK, HP, UT, SK, WB, AR	Nepal, Bangladesh, Thailand

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622	<i>Plusiodonta coelonota</i> (Kollar, [1844]) #	AS1029A(2)	HP, UT, WB	Nepal, China, Taiwan, Sri Lanka, Malaysia, Vietnam, Indonesia, Phillipines, New Guinea, Australia, Japan, Korea
623	<i>Rema tetraspila</i> (Walker, 1865)	AS632C(1)	HP, UT	Pakistan, Nepal, Sri Lanka, Myanmar, Thailand, Europe, South Africa
624	<i>Tinolius eburneigutta</i> Walker, 1855 #	AS632D(1)	UT, WB, TN, KL, AN	Nepal, Bangladesh, Sri Lanka, China, Hong Kong, Thailand, Malaysia, Indonesia
Subfamily: Erebinæ Leach, 1815				
625	<i>Achaea janata</i> (Linnaeus, 1758)	AS632D(1)	HP, UT, WB, AS, JH, PB, CT, MH, KA, TN, KL	Nepal, Bhutan, Myanmar, China, Taiwan, Vietnam, Thailand, Malaysia, Indonesia, Philippines, Australia, New Guinea, Japan, Ethiopia
626	<i>Artena dotata</i> (Fabricius, 1794)	AS632C(1)	JK, HP, UT, WB, AR, AS, ME, NL, MN, JH, CT, MH, GA, TN, KL, OD	Pakistan, Nepal, Bhutan, Sri Lanka, Myanmar, China, Taiwan, Vietnam, Cambodia, Thailand, Malaysia, Indonesia (Sumatra), Philippines, Papua New Guinea, Japan, Korea, Russia
627	<i>Bamra lepida</i> (Moore, 1867)	AS632D(1)	HP, UT, SK, WB	Nepal, Taiwan, Hong Kong

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628	<i>Bastilla analis</i> (Guenée, 1852)	AS749A(1)	HP, UT, SK, NL, CT, KA, TN	Nepal, Sri Lanka, Myanmar, China, Taiwan, Vietnam, Thailand, Indonesia (Java), Europe
629	<i>Bastilla latifascia</i> Warren, 1888	AS632C(1)	HP, UT, PB	Pakistan, Sri Lanka, Myanmar, China, Japan, Europe, Africa
630	<i>Bastilla praetermissa</i> (Warren, 1913)	AS1029A(1), AS1430A(1)	UT, WB, AR	Nepal, Bhutan, China, Taiwan, Hong Kong, Thailand
631	<i>Batracharta irrorata</i> Hampson, 1894	AS2061A(1)	JK, HP, UT, MN	Nepal, China, Thailand, Indonesia (Sumatra)
632	<i>Catocala patala</i> Felder & Rogenhofer, 1874	AS3150A(1), AS3166A(2)	JK, HP, UT, AR, PB	China, Japan, Korea
633	<i>Catocala tapestrina</i> (Moore, 1882)	AS2248A(1), AS2462C(1)	HP, UT, SK, WB	Nepal, Bhutan, Myanmar, China
634	<i>Chalciope mygdon</i> (Cramer, 1777)	AS632D(1)	HP, UT, SK, WB, AR, AS, NL, MN, JH, CT, MP, MH, KA, TN, KL, OD, AN	Nepal, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia (Borneo, Java, Sumatra), Philippines, Japan
635	<i>Daddala lucilla</i> (Butler, 1881)	AS1843B(1)	UT, SK, WB, AR, AS, ME, PB	Nepal, Myanmar, China, Taiwan, Hong Kong, Thailand, Malaysia, Indonesia (Borneo, Java, Bali, Sumatra, Sulawesi), Papua New Guinea, Japan, Korea

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636	<i>Dysgonia arctotaenia</i> (Guenée, 1852)	AS632C(2)	HP, UT, AS, JH, CT, MP, MH	Pakistan, Nepal, Bangladesh, Sri Lanka, Myanmar, Taiwan, Indonesia (Java, Borneo), Fiji, New Guinea, Australia Japan, Korea
637	<i>Erebus ephesperis</i> (Hubner, 1827)	AS632A(1)	HP, UT, SK, AR, AS, ME, NL, TR, JH, PB, CT, MH, GA, KA, TN, KL, OD, AN	Sri Lanka, Myanmar, China, Taiwan, Malaysia, Indonesia (Borneo, Sumatra, Java), Philippines, Timor, Australia, New Guinea, Japan
638	<i>Ericeia pertendens</i> (Walker, 1858)	AS632D(1)	UT, WB, AR, MH, KA, AN	Nepal, Sri Lanka, Myanmar, China, Thailand, Malaysia, Indonesia (Borneo), Korea, Australia
639	<i>Fodina pallula</i> Guenée, 1852	AS632C(1), AS749A(1)	HP, UT, WB, AR, AS, PB, MP	Nepal, Bhutan, Bangladesh, Sri Lanka, China, Thailand
640	<i>Hypersypnoides</i> <i>submarginata</i> (Walker, 1865)	AS1356A(1)	JK, HP, UT, SK, AR	China, Taiwan, Malaysia, Indonesia, Japan, Korea, Iran
641	<i>Hypopyra feniceca</i> Guenée, 1854 #	AS749A(1)	HP, UT, WB, AS	Nepal, Bangladesh, China, Vietnam, Thailand
642	<i>Lacera procellosa</i> Butler, 1879 #	AS632B(2), AS632D(1)	HP, UT, SK, WB, AS, ME, MH, MP, KA, TN, AN	Nepal, Sri Lanka, Myanmar, China, Taiwan, Vietnam, Cambodia, Thailand, Indonesia, Phillippines, Japan, Korea, Africa, Madagascar
643	<i>Mocis discios</i> (Kollar, 1848)	AS1843B(3)	JK, HP, UT	Nepal

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644	<i>Mocis frugalis</i> (Fabricius, 1775)	AS1356A(1)	HP, UT, SK, WB, AR, AS, ME, MN, TR, JH, UP, PB, CT, MH, KA, TN, KL, OD, AN	Pakistan, Nepal, Sri Lanka, China, Taiwan, Hong Kong, Vietnam, Laos, Cambodia, Malaysia, Thailand, Indonesia, Philippines, Australia, Fiji, Japan, Egypt, South Africa
645	<i>Mocis undata</i> (Fabricius, 1775)	AS632C(3), AS749A(1)	HP, UT, WB, AR, AS, ME, TR, BH, UP, PB, MP, CT, MH, KA, KL, TN, OD, AN	Nepal, Sri Lanka, China, Taiwan, Hong Kong, Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia, Philippines, Japan, Korea, Africa
646	<i>Ophiusa indistincta</i> (Moore, 1882)	AS632D(2), AS1843B(1)	HP, UT, WB, ME, MH	Laos, Thailand, Indonesia
647	<i>Spirama retorta</i> (Clerck, 1764)	AS632C(1)	JK, HP, UT, SK, WB, AS, ME, NL, DL, CT, AD, MH, GA, KA, TN, KL	Nepal, Bhutan, Bangladesh, Myanmar, China, Taiwan, Hong Kong, Cambodia, Thailand, Malaysia, Indonesia (Java), Philippines, Japan, Korea
648	<i>Sypnoides cyanivitta</i> (Moore, 1867)	AS2195A(1)	UT, SK, WB, AR	Nepal, Bangladesh, China, Thailand
649	<i>Sypnoides kirbyi</i> (Butler, 1881)	AS1692A(1)	HP, UT, SK, WB	China, Thailand

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650	<i>Trigonodes hyppasia</i> (Cramer, 1779)	AS632C(2), AS749A(1)	HP, UT, WB, AR, AS, ME, NL, JH, UP, DL, CT, MP, MH, GA, KA, TN, KL, AN	Pakistan, Nepal, Sri Lanka, China, Taiwan, Hong Kong, Vietnam, Cambodia, Thailand, Malaysia, Indonesia, Philippines, Australia, Papua New Guinea, Japan, Iran, Madagascar, Kenya, Mozambique, South Africa, Honduras, Mexico, USA
Subfamily: Herminiinae Leach, 1815				
651	<i>Adrapsa quadrilinealis</i> Wileman, 1914	AS1222A(1)	UT	Japan
652	<i>Bertula incongruens</i> (Butler, 1879)	AS2248A(1)	UT	Japan, Korea, Russia
653	<i>Simplicia mistacalis</i> (Guenée, 1854)	AS1222A(1), AS2462C(1)	UT, WB	China, Taiwan, Japan, Myanmar, Malaysia, Java, Borneo, Philippines, New Guinea
Subfamily: Hypeninae Herrich-Schäffer, 1851				
654	<i>Coarica fasciata</i> Moore, 1882	AS2061A(1)	UT, WB	Nepal
655	<i>Dichromia quadralis</i> (Walker, 1858)	AS1356A(3)	HP, UT, SK, WB, ME, AN	Afghanistan, Nepal, Bhutan, Myanmar, China, Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia (Borneo, Sumatra), Philippines

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656	<i>Dichromia sagitta</i> (Fabricius, 1775) #	AS1356A(1)	HP, UT, AS, WB, MH, KA, TN, KL, OD	Pakistan, Sri Lanka, China, Taiwan, Hong Kong, Vietnam, Thailand, Japan, Korea
657	<i>Dichromia trigonalis</i> Guenée, 1854	AS632C(1)	JK, HP, UT, SK, WB, ME, MP	Pakistan, Nepal, Thailand, China, Taiwan, Japan, Korea, Iran
658	<i>Dichromia tripicalis</i> Walker, [1859]	AS1843B(4)	UT, SK, WB, ME	Bhutan, Australia
659	<i>Hypena abductalis</i> Walker, 1859	AS1029A(2), AS1356A(1), AS1630B(3)	UT, PB	Japan, Java
660	<i>Hypena albisigna</i> Moore, 1882	AS632D(1)	UT, ME	
661	<i>Hypena conscitalis</i> Walker, [1866] #	AS749A(1)	UT, WB, ME	Sri Lanka, Taiwan, Vietnam, Cambodia, Thailand, Indonesia (Sumatra, Java), Australia, Papua New Guinea, Fiji, Japan, South Africa, Tanzania, Madagascar
662	<i>Hypena laesalis</i> Walker, 1859	AS632D(1), AS1121A(1), AS1222A(2), AS1714A(1)	UT	Java, Solomon Islands
663	<i>Hypena obductalis</i> Walker, [1859]	AS2655B(1)	HP, UT, SK, WB, ME, MH	China, Japan
664	<i>Hypena perspicua</i> Leech, 1900	AS1843B(1)	UT	China
665	<i>Hypena proboscidalis</i> Linnaeus, 1758	AS2442A(1)	JK, UT	China, Korea, Japan, Taiwan, Siberia, Iran, Russia

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666	<i>Hypena robustalis</i> Snellen, 1880	AS632E(1), AS749A(2), AS1029A(2), AS1222A(1), AS1272A(1), AS1356A(4), AS1430A(1), AS1630B(6), AS1714A(2)	India	Thailand, Indonesia (Borneo)
667	<i>Hypena tenebralis</i> Moore, 1867	AS2547A(1)	UT, WB	
668	<i>Hypena tristalis</i> Lederer, 1853 *	AS2061A(1)	UT	Russia, China
669	<i>Perciana marmorea</i> Walker, 1865	AS1843B(1)	UT	Nepal
Subfamily: Hypocalinae Guenée, 1852				
670	<i>Hypocala rostrata</i> (Fabricius, 1794)	AS2248A(1)	UT	Afghanistan, Nepal, China, Bangladesh, Taiwan, Korea, Japan, Philippines, Indonesia, Spain, Mauritania, Nigeria, Botswana, Zaire, Kenya, Tanzania, Zambia, Zimbabwe, Mozambique, South Africa, Namibia
671	<i>Hypocala subsatura</i> Guenée, 1852	AS1843B(1)	HP, UT, WB, AR, AS, MP, MH, KA, TN, KL, OD	Pakistan, Nepal, Bangladesh, Myanmar, China, Taiwan, Hong Kong, Vietnam, Thailand, Malaysia, Indonesia (Borneo, Java), Philippines, Australia, Japan, Korea, Russia, Africa
Subfamily: Lymantriinae Hampson, 1893				

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672	<i>Arctornis comma</i> (Hutton, 1865)	AS632C(1)	HP, UT, AR, TN	Nepal, Myanmar, China
673	<i>Arctornis cygna</i> (Moore, 1879) #	AS1630B(1), AS2248A(1)	HP, UT, SK, WB, ME	Nepal, China
674	<i>Artaxa digramma</i> (Boisduval, 1844)	AS1121A(1), AS1222A(1), AS1430A(3), AS1630A(2), AS1843B(1), AS2462A(1)	UT, AS	Nepal, China, Bhutan, Myanmar, Bhutan, Sri Lanka, Indonesia (Java, Sumatra)
675	<i>Artaxa vitellina</i> (Kollar, 1848)	AS1430A(1), AS1843B(1)	JK, HP, UT, SK, MH	Pakistan, Sri Lanka
676	<i>Calliteara horsfieldii</i> (Saunders, 1851)	AS2655B(2), AS2800A(4), AS3065A(6)	HP, UT, WB, AR, AS, NL, TN	Laos, Thailand, Malaysia, Indonesia (Java, Sarawak, Celebs, Sulawesi), Papua New Guinea, Australia
677	<i>Calliteara postfusca</i> (Swinhoe, 1895)	AS632D(1)	UT, AS	Nepal, Taiwan
678	<i>Dasychira complicata</i> (Walker, 1865)	AS2248A(1)	HP, UT, SK, WB, AR	Nepal, Bhutan, China
679	<i>Dasychira flavimacula</i> Moore, 1866	AS2655B(1), AS3065A(1), AS4216A(1)	UT, WB	Nepal, China (Tibet)
680	<i>Euproctis basalis</i> (Moore, 1879)	AS1356A(1), AS2061A(1)	UT, AS	Nepal
681	<i>Euproctis divisa</i> Walker, 1855	AS1356A(1), AS1714A(2), AS2061A(1), AS2462A(4), AS4216A(3)	UT, SK, WB, AR, NL, PB	Pakistan, Nepal, Bhutan, Bangladesh, China, Malaysia, Indonesia (Sumatra, Borneo), Japan, Africa
682	<i>Euproctis fraterna</i> (Moore, 1883)	AS1630B(1)	UT	Nepal, Sri Lanka
683	<i>Euproctis inconcisa</i> (Walker, 1865)	AS1714A(2)	UT, SK, WB	Nepal

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684	<i>Euproctis latifascia</i> Walker, 1855 #	AS1630A(5), AS1714A(1), AS1843B(4), AS2279A(1), AS2655A(1), AS4216A(1)	HP, UT, SK	Nepal, Bhutan, Taiwan
685	<i>Euproctis madana</i> Moore, 1859	AS632D(2)	UT, WB	Nepal
686	<i>Euproctis marginata</i> (Moore, 1879)	AS1843B(3), AS2248A(1)	HP, UT, SK, WB, AR, NL, MN	Nepal, Bhutan, China, Taiwan
687	<i>Euproctis plagiata</i> (Walker, 1855)	AS632C(2), AS1121A(1), AS1630A(1), AS1843A(1), AS2195A(3)	UT	Nepal
688	<i>Euproctis postica</i> Walker, 1865	AS1356A(1), AS1430A(1), AS1714A(1), AS1843A(1), AS2195A(3), AS4216A(1)	India	Nepal
689	<i>Ilema bhana</i> (Moore, [1866])	AS1843B(2), AS2061B(1), AS4216A(3)	UT, WB	Nepal
690	<i>Ilema preangerensis</i> <i>melanochlora</i> (Hampson, 1895)	AS1222A(1)	UT	Nepal, Bhutan
691	<i>Laelia litura</i> (Walker, 1855)	AS1843B(1)	UT	Nepal
692	<i>Leucoma clara</i> (Walker, 1865)	AS2061A(1)	UT, SK	Taiwan, Hong Kong
693	<i>Lymantria concolor</i> <i>concolor</i> Walker, 1855	AS1356A(1), AS1714A(1)	HP, UT, SK, WB, AR, AS, ME, NL, MN, KA, KL	Pakistan, Nepal, Bangladesh, Myanmar, China, Taiwan, Vietnam, Thailand, Australia, Brazil
694	<i>Lymantria incerta</i> Walker, 1865 #	AS632C(2)	HP, UT, MP, CT, MH, KA, TN	Sri Lanka
695	<i>Lymantria liedgensii</i> Schintlemeister, 2004	AS632C(2), AS1356A(1)	UT	Nepal, China, Myanmar, Vietnam

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696	<i>Lymantria marginata</i> Walker, 1855	AS632C(1)	HP, UT, WB, JH, MP, AD, AN	Nepal, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Thailand
697	<i>Lymantria mathura</i> Moore, 1866	AS632D(1)	HP, UT, WB, SK, AR, AS, ME, NL, TR	Nepal, Taiwan, Hong Kong, Thailand, Indonesia (Borneo), Japan, Korea, Russia, United States, Canada
698	<i>Lymantria moesta</i> Swinhoe, 1903	AS632C(1), AS1029A(1)	HP, UT	
699	<i>Lymantria semmicincta</i> (Walker, 1855)	AS632D(1), AS749A(1)	HP, UT, SK, WB, ME, JH, MP, OD	Nepal, Taiwan, Thailand
700	<i>Lymantria serva</i> (Fabricius, 1793)	AS632C(2), AS2655A(1)	HP, UT, SK, WB, AR, AS, ME, JH, MP, OD	Nepal, Sri Lanka, Myanmar, China, Taiwan, Malaysia, Philippines
701	<i>Nygmia plana</i> (Walker, 1856)	AS1714A(1)	UT, WB	Nepal
702	<i>Olene inclusa</i> (Walker, 1856)	AS3225A(1), AS3390B(1)	UT	Nepal, Java, Philippines
703	<i>Olene mendosa</i> Hubner, 1823	AS1843B(1)	UT	Nepal, Sri Lanka, Bangladesh, Java, New Guinea, Australia
704	<i>Olene tenebrosa</i> (Walker, 1865)	AS1692A(1), AS1714A(1), AS2248A(1)	UT, WB	China (Tibet), Japan
705	<i>Pida calligramma</i> (Walker, 1865)	AS632D(1), AS1356A(1), AS1714A(3), AS2248A(1), AS2462C(1), AS2547A(1)	UT, SK, WB	Nepal
706	<i>Pida decolorata</i> (Walker, 1869) #	AS1714A(1)	HP, UT, ME	Nepal, Taiwan
707	<i>Pida patrana</i> (Moore, 1859)	AS1356A(1), AS1714A(1), AS2462B(1), AS2195A(1), AS2248A(1)	HP, UT, SK, WB, AR, ME, JH, MP, OD	Nepal, Bhutan, Myanmar, China, Taiwan

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708	<i>Somena scintillans</i> Walker, 1865	AS1121A(1), AS2248A(1)	JK, HP, UT, WB, AR, AS, RJ, MH, KA, KL, AN	Pakistan, Nepal, Sri Lanka, Myanmar, China, Taiwan, Japan, Korea
Subfamily: Pangraptinae Grote, 1882				
709	<i>Pangrapta parvula</i> (Leech, 1900)	AS2061A(1)	UT	China
Subfamily: Rivulinae Grote, 1895				
710	<i>Bocula bifaria</i> (Walker, 1858) #	AS632D(2)	UT, AR	China, Thailand, Malaysia, Indonesia (Borneo, Sarawak, Sumatra), Philippines, Australia
Subfamily: Scoliopteryginae Herrich-Schäffer, [1852]				
711	<i>Rusicada albitibia</i> (Walker, 1858)	AS2009A(1)	UT	Sri Lanka, Borneo, Australia
Subfamily: Tinoliinae Moore, [1885]				
712	<i>Calesia dasyptera</i> (Kollar, 1844)	AS632B(1)	HP, UT, SK, WB, JH, MH	Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Vietnam, Laos, Thailand
Family: Euteliidae Grote, 1882				
Subfamily: Euteliinae Grote, 1882				
713	<i>Anigraea rubida</i> Walker, 1862	AS1692A(1), AS1843B(1)	UT	Malaysia, Taiwan, Indonesia (Borneo, Sulawesi)

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714	<i>Eutelia adulatorix</i> Hübner, 1813	AS1843B(1)	HP, UT, WB	Afghanistan, Sri Lanka, Iran, Kajaksthan, Turkey, Italy, France, Spain, Portugal, Greece, Bulgaria, Croatia, Austria, Syria, Russia, South Africa, Algeria, Botswana, Egypt, Ethiopia, Kenya, Morocco, Namibia, South Africa, Tanzania, Tunisia, Zimbabwe
715	<i>Penicillaria jocosatrix</i> Guenée, 1852	AS632D(1)	JK, UT, WB, BH, JH, PB, MH, TN, KL, AN	Nepal, Sri Lanka, China, Taiwan, Vietnam, Cambodia, Thailand, Malaysia, Indonesia (Sumatra, Java, Borneo, Sulawesi), Philippines, Fiji, Australia, Japan, Turkey, Tanzania, Hawaii, United States
Family: Nolidae Bruand, 1847				
Subfamily: Chloephorinae Stainton, 1859				
716	<i>Blenina quinaria</i> Moore, 1881	AS632D(1)	UT, SK, WB, ME	Nepal, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Indonesia (Sumatra, Bali, Sulawesi, Sumbawa, Flores, Borneo), Brunei, Philippines, New Guinea, Japan
717	<i>Calymera confinis</i> (Warren, 1906)	AS632D(1)	UT, AS	

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718	<i>Carea angulata</i> (Fabricius, 1793)	AS632D(2)	JK, HP, UT, WB, AS, ME, TR, JH, CT, MH, GA, AN	Nepal, Sri Lanka, China, Hong Kong, Vietnam, Thailand, Indonesia (Sumatra, Java, Maluku, Sulawesi)
719	<i>Gelastocera castanea</i> (Moore, 1879)	AS1714A(1)	HP, UT, SK, WB, AR	Nepal, Thailand, Malaysia, Indonesia (Sumatra, Borneo, Bali), Brunei
720	<i>Kerala grisea</i> (Hampson, 1912)	AS2462C(1)	UT, SK	China (Tibet)
721	<i>Kerala punctilineata</i> Moore, 1881	AS1356A(1), AS1714A(5), AS2195A(1), AS2462A(1)	UT, WB	Myanmar, Borneo
722	<i>Maurilia iconica</i> (Walker, [1858])	AS1843B(1)	UT	Sri Lanka, Borneo, Sumara, New Guinea, Queensland, Samoa, New Caledonia, Seychelles
723	<i>Negritothripa orbifera</i> (Hampson, 1894)	AS632D(1)	UT, SK	Nepal, Myanmar, Thailand, China
724	<i>Tyana callichlora</i> Walker, 1886	AS2061A(2)	UT, SK, WB, AR	Nepal, Bhutan, China, Vietnam, Thailand
725	<i>Tyana falcata</i> (Walker, 1866)	AS1714A(1), AS2248A(3), AS2061A(3)	UT, SK, WB, AR	Nepal, China, Taiwan, Laos, Thailand
726	<i>Tympanistes rubidorsalis</i> Moore, 1889	AS2462A(1), AS2462C(2)	HP, UT	Nepal
Subfamily: Eariadinae				
727	<i>Earias roseoviridis</i> Sugi, 1982 #	AS632D(1)	UT	Taiwan, Vietnam, Thailand, Japan, Korea, Russia
Subfamily: Eligminae Mell, 1943				
728	<i>Selepa plumbeata</i> Hampson, 1912	AS632D(1)	UT	Sri Lanka, Indonesia (Borneo)
Subfamily: Nolinae Hampson, 1894				

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729	<i>Meganola scriptoides</i> Holloway, 2003 *	AS1843B(1)	UT, AR	China, Thailand, Malaysia, Indonesia (Borneo)
Subfamily: Risobinae Mell, 1943				
730	<i>Risoba flavipennis</i> Hampson, 1895	AS1843B(1)	UT	Bhutan
Subfamily: Westermanniinae Hübner, 1821				
731	<i>Westermannia triangularis</i> Moore, 1887	AS632D(1)	UT, AR, AS, JH, TN, KL, AN	Nepal, China, Thailand, Malaysia, Indonesia (Sumatra, Borneo, Sulawesi), Philippines
Family: Noctuidae Latreille, 1809				
Subfamily: Plusiinae Boisduval, 1829				
Tribe: Abrostolini Eichlin & Cunningham, 1978				
732	<i>Abrostola anophioides</i> Moore, 1882	AS632D(1), AS1843B(1)	UT, WB	Nepal, China, Taiwan
Tribe: Argyrogrammatini Eichlin & Cunningham, 1978				
733	<i>Chrysodeixis acuta</i> (Walker, 1858)	AS632D(1), AS1029A(1)	HP, UT, WB, MH, KA	Pakistan, Nepal, Sri Lanka, China, Taiwan, Hong Kong, Vietnam, Thailand, Indonesia (Sumatra, Borneo, Bali, Flores), Philippines, Timor, Papua New Guinea, Australia, Japan, Europe, UAE, Cameroon, Namibia, Zimbabwe, Congo, Kenya, Nigeria, Ethiopia, Ghana, South Africa, Uganda
734	<i>Chrysodeixis chalcites</i> (Esper, 1789)	AS1029A(2)	HP, UT	Germany, Italy, Croatia, France, Switzerland, Greece, Austria, Africa, Asia

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735	<i>Ctenoplusia albostriata</i> (Bremer & Grey, 1853)	AS1630B(1)	HP, UT, AP, PB, DL, KR, TN, KA, OD, ME	China, Sri Lanka, Indonesia, New Guinea, Australia, New Zealand
736	<i>Ctenoplusia furcifera</i> (Walker, [1858])	AS1843B(1)	HP, UT, WB, KL, TN	Pakistan, Nepal, Taiwan, New Guinea, Burkina Faso, Nigeria, Ivory Coast, Gabon, Equatorial Guinea, Cameroon, Arabia, Ethiopia, Kenya, Tanzania, Zambia, Zimbabwe, S.Africa, Comoros, Madagascar
737	<i>Thysanoplusia orichalcea</i> (Fabricius, 1775)	AS1843B(1)	HP, UT, WB, AR, AS, ME, MN, NL, BH, UP, RJ, MP, MH, KA, TN	Pakistan, Nepal, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Indonesia, Philippines, Papua New Guinea, Australia, New Zealand, Japan, Russia, Iran, Switzerland, United Kingdom, Netherlands, Portugal, Israel, Spain, Ethiopia, South Africa, Zimbabwe, Hawaii, Brazil
Tribe: Plusiini Boisduval, 1829				
738	<i>Autographa purpureofusa</i> (Hampson, 1894)	AS3166A(1)	UT, SK	Nepal, Myanmar, China
Subfamily: Bagisarinae Crumb, 1956				
739	<i>Chasmina tibialis</i> (Fabricius, 1775)	AS632C(1), AS632D(1)	UT, SK, PB, TN	Sri Lanka, Sumatra, New Guinea, Australia, Madagascar, Senegal

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740	<i>Xanthodes intersepta</i> Guenée, 1852	AS632B(1), AS2442A(1)	HP, UT, SK, WB, AR, AS, TR, CT, MP, MH, AN	Nepal, Sri Lanka, Bangladesh, Mayanmar, China, Taiwan, Hong Kong, Vietnam, Thailand, Indonesia (Java, Sulawesi, Sumatra, Celebes), Philippines, Japan, Africa
741	<i>Xanthodes transversa</i> Guenée, 1852	AS632A(1)	HP, UT, SK, WB, AS, MP, MH, KA, TN, KL, AN	Pakistan, Nepal, Bangladesh, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Indonesia (Java), Philippines, Timor, Papua New Guinea, Australia, Japan, Korea
Subfamily: Eustrotiinae Grote, 1882				
742	<i>Maliattha picata</i> (Butler, 1889)	AS1430A(1)	HP, UT	Nepal
743	<i>Micardia pulcherrima</i> (Moore, 1867) #	AS2061A(1)	HP, UT, SK, WB, AR, NL, KA, TN, KL	Bhutan, China (Tibet)
Subfamily: Acontiinae Guenée, 1841				
Tribe: Acontiini Guenée, 1841				
744	<i>Acontia (Emmelia)</i> <i>marmoralis</i> (Fabricius, 1794) #	AS1630A(2), AS1714A(1)	UT, AR, JH, KA, TN, KL	Nepal, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Cambodia, Thailand, Indonesia (Java), Australia, Japan, Oman, UAE
Subfamily: Aediinae Beck, 1960				

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745	<i>Aedia leucomelas</i> (Linnaeus, 1758) #	AS749A(1)	HP, UT, JH, CT, KA, AN	Pakistan, Nepal, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia (Borneo, Java, Sulawesi), Philippines, Fiji, Papua New Guinea, Australia, Japan, Korea, Russia, Ukraine, Turkey, Israel, Jordan, Italy, France, Greece, Germany, Portugal, Poland, Austria, Romania, Africa
Subfamily: Pantheinae Smith, 1898				
746	<i>Anacronicta infausta</i> (Walker, 1856)	AS1843B(8), AS2061A(5), AS2248A(3)	UT, ME	Nepal, Bangladesh
747	<i>Donda unispinosa</i> Bandyopadhyay, Raha and Chandra, 2019	AS632D(1)	UT	
748	<i>Tambana subflava</i> (Wileman, 1911)	AS1843B(1)	UT, SK, WB, AR, AS, NL, ME	Nepal, China, Taiwan, Vietnam, Thailand, Japan
749	<i>Trisuloides sericea</i> Butler, 1881	AS2248A(1)	HP, UT, SK, WB, ME	Pakistan, Nepal, Myanmar, China, Taiwan, Vietnam, Thailand, Japan
Subfamily: Acronictinae Harris, 1841				
Tribe: Acronictini Smith & Dyar, 1898				
750	<i>Acronicta bicoloraria</i> (Yoshimoto, 1994)	AS2248A(1)	UT	Nepal

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751	<i>Acronicta (Triaena) denticulata</i> (Moore, 1888)	AS1843B(1)	UT	Nepal
752	<i>Acronicta gastridia</i> (Swinhoe, 1895)	AS3225A(1)	JK, UT	Nepal
753	<i>Acronicta pruinosa</i> (Guenée, 1852)	AS1692A(1), AS1843B(1)	UT	Sri Lanka, Myanmar, Borneo, Java, Taiwan, Malaysia, New Guinea
Tribe: Unassigned				
754	<i>Harmandicrania nubilata</i> (Hampson, 1894)	AS2462C(1)	UT, SK	Nepal
755	<i>Thalathoides conjecturalis</i> (Swinhoe, 1890)	AS632D(1)	UT	Sri Lanka, Myanmar, Borneo
Subfamily: Agaristinae Boisduval, 1833				
756	<i>Aegocera bimacula</i> Walker, 1854	AS632D(1), AS632C(2)	UT, SK, AS, JH, CT, MP, MH	Nepal, Sri Lanka, Mayanmar, Cambodia, Thailand
757	<i>Sarbanissa dissimilis</i> (Swinhoe, 1890) #	AS1430A(1)	UT, SK, WB, AS, ME, NL	Nepal, Mayanmar, Vietnam, Thailand, Indonesia (Java, Borneo)
758	<i>Sarbanissa transiens</i> (Walker, 1856)	AS632D(1)	HP, UT, SK, WB, AR, AS, NL, ME, CT	Nepal, Bhutan, Myanmar, China, Vietnam, Malaysia, Thailand, Indonesia (Sumatra, Java, Borneo, Bali)
Subfamily: Cuculliinae Herrich-Schäffer, [1850]				
759	<i>Apostema distigmata</i> (Hampson, 1906)	AS2547A(2), AS3150A(1), AS3343A(1), AS3427A(1)	HP, UT	
760	<i>Cucullia pullata</i> (Moore, 1881)	AS3150A(1), AS3166A(4)	JK, HP, UT, SK	Nepal, China
Subfamily: Amphipyrinae Guenée, 1838				
Tribe: Amphipyryni Guenée, 1838				

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761	<i>Amphipyra cupreipennis</i> Moore, 1888	AS3150A(2)	HP, UT, SK, WB, AR, NL	Nepal, Bhutan
762	<i>Amphipyra pyramidea</i> (Linnaeus, 1758) #	AS1714A(1)	JK, UT	China, Taiwan, Japan, Korea, Russia, Finland, Poland, Turkey, Lebanon, Syria, Israel, Iraq, Iran, Kazakhstan, Germany, United Kingdom, Norway, Italy, Austria, Finland, Netherlands, France, Portugal, Sweden, Denmark, USA
763	<i>Nacna prasinaria</i> (Walker, [1865]) #	AS2248A(1)	UT, SK, WB	Nepal, China, Thailand
Tribe: Psaphidini Grote, 1896				
764	<i>Diphtherocome discibrunnea</i> (Moore, 1867)	AS2248A(1), AS2655B(2)	HP, UT, SK, WB, ME, NL	Pakistan, Nepal, Thailand
765	<i>Diphtherocome diverticulata</i> Hreblay & Kononenko, 1999 *	AS3065A(2), AS3390B(1), AS3700A(1)	UT	China
766	<i>Diphtherocome fasciata</i> (Moore, 1888)	AS3150A(1)	HP, UT, SK, AR	Nepal, China
767	<i>Diphtherocome pallida</i> (Moore, 1867)	AS632B(1), AS2547A(4), AS3225B(1), AS3015A(1), AS3150A(1)	HP, UT, SK, WB, AR, NL	Pakistan, Nepal, China (Tibet),
Subfamily: Heliothinae Boisduval, 1829				

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768	<i>Helicoverpa armigera</i> (Hübner, [1805])	AS1843A(3), AS2462A(6), AS3065A(4)	JK, HP, UT, HP, WB, AR, AS, BH, PB, CT, MP, MH, KA, TN	Afghanistan, Pakistan, Nepal, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Thailand, Indonesia (Borneo, Java), Philippines, Papua New Guinea, Australia, New Zealand, Japan, Korea, Turkey, Germany, Denmark, Portugal, Italy, France, Spain, Norway, Finland, Austria, Netherlands, United Kingdom, UAE, South Africa, Kenya, Tanzania, Uruguay, Peru
Subfamily: Condicinae Poole, 1995				
Tribe: Condicini Poole, 1995				
769	<i>Bagada poliomera</i> (Hampson, 1908)	AS632D(1)	UT, AS	Nepal, China, Sumatra, Borneo
770	<i>Condica atricuprea</i> (Hampson, 1908)	AS2655A(1), AS2655B(1), AS2800A(1), AS3225A(1)	UT, SK	China (Tibet)

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771	<i>Condica capensis</i> (Guenée, 1852)	AS632D(1), AS749A(2), AS1222A(1), AS1272A(1), AS1356A(1), AS1843B(1), AS2248A(1)	HP, UT, SK, WB, AS, NL, MH, TN, KL	Sri Lanka, Myanmar, China, Indonesia (Borneo, Sarawak), Hong Kong, Singapore, Taiwan, Australia, Spain, Morocco, Mauritania, Arabia, Egypt, Congo, Eritrea, Somalia, Kenya, Burundi, Zaire, Equatorial Guinea, Zambia, S.Africa, Ghana, Cape Verde, Comoros, Madagascar
772	<i>Condica illecta</i> (Walker, 1865)	AS825A(1), AS1029A(3), AS1121A(1), AS1630B(1), AS1714A(2), AS1843B(3)	UT	Nepal, Borneo, Australia
773	<i>Hadjina cupreipennis</i> (Moore, 1882)	AS2800A(2), AS3065A(1), AS3225B(1)	UT, SK, WB	Nepal, Pakistan
Subfamily: Eriopinae Herrich-Schäffer, [1851]				
774	<i>Callopietria callopietroides</i> (Moore, 1881)	AS1430A(1), AS1692A(1), AS1843B(2)	UT, AS	Indonesia, Philippines (Luzon)
775	<i>Callopietria minor</i> Hampson, 1891	AS1356A(1), AS1430A(1), AS1630A(1), AS1843B(4)	UT, TN	Nepal
776	<i>Callopietria pulchrilinea</i> (Walker, 1862)	AS632D(1), AS1029A(1), AS1222A(1), AS1692A(2), AS1714A(1), AS1843B(2), AS3343A(1)	UT, SK, TN	Nepal, Myanmar, Sri Lanka, Vietnam, Singapore, Java, Borneo, Fiji

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777	<i>Calloplistria repleta</i> Walker, 1858	AS632A(1), AS632D(1), AS1692A(1), AS1843B(3)	HP, UT, AS, ME, TN, KA	Pakistan, Nepal, China, Taiwan, Vietnam, Laos, Thailand, Malaysia, Indonesia (Sumatra, Borneo), Japan, Korea, Russia
778	<i>Calloplistria rivularis</i> Walker, 1858	AS632C(1), AS1272A(1)	HP, UT, MP, KA, TN, KL, AN	Nepal, Sri Lanka, China, Taiwan, Hong Kong, Thailand, Malaysia, Indonesia (Sulawesi, Borneo), New Guinea, Fiji, Australia, Melanesia, Japan, Korea
Subfamily: Bryophilinae Guenée, 1852				
779	<i>Bryophila literata</i> Moore, 1881	AS3166A(1)	JK, HP, UT	
Subfamily: Xyleninae Guenée, 1837				
Tribe: Prodeniini Forbes, 1954				
780	<i>Spodoptera cilium</i> Guenée, 1852	AS2195A(1)	HP, UT	Nepal, Indonesia (Borneo), Greece, Italy, Spain, Albania, Turkey, Portugal, Afganisthan, Africa

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781	<i>Spodoptera litura</i> (Fabricius, 1775)	AS632C(1)	HP, UT, WB, AR, AS, NL, TR, DL, PB, CT, MH, AD, KA, TN, KL, OD, GA	Pakistan, Nepal, Sri Lanka, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Malaysia, Indonesia (Borneo, Sarawak), Philippines, Timor, Australia, New Zealand, Papua New Guinea, Fiji, Melanesia, Tonga, Vanuatu, Japan, Korea, Russia, United Arab Emirates
782	<i>Spodoptera pecten</i> Guenée, 1853	AS1714A(1)	HP, UT, SK, WB, NL	Nepal, Myanmar, Taiwan, Korea, Singapore, Indonesia (Borneo, Sumatra, Java), Australia,
Tribe: Caradrinini Boisduval, 1840				
783	<i>Athetis bipuncta</i> (Snellen, 1886)	AS632D(1), AS749A(1)	UT	Nepal, Borneo, Papua New Guinea
784	<i>Athetis cognata</i> (Moore, 1882)	AS632C(1)	UT	Nepal
785	<i>Athetis lineosa</i> (Moore, [1881])	AS632C(1), AS749A(1), AS1843B(1)	HP, UT, AR	Nepal, Myanmar, China, Taiwan, Japan, Korea, Russia
786	<i>Athetis sincera</i> (Swinhoe, 1889)	AS2195A(1), AS2442A(1)	HP, UT	
Tribe: Dypterygiini Forbes, 1954				
787	<i>Callyna jugaria</i> Walker, 1858	AS632D(1)	HP, UT, SK, WB, AN	Sri Lanka, Thailand

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788	<i>Callyna monoleuca</i> Walker, 1858	AS632D(2)	HP, UT, SK, WB, AR, AS, JH, MH, KA, TN, KL, AN	Nepal, Sri Lanka, Myanmar, China, Taiwan, Hong Kong, Vietnam, Laos, Thailand, Indonesia (Java, Celebes), Phillippines, Papua New Guinea, Australia, Japan
789	<i>Dipterygina indica</i> (Moore, 1867)	AS1029A(1)	UT, WB, TN	Nepal, Thailand
790	<i>Feliniopsis leucostigma</i> (Moore, 1867) #	AS2248A(1)	HP, UT, SK, WB, NL	Bangladesh, Nepal, China
791	<i>Trachea aurigera</i> (Walker, 1858)	AS2655A(1), AS2655B(4), AS3225A(1), AS4216A(3)	UT, SK, WB	Nepal, China (Tibet)
792	<i>Trachea guttata</i> (Warren, 1913)	AS2248A(1), AS2655B(4), AS3225B(2), AS3015A(2), AS3150A(7), AS3166A(3)	HP, UT, SK	Nepal, Bhutan, China (Tibet), Thailand
793	<i>Trachea microspila</i> Hampson, 1908	AS1843A(1), AS2061A(1), AS2248A(1)	HP, UT	Nepal, China
794	<i>Trachea tibetensis</i> (Warren, 1912)	AS2932A(3)	UT	China (Tibet)
Tribe: Phlogophorini Hampson, 1918				
795	<i>Auchmis inextricata</i> (Moore, 1881)	AS632D(1), AS1843B(1)	HP, UT	Nepal
796	<i>Euplexia annapurna</i> Hreblay & Ronkay, 1998 *	AS2248A(1)	UT	Nepal
797	<i>Karana similis</i> (Moore, 1888)	AS1843B(2), AS2061A(1), AS2248A(14)	HP, UT, SK, MH, TN	Nepal, Myanmar, China, Taiwan, Thailand

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798	<i>Oroplexia decorata</i> (Moore, 1882)	AS2248A(1), AS2061A(3), AS2655B(6), AS2547A(3), AS3225B(2), AS3015A(1), AS3166A(1)	UT, SK, WB, AR	Nepal, China (Tibet)
799	<i>Oroplexia hamptoni</i> Leech, 1900	AS3065A(3), AS3225B(1)	UT	Nepal, China
800	<i>Oroplexia luteifrons</i> (Walker, 1857)	AS2279A(5), AS2442A(3), AS2547(2), AS2723A(1), AS2932A(2), AS3150A(2), AS3225A(6), AS3390A(1)	JK, HP, UT, ME, PB	
801	<i>Oroplexia pectinosa</i> Hreblay & Plante, 1996 *	AS2462C(1), AS3150A(1), AS4216A(1)	UT	Nepal
802	<i>Phlogophora conservuloides</i> (Hampson, 1898)	AS2248A(1), AS2061A(3), AS2655B(2)	HP, UT, SK, WB, AR	Nepal, China, Taiwan
803	<i>Phlogophora costalis</i> (Moore, 1882) #	AS2655B(1)	UT, SK, WB, AR	Nepal, China
804	<i>Phlogophora discisignata</i> (Moore, 1867) #	AS1356A(1)	UT, SK, WB, NL	Nepal, Bhutan, Thailand, Vietnam
805	<i>Phlogophora distorta</i> (Moore, 1881)	AS2248A(1)	UT, SK, WB, AR	Nepal, Thailand
806	<i>Phlogophora plumbeola</i> (Hampson, 1894)	AS2248A(2), AS2061A(5), AS2655B(1), AS2547A(4)	UT, SK	Nepal
807	<i>Phlogophora subpurpurea</i> Leech, 1900	AS2547A(3)	HP, UT	Nepal, China
808	<i>Valeriodes aurantica</i> Hreblay & Plante, 1993	AS3225A(1), AS3700A(1), AS4216A(1)	UT	Nepal
809	<i>Valeriodes cyanelinea</i> (Hampson, 1894)	AS3065A(1)	UT, SK	Nepal

Chapter III: Taxonomic Inventory

810	<i>Valeriodes heterocampa</i> (Moore, 1882)	AS3150A(1)	HP, UT, SK, WB, AR, NL	Nepal, China (Tibet)
811	<i>Valeriodes icamba</i> (Swinhoe, 1893)	AS3065A(5), AS3700A(1)	HP, UT, SK	Nepal
812	<i>Xenotrachea albidisca</i> (Moore, 1867)	AS1692A(1)	HP, UT, SK, WB, AS, ME, NL, TN, KL	Nepal, Bangladesh, Myanmar, China, Taiwan, Vietnam, Thailand, Malaysia, Indonesia (Borneo, Sumatra, Flores), Timor
813	<i>Xenotrachea aurantiaca</i> (Hampson, 1894)	AS2462C(1)	UT, SK	Nepal
Tribe: Apameini Guenée, 1841				
814	<i>Apamea chalybaeata</i> (Walker, 1855)	AS4216A(2)	HP, UT, SK	Nepal, China (Tibet)
815	<i>Apamea chhiringi</i> Hreblay, 1998 *	AS3166A(1)	UT	Nepal
816	<i>Apamea fasciata</i> (Leech, 1900)	AS4216A(2)	HP, UT, SK	Nepal, China (Tibet)
817	<i>Apamea gratissima</i> Hreblay & Ronkay, 1999 *	AS3166A(1)	UT	Nepal
818	<i>Apamea purpurina</i> (Hampson, 1902) #	AS3166A(2)	UT, SK	Nepal, China (Tibet)
819	<i>Bryoxena centralasiae</i> (Staudinger, 1882)	AS3150A(6), AS3427A(2)	JK, UT	Pakistan, Afghanistan, Nepal, Kazakhstan, Turkmenistan, Tajikistan, Uzbekistan, Kyrgyzstan, Mongolia
820	<i>Chandata tridentata</i> Yoshimoto, 1982	AS4216A(1)	UT	Nepal

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821	<i>Hygrostola robusta</i> (Hampson, 1894)	AS1692A(1), AS2061A(1), AS2462C(1), AS2655B(1)	UT, SK, AS	Nepal
822	<i>Trichoridia canosparsa</i> (Hampson, 1894)	AS3700A(5), AS4216A(52)	UT, SK	Nepal
823	<i>Trichoridia dentata</i> (Hampson, 1894)	AS2723A(1)	UT, SK	Nepal
824	<i>Trichoridia endroma</i> (Swinhoe, 1893)	AS3150A(1)	UT, SK	Nepal, Bhutan, China (Tibet)
825	<i>Trichoridia fuscicuprea</i> Hreblay & Ronkay, 1998 #	AS2462A(1), AS2932A(2), AS3150A(3), AS3225A(13), AS3343A(1), AS3390A(4)	UT	Nepal
Tribe: Xylenini Guenée, 1837				
826	<i>Dasypolia templi</i> (Thunberg, 1792) *	AS3150A(3), AS3427A(2)	UT	Austria, Italy, Sicily, Bulgaria, Romania, Switzerland, Morocco
827	<i>Hyalobole nigripalpis</i> (Warren, 1911) #	AS3226A(1)	UT, WB	Nepal
828	<i>Hyalobole subapicalis</i> (Hreblay & Ronkay, 1998)*	AS2279A(2), AS2442B(1)	UT	Nepal
829	<i>Mniotype olivascens</i> (Draudt, 1950)	AS4216A(1)	UT	Nepal, China
830	<i>Parabole rectilinea</i> Hreblay & Ronkay, 1998*	AS2442B(1)	UT	Nepal
831	<i>Sydiva stoliczkae</i> (Felder & Rogenhofer, 1874)	AS4216A(1)	JK, HP, UT, WB	Pakistan, Nepal
832	<i>Sydiva meissneri</i> warreni (Plante, 1990)	AS4216A(1)	UT, WB	Nepal
833	<i>Xanthia approximata</i> (Hampson, 1906)	AS3015A(1), AS3150A(2)	JK, UT	

Subfamily: Hadeninae Guenée, 1837				
Tribe: Hadenini Guenée, 1837				
834	<i>Dictyestra dissectus</i> (Walker, 1865) #	AS1843A(1)	UT, SK, WB, AR	Nepal, Sri Lanka, Myanmar, China, Taiwan, Vietnam, Thailand, Indonesia (Borneo, Maluku, Sulawesi), Philippines, New Guinea, Japan, Korea
835	<i>Kollariana scotochlora</i> (Kollar, [1844])	AS3700A(3)	JK, UT, SK	Pakistan, Nepal, Sri Lanka, China (Tibet)
836	<i>Odontestra submarginalis</i> (Walker, 1869)	AS1843B(1)	HP, UT	Pakistan, Nepal
837	<i>Polia culta</i> (Moore, 1881) #	AS3166A(1)	JK, HP, UT, SK	Pakistan, Nepal, China (Tibet)
838	<i>Tricheurois cuprina</i> (Moore, 1881)	AS4216A(3)	UT, SK	Nepal, China
Tribe: Leucaniini Guenée, 1837				
839	<i>Anapoma albicosta</i> (Moore, 1881)	AS2061B(2), AS2195A(2), AS4216A(1)	JK, HP, UT, SK, WB, ME, NL	Bhutan, Sri Lanka, China (Tibet), Japan
840	<i>Anapoma duplicata</i> (Butler, 1889)	AS1714A(1)	UT, WB, ME, MN	Nepal, Taiwan
841	<i>Anapoma unicorna</i> (Berio, 1973) #	AS3225B(1), AS4216A(1)	HP, UT, AS	Nepal, Myanmar, Vietnam, Sri Lanka
842	<i>Leucania simillima</i> Walker, 1862	AS632C(2), AS749A(1), AS1029A(1)	UT	Nepal, China, Taiwan, Indonesia (Borneo, Bali, Sulawesi), Philippines, Japan
843	<i>Mythimna bifasciata</i> (Moore, 1888) #	AS1843B(3), AS2462A(1)	HP, UT	Nepal
844	<i>Mythimna decisissima</i> (Walker, 1865) #	AS632C(3), AS749A(3), AS825A(1)	HP, UT, SK, WB	Nepal, Sri Lanka, Taiwan, Japan, Australia
845	<i>Mythimna modesta</i> (Moore, 1881)	AS1714A(1), AS4216A(1)	UT, WB	Nepal

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846	<i>Mythimna nepos</i> (Leech, 1900) #	AS1843B(3), AS3150A(1), AS4216A(1)	HP, UT	Nepal, China, Myanmar, Thailand, Vietnam, Indonesia (Java)
847	<i>Mythimna pallidicosta</i> (Hampson, 1894)	AS2547A(1), AS3390A(1)	HP, UT, WB	Nepal
848	<i>Tiracola aureata</i> Holloway, 1989 #	AS632D(1), AS1843B(1)	UT, TN	Nepal, China, Sundaland, Indonesia (Sarawak), Philippines, Sulawesi, S.Maluku, New Guinea, Japan, Taiwan
Subfamily: Noctuidae Latreille, 1809				
Tribe: Noctuini Latreille, 1809				
849	<i>Anaplectoides</i> <i>inexpectata</i> Dierl, 1993 #	AS3166A(1)	UT, WB	Nepal
850	<i>Axylia putris</i> (Linnaeus, 1761)	AS632D(3), AS1121A(1), AS1630B(3), AS1692A(3), AS1843B(4), AS2195A(1)	HP, UT	Pakistan, Nepal, Taiwan, Indonesia (Java), Japan, Korea, Russia, Mongolia, Kazakhstan, Armenia, Sweden, Ukraine, United Kingdom, Netherlands, Austria, Finland, Denmark, France, Spain, Norway, Germany
851	<i>Axylia renalis</i> (Moore, 1867)	AS2547A(1)	JK, HP, UT, SK, WB, NL, PB, MH	Pakistan, Nepal, China, Thailand, South Africa
852	<i>Diarsia cerastioides</i> (Moore, 1867)	AS2195A(1), AS3065A(1), AS3343A(1)	HP, UT, WB	Nepal
853	<i>Diarsia claudia</i> Boursin, 1963 *	AS3065A(1), AS3150A(1), AS3150A(1), AS4216A(14)	UT	Nepal

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854	<i>Diarsia erubescens</i> (Butler, 1880)	AS1843B(1), AS2061A(1), AS2195A(7), AS2248A(1), AS3150A(2), AS3226A(4)	JK, UT, HP, TN	Nepal
855	<i>Diarsia griseithorax</i> (Warren, 1912)	AS2248A(3)	UT, AS	
856	<i>Diarsia metadichroa</i> Varga & Ronkay, 2007	AS2655B(1)	UT	Vietnam
857	<i>Diarsia nigrosigna</i> (Moore, 1881)	AS2462B(2)	JK, HP, UT, SK, WB, AR, TN	Pakistan, Nepal, Bhutan, Myanmar, China, Taiwan, Hong Kong, Vietnam, Thailand, Indonesia (Sulawesi), Philippines
858	<i>Diarsia postpallida</i> (Prout, 1928)	AS2248A(1)	UT, SK, AR, TN	Malaysia, Thailand, Indonesia (Borneo, Sumatra, Java, Sulawesi), Philippines
859	<i>Diarsia stictica</i> (Poujade, 1887) #	AS2279A(2), AS3150A(9), AS3343A(5), AS3427A(5)	UT, HR	Nepal, Tibet, Indonesia (Borneo)
860	<i>Diarsia vulpina</i> (Moore, 1882) #	AS2279A(1), AS2442A(1), AS2547A(2), AS3150A(3), AS3427A(2)	UT, WB	Nepal
861	<i>Hermonassa</i> <i>chagyabensis</i> Chen, 1983 #	AS4216A(1)	UT, WB	Nepal, China
862	<i>Hermonassa consignata</i> Walker, 1865	AS3166A(1)	JK, HP, UT, SK, WB, NL, TN	Pakistan, Nepal, Bhutan, China (Tibet), Thailand
863	<i>Hermonassa cuprina</i> Moore, 1882	AS3225A(1)	UT, WB	Nepal

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864	<i>Hermonassa divida</i> Hreblay & Ronkay, 1998 *	AS2279A(1), AS2932A(3), AS3150A(1), AS3225A(1), AS4216A(1)	UT	Nepal, China
865	<i>Hermonassa incisa</i> Moore, 1882	AS3015A(1), AS3150A(1)	JK, HP, UT, SK, WB, NL	Nepal, Bhutan, China (Tibet), Thailand
866	<i>Hermonassa marginata</i> Hreblay & Ronkay, 1998 *	AS3166A(1)	UT	Nepal, China
867	<i>Hermonassa oxypila</i> Boursin, 1968 *	AS2800A(3)	HP, UT	Nepal
868	<i>Hermonassa phenax</i> Boursin, 1968	AS2279A(1), AS2800A(1), AS4216A(1)	UT	Nepal
869	<i>Hermonassa renifera</i> Chen, 1991	AS2195A(1), AS3225A(1)	UT, WB	Nepal, China
870	<i>Hermonassa selecta</i> Hreblay & Plante, 1995	AS3390B(1)	UT	Nepal
871	<i>Hermonassa sherpae</i> Sugi, 1995 *	AS3390B(1)	UT	Nepal
872	<i>Hermonassa stigmatica</i> Warren, 1912	AS1630B(1), AS3225B(1)	UT	Nepal, Bhutan
873	<i>Protognorisma fusca</i> (Hreblay & Ronkay, 1998)	AS3427A(2)	UT	Nepal
874	<i>Xestia angara</i> Hacker & Pecks, 1990 *	AS2248A(1), AS2655A(1), AS2655B(2), AS2800A(10), AS3065A(10), AS3166A(1), AS3390B(1), AS3700A(4), AS4216A(1)	UT	Nepal
875	<i>Xestia bdelygma</i> (Boursin, 1963) *	AS3065A(2), AS3225B(1), AS3700A(28), AS4216A(41)	UT	Nepal, China
876	<i>Xestia brunneago</i> (Staudinger, 1895)	AS1714A(1), AS3150A(5)	UT	Nepal

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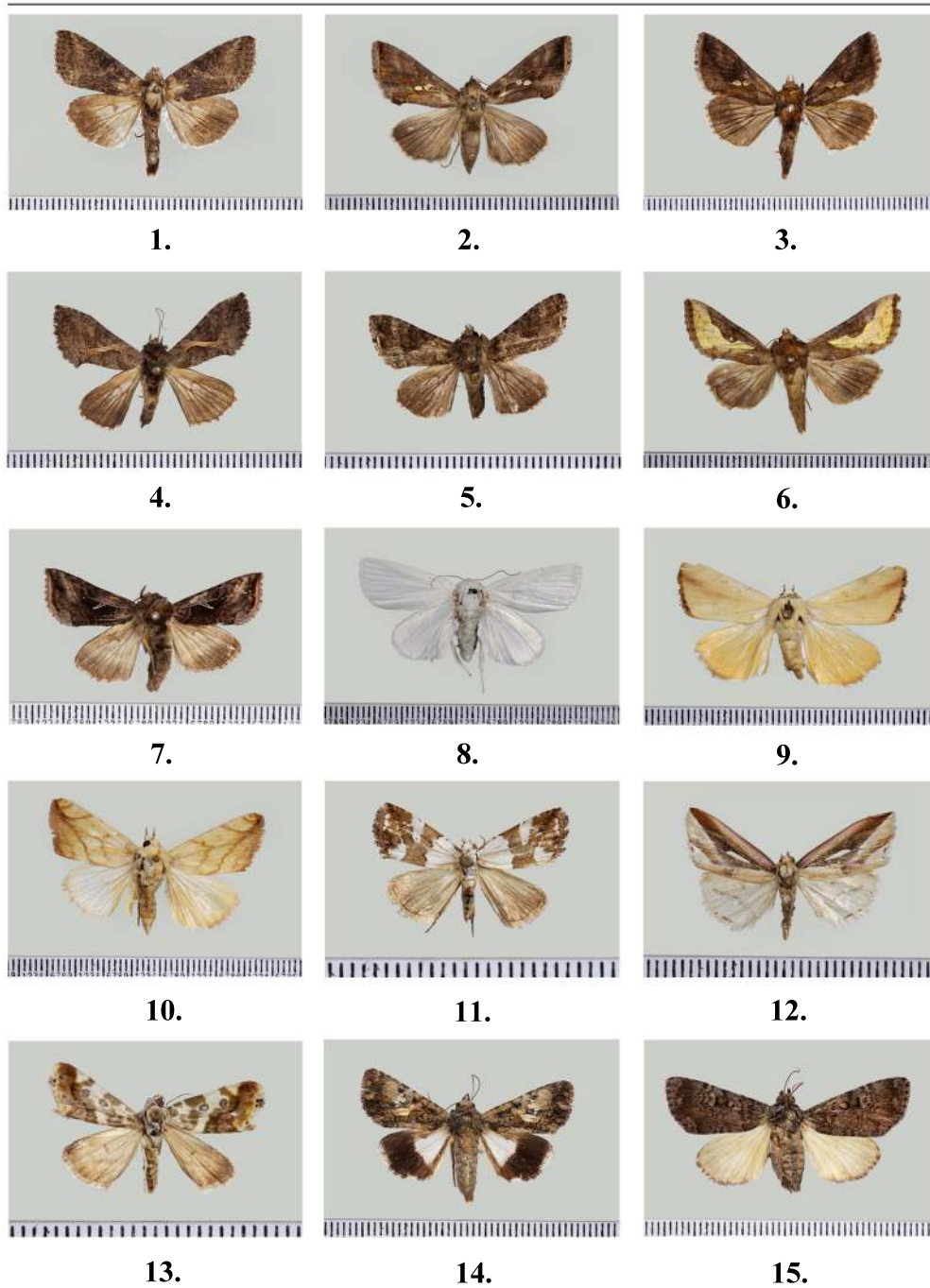
877	<i>Xestia clavata</i> (Hampson, 1907)	AS3065A(9), AS3700A(34)	HP, UT	Nepal
878	<i>Xestia c-nigrum</i> (Linnaeus, 1758) #	AS1692A(1), AS1714A(1)	JK, HP, UT, PY	Pakistan, China, Japan, Korea, Russia, Turkey, Germany, United Kingdom, Italy, Austria, Norway, Portugal, France, Netherlands, Spain, Finland, Canada, United States, Mexico
879	<i>Xestia forsteri</i> (Boursin, 1964)	AS3225B(2), AS3390A(1), AS3700A(10), AS4216A(49)	UT	Nepal
880	<i>Xestia gandakiensis</i> Yoshimoto, 1995 *	AS3390B(1), AS3700A(6), AS4216A(1)	UT	Nepal
881	<i>Xestia isochroma</i> (Hampson, 1903) *	AS3150A(2)	UT	Nepal, China (Tibet)
882	<i>Xestia janakpura</i> Yoshimoto, 1995	AS3065A(1)	UT	Nepal
883	<i>Xestia lobbichleri</i> (Boursin, 1964) *	AS3150A(3)	UT	Nepal
884	<i>Xestia nepalensis</i> (Boursin, 1964)	AS3225B(2), AS4216A(11)	UT	Nepal
885	<i>Xestia renalis</i> (Moore, 1867) #	AS2462A(1)	UT, WB	Nepal, China
886	<i>Xestia retracta</i> (Hampson, 1903)	AS3700A(10), AS4216A(1)	UT, SK	Nepal
887	<i>Xestia tenuis</i> (Butler, 1889)	AS2655B(1)	UT	Nepal, China (Tibet)
Tribe: Agrotini Rambur, 1848				
888	<i>Agrotis fraterna</i> Moore, 1882 #	AS2195A(2), AS3015A(1), AS3150A(1)	HP, UT, WB, PU	Nepal

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889	<i>Agrotis ipsilon</i> (Hufnagel, 1766)	AS3166A(2)	JK, HP, UT, WB, AR, AS, ME, BH, JH, UP, PB, RJ	Pakistan, Nepal, Myanmar, China, Taiwan, Thailand, Australia, New Zealand, Japan, Korea, Russia, Iran, Turkey, Tajikistan, United Kingdom, Romania, Denmark, Portugal, Ireland, Israel, Poland, Malta, Jordan, Cyprus, Austria, Galapagos, Egypt, Namibia, United States, Canada, Mexico, Ecuador, Brazil, Argentina, Costa Rica, Ecuador
890	<i>Agrotis segetum</i> (Denis & Schiffermüller, 1775)	AS2462A(1)	HP, UT, SK, WB, AS, NL, PB, JH, CT, MP, MH	Pakistan, Nepal, Sri Lanka, China, Taiwan, Thailand, Indonesia (Java), Philippines, New Guinea, Japan, Korea, Iran, Turkey, United Kingdom, Austria, Italy, France, Norway, Spain, Netherland, Germany, Portugal, Bulgaria, UAE, Africa, Kenya, Madagascar
891	<i>Dichagyris triangularis</i> (Moore, 1867)	AS2061B(1)	JK, HP, UT, SK, AS, NL, MH	Afghanistan, Pakistan, Nepal, Bhutan, Myanmar, China (Tibet), Taiwan, Thailand, Japan, Korea, Russia, Mongolia, Iran

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892	<i>Euxoa adumbrata</i> (Eversmann, 1842) #	AS1714A(1), AS3150A(1), AS3390A(1)	JK, UT	China (Tibet), Japan, Russia, Mongolia, Turkey, Iran, Tajikistan, Kazakhstan, Sweden, Finland, Greenland, Norway, Denmark, Canada, United States
893	<i>Euxoa ochrogaster</i> (Guenée, 1852) #	AS3427A(1)	JK, UT	Japan, Russia, Mongolia, Tazikistan, Krrgyzstan, Kazakhstan, Iceland, Finland, Denmark, United States, Canada
894	<i>Perissandria sikkima</i> (Moore, 1867) #	AS3166A(1)	HP, UT, SK, WB, AR	Nepal, China (Tibet)
Tribe: Unassigned				
895	<i>Paraxestia flavicaudata</i> (Warren, 1888)	AS3166A(1)	JK, HP, UT	Pakistan, Nepal



Habitus Plate 1:

Plusiinae, Bagisarinae, Eustrotiinae, Acontiinae, Aediinae, Pantheinae

1. *Abrostola anophioides* 2. *Chrysodeixis acuta* 3. *Chrysodeixis chalcites*

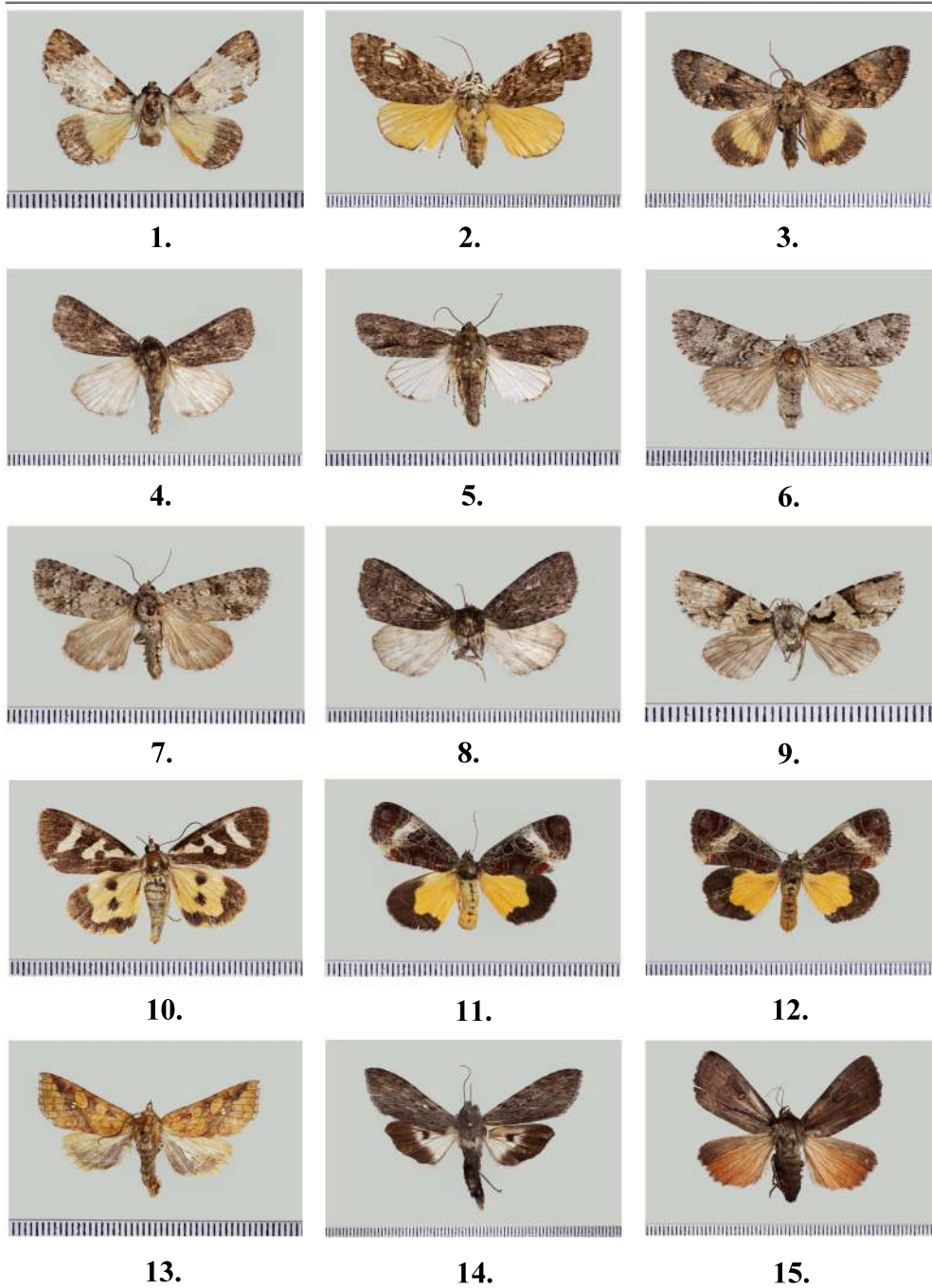
4. *Ctenoplusia albostriata* 5. *Ctenoplusia furcifera*

6. *Thysanoplusia orichalcea* 7. *Autographa purpureofusa*

8. *Chasmina tibialis* 9. *Xanthodes intersepta* 10. *Xanthodes transversa*

11. *Maliattha picata* 12. *Micardia pulcherrima* 13. *Acontia (Emmelia)*

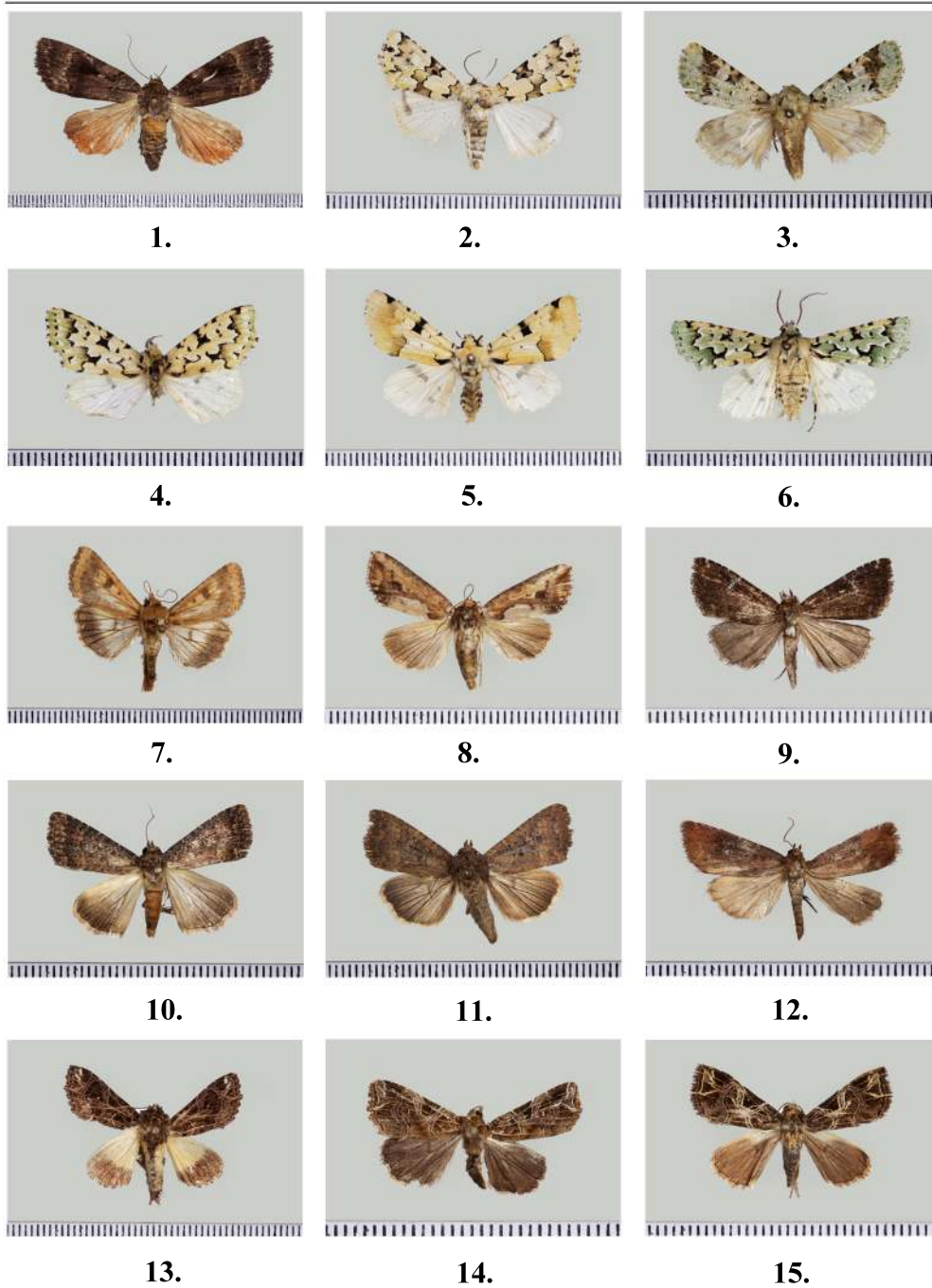
marmoralis 14. *Aedia leucomelas* 15. *Anacronicta infausta*



Habitus Plate 2:

Pantheinae, Acronictinae, Agaristinae, Cuculliinae, Amphipyridae

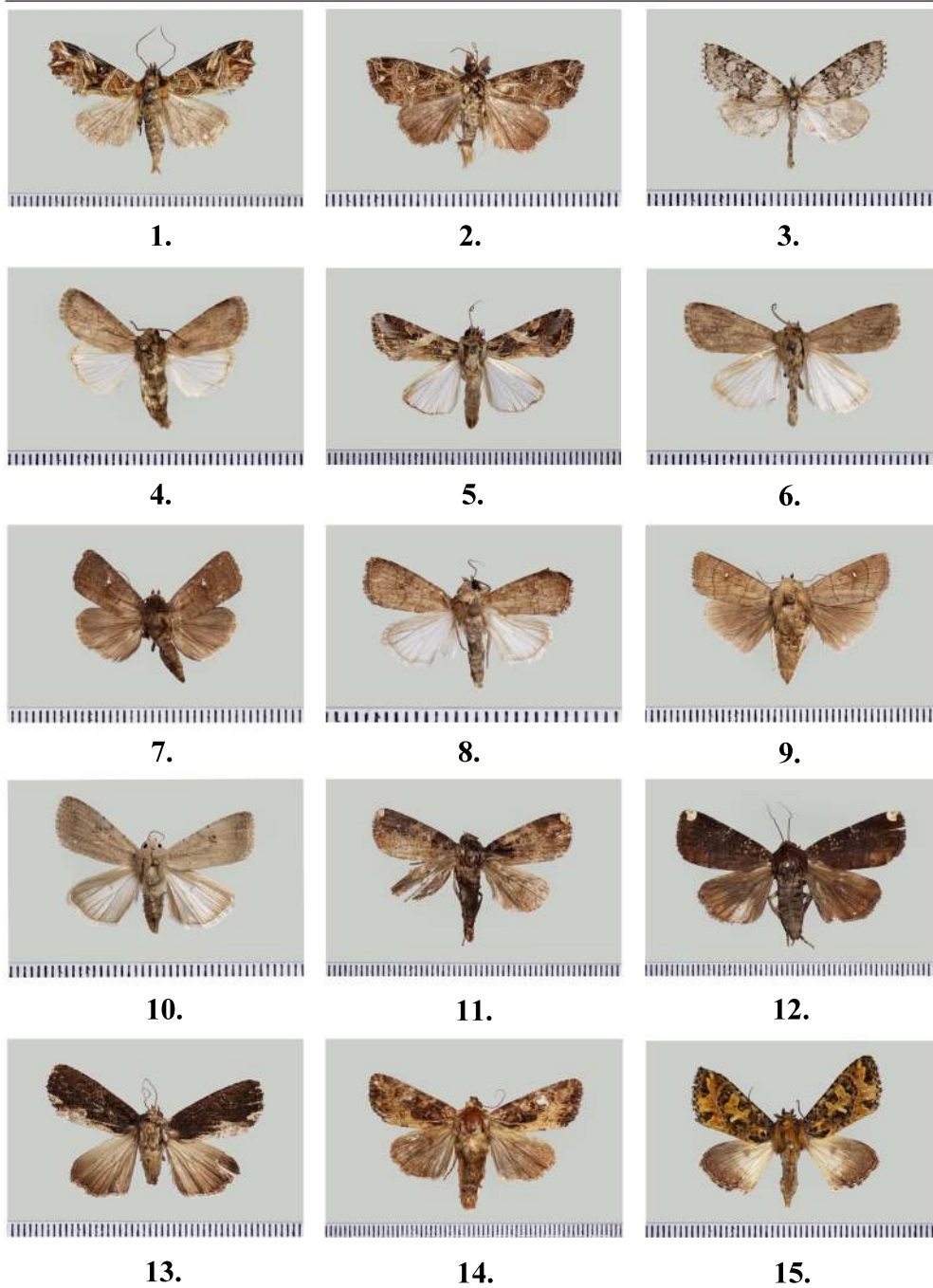
1. *Donda unispinosa* 2. *Tambana subflava* 3. *Trisuloides sericea*
4. *Acronicta bicoloraria* 5. *Acronicta (Triaena) denticulata*
6. *Acronicta gastridia* 7. *Acronicta pruinosa* 8. *Harmandicrania nubilata*
9. *Thalathoides conjecturalis* 10. *Aegocera bimacula*
11. *Sarbanissa dissimilis* 12. *Sarbanissa transiens* 13. *Apostema distigmata*
14. *Cucullia pullata* 15. *Amphipyra cupreipennis*



Habitus Plate 3:

Amphipyrinae, Heliothinae, Condicinae, Eriopinae

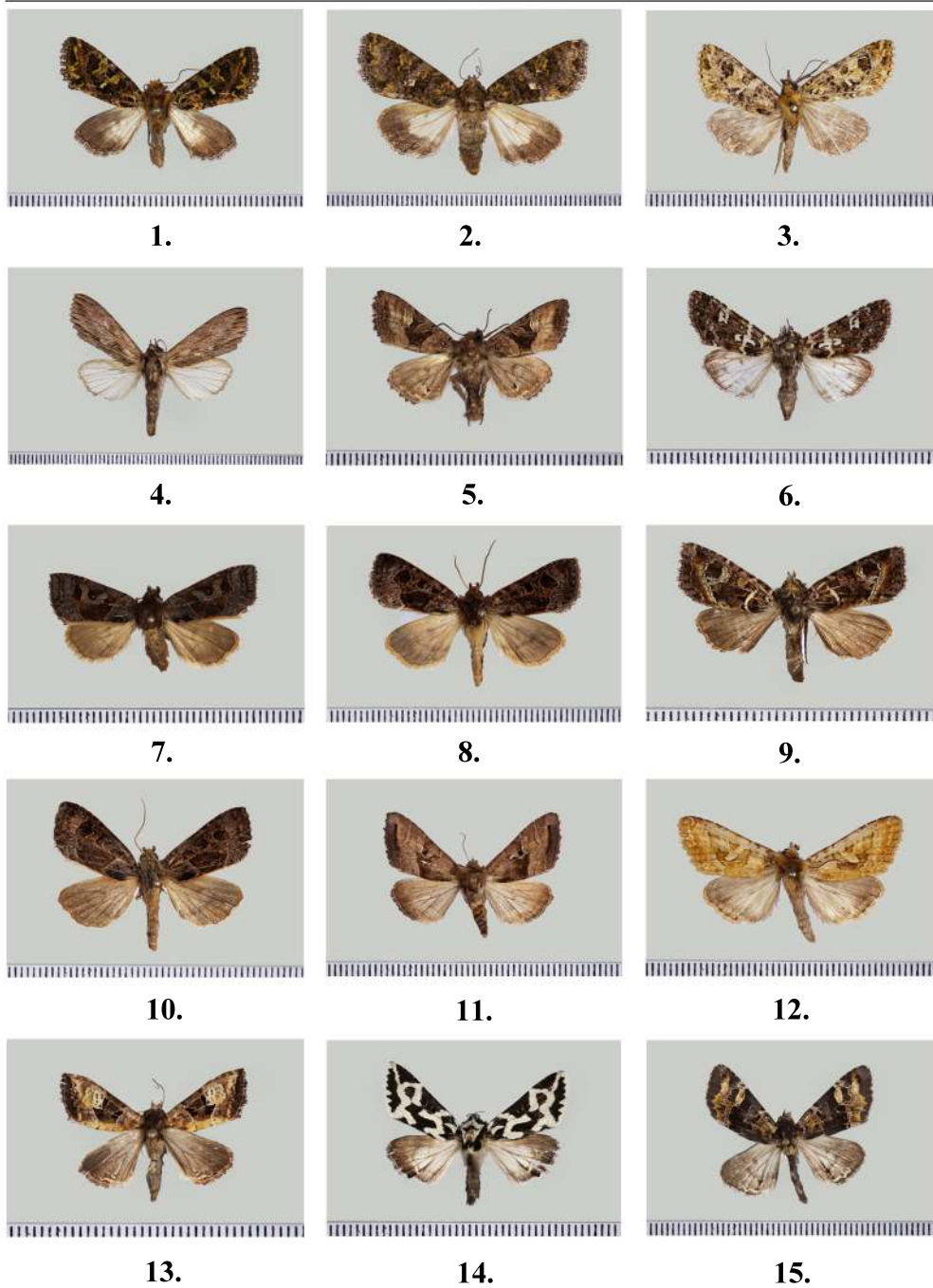
1. *Amphipyra pyramidea* 2. *Nacna prasinaria* 3. *Diphtherocome discibrunnea* 4. *Diphtherocome diverticulata* 5. *Diphtherocome fasciata* 6. *Diphtherocome pallida* 7. *Helicoverpa armigera* 8. *Bagada poliomera* 9. *Condica atricuprea* 10. *Condica capensis* 11. *Condica illecta* 12. *Hadjina cupreipennis* 13. *Callopietria callopietroides* 14. *Callopietria minor* 15. *Callopietria pulchrilinea*



Habitus Plate 4:

Eriopinae, Bryophilinae, Xyleninae

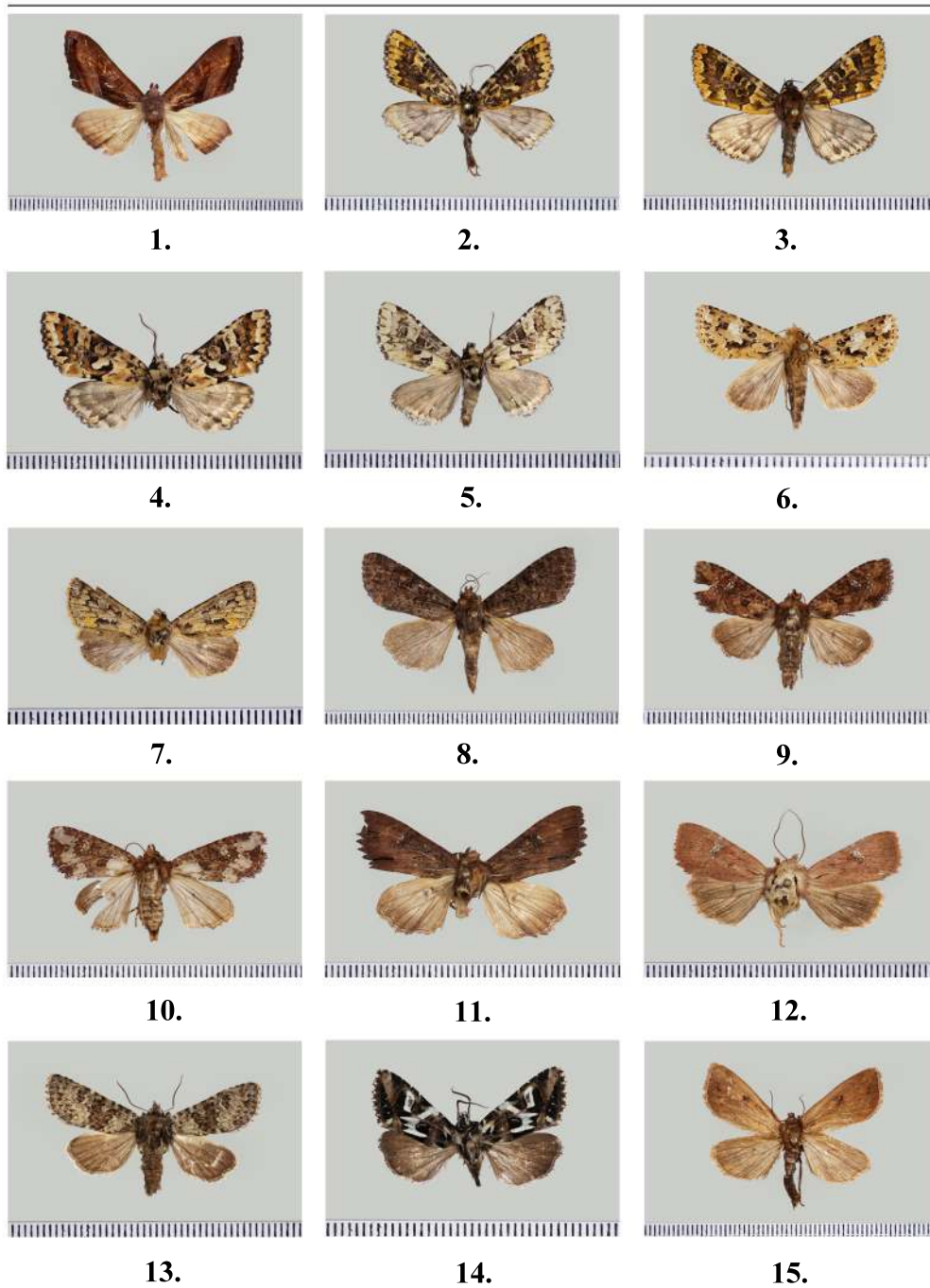
1. *Callopietria repleta*
2. *Callopietria rivularis*
3. *Bryophila literata*
4. *Spodoptera cilium*
5. *Spodoptera litura*
6. *Spodoptera pecten*
7. *Athetis bipuncta*
8. *Athetis cognata*
9. *Athetis lineosa*
10. *Athetis sincera*
11. *Callyna jugaria*
12. *Callyna monoleuca*
13. *Dipterygina indica*
14. *Feliniopsis leucostigma*
15. *Trachea aurigera*



Habitus Plate 5:

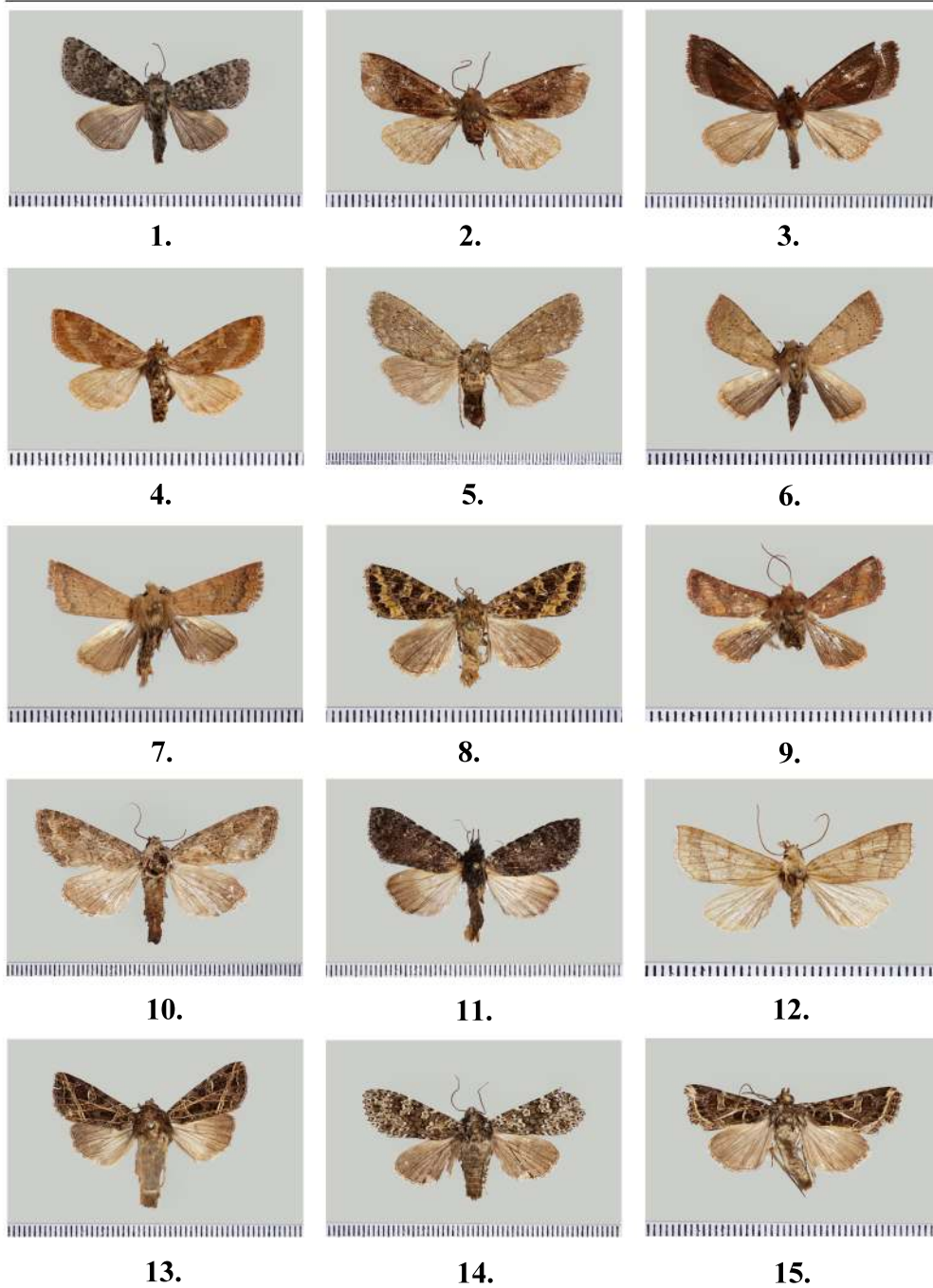
Xyleninae

1. *Trachea guttata* 2. *Trachea microspila* 3. *Trachea tibetensis*
4. *Auchmis inextricata* 5. *Euplexia annapurna* 6. *Karana similis*
7. *Oroplexia decorata* 8. *Oroplexia hampsoni* 9. *Oroplexia luteifrons*
10. *Oroplexia pectinosa* 11. *Phlogophora conservuloides*
12. *Phlogophora costalis* 13. *Phlogophora discisignata*
14. *Phlogophora distorta* 15. *Phlogophora plumbeola*



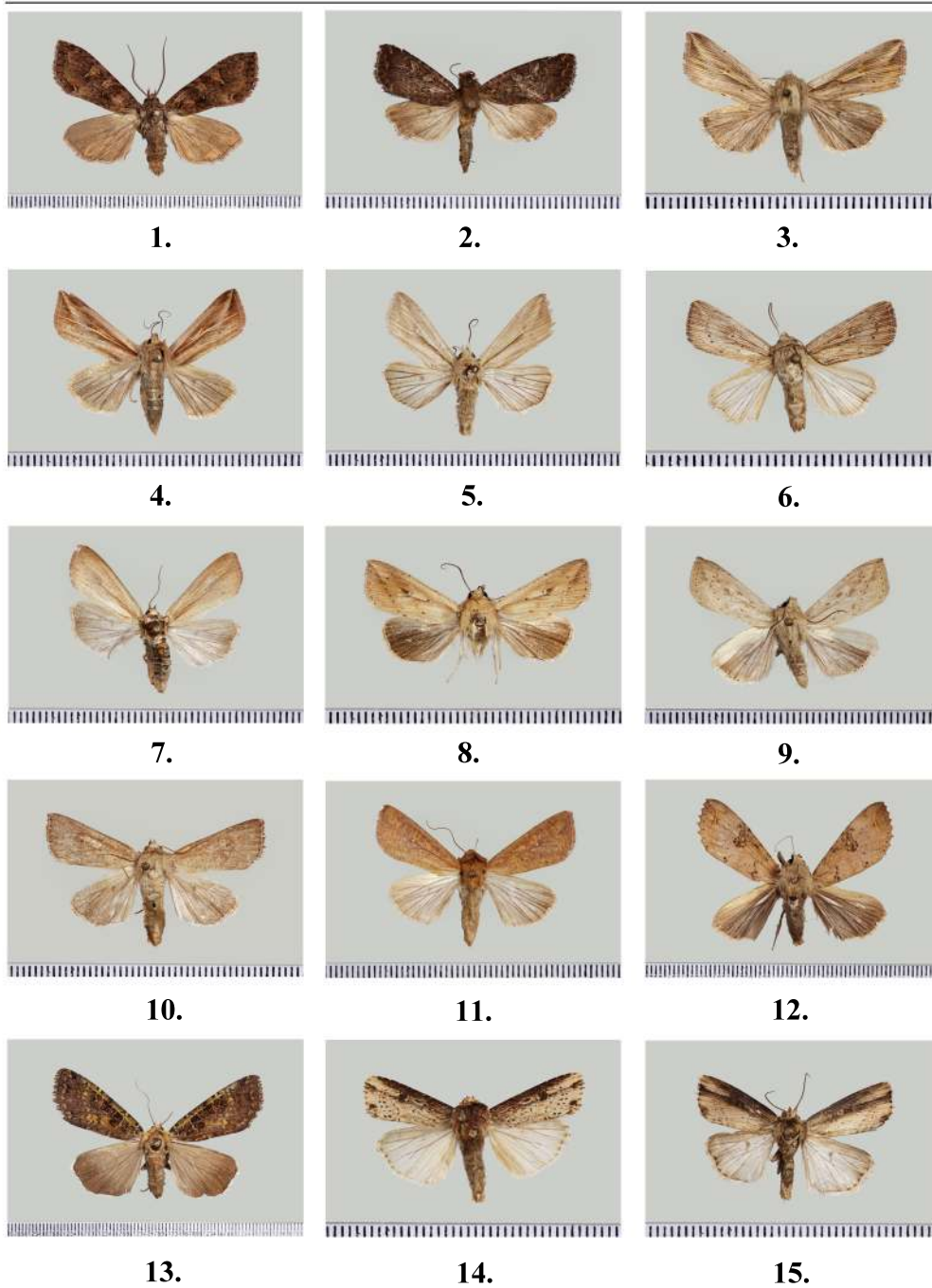
**Habitus Plate 6:
Xyleninae**

1. *Phlogophora subpurpurea* 2. *Valeriodes aurantica* 3. *Valeriodes cyanelinea* 4. *Valeriodes heterocampa* 5. *Valeriodes icamba*
6. *Xenotrachea albidisca* 7. *Xenotrachea aurantiaca* 8. *Apamea chalybaeata*
9. *Apamea chhiringi* 10. *Apamea fasciata* 11. *Apamea gratissima*
12. *Apamea purpurina* 13. *Bryoxena centralasiae*
14. *Chandata tridentata* 15. *Hygrostola robusta*



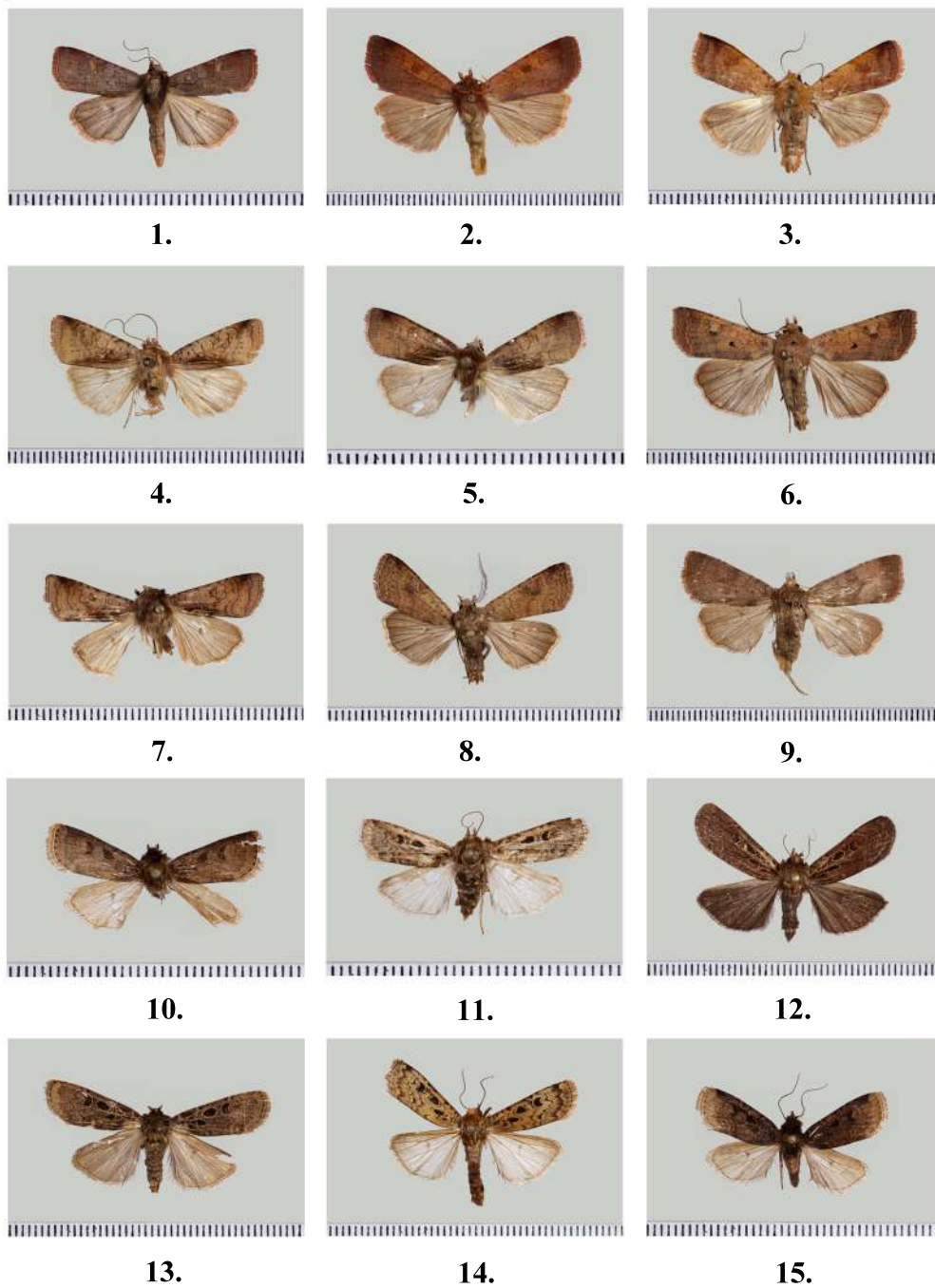
Habitus Plate 7:
Xyleninae, Hadeninae

1. *Trichoridia canosparsa* 2. *Trichoridia dentata* 3. *Trichoridia endroma*
4. *Trichoridia fuscicuprea* 5. *Dasypolia templi* 6. *Hyalobole nigripalpis*
7. *Hyalobole subapicalis* 8. *Mniotype olivascens* 9. *Parabole rectilinea*
10. *Sydiva stoliczkae* 11. *Sydiva meissneri warreni* 12. *Xanthia approximata*
13. *Dictyestra dissectus* 14. *Kollariana scotochlora*
15. *Odontestra submarginalis*



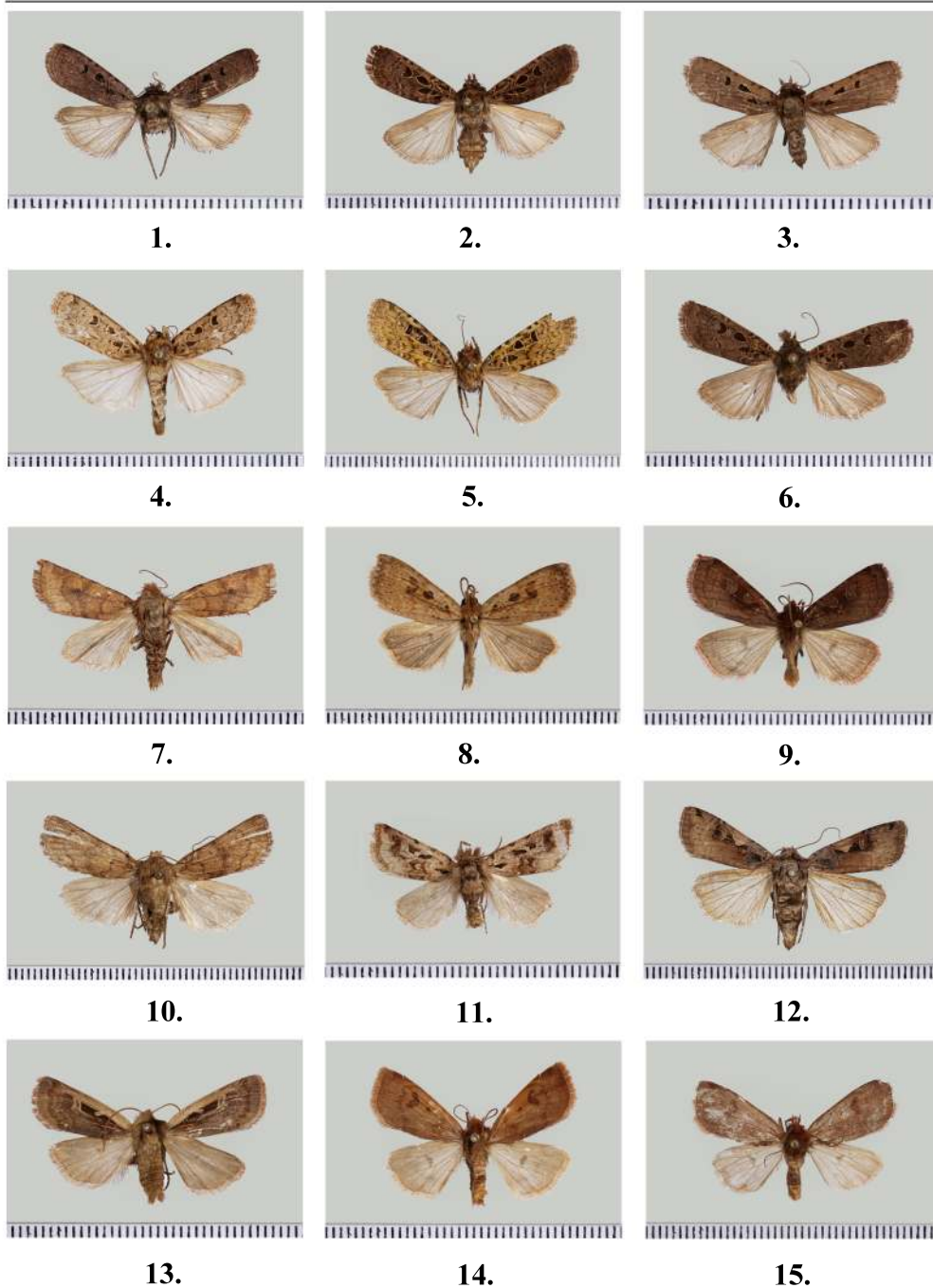
Habitus Plate 8:
Hadeninae, Noctuidae

1. *Polia culta* 2. *Tricheurois cuprina* 3. *Anapoma albicosta*
4. *Anapoma duplicata* 5. *Anapoma unicorna* 6. *Leucania simillima*
7. *Mythimna bifasciata* 8. *Mythimna decisissima* 9. *Mythimna modesta*
10. *Mythimna nepos* 11. *Mythimna pallidicosta* 12. *Tiracola aureata*
13. *Anaplectoides inexpectata* 14. *Axylia putris* 15. *Axylia renalis*



**Habitus Plate 9:
Noctuinae**

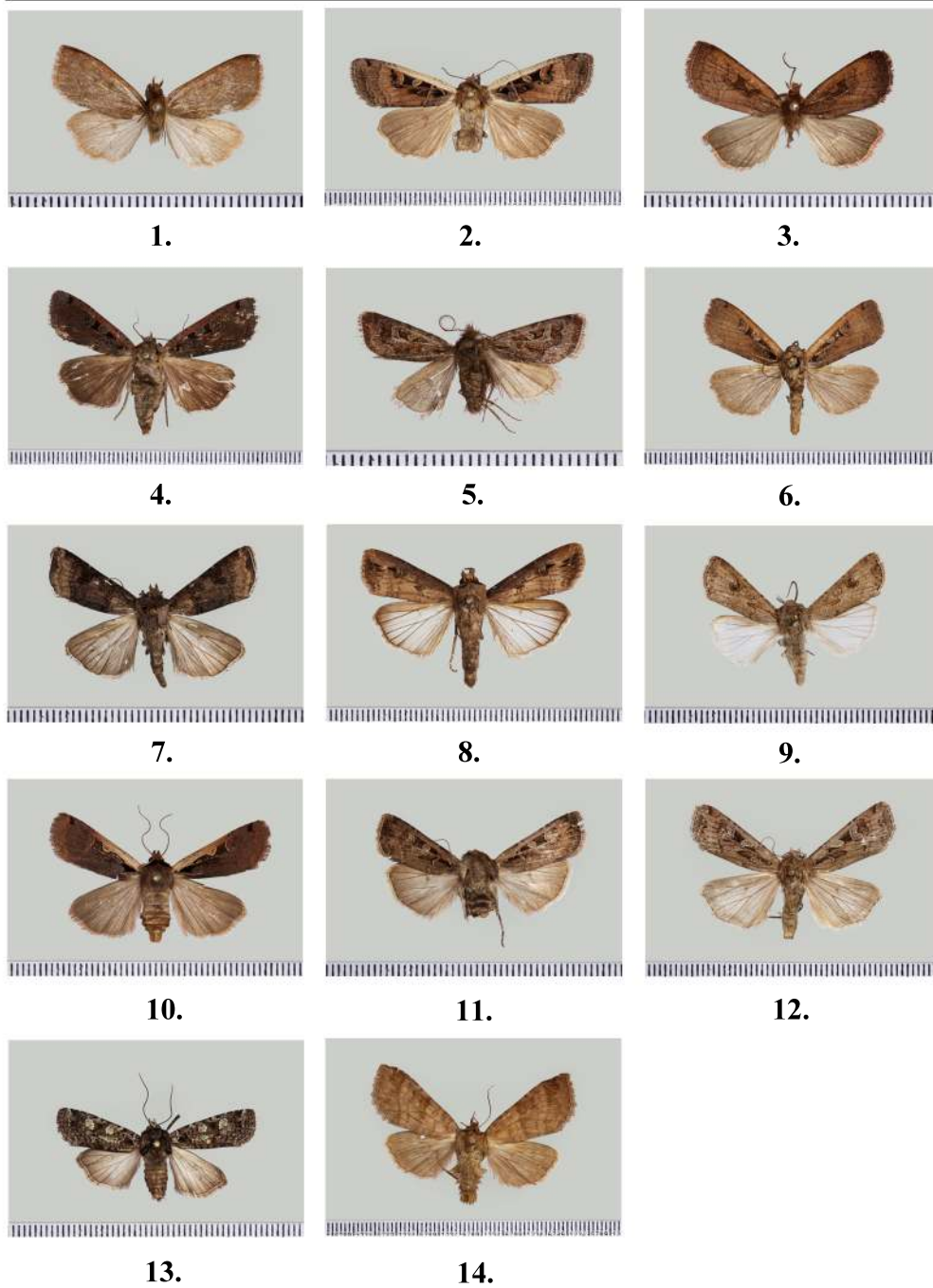
1. *Diarsia cerastioides* 2. *Diarsia claudia* 3. *Diarsia erubescens*
4. *Diarsia griseithorax* 5. *Diarsia metadichroa* 6. *Diarsia nigrosigna*
7. *Diarsia postpallida* 8. *Diarsia stictica* 9. *Diarsia vulpina*
10. *Hermonassa chagyabensis* 11. *Hermonassa consignata*
12. *Hermonassa cuprina* 13. *Hermonassa divida*
14. *Hermonassa incisa* 15. *Hermonassa marginata*



Habitus Plate 10:

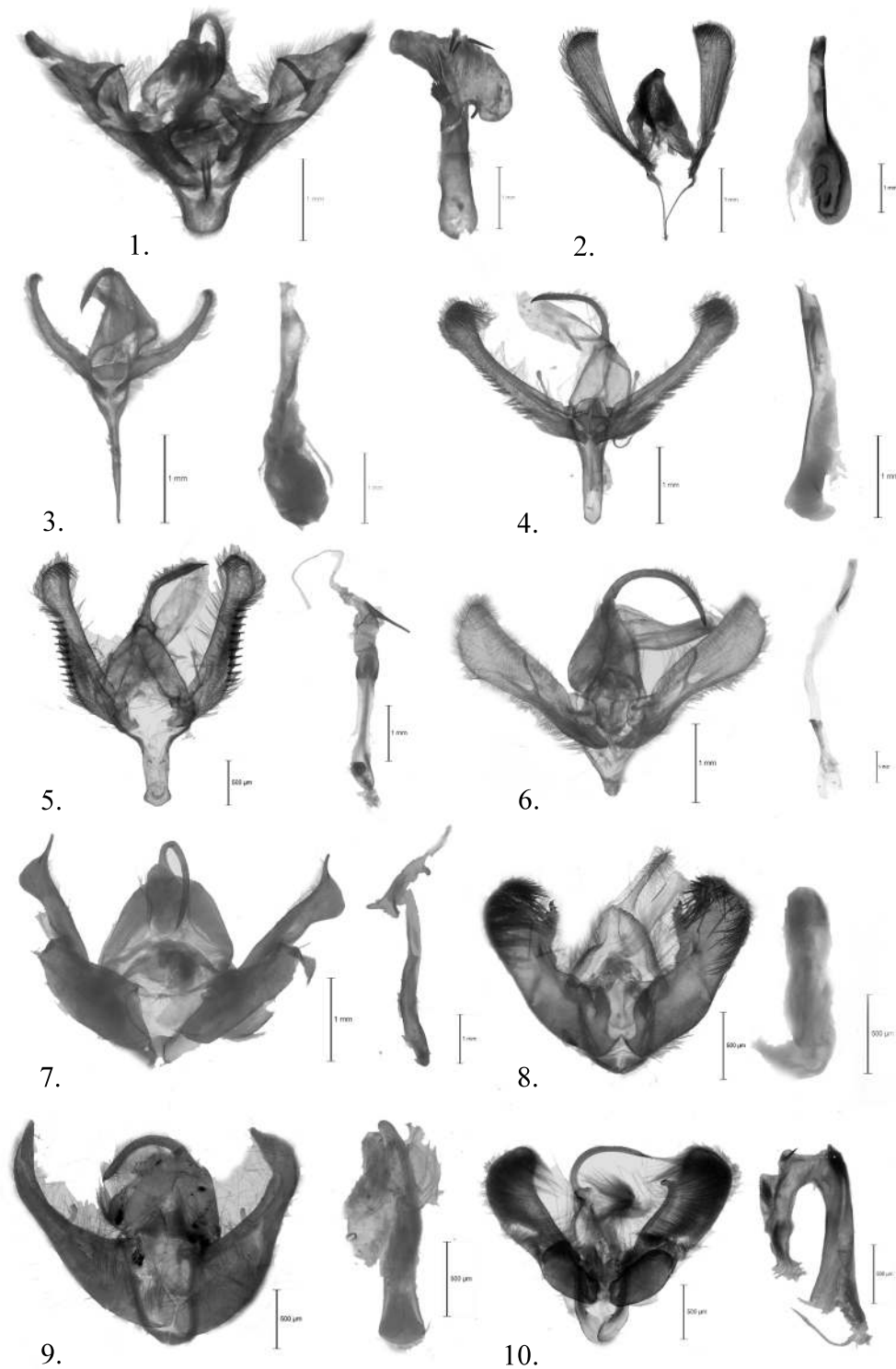
Noctuidae

1. *Hermonassa oxypila* 2. *Hermonassa phenax* 3. *Hermonassa renifera*
4. *Hermonassa selecta* 5. *Hermonassa sherpae* 6. *Hermonassa stigmatica*
7. *Protognorisma fusca* 8. *Xestia angara* 9. *Xestia bdelygma*
10. *Xestia brunneago* 11. *Xestia clavata* 12. *Xestia c-nigrum*
13. *Xestia forsteri* 14. *Xestia gandakiensis* 15. *Xestia isochroma*



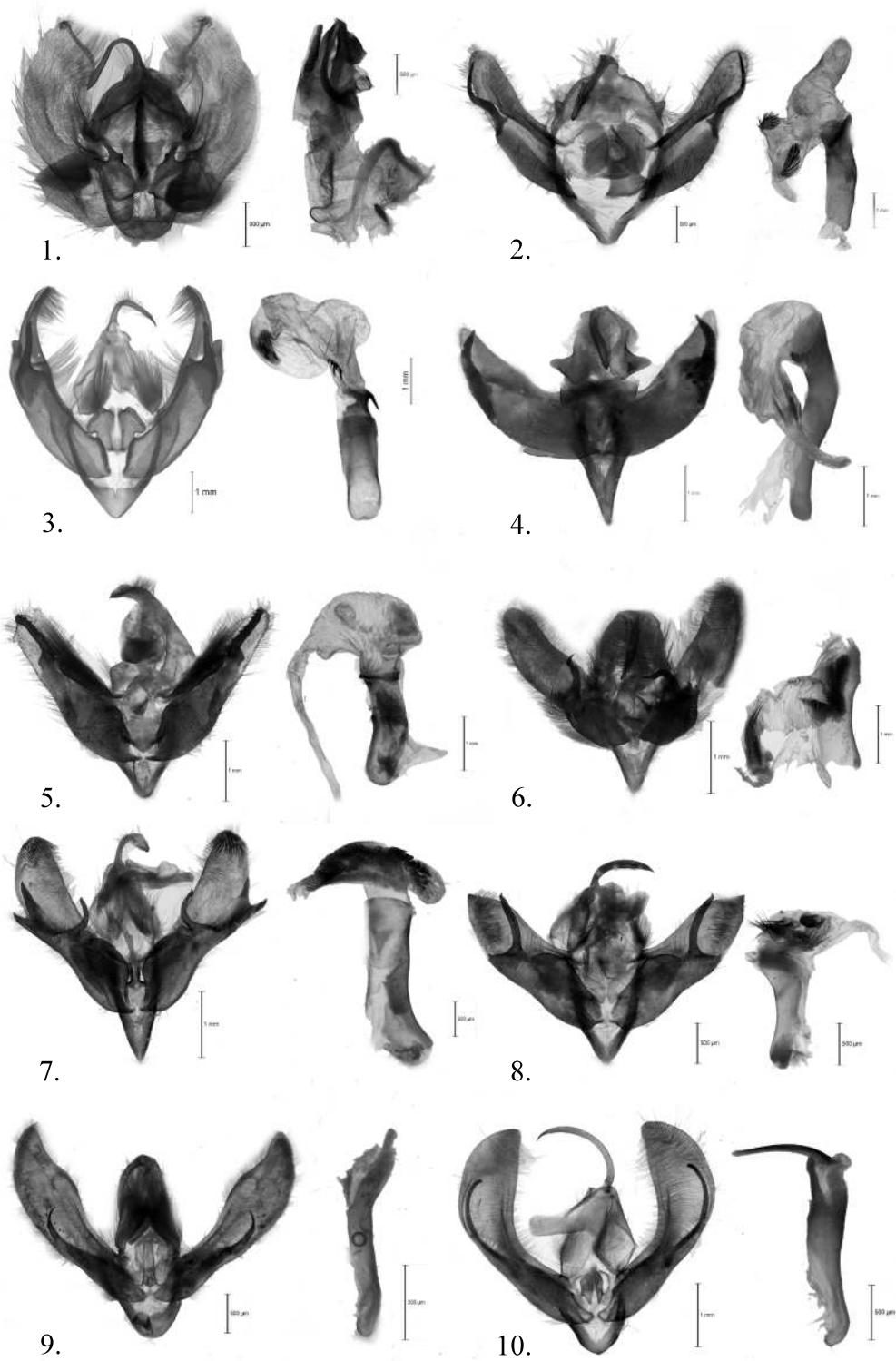
Habitus Plate 11:
Noctuinae

1. *Xestia janakpura* 2. *Xestia lobbichleri* 3. *Xestia nepalensis*
4. *Xestia renalis* 5. *Xestia retracta* 6. *Xestia tenuis* 7. *Agrotis fraterna*
8. *Agrotis ipsilon* 9. *Agrotis segetum* 10. *Dichagyris triangularis*
11. *Euxoa adumbrata* 12. *Euxoa ochrogaster* 13. *Perissandria sikkima*
14. *Paraxestia flavicaudata*



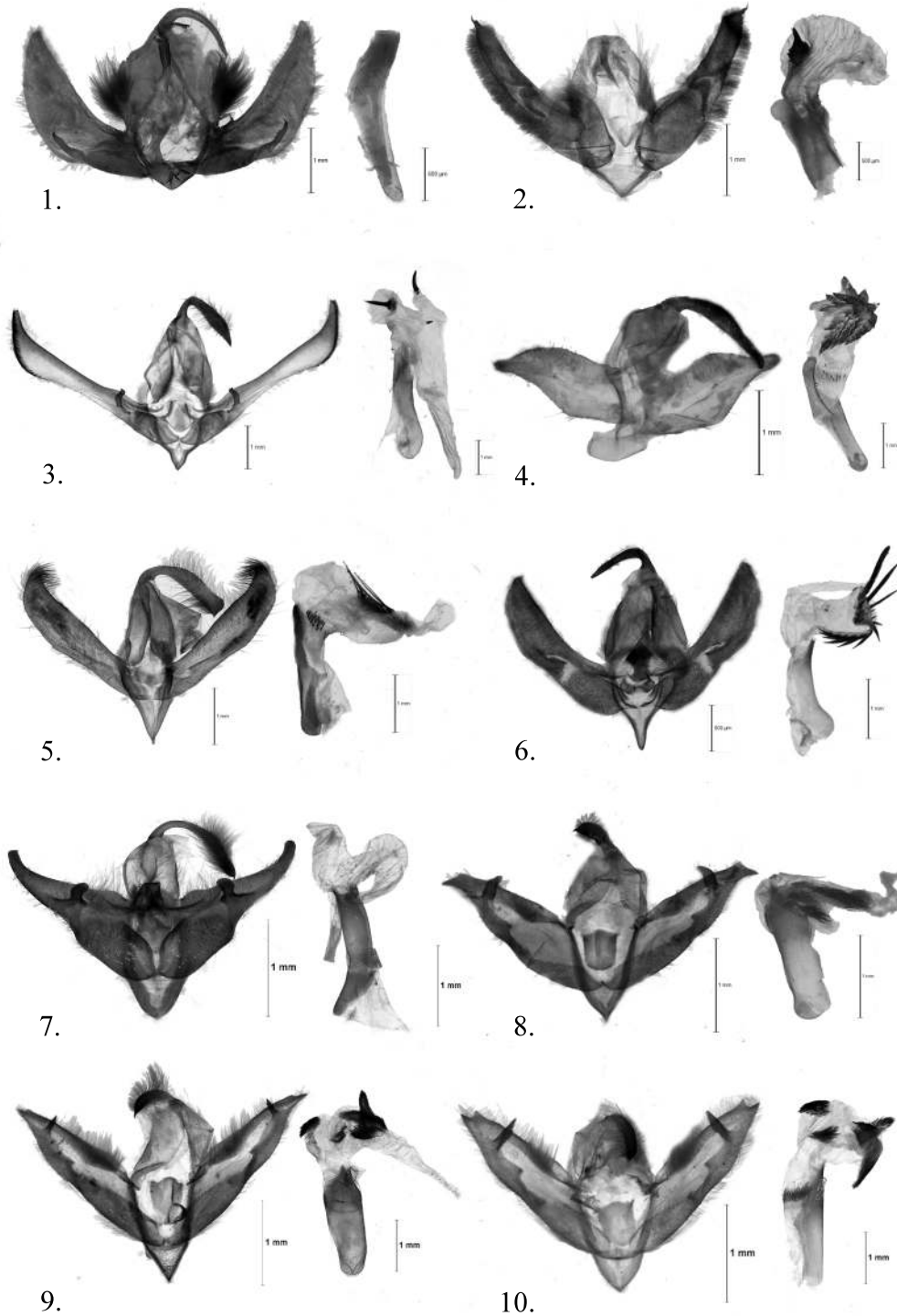
Genitalia Plate 1

1. *Abrostola anophioides* 2. *Chrysodeixis acuta* 3. *Chrysodeixis chalcites*
4. *Ctenoplusia albostriata* 5. *Ctenoplusia furcifera*
6. *Autographa purpureofusa* 7. *Xanthodes transversa* 8. *Maliattha picata*
9. *Micardia pulcherrima* 10. *Acontia (Emmelia) marmoralis*



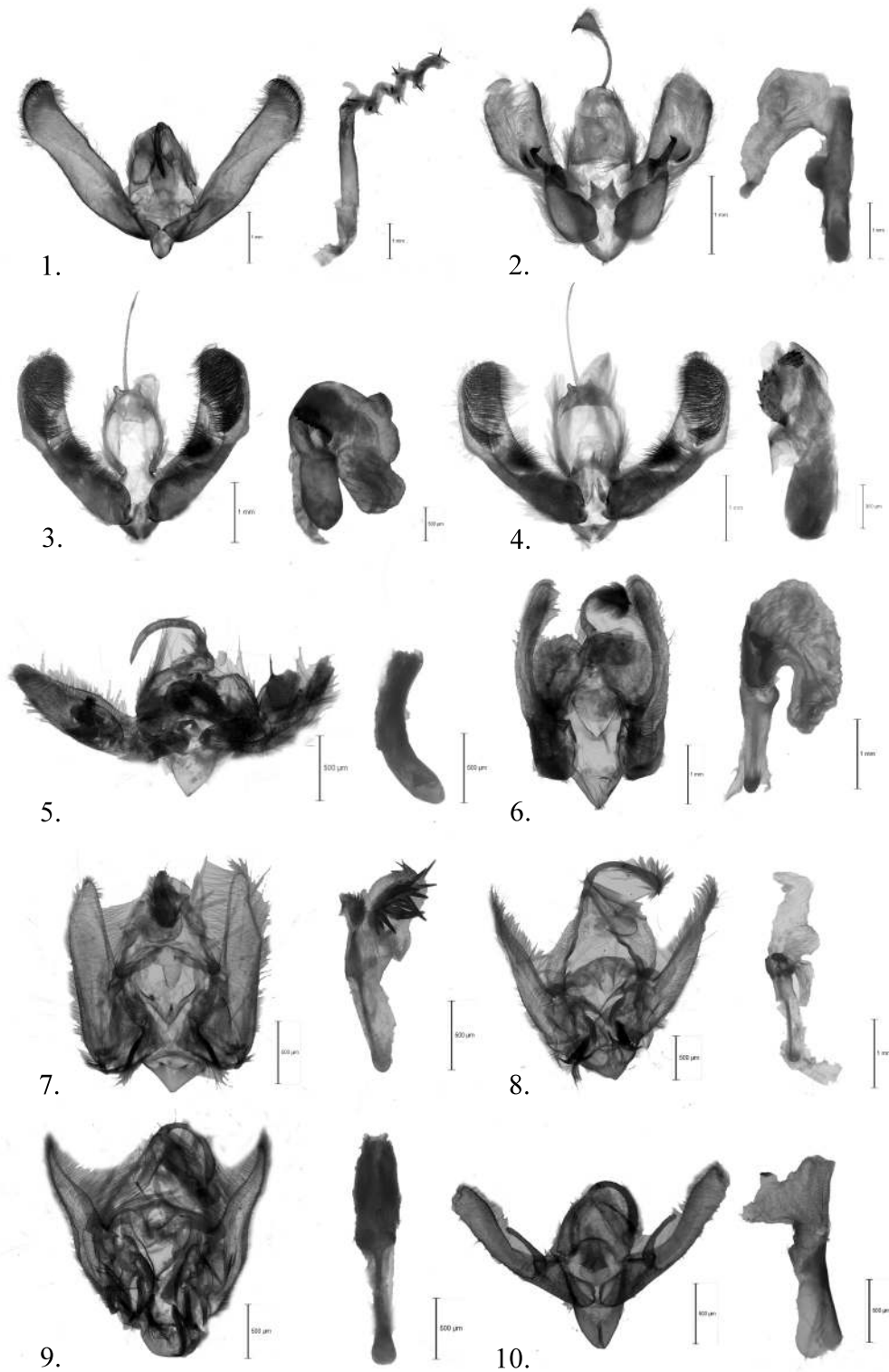
Genitalia Plate 2

1. *Aedia leucomelas* 2. *Anacronicta infausta* 3. *Donda unispinosa*
4. *Tambana subflava* 5. *Trisuloides sericea* 6. *Acronicta bicoloraria*
7. *Acronicta (Triaena) denticulata* 8. *Acronicta gastridia*
9. *Sarbanissa dissimilis* 10. *Sarbanissa transiens*



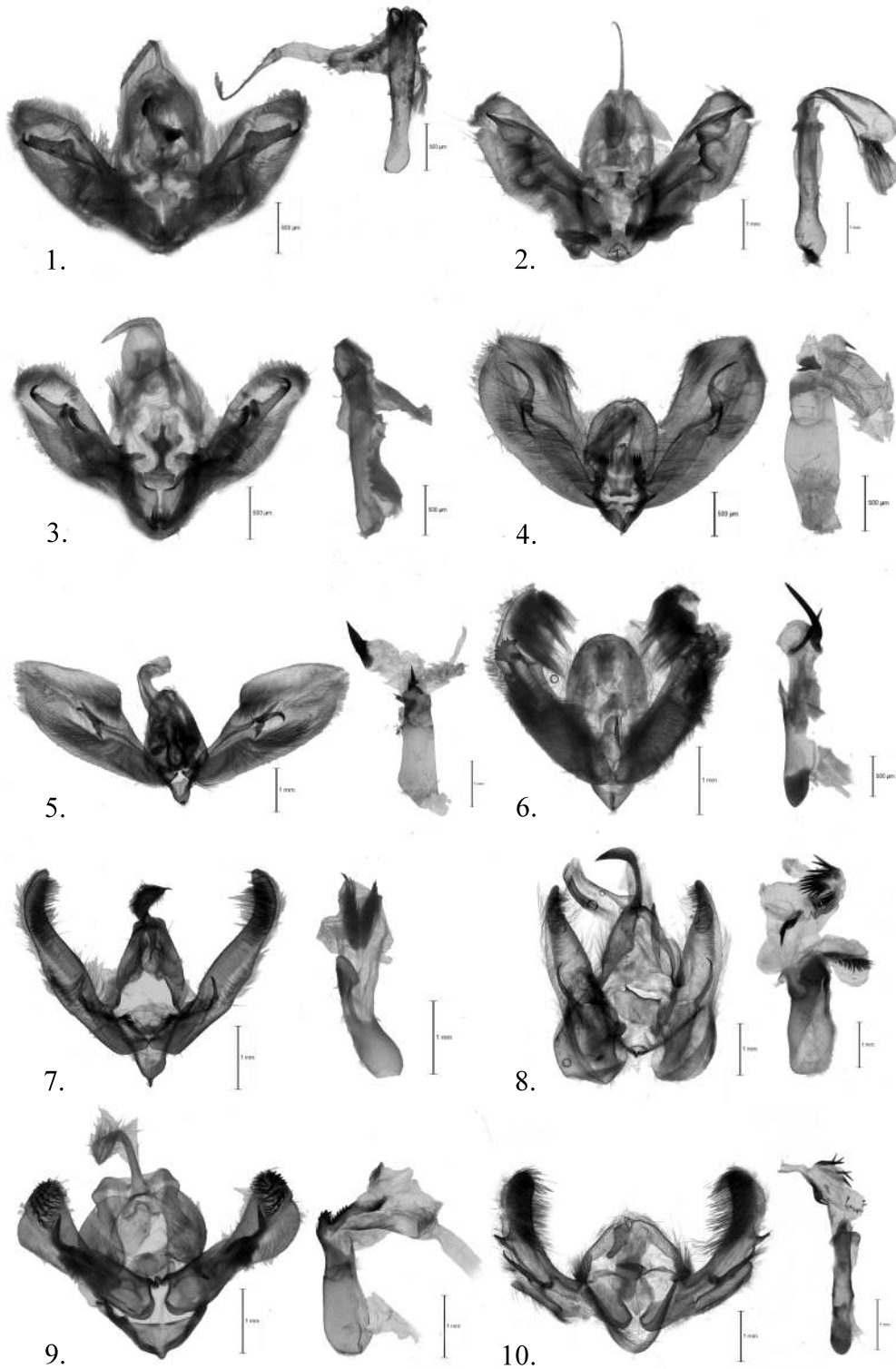
Genitalia Plate 3

1. *Aegocera bimacula* 2. *Apostema distigmata* 3. *Cucullia pullata*
4. *Amphipyra cupreipennis* 5. *Amphipyra pyramidea* 6. *Nacna prasinaria*
7. *Diphtherocome discibrunnea* 8. *Diphtherocome diverticulata*
9. *Diphtherocome fasciata* 10. *Diphtherocome pallida*



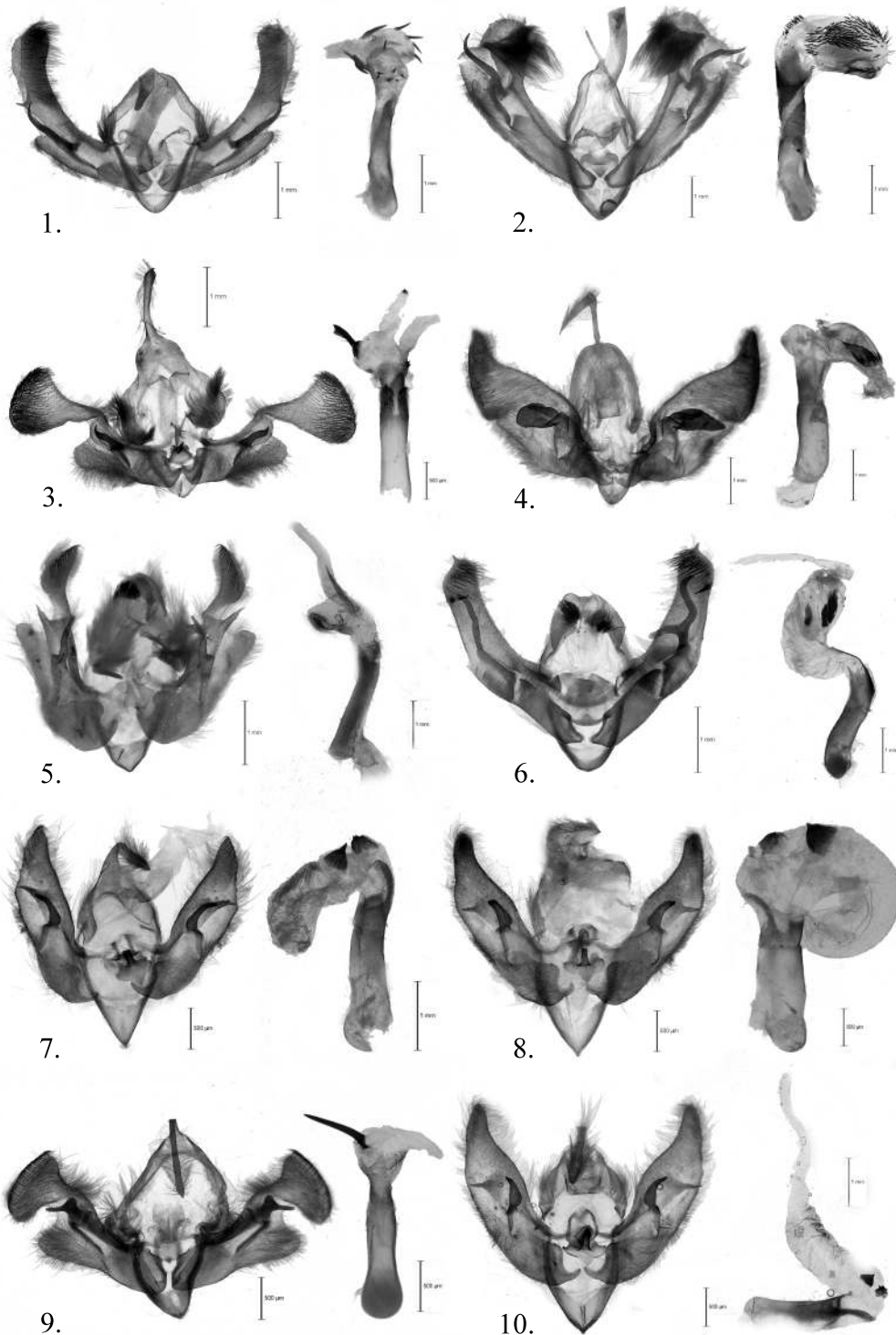
Genitalia Plate 4

1. *Helicoverpa armigera* 2. *Bagada poliomera* 3. *Condica capensis*
4. *Condica illecta* 5. *Hadjina cupreipennis* 6. *Callopistria callopistroides*
7. *Callopistria minor* 8. *Callopistria repleta* 9. *Callopistria rivularis*
10. *Bryophila literata*



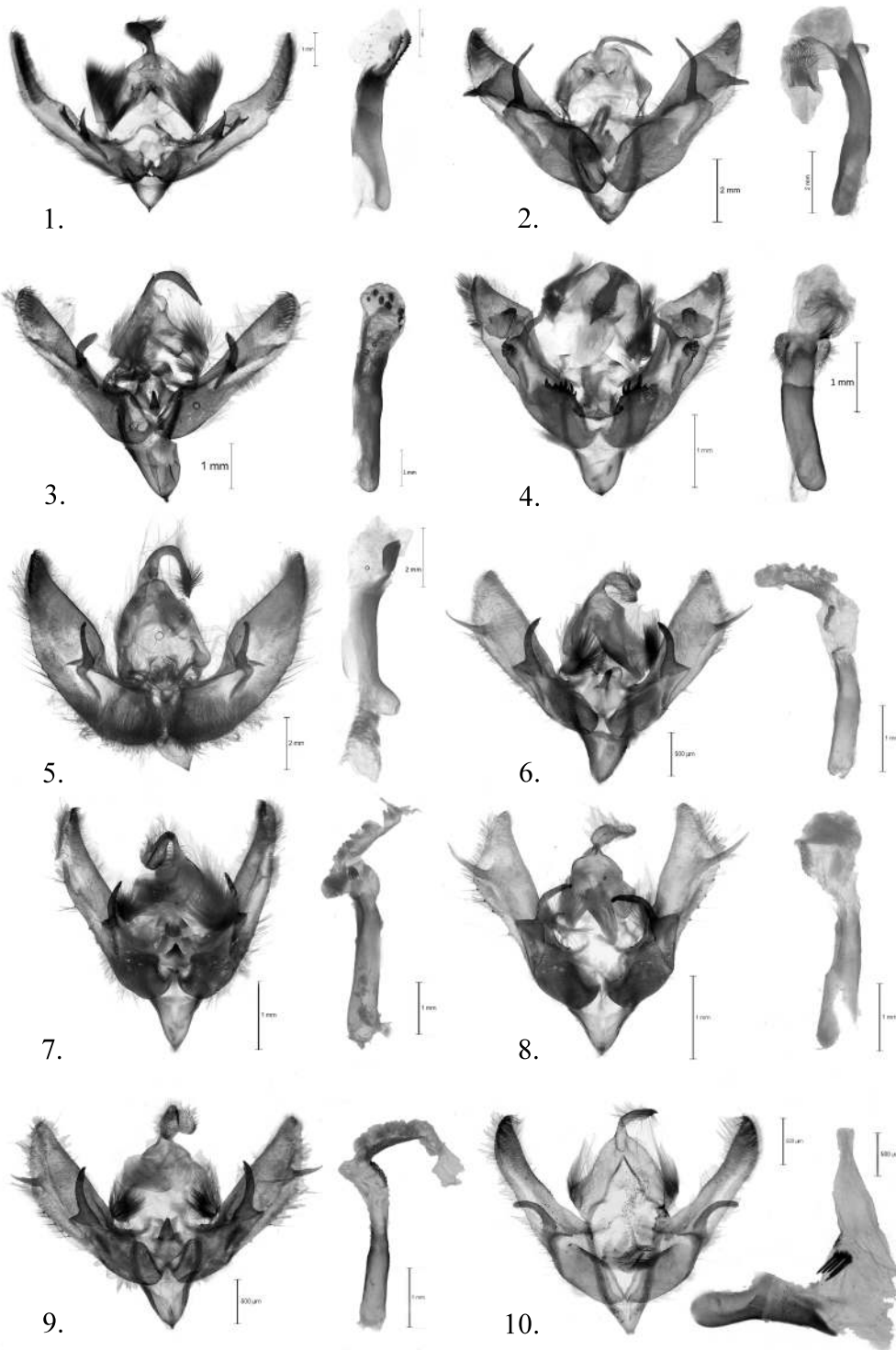
Genitalia Plate 5

1. *Spodoptera cilium* 2. *Spodoptera litura* 3. *Spodoptera pecten*
4. *Athetis cognata* 5. *Athetis lineosa* 6. *Athetis sincera*
7. *Callyna jugaria* 8. *Callyna monoleuca*
9. *Feliniopsis leucostigma* 10. *Trachea aurigera*



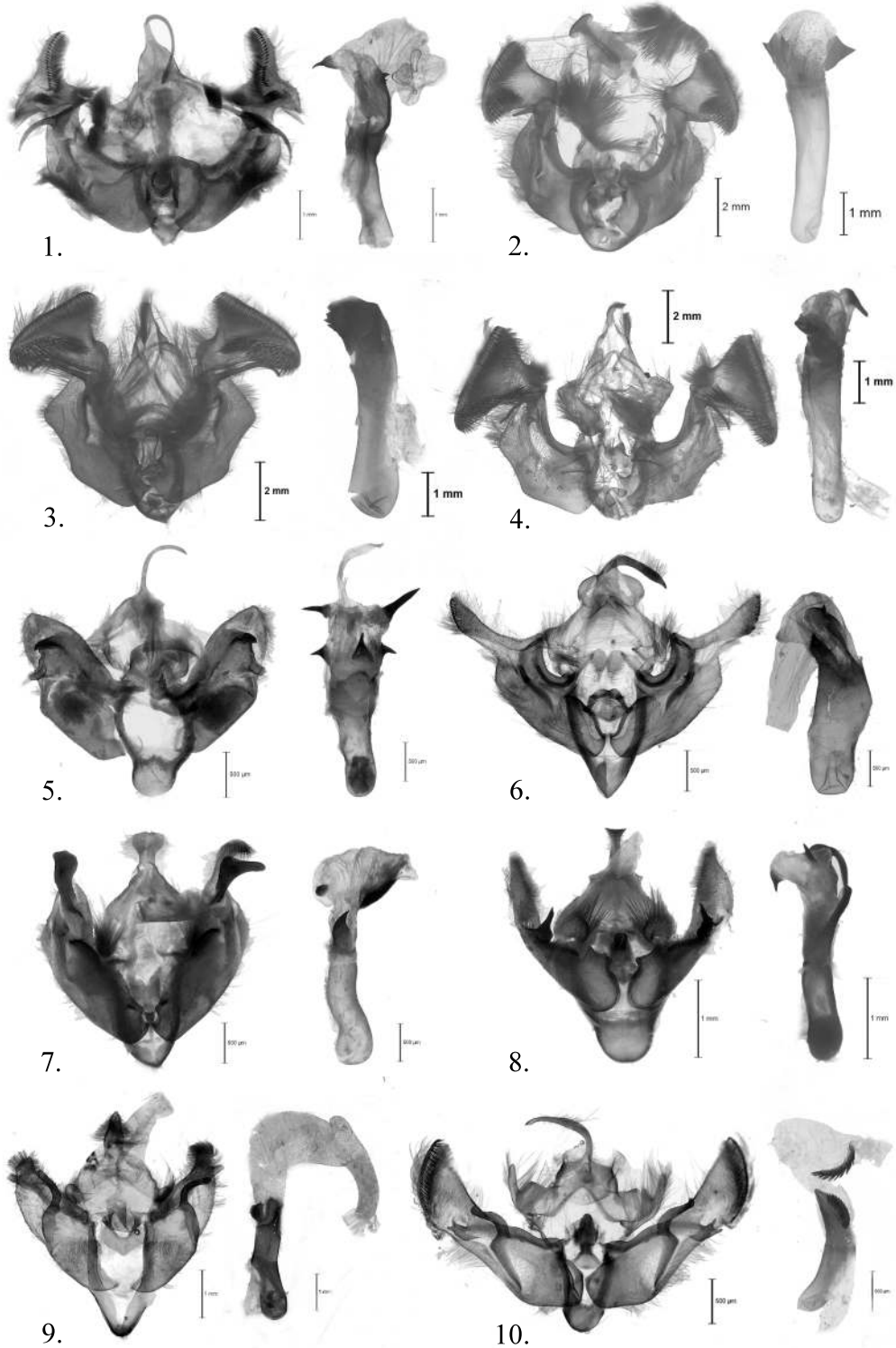
Genitalia Plate 6

1. *Trachea guttata* 2. *Trachea microspila* 3. *Trachea tibetensis*
4. *Auchmis inextricata* 5. *Euplexia annapurna* 6. *Karana similis*
7. *Oroplexia decorata* 8. *Oroplexia hamptoni* 9. *Oroplexia luteifrons*
10. *Oroplexia pectinosa*



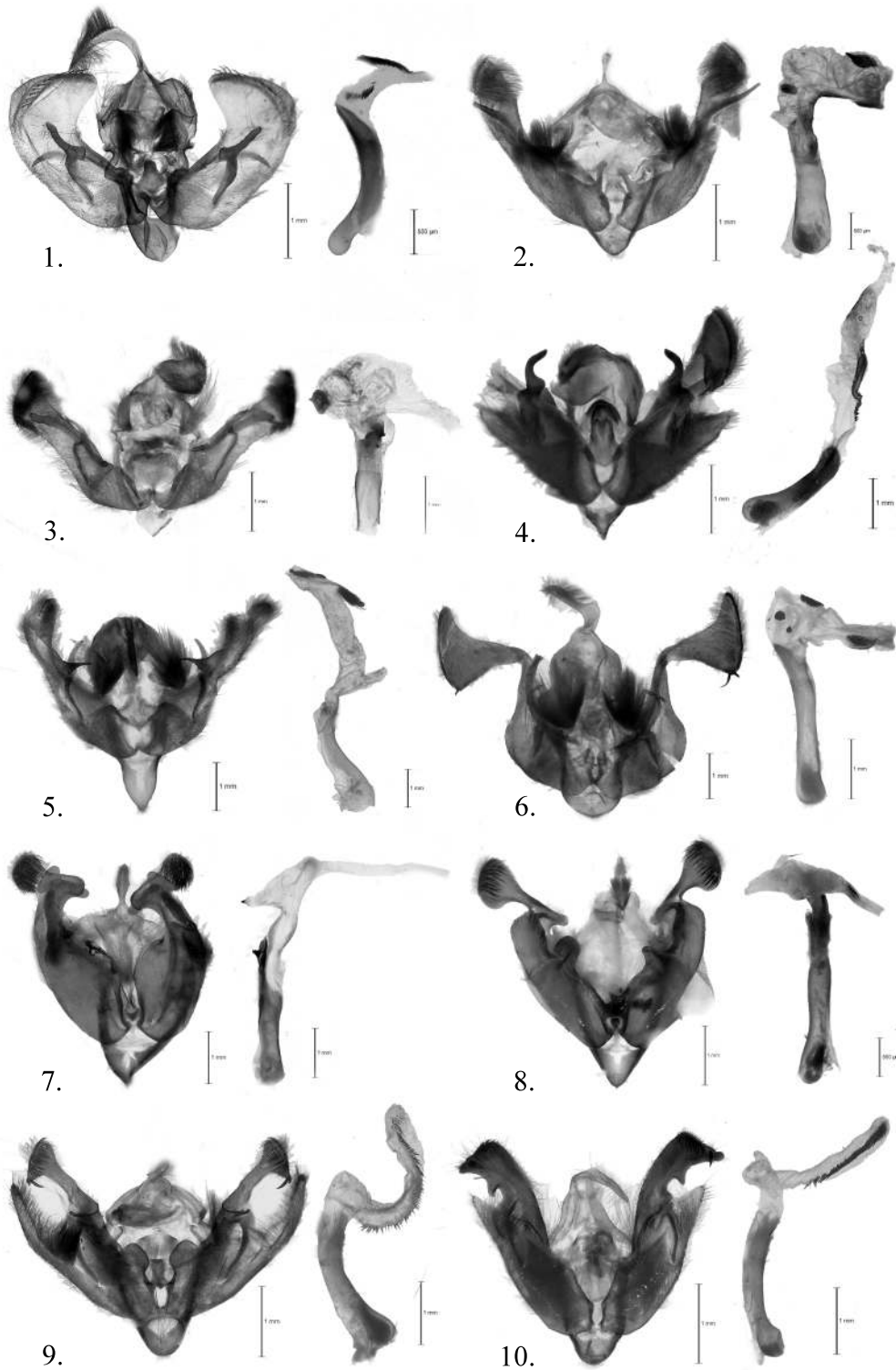
Genitalia Plate 7

1. *Phlogophora conservuloides* 2. *Phlogophora costalis*
3. *Phlogophora distorta* 4. *Phlogophora plumbeola*
5. *Phlogophora subpurpurea* 6. *Valeriodes aurantica*
7. *Valeriodes cyanelinea* 8. *Valeriodes heterocampa*
9. *Valeriodes icamba* 10. *Xenotrachea aurantiaca*



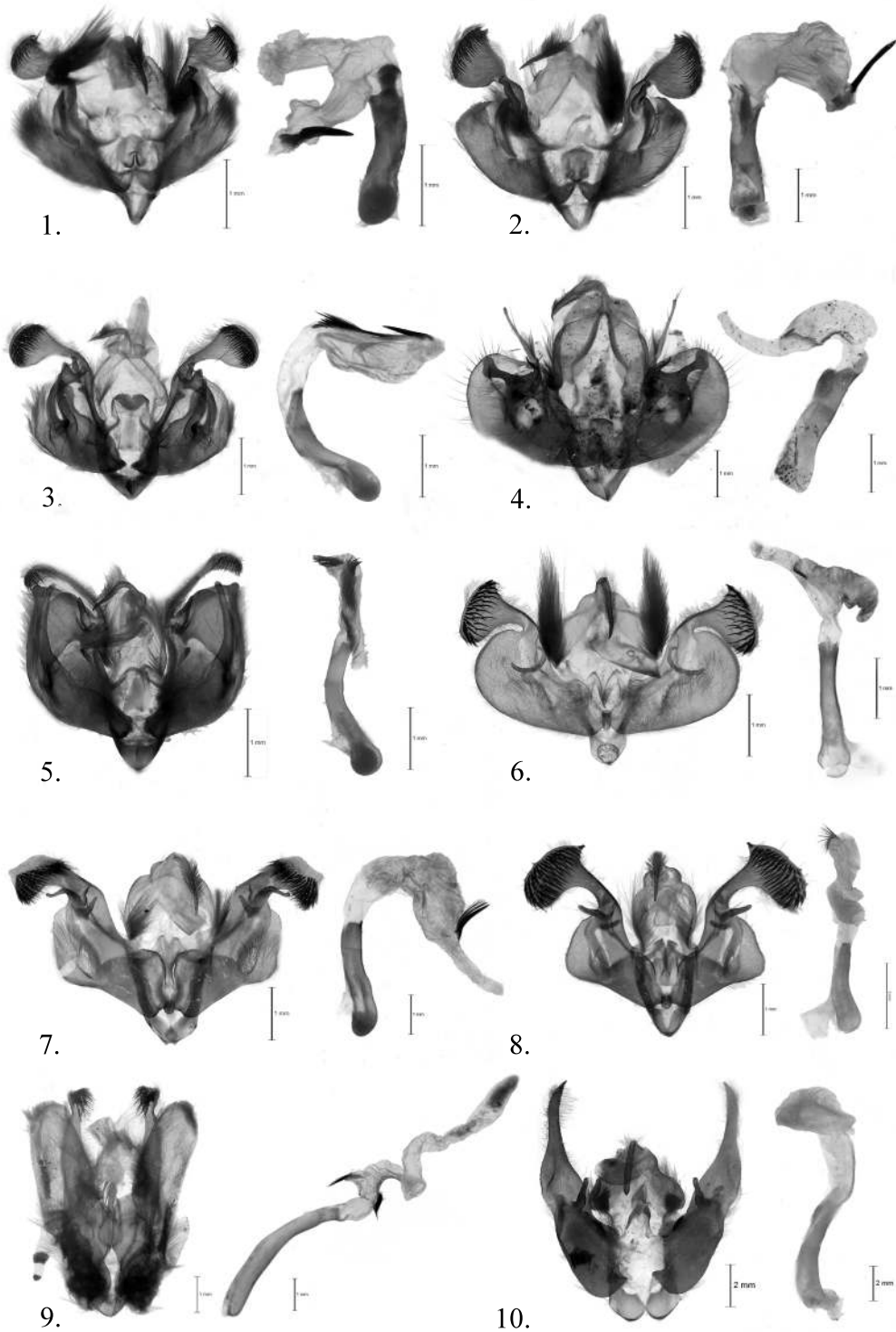
Genitalia Plate 8

1. *Apamea chalybaeata* 2. *Apamea chhiringi* 3. *Apamea gratissima*
4. *Apamea purpurina* 5. *Bryoxena centralasiae* 6. *Hygrostola robusta*
7. *Trichoridia canosparsa* 8. *Trichoridia dentata* 9. *Dasypolia templi*
10. *Hyalobole nigripalpis*



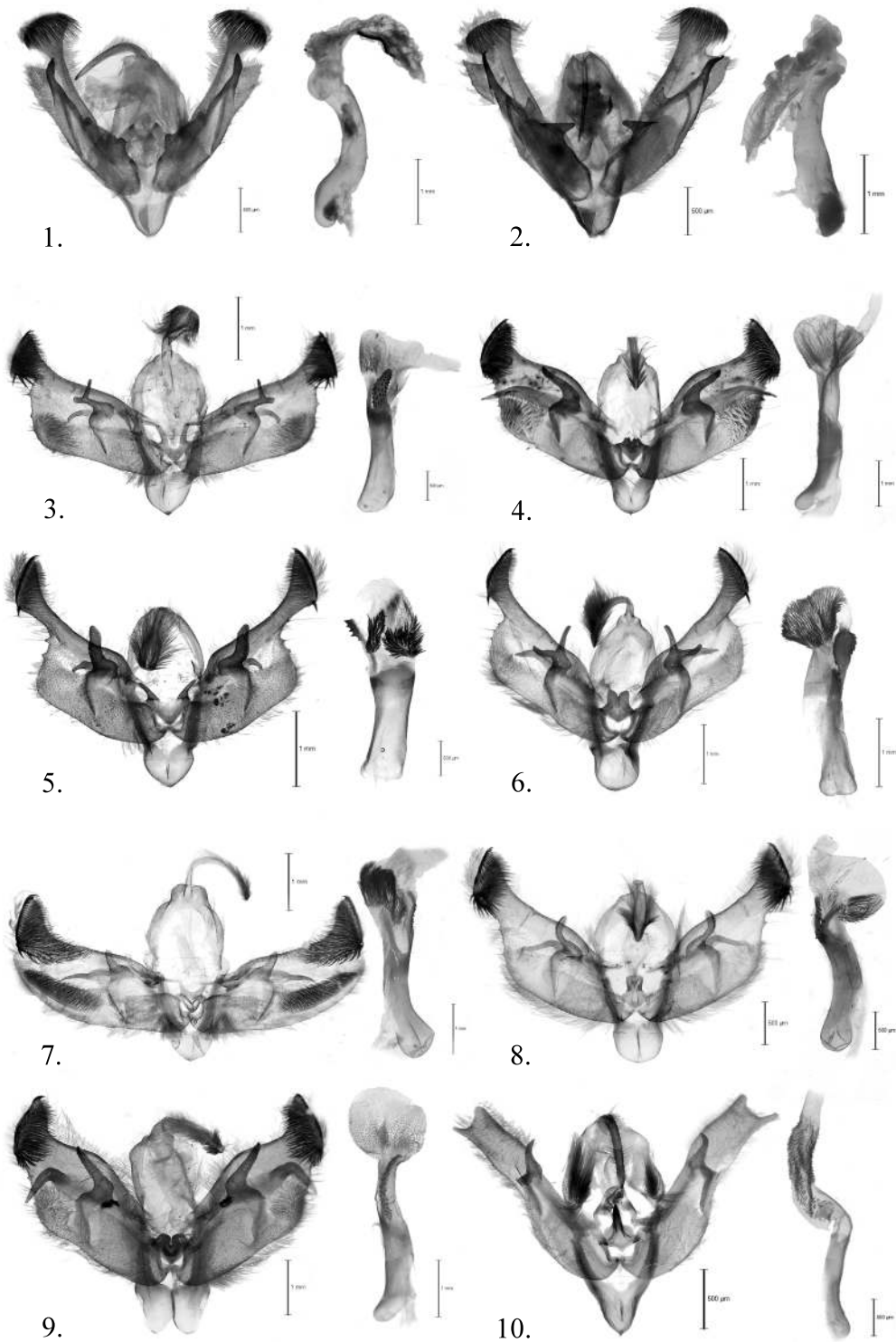
Genitalia Plate 9

1. *Hyalobole subapicalis* 2. *Mniotype olivascens* 3. *Parabole rectilinea*
4. *Sydiva meissneri warreni* 5. *Xanthia approximata* 6. *Dictyestra dissectus*
7. *Kollariana scotochlora* 8. *Odontestra submarginalis* 9. *Polia culta*
10. *Tricheurois cuprina*



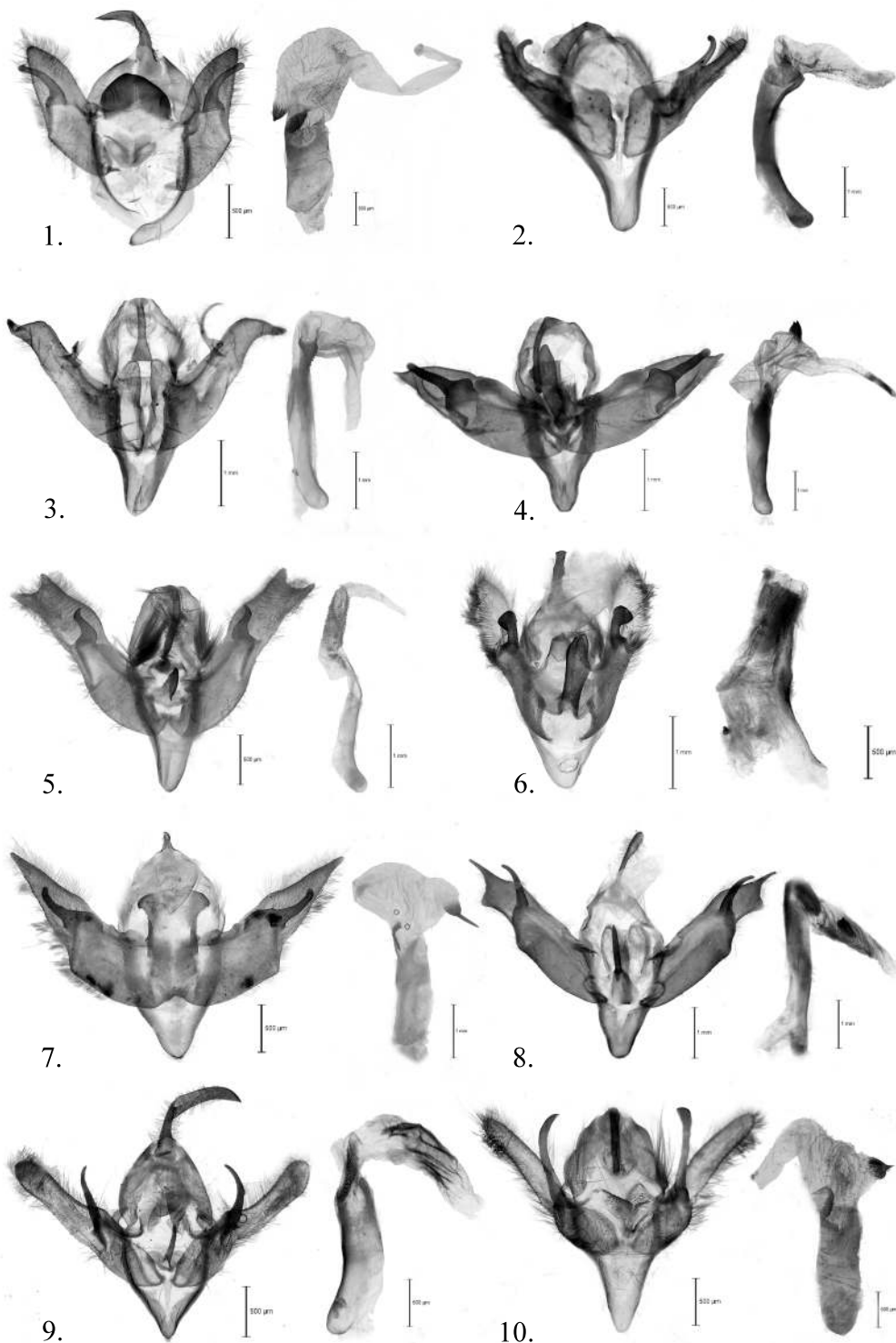
Genitalia Plate 10

1. *Anapoma albicosta* 2. *Anapoma duplicata* 3. *Anapoma unicorna*
4. *Leucania simillima* 5. *Mythimna bifasciata* 6. *Mythimna decisissima*
7. *Mythimna modesta* 8. *Mythimna nepos* 9. *Tiracola aureata*
10. *Anaplectoides inexpectata*



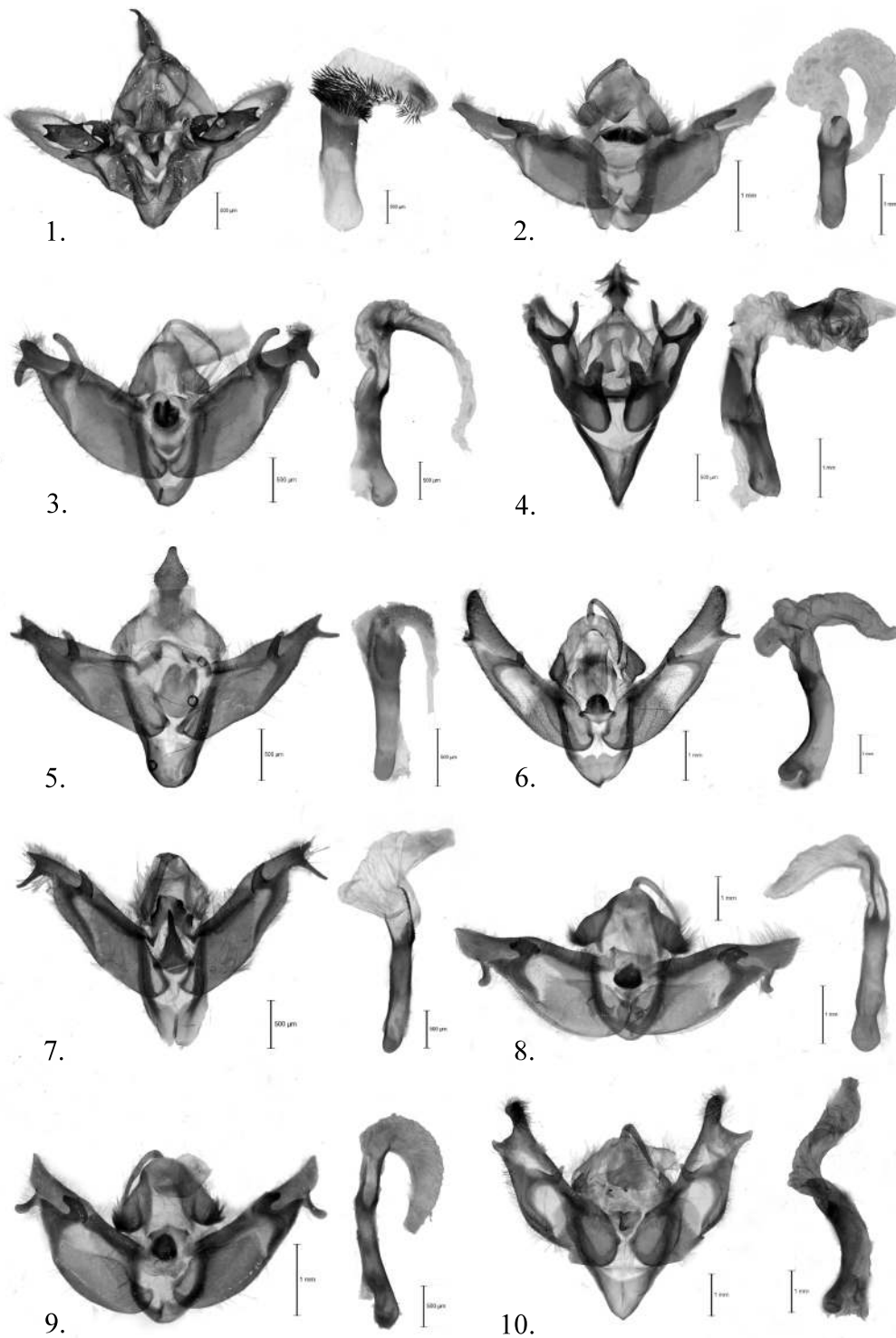
Genitalia Plate 11

1. *Axylia putris* 2. *Axylia renalis* 3. *Diarsia cerastioides*
4. *Diarsia claudia* 5. *Diarsia erubescens* 6. *Diarsia griseithorax*
7. *Diarsia nigrosigna* 8. *Diarsia stictica* 9. *Diarsia vulpina*
10. *Hermonassa chagyabensis*



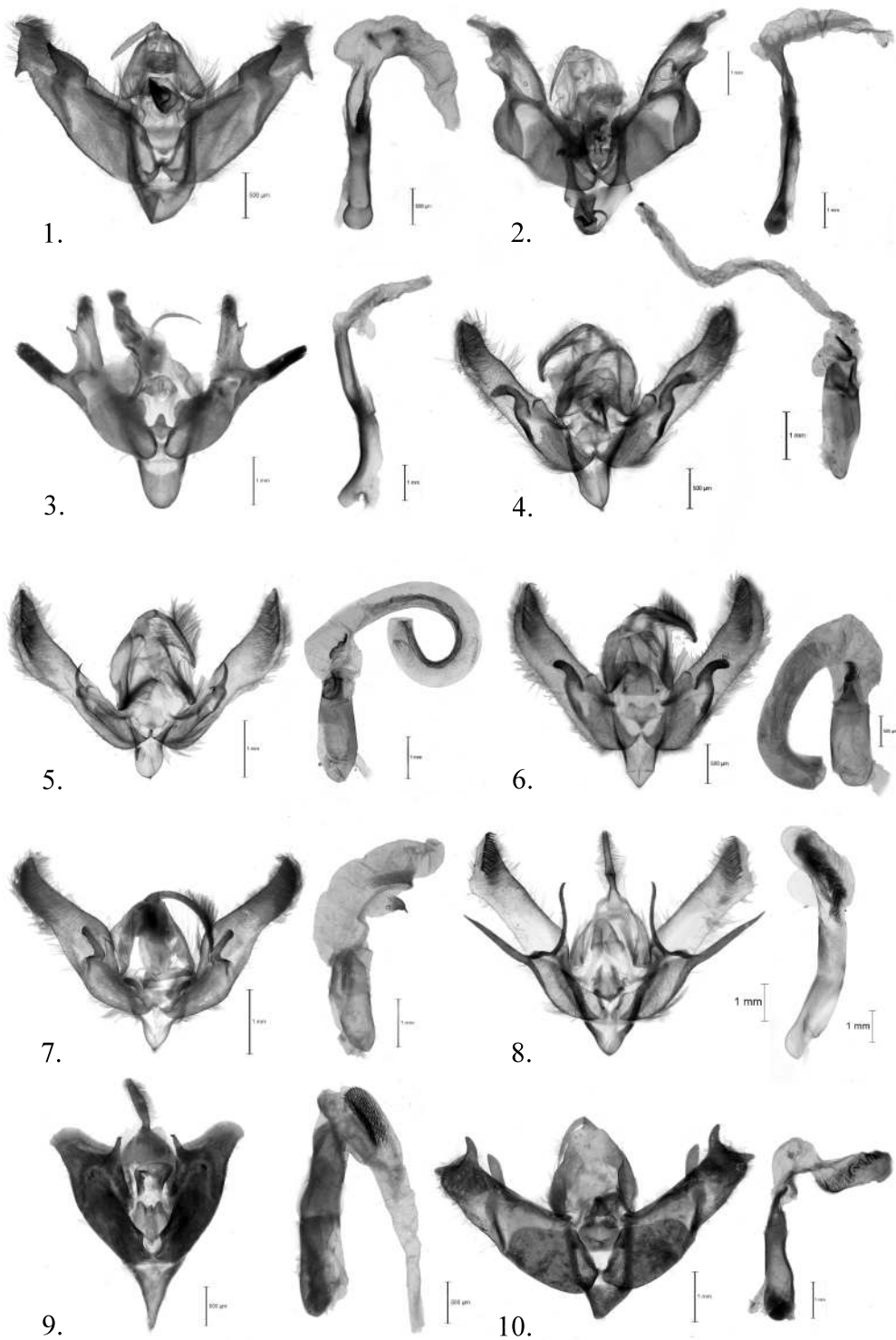
Genitalia Plate 12

1. *Hermonassa consignata* 2. *Hermonassa cuprina* 3. *Hermonassa divida*
4. *Hermonassa incisa* 5. *Hermonassa marginata* 6. *Hermonassa phenax*
7. *Hermonassa renifera* 8. *Hermonassa selecta* 9. *Hermonassa sherpae*
10. *Hermonassa stigmatica*



Genitalia Plate 13

1. *Protognorisma fusca* 2. *Xestia angara* 3. *Xestia bdelygma*
4. *Xestia brunneago* 5. *Xestia clavata* 6. *Xestia c-nigrum*
7. *Xestia forsteri* 8. *Xestia gandakiensis* 9. *Xestia isochroma*
10. *Xestia lobbichleri*



Genitalia Plate 14

1. *Xestia nepalensis* 2. *Xestia renalis* 3. *Xestia tenuis*
4. *Agrotis fraterna* 5. *Agrotis ipsilon* 6. *Agrotis segetum*
7. *Dichagyris triangularis* 8. *Euxoa ochrogaster*
9. *Perissandria sikkima* 10. *Paraxestia flavicaudata*

CHAPTER 4: SEASONAL DIVERSITY PATTERN OF

FAMILY NOCTUIDAE

4.1 Introduction

Climatic factors contribute most significantly in temporal variation of insect population abundances or in community composition. Insect assemblages changes significantly both in long-term as well as in very short-term cycles (Wolda, 1978). Most insect species are seasonal, which may occur in several generations throughout the year and may show one or several peaks in abundance during favourable seasons. In unfavourable and harsh climatic conditions, like in the winter, the adult insects enter into reproductive dormancy or pupae cease metamorphosis and development. Temperature, precipitation or humidity and photoperiod have significant effects on metamorphosis and development in life cycle stages (Tauber et al., 1998; Didham & Springate, 2003).

In the Indian Himalayas, the fluctuations in average monthly temperature and seasonality pattern plays a key role maintaining all insect diversity. Moths are also no exception. As majority of them are polyphagous and many are harmful pests, especially Noctuids, to the forests and agriculture, studies on their seasonal assemblage pattern are important for effective conservation and integrated pest management strategies. The larvae of moths are herbivores and feeds on particular plants, thus are very vulnerable to changing plant phenology occurred due to climatic perturbations. A very few works focusing on the seasonal fluctuations in adult

moth assemblages have been done (Yoshida 1980; Yela & Herrera 1993; Butler et al. 2001; Raha, 2017) in the past. This chapter focuses on the season-wise variation of the Noctuidae assemblage and its relation with the Annual temperature, Annual precipitation and temperature seasonality of Askot Wildlife Sanctuary.

4.2 Methods

To observe the seasonal diversity and distribution pattern of Noctuid moths, sampling was carried out in two prominent seasons during the study period of 2016–2019: Pre-monsoon, spanning from May to July and in the Post-monsoon, spanning from August to November. Sampling have been strategized in such a manner so that sampling sites representing each altitudinal band is sampled in both the season.

4.3 Data Analysis

Fisher's alpha is generally used in the studies of insect diversity in the tropics (e.g. Brehm et al., 2003; Schulze and Fiedler, 2003; Axmacher et al., 2004). To assess seasonal fluctuations in moth assemblages, diversity indices of moths in different seasons were separately calculated. Site wise diversities in both the seasons were then compared using ANOSIM-SIMPER to assess seasonal fluctuations in pre-monsoon and post-monsoon sites. Effects of environmental variables such as, Average Monthly Minimum temperature, Average Monthly Maximum temperature, Average Monthly Precipitation, Annual Mean temperature (Bio1), Temperature Seasonality (Bio4), Annual Precipitation (Bio12), Altitude and Normalized Difference Vegetation Index

(NDVI) upon species assemblage were estimated using Canonical Corresponding Analysis (CCA) taking the Species Richness and Abundance as dependent variables. All the analyses were performed with the help of programme PAST 2.17c.

4.4 Results and Discussion

4.4.1 Site-wise diversity: Site-wise, highest number of species was encountered at Chipla Kedar with 40 species followed by Kanar_18 with 34 and Jauljibi with 32 species respectively. Whereas, highest abundance was observed at Chipla Kedar (357 individuals) followed by Tejamkhaya (141 individuals) and Vayman_30 (95 individuals).

Since, alpha diversity is a function of both species richness and abundance, diversity was highest at Jauljibi [Fisher's alpha 44.13; Simpson (1-D) 0.9579; Shannon 3.326]. Kanar_18 was found to be the next most diverse site [Fisher's alpha 28.18; Simpson (1-D) 0.9568; Shannon 3.335]. The alpha diversity, evenness and species estimate indices of 36 sites surveyed in Askot WLS are provided in Table 4.1.

Table 4.1: Alpha diversity indices, evenness and species estimates of Noctuids for all the sampled sites

Site	Sp. Obs.	Abnd.	Simpson 1-D	Shannon H	Evenness $e^{H/S}$	Fishers' alpha	Chao- 1
AS632	32	47	0.9579	3.326	0.87	44.13	74.17
AS749	9	13	0.8639	2.098	0.9057	12.94	14
AS825	2	2	0.5	0.6931	1	0	3
AS1029	6	9	0.7901	1.677	0.8916	7.867	9
AS1121	4	6	0.7222	1.33	0.9449	5.245	4.333
AS1222	4	5	0.72	1.332	0.9473	9.284	5.5
AS1272	4	4	0.75	1.386	1	0	10
AS1356	2	2	0.5	0.6931	1	0	3
AS1430	4	4	0.75	1.386	1	0	10
AS1630	11	15	0.8889	2.303	0.9099	18.6	20.33
AS1692	11	15	0.8889	2.303	0.9099	18.6	20.33
AS1714	17	26	0.9201	2.685	0.862	21.33	39
AS1843	34	66	0.9568	3.335	0.8254	28.18	53.13
AS2009	1	1	0	0	1	0	1
AS2061	13	22	0.8843	2.363	0.8168	13.35	31
AS2195	10	19	0.8366	2.059	0.784	8.541	15
AS2248	24	45	0.877	2.704	0.6227	20.9	75
AS2279	15	31	0.9095	2.542	0.8474	11.44	20.25
AS2442	6	8	0.7813	1.667	0.8831	10.91	16
AS2462	18	37	0.8985	2.578	0.7319	13.83	51

Site	Sp. Obs.	Abnd.	Simpson 1-D	Shannon H	Evenness e ^{H/S}	Fishers' alpha	Chao- 1
AS2547	9	13	0.8757	2.138	0.9429	12.94	11
AS2655	15	40	0.8937	2.452	0.774	8.717	18.75
AS2723	2	2	0.5	0.6931	1	0	3
AS2800	11	36	0.8302	2.019	0.6843	5.401	14.33
AS2932	6	13	0.8166	1.738	0.9476	4.322	6
AS3015	5	8	0.6875	1.386	0.8	5.705	11
AS3065	21	95	0.8946	2.597	0.6389	8.345	24
AS3150	25	62	0.9355	2.967	0.7772	15.57	36
AS3166	3	4	0.625	1.04	0.9428	5.453	3.5
AS3225	21	60	0.8967	2.607	0.6454	11.49	43
AS3226	3	6	0.5	0.8676	0.7937	2.388	4
AS3343	13	19	0.892	2.406	0.8532	18.15	35.5
AS3390	16	23	0.9149	2.631	0.8676	23.3	38
AS3427	13	28	0.9056	2.463	0.9029	9.43	13.38
AS3700	26	141	0.8784	2.567	0.5012	9.366	33.5
AS4216	40	357	0.8934	2.617	0.3424	11.55	75

4.4.2 Seasonal Pattern: Noctuidae richness and relative abundance shows a general seasonal trend along altitudinal bands and is significantly governed by average monthly rainfall. Average monthly precipitation also plays a key role for Noctuidae richness and abundance. In case of both the prominent seasons, the observed species richness and relative abundance of Noctuids increased with increase in altitude and decrease in average monthly minimum

temperature, average monthly maximum temperature and average monthly precipitation (Fig. 4.1–4.2). For both pre-monsoon and post-monsoon, the relative abundance in Low altitude group is comparatively very less but the alpha diversity is high which indicates the congregation of singleton and doubleton species in the low altitudinal areas. However, the Shannon diversity increases with increase in altitude for both the seasons, Fishers' alpha decreases in the post-monsoon. Although the species richness and relative abundance are high in high altitude areas, the Fisher's alpha decreases due to lesser number of singletons and doubletons.

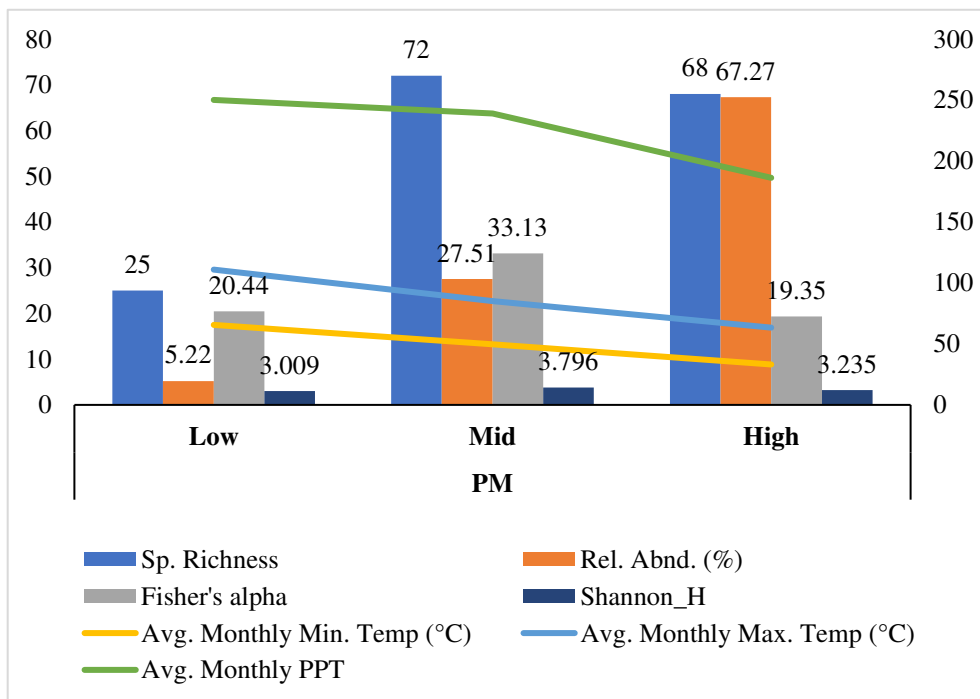


Fig. 4.1: Pre-monsoonal Species richness, Relative abundance and Alpha diversity of Noctuids along with Average Monthly Minimum and Maximum Temperature and Precipitation

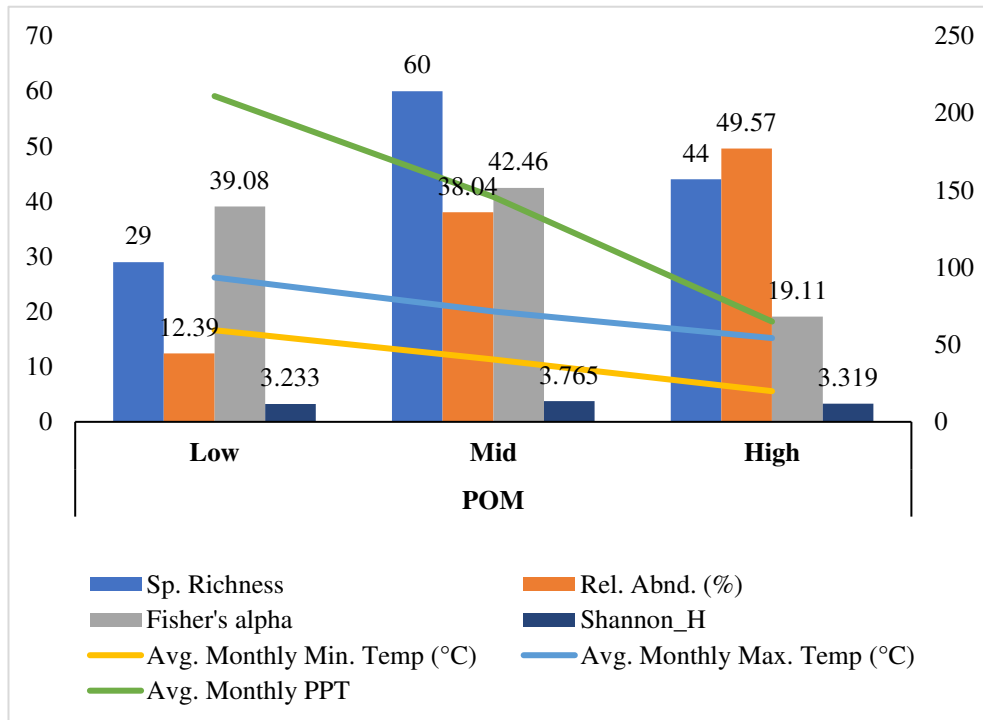


Fig. 4.2: Post-monsoonal Species richness, Relative abundance and Alpha diversity of Noctuids along with Average Monthly Minimum and Maximum Temperature and Precipitation

4.4.3 Factors governing Seasonal variation: For the CCA of Seasonal Abundance-Environmental factors data matrix, the first two axes explained 64.73% cumulative variation in the data (Table 4.2). For variability in seasonal abundance, the first CCA axis is positively influenced by Annual Precipitation (Bio12) ($r = 0.76$) and NDVI ($r = 0.65$) whereas it was most negatively influenced by Altitude ($r = -0.43$) (Fig. 5). For the second axis, Annual Mean temperature (Bio1) ($r = 0.46$) and Average Monthly Precipitation ($r = 0.26$) positively influenced the axis and Temperature Seasonality (Bio4) ($r = -0.44$) have a negative influence. The CCA diagram clearly indicates that majority of the sites sampled in both pre-monsoon and post-monsoon shows similar seasonal ensembles by forming a cluster among

the positive values of both axes, depicting a major influence of Annual Mean Temperature (Bio1), Annual Precipitation (Bio12), Average Monthly Precipitation and NDVI. Overall species richness and abundance were negatively influenced by Bio1, Bio12, Average Monthly Precipitation and NDVI while it was positively influenced by Bio4 and Altitude (Table 4.3).

Table 4.2: Summary of the Canonical Correspondence Analysis (CCA) for Noctuidae species richness and abundance with axes related to environmental variables

Axis	Eigenvalue	%
1	0.5874	47.77
2	0.20853	16.96

Table 4.3: Intraset correlations between explanatory variables and ordination axes resulting from the CCA, describing the relative magnitude and importance of each environmental variable in structuring the Noctuidae species richness and abundance ordination

Variable	Axis 1	Axis 2
Altitude (m)	-0.431254	-0.403863
Species richness	-0.584569	-0.685983
Abundance	-0.905983	-0.410189
Average Monthly Precipitation	0.163244	0.269774
Annual Mean Temperature (Bio1)	0.398154	0.467476
Temperature Seasonality (Bio4)	-0.0645456	-0.443948
Annual Precipitation (Bio12)	0.767239	0.286286
NDVI	0.653047	0.129888

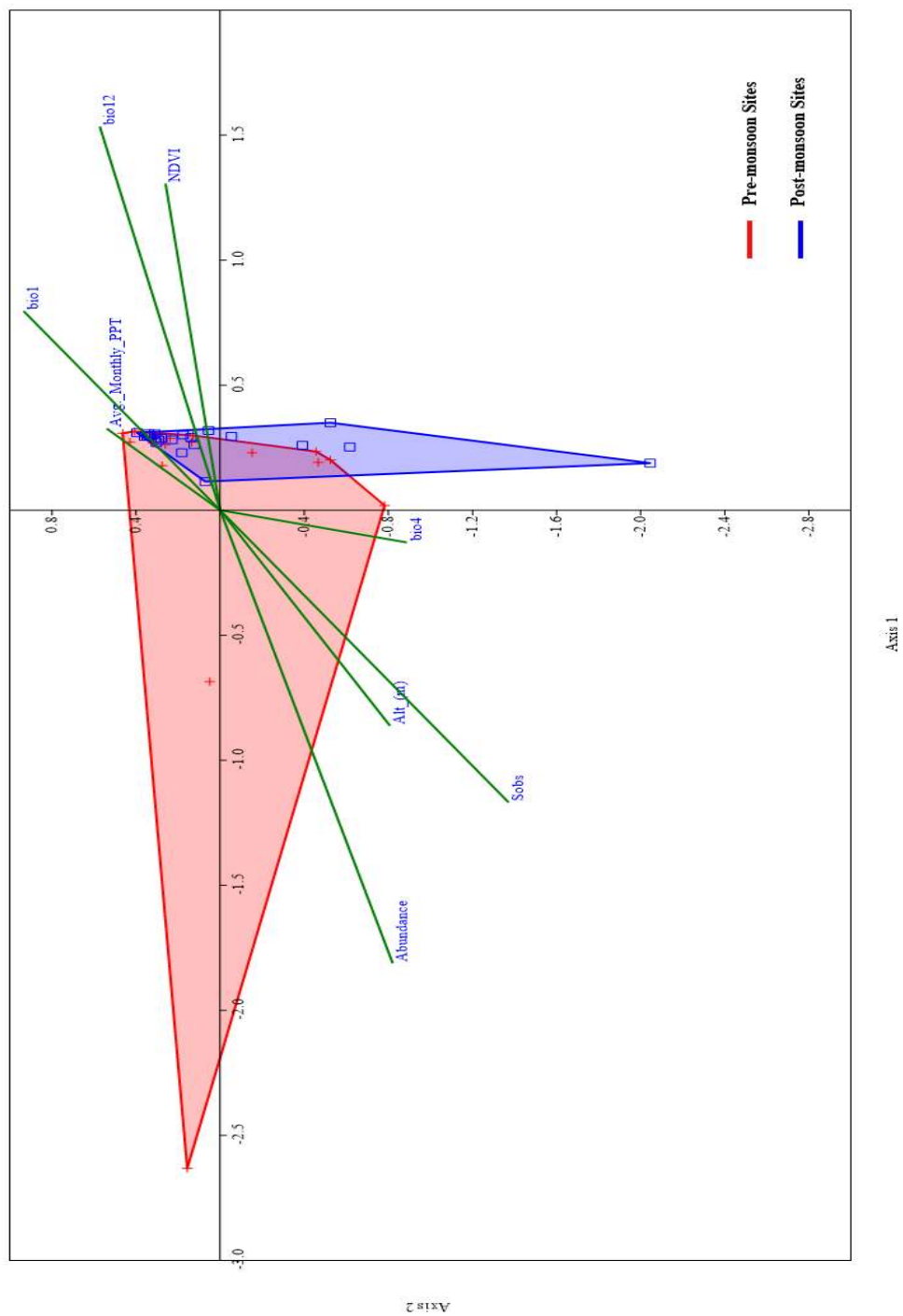


Fig. 4.3: CCA biplot based on species richness and abundance of Noctuidae and environmental variables with sites

4.4.4 Season-wise difference in species composition: The Global R statistics from ANOSIM from 1% threshold level was 0.22 with $p = 0.0001$ indicating that the overall difference between the two prominent seasons were large and

statistically significant. Pair wise ANOSIM test (Table 4.4) showed that significant difference in species composition occurred between pre-monsoon and post-monsoon season ($R = 0.22$, $p = 0.0001$).

Table 4.4: Pairwise comparison of similarity of moth assemblages in different seasons from ANOSIM (Analysis of Similarity). Significant results are indicated with bold

Mean Rank Within	382.6	
Mean Rank Between	477.3	
R	0.22	
p	0.0001	
R values		
	Pre-Monsoon	Post-Monsoon
Pre-Monsoon	0	0.22
Post-Monsoon	0.22	0
p values		
	Pre-Monsoon	Post-Monsoon
Pre-Monsoon	0	0.0001
Post-Monsoon	0.0001	0

To identify the species contributing to the assemblage differences between the two season that differed significantly i.e., between pre-monsoon and post-monsoon, similarity percentage analysis (SIMPER) was performed.

The SIMPER analysis between pre-monsoon and post-monsoon indicated that *Trachea guttata* associated with pre-monsoon was the most important species contributing for maximum significant differences. Apart from this, two other species viz., *Oroplexia decorata* and *Xestia angara* associated with pre-monsoon contributed significantly for the differences between the seasons. Two species, viz. *Oroplexia luteifrons* and *Trichoridia fuscicuprea* associated with post-monsoon, contributed significantly for the compositional differences for the season (Table 4.5).

Table 4.5: SIMPER analysis of differences in the species of moth assemblage contributing to the dissimilarity (97.52%) between Pre-monsoon and Post-monsoon seasons

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				PM	POM
<i>Trachea guttata</i>	4.329	4.439	4.439	2.55	0.0455
<i>Oroplexia luteifrons</i>	2.686	2.754	10.18	0	1
<i>Xestia angara</i>	2.616	2.682	12.86	1.55	0
<i>Oroplexia decorata</i>	2.493	2.556	15.41	1.5	0
<i>Trichoridia fuscicuprea</i>	2.452	2.514	17.93	0	1.09
<i>Xestia bdelygma</i>	1.685	1.728	29.69	3.6	0
<i>Xestia clavata</i>	1.505	1.543	39.27	2.15	0

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				PM	POM
<i>Xestia forsteri</i>	1.497	1.535	42.34	3.1	0
<i>Trichoridia canosparsa</i>	1.082	1.11	53.99	3.75	0
<i>Perissandria sikkima</i>	0.8672	0.8893	56.91	1.9	0.0909
<i>Polia culta</i>	0.864	0.886	58.68	2.25	0
<i>Trichoridia endroma</i>	0.5747	0.5893	68.26	2	0

CHAPTER 5: PROCESSES GOVERNING ASSEMBLAGE OF FAMILY NOCTUIDAE

5.1 Introduction

Globally, a major part of insect diversity is composed majorly of herbivorous taxa (Novotny et al., 2006) and not only they play a key role in ecosystem functioning as pollinators, they also act as decomposers and pest to the various economic and ecologically important species. Moths are the largest herbivorous group of insects and their role as bioindicators are well established (Holloway, 1985; Intachat et al., 1997, 1999; Brehm et al., 2003, 2007) throughout the world. Although being taxonomically challenging, the intense diversity and species richness offers robust detection of ecosystem changes (Holloway, 1977, 1985). Being exclusively herbivorous, their typical assemblage helps to determine the habitat quality. Also, the species richness significantly changes along altitudinal gradients (Holloway 1987, McCoy 1990) and are also important at a local scale, climatic factors and geographic position (Chown & Gaston 2000, Willig et al. 2003; Currie et al. 2004) are mostly at larger spatial scales. However, the local scale variables can play more important role than regional variables in assessing the diversity and species richness at a particular site (Sanyal, 2015).

Forest in Askot Wildlife Sanctuary are in some places mixed with human disturbances and habitation as well as at major places has its unique characteristic features (e.g., Rianj Oak Forest). Although plant communities and forest types in the area are well defined (Adhikari, 2009; Bisht et al.,

2018), but study of lepidoptera fauna associated with these particular forest types and habitats has never been attempted. In this chapter, I also tried to see the altitudinal variation of different subfamilies of Noctuidae. Also tried to identify the environmental factors that positively or negatively contributes in the assemblage of Noctuids in different altitudinal classes. The Noctuidae assemblage in different habitat types were also explored to see the preference of a species for a distinct habitat type.

5.2 Methods

Along the two separate altitude gradient, random sites were selected at every 300 m vertical distance according to the pre-determined vegetation types. Per altitudinal site 2–3 sampling plots were established for Light trapping until at least 90% of all species had been assembled and were pooled for analysis. To see the effect of altitude upon the diversity and species richness, sites were further grouped into three categories: Low (<1500 m), Medium (1500–3000 m) and High (>3000 m). Topographic variables such as Slope, Aspect and Hill shade were also calculated with the help of GIS Platform ArcMap 10.4.

To test the effects of different vegetation type on the diversity of Noctuid moths in the area, sites were grouped in to five broad habitat categories viz. Himalayan Chir Pine Forest, Himalayan Oak Forest, Western Mixed Coniferous Forest, West Himalayan Fir Forest and Alpine Scrub. NDVI values of each sampling site were also extracted using ArcMap 10.4 which gives an overall idea about the vegetation structure of the sites.

Ambient air temperature and relative humidity, wind velocity was recorded during the light trap in every 60 min with an electronic weather meter and were averaged over all catch nights for every site. Sample collection was generally avoided during the full moon period (3 days before and after full moon). Cloud cover was also noted in every hour for each light trap catch during the study period.

5.3 Data Analysis

Estimated species richness was used to measure inventory completeness of moth assemblages at both local and regional level. Non-parametric species richness estimators like Chao 1 as well as Rarefaction methods were used to get an idea about the species richness and sampling success. These diversity indices are selected as they have proved to be widely independent of the sample size, and a comparison of the results by different statistical approaches will allow conclusions about the robustness of the expected results. Dissimilarity of moth communities within and between different sampling sites (categorized by vegetation and altitude) was investigated by an analysis of similarities (ANOSIM). Fisher's alpha and Chao 1 was calculated using software PAST 2.1c (Hammer et al., 2007). A particular species contributing to the dissimilarity was revealed by SIMPER. Canonical Correspondence Analysis (CCA) was performed to see the contribution of topographical variables in species assemblage in different altitudinal groups. The influence of the explanatory variables on Lepidopteran diversity was tested by partial correlation analysis. The variation partitioning

of significant explanatory variables was used to quantify the relative importance of the effect of each determinant alone and its respective shared influences.

5.4 Results and Discussion

5.4.1 Altitudinal distribution of major subfamilies: Among the total 164 identified Noctuidae species, subfamily Xyleninae was most species rich being represented by 54 species and followed by Noctuinae with 47 and then Hadeninae with 15 species. These three most speciose subfamilies along with Acronictinae were selected to see if there is any significant difference in the altitudinal distributional in between the subfamily members or if they prefer some certain altitudinal band. The altitudinal distribution box plot showed that members of subfamily Acronictinae are mostly distributed in the mid-altitude sites with elevation ranging from 2000–3000 m with a mean distribution at 2200 m (Fig. 5.1). The distribution of subfamily Noctuinae ranged from 1600–4200 m with majority being distributed in between 3000–4200 m. A mean distribution of the group members can be observed at an altitude of 3700 m. For Xyleninae, the pattern was mostly similar with Noctuinae and the species were majorly distributed within 2600–4200 m with a lower range of 600 m and a mean distribution at 3200 m. This also indicates the high-altitude preference of Noctuinae and Xyleninae group members. Members of the subfamily Hadeninae showed a wide distributional range of 1600 m to 4200 m with a mean distribution at 3700 m.

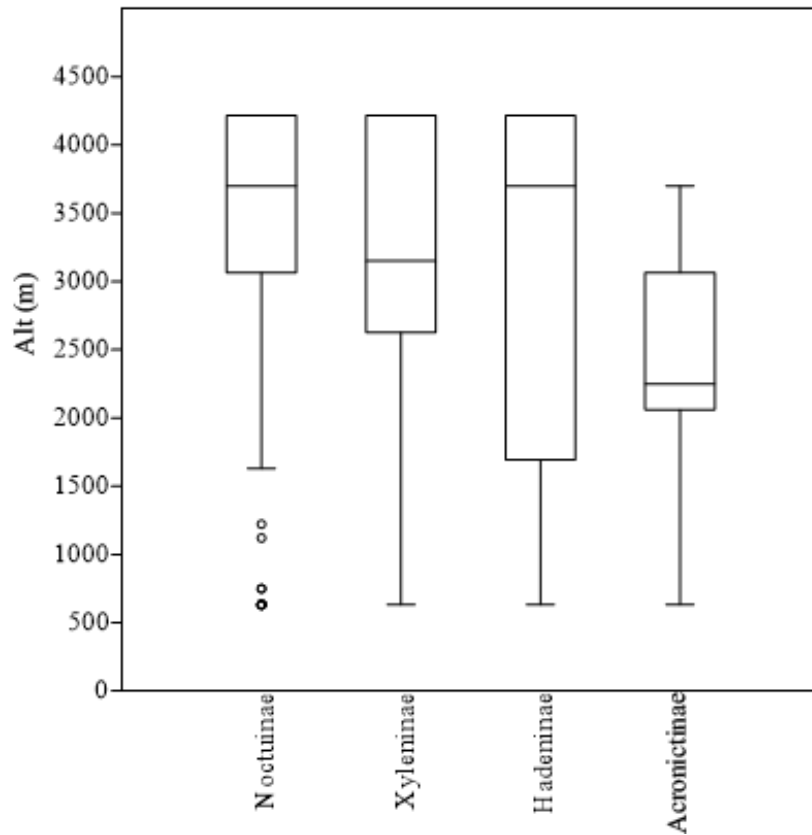


Fig. 5.1: Altitudinal distribution of three major subfamilies of Noctuidae

5.4.2 Relation between Altitude and Species Richness: Noctuids, majorly being grass feeders and strong fliers are mostly found to be abundant in the high altitudinal zones. Also, the typical habitats in the high altitudinal areas give rise to specific climatic conditions that harbours high species richness of Noctuids. The scatter plot between species richness and altitude depicts a similar pattern ($R^2 = 0.1803$), i.e., an increase in altitude results in increased species richness (Fig. 5.2).

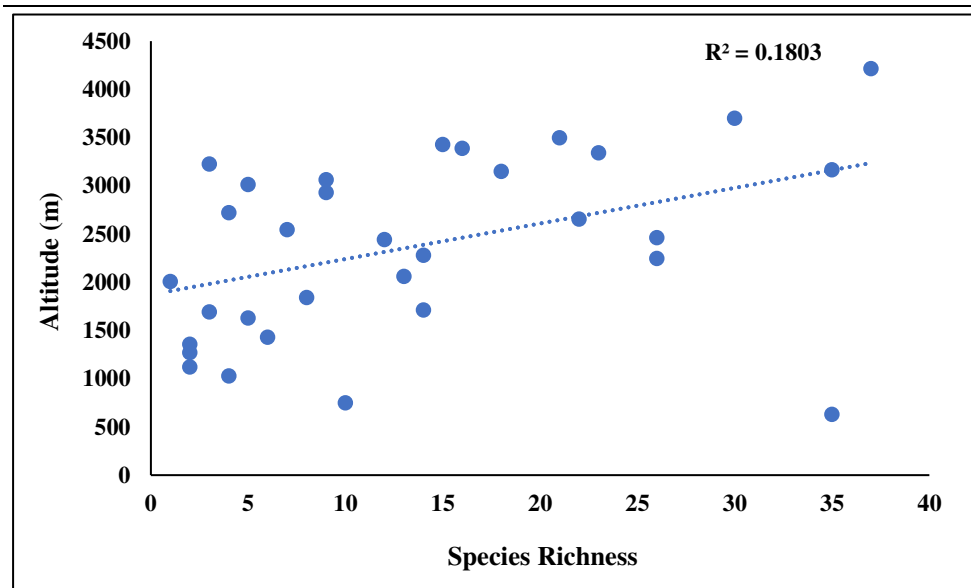


Fig. 5.2: Scatter plot showing relation between Species richness and Altitude

5.4.3 Factors governing Altitudinal variation: For the CCA of Altitudinal Assemblage-Topographical factors data matrix, the first two axes explained 45.98% cumulative variation in the data (Table 5.1). For variability in altitudinal assemblage, the first CCA axis is most positively influenced by Altitude ($r = 0.90$) and Hill shade ($r = 0.30$) while it was highly negatively influenced by NDVI ($r = -0.56$) and slope ($r = -0.10$) (Fig. 5.3). For the second axis, NDVI ($r = 0.18$) have positive influence whereas, Altitude ($r = -0.77$) has negative influence upon it (Table 5.2).

The CCA diagram clearly indicates that sampled sites in different altitudinal zones shows unique species ensembles especially in the low altitudinal zones by forming different cluster with no/minimum overlapping, depicting a major influence of NDVI for low altitudinal sites and altitude, slope and hill shade as major factors for high altitudinal sites. Overall species richness and abundance were negatively influenced by NDVI and Slope,

whereas it was positively influenced by Altitude, aspect and hill shade (Fig. 5.3).

Table 5.1: Summary of the Canonical Correspondence Analysis (CCA) for Noctuidae species richness and abundance with axes related to environmental variables

Axis	Eigenvalue	%
1	0.74884	23.77
2	0.69968	22.21

Table 5.2: Intraset correlations between explanatory variables and ordination axes resulting from the CCA, describing the relative magnitude and importance of each topographical variable in structuring the Noctuidae species richness and abundance ordination

Variables	Axis 1	Axis 2
Altitude (m)	0.908325	-0.777302
NDVI	-0.564732	0.1874
Slope	-0.10037	-0.0951697
Hill shade	0.306919	-0.0225207
Aspect	0.123215	-0.0527576
Species richness	0.245076	-0.00988771
Abundance	0.538498	0.0399783
Fishers' alpha	-0.266421	0.166991

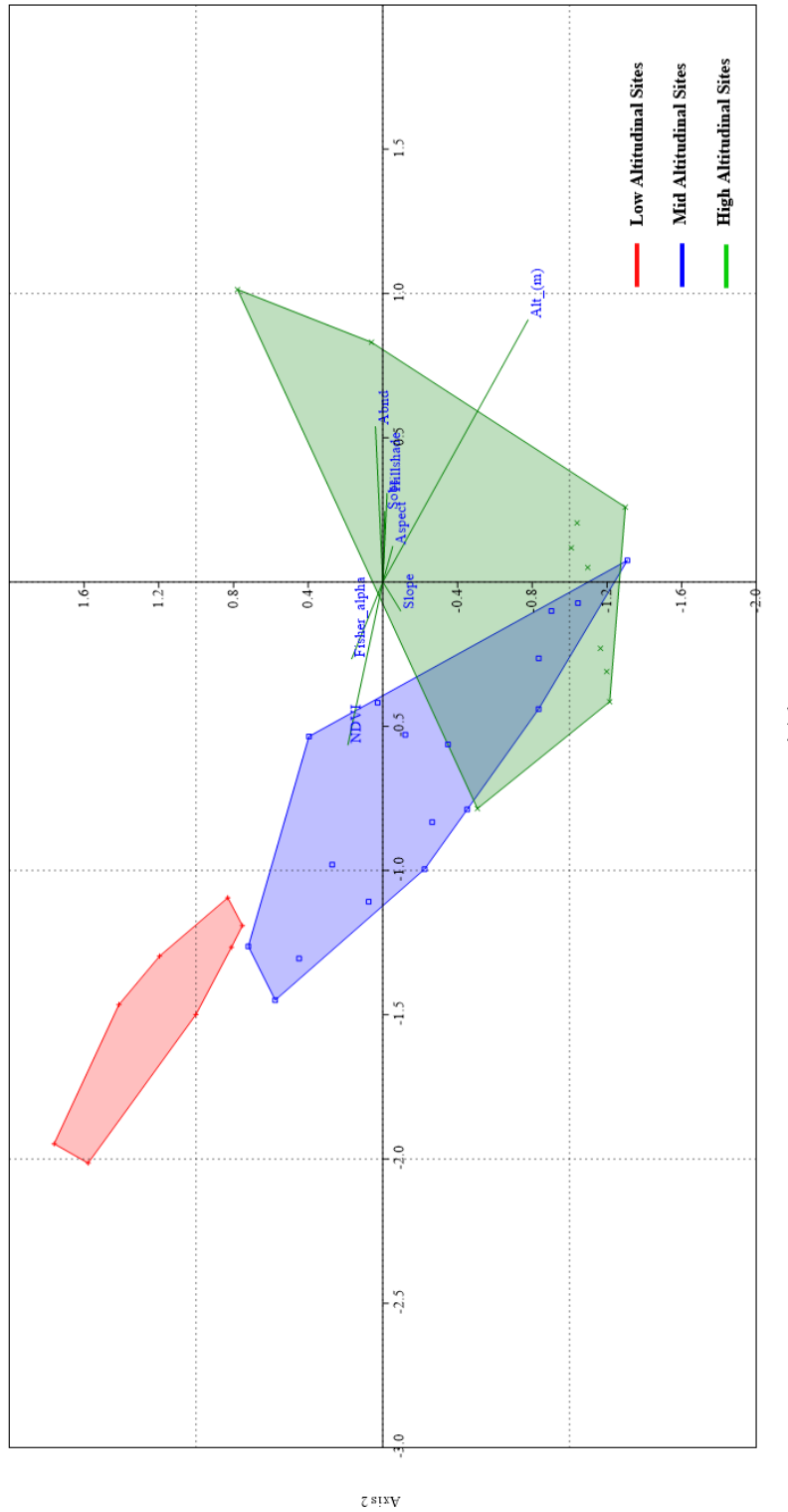


Fig. 5.3: CCA biplot based on species richness and abundance of Noctuidae and environmental variables with sites

5.4.4 Relation between NDVI and Species Richness: NDVI is the most widely used vegetation index to estimate vegetation density and cover of a particular site which in terms have a major influence on herbivorous insect diversity and richness. The value, which ranges from -1 to 1, generally decreases with increase in altitude, i.e., values closer to zero indicates very less vegetation cover which is typical in case of Alpine pastures and Sub-alpine scrublands. Majority of the Noctuidae species being grassland dwellers, are found to be abundant in the high altitudinal zones with less forest cover and adequate grass patches. Which also explains the trend of the decreasing species richness of Noctuids with increasing NDVI value (Fig. 5.4).

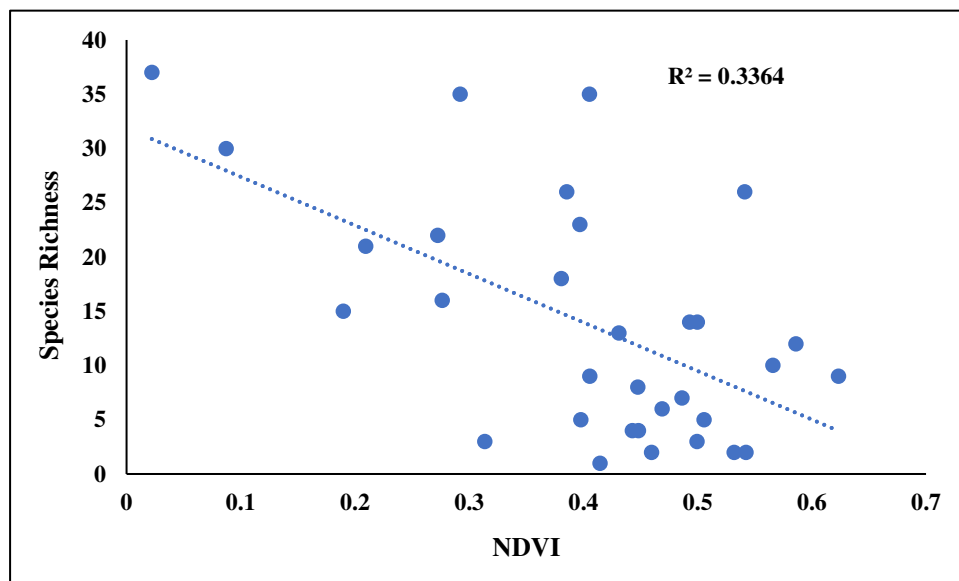


Fig. 5.4: Scatter plot showing relation between Species richness and NDVI

5.4.5 Habitat-wise difference in species composition: The Global R statistics from ANOSIM from 1% threshold level was 0.3329 with $p = 0.0001$ indicating that the overall difference between six habitat types were large and

statistically significant. Pair wise ANOSIM test (Table 5.3) showed most difference in species composition occurred between Himalayan Chir Pine (HCP) and Himalayan Oak Forest (HOF) ($R = 0.28$, $P = 0.007$); Himalayan Chir Pine (HCP) and Western Mixed Coniferous forest (WMC) ($R = 0.50$, $P = 0.0006$); Himalayan Chir Pine (HCP) and West Himalayan Fir forest (WHF) ($R = 0.41$, $P = 0.0002$); Himalayan Chir Pine (HCP) and Alpine Scrub (AS) ($R = 0.51$, $P = 0.002$); Himalayan Oak Forest (HOF) and Western Mixed Coniferous forest (WMC) ($R = 0.56$, $P = 0.0005$); Himalayan Oak Forest (HOF) and West Himalayan Fir forest (WHF) ($R = 0.29$, $P = 0.006$); Himalayan Oak Forest (HOF) and Alpine Scrub (AS) ($R = 0.46$, $P = 0.001$); Western Mixed Coniferous forest (WMC) and Alpine Scrub (AS) ($R = 0.38$, $P = 0.009$).

Table 5.3: Pairwise comparison of similarity of moth assemblages in different habitats from ANOSIM (Analysis of Similarity). Significant results are indicated with bold

Mean Rank Within	228.8
Mean Rank Between	333.6
Global R	0.3329
p	0.0001

R Values						
	DSS	HCP	HOF	WMC	WHF	AS
DSS	0	-0.1161	0.02679	0.2222	0.09821	0.38
HCP	-0.1161	0	0.2874	0.5097	0.4113	0.5171
HOF	0.02679	0.2874	0	0.563	0.2991	0.4664
WMC	0.2222	0.5097	0.563	0	0.1279	0.3813
WHF	0.09821	0.4113	0.2991	0.1279	0	-0.06316
AS	0.38	0.5171	0.4664	0.3813	-0.06316	0
p Values						
	DSS	HCP	HOF	WMC	WHF	AS
DSS	0	0.7762	0.4388	0.2859	0.5622	0.3405
HCP	0.7762	0	0.0072	0.0006	0.0002	0.0027
HOF	0.4388	0.0072	0	0.0005	0.0066	0.0011
WMC	0.2859	0.0006	0.0005	0	0.1105	0.0096
WHF	0.5622	0.0002	0.0066	0.1105	0	0.6543
AS	0.3405	0.0027	0.0011	0.0096	0.6543	0

To identify the species contributing to the assemblage differences between habitats that differed significantly i.e., between all the above significant combinations, similarity percentage analysis (SIMPER) was performed.

All the SIMPER analysis between Himalayan Chir Pine Forest and subsequent altitudinal forest types indicated that species of the genera like

Oroplexia, *Xestia* and *Trachea* associated with the HCP were the major species contributing for maximum significant differences. *Diphtherocome discibrunnea*, *Karana similis* and *Anacronicta infausta* showed most average dissimilarity between HCP and HOF whereas, *Oroplexia luteifrons* and *Hermonassa consignata* showed the maximum difference in mean abundance between HCP and WMC. *Trachea guttata*, *Xestia angara*, *Trichoridia fuscicuprea* and *Oroplexia decorata* were the major contributors for average dissimilarity between HCP and WHF. In case of HCP and AS, out of 14 contributing species the most difference in mean abundance were observed between 8 species viz. *Xestia bdelygma*, *Xestia forsteri*, *Trichoridia canosparsa*, *Polia culta*, *Trichoridia endroma*, *Perissandria sikkima*, *Xestia clavata* and *Hermonassa marginata*. For HOF and WMC, the most contributing species were *Oroplexia luteifrons*, *Diphtherocome discibrunnea*, *Karana similis* and *Anacronicta infausta* whereas in between HOF and WHF, *Trachea guttata*, *Xestia angara*, *Oroplexia decorata* and *Trichoridia fuscicuprea* were the major contributors. The very high mean abundance score of *Xestia bdelygma*, *Xestia forsteri*, *Trichoridia canosparsa*, *Xestia clavata*, *Polia culta*, *Perissandria sikkima* and *Trichoridia endroma* in AS compared to HOF and WMC suggest that these species are typical alpine dwellers and mostly contributes in the species ensemble between different habitats when compared to Alpine Scrublands (Table 5.4–5.11).

Table 5.4: SIMPER analysis of differences in the species of moth assemblage contributing to the dissimilarity (93.78%) Himalayan Chir Pine (HCP) and Himalayan Oak Forest (HOF)

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				HCP	HOF
<i>Diphtherocome discibrunnea</i>	4.753	5.068	5.068	0	2
<i>Karana similis</i>	4.079	4.35	13.97	0	2.13
<i>Anacronicta infausta</i>	4.026	4.293	18.26	0	1.88
<i>Axylia renalis</i>	3.49	3.722	21.98	0	1.13
<i>Trachea guttata</i>	3.215	3.428	28.99	0	1.5
<i>Oroplexia decorata</i>	2.325	2.479	43.12	0	1.13

Table 5.5: SIMPER analysis of differences in the species of moth assemblage contributing to the dissimilarity (97.94%) between Himalayan Chir Pine (HCP) and Western Mixed Coniferous Forest (WMC)

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				HCP	WMC
<i>Oroplexia luteifrons</i>	9.456	9.654	9.654	0	1.83

Taxon	Average dissimilarity	Contrib %	Cumulative %	Mean abundance	
				HCP	WMC
<i>Condica illecta</i>	5.604	5.721	15.38	0.875	0
<i>Hermonassa consignata</i>	4.044	4.128	25.11	0	1.17
<i>Diarsia erubescens</i>	3.818	3.898	37.21	0	1

Table 5.6: SIMPER analysis of differences in the species of moth assemblage contributing to the dissimilarity (97.72%) between Himalayan Chir Pine (HCP) and West Himalayan Fir Forest (WHF)

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				HCP	WHF
<i>Trachea guttata</i>	6.567	6.72	6.72	0	3.75
<i>Xestia angara</i>	5.321	5.444	18.18	0	2.63
<i>Trichoridia fuscicuprea</i>	4.184	4.281	26.98	0	2.25
<i>Oroplexia decorata</i>	3.643	3.727	30.71	0	2.5
<i>Oroplexia luteifrons</i>	2.718	2.781	40.09	0	1.25
<i>Diarsia stictica</i>	1.608	1.645	58.82	0	1.13
<i>Xestia clavata</i>	1.091	1.116	67.89	0	1.13

Table 5.7: SIMPER analysis of differences in the species of moth assemblage contributing to the dissimilarity (97.73%) between Himalayan Chir Pine (HCP) and Alpine Scrub (AS)

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				HCP	AS
<i>Xestia bdelygma</i>	5.995	6.134	6.134	0	13.8
<i>Diarsia stictica</i>	5.873	6.009	12.14	0	1.8
<i>Xestia forsteri</i>	4.68	4.789	16.93	0	12
<i>Xestia clavata</i>	4.555	4.66	21.59	0	6.8
<i>Trichoridia canosparsa</i>	4.421	4.524	26.12	0	15
<i>Trichoridia fuscicuprea</i>	3.401	3.479	33.46	0	1
<i>Perissandria sikkima</i>	3.239	3.314	36.77	0	7.8
<i>Polia culta</i>	3.2	3.274	40.04	0	8.8
<i>Trachea guttata</i>	2.39	2.446	44.95	0	2
<i>Trichoridia endroma</i>	2.347	2.402	47.35	0	8
<i>Hermonassa marginata</i>	1.833	1.875	57.92	0	4.2
<i>Xestia gandakiensis</i>	1.518	1.553	61.25	0	1.6
<i>Xestia retracta</i>	1.26	1.29	63.89	0	2
<i>Xestia angara</i>	1.25	1.279	65.17	0	1.2

Table 5.8: SIMPER analysis of differences in the species of moth assemblage contributing to the dissimilarity (98.33%) between Himalayan Oak Forest (HOF) and Western Mixed Coniferous Forest (WMC)

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				HOF	WMC
<i>Oroplexia luteifrons</i>	5.369	5.461	5.461	0	1.83
<i>Diphtherocome discibrunnea</i>	4.472	4.548	10.01	2	0
<i>Axylia putris</i>	3.903	3.969	13.98	1.25	0.167
<i>Karana similis</i>	3.868	3.934	17.91	2.13	0
<i>Anacronicta infausta</i>	3.793	3.857	21.77	1.88	0
<i>Axylia renalis</i>	3.249	3.304	25.07	1.13	0
<i>Trachea guttata</i>	3.038	3.09	28.16	1.5	0
<i>Hermonassa consignata</i>	2.603	2.647	36.79	0	1.17
<i>Oroplexia decorata</i>	2.2	2.238	41.34	1.13	0
Phlogophora plumbeola	2.018	2.052	45.51	1	0

Table 5.9: SIMPER analysis of differences in the species of moth assemblage contributing to the dissimilarity (95.95%) between Himalayan Oak Forest (HOF) and West Himalayan Fir Forest (WHF)

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				HOF	WHF
<i>Trachea guttata</i>	5.888	6.136	6.136	1.5	3.75
<i>Xestia angara</i>	4.067	4.239	10.38	0.5	2.63
<i>Oroplexia decorata</i>	3.876	4.039	14.42	1.13	2.5
<i>Diphtherocome discibrunnea</i>	3.442	3.587	18	2	0
<i>Trichoridia fuscicuprea</i>	3.124	3.256	21.26	0.125	2.25
<i>Karana similis</i>	3.064	3.193	24.45	2.13	0
<i>Anacronicta infausta</i>	2.931	3.055	27.51	1.88	0
<i>Axylia putris</i>	2.736	2.852	30.36	1.25	0
<i>Oroplexia luteifrons</i>	1.888	1.968	46.53	0	1.25
<i>Diarsia stictica</i>	1.274	1.327	54.11	0	1.13

Table 5.10: SIMPER analysis of differences in the species of moth assemblage contributing to the dissimilarity (96.82%) between Himalayan Oak Forest (HOF) and Alpine Scrub (AS)

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				HOF	AS
<i>Xestia bdelygma</i>	5.434	5.612	5.612	0	13.8
<i>Xestia forsteri</i>	4.153	4.289	9.901	0	12
<i>Trichoridia canosparsa</i>	4.149	4.285	14.19	0	15
<i>Xestia clavata</i>	4.02	4.152	18.34	0	6.8
<i>Diarsia stictica</i>	3.859	3.985	22.32	0	1.8
<i>Polia culta</i>	3.033	3.133	25.46	0.125	8.8
<i>Perissandria sikkima</i>	2.782	2.874	31.27	0	7.8
<i>Diphtherocome discibrunnea</i>	2.394	2.472	36.33	2	0
<i>Karana similis</i>	2.209	2.281	38.61	2.13	0
<i>Trichoridia endroma</i>	2.204	2.276	40.89	0	8
<i>Anacronicta infausta</i>	2.046	2.113	45.26	1.88	0
<i>Axylia putris</i>	1.73	1.786	47.05	1.25	0
<i>Hermonassa marginata</i>	1.535	1.586	50.29	0	4.2

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				HOF	AS
Xestia retracta	1.116	1.153	62.46	0	2
Diarsia claudia	0.8431	0.8707	68.83	0	3

Table 5.11: SIMPER analysis of differences in the species of moth assemblage contributing to the dissimilarity (96.55%) between Western Mixed Coniferous Forest (WMC) and Alpine Scrub (AS)

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				WMC	AS
<i>Xestia bdelygma</i>	5.89	6.101	6.101	0	13.8
<i>Diarsia stictica</i>	5.4	5.592	11.69	0.333	1.8
<i>Xestia forsteri</i>	4.579	4.743	16.44	0	12
<i>Xestia clavata</i>	4.454	4.614	21.05	0	6.8
<i>Trichoridia canosparsa</i>	4.372	4.528	25.58	0	15
<i>Polia culta</i>	3.153	3.265	35.76	0	8.8
<i>Perissandria sikkima</i>	3.151	3.263	39.02	0	7.8
<i>Trichoridia endroma</i>	2.321	2.404	46.97	0	8
<i>Trachea guttata</i>	2.275	2.356	49.33	0	2

Taxon	Average dissimilarity	Contrib. %	Cumulative %	Mean abundance	
				WMC	AS
<i>Hermonassa marginata</i>	1.774	1.838	57.28	0	4.2
<i>Xestia gandakiensis</i>	1.454	1.506	67.22	0	1.6
<i>Xestia retracta</i>	1.233	1.277	69.79	0	2
<i>Diarsia claudia</i>	0.8897	0.9215	77.41	0	3

CHAPTER 6: ASSESSING INDICATOR POTENTIAL OF FAMILY NOCTUIDAE AND PREDICTING CLIMATIC SUITABILITY OF SELECTED NOCTUIDS

6.1 Introduction

Dufrêne and Legendre (1997) proposed the Ind Val method which identifies indicator species of a particular habitat with high specificity and fidelity to that habitat. Fidelity or frequency of occurrence of a species across different sample sites is directly positively related to its abundance (Brown, 1984). Thus, a species with high specificity and fidelity for a habitat will show a high indicator value. When monitoring climatic changes, a species which has a broad distributional range is more useful than a specific species restricted to a single state. As habitat specificity may likely to be unaffected over time the fidelity of characteristic species may decline rapidly under changing climatic conditions (Sanyal, 2015).

6.2 Methods

Specimens were collected by using the previously mentioned method and details habitat data was also recorded for each light trapping site. Noctuid moths meet the basic criteria for good candidates as indicators based on following attributes: Diverse Fauna, Well-known Taxonomy, Easy to Identify, Well-known Natural History, readily surveyed, Ecological fidelity. Indicator Species Analysis (Dufrêne and Legendre, 1997) was performed to determine those Noctuid species, characteristics of certain altitude and

vegetation types. Species with a minimum Indicator Value score of 70 with a significant p value were considered as Indicator species for the certain habitat. Also, species with a score between 50–70 were categorized as Detector species.

Species assemblage and composition differs with different altitudinal zone due to habitat heterogeneity, habitat use pattern and disturbances, thus in general, species responding to these attributes provides the opportunity to identify or indicate a typical habitat type. Apart from Indicator species with Ind Val percentage above 70%, Detector species were also selected whose indicator score are between 50% and 70% (McGeoch et al. 2002). Only those species with statistically significant values ($P < 0.05$) were selected as suitable indicators or detectors from a list of 164 Noctuidae species and are presented here.

For predicting climatic suitability, species occurrence data along with the spatial environmental variables were combined for selected *Phlogophora* species and the MaxEnt software (Ver: 3.4.1) was used to develop such similar climatic areas to predict and quantify the probability of present occurrence of the selected *Phlogophora* spp. across the Himalayan Biodiversity Hotspot (HBH). With little known knowledge about the species ecology, SDMs are particularly helpful for understanding the same. Keeping in mind the distribution of the *Phlogophora* species along with the highest unique occurrence points (both primary and secondary), three *Phlogophora* species were chosen to be modelled: *P. conservuloides* (Western to Central;

13 points), *P. costalis* (Western to Central; 16 points) and *P. distorta* (Western to Central; 14 points). For each of the species, SDM Toolbox v2.4 (Brown 2014; <http://sdmtoolbox.org>) was used to reduce spatial clustering of location points with a resolution of 1.5km and generating a bias file using the Gaussian Kernel Density of Sampling localities with a sampling bias distance of 0.14638 degrees. Extent of HBH was downloaded from databasin.org (Mittermeier, et al., 2004). 19 bioclimatic variables used to represent the current climate features (averaged over 1970–2000) with 30 arc seconds resolution were obtained from the WorldClim database Version 2.1 (www.worldclim.org). All the Bioclim data along with 30 arc seconds Digital Elevation Model (DEM) (usgs.gov) was further cropped by the extent of the Himalayan Biodiversity Hotspot. After Principal Component Analysis (PCA), bioclimatic variables having strong auto-correlation (correlation coefficient > 0.9) were removed. The final model was developed using the non-correlated bioclimatic variables Mean Diurnal Range (BIO2), Isothermality (BIO3), Temperature Seasonality (BIO4), Temperature Annual Range (BIO7), Precipitation of Driest Month (BIO14), Precipitation Seasonality (BIO15), Precipitation of Driest Quarter (BIO17) along with the elevation data (DEM). For individual species, 10 replicated models were generated by cross validation method with a maximum of 5000 iterations, 10000 background points and MaxEnt cloglog function. Out of the ten generated models, model validation was performed through threshold independent evaluation using Receiver operating characteristics (ROC) from Area under ROC curve (AUC) value ranging from 0 to 1 where 0.5 resembles

complete random model predictions (Phillips et al., 2006). All the related GIS works was performed using ArcMap 10.4.

6.3 Data Analysis

ISA was performed in PCORD to produce Indicator value of each species mentioning to a particular site. The Indicator Value is the proportion value of each species produced from the arrangement of measures of reliability and specificity of each classified area.

$$\text{Specificity measure: } A_{ij} = N_{individuals_{ij}}/N_{individuals_i}$$

Where $N_{individuals_{ij}}$ is the mean number of species i across sites of group j , and $N_{individuals_i}$ is the sum of the mean numbers of individuals of species i over all groups:

$$\text{Fidelity measure: } B_{ij} = N_{sites_{ij}}/N_{sites_j}$$

Where $N_{sites_{ij}}$ is the number of sites in cluster (habitat) j where species i is present, and N_{sites_j} is the total number of sites in that cluster. The percentage indicator value for species i in cluster (habitat) j is then:

$$IndVal_{ij} = A_{ij} \times B_{ij} \times 100$$

For testing the significance of Indicator value for each species, random reallocation procedure of sites among site groups was used (Dufrêne & Legendre's, 1997). Good indicator species was defined by higher Indicator value with statistical significance. From the significant Indicator Value (IV) percentage produced from this analysis, characteristic moth species were then

identified (McGeoch et al., 2002). Species regarded as good Indicator for each habitat with Indicator values greater than 70% produced from ISA and species with the Indicator Value of between 50% <70% regarded as detector species as a detector of a change in habitat (McGeoch et al. 2002).

6.4 Results and Discussion

6.4.1 Indicator Species Analysis: Among 164 Noctuidae species selected from 7 altitudinal zone each ranging 500 m (600–1100 m, 1100–1600 m and so), 14 species met the indicator criteria (Table 6.1) while 7 species met the criteria of detector species (Table 6.2). 5 species viz., *Leucania simillima*, *Trichoridia canosparsa*, *Trichoridia endroma*, *Xestia retracta* and *Amphipyra cupreipennis* showed maximum indicator percentage (100) value, all of which are found only in the highest altitude zone (>3500 m) indicating strict specificity towards the alpine habitat except *L. simillima*, which was mostly recorded from the lower altitudinal sites. Being a pest species, it justifies its specificity towards agricultural lands, disturbed forest areas or and human settlements which are often adjacent to lower altitudinal sites. Apart from these, *Polia culta* (99.2), *Xestia forsteri* (98.6), *Xestia bdelygma* (98.6), *Hermonassa marginata* (98.6), *Perissandria sikkima* (98.4), *Xestia gandakiensis* (96.1), *Diarsia claudia* (96) and *Valeriodes aurantica* (87.5) also showed very high indicator values and preference for the highest altitudinal zone.

A total of 7 species of Noctuids were identified as detector species by their indicator score. The lowest altitudinal zone was represented by 4 species viz., *Mythimna decisissima*, *Athetis bipuncta*, *Spodoptera litura* and *Chrysoideixis acuta*, all with indicator score of 66.7, which again indicates the disturbed nature of low altitude habitats. From the mid-altitude zone of 1600–2100 m, 3 detector species viz., *Acontia marmoralis* and *Xenotrachea albidisca*, both with indicator score of 50, and *Axylia renalis* with an indicator score of 54.5 were recognised depicting their preference towards mid altitudinal habitats.

Table 6.1: Indicator species of Noctuidae for different altitudinal zones

Species	Altitude Group	Observed Indicator Value (IV)	IV from randomized groups		
			Mean	S. Dev.	p
<i>Leucania simillima</i>	600–1100 m	100	17.4	11.24	0.001
<i>Trichoridia canosparsa</i>	>3500 m	100	21.1	10.23	0.001
<i>Trichoridia endroma</i>	>3500 m	100	21.2	10.22	0.001
<i>Xestia retracta</i>	>3500 m	100	20.4	10.4	0.001
<i>Amphipyra cupreipennis</i>	>3500 m	100	17.4	11.24	0.001

Chapter VI: Indicator Potential of Noctuidae

Species	Altitude Group	Observed Indicator Value (IV)	IV from randomized groups		
			Mean	S. Dev.	p
<i>Polia culta</i>	>3500 m	99.2	20.4	11.23	0.001
<i>Xestia forsteri</i>	>3500 m	98.6	22.3	11.93	0.001
<i>Xestia bdelygma</i>	>3500 m	98.6	20.8	12.32	0.001
<i>Hermonassa marginata</i>	>3500 m	98.6	22.5	11.43	0.002
<i>Perissandria sikkima</i>	>3500 m	98.4	22.9	12.12	0.001
<i>Xestia gandakiensis</i>	>3500 m	96.1	20.0	11.45	0.003
<i>Diarsia claudia</i>	>3500 m	96.0	23.3	12.51	0.003
<i>Valeriodes aurantica</i>	>3500 m	87.5	17.6	10.47	0.002
<i>Cuculia pullata</i>	>3500 m	75.0	19.0	9.71	0.004

Table 6.2: Detector species of Noctuidae for different altitudinal zones

Species	Altitude Group	Observed Indicator Value (IV)	IV from randomized groups		
			Mean	S. Dev.	p
<i>Mythimna decisissima</i>	600–1100 m	66.7	18.3	12.38	0.01
<i>Athetis bipuncta</i>	600–1100 m	66.7	18.2	12.51	0.01
<i>Spodoptera litura</i>	600–1100 m	66.7	18.2	12.51	0.01
<i>Chrysoideixis acuta</i>	600–1100 m	66.7	17.7	11.62	0.007
<i>Axylia renalis</i>	1600–2100 m	54.5	18.7	9.77	0.016
<i>Acontia marmoralis</i>	1600–2100 m	50.0	18.8	11.99	0.03
<i>Xenotrachea albidisca</i>	1600–2100 m	50.0	18.6	11.16	0.029

6.4.2 Climatic suitability models of selected *Phlogophora* species: AUC value for the generated 3 models were all above 0.9 indicating a good model (Thuiller et al., 2005). The major factors contributing to the geographical distribution of the three *Phlogophora* species was found to be Temperature Annual Range (BIO7), Temperature Seasonality (BIO4) and Elevation (DEM) (Table 6.3). For all the three *Phlogophora* species modelled, very high suitable regions in the Indian Himalaya were predicted to fall majorly under

the districts of West, South, East and the non-trans Himalayan zones of North Sikkim; Darjeeling and Kalimpong districts of West Bengal; West and East Kameng of Arunachal Pradesh; Chamoli, Pithoragarh and Pauri Garhwal districts of Uttarakhand. Very high suitable habitats in Nepal were predicted to constitute the districts Sankhuwasaba, Bhojpur, Terhathum (Koshi province); Ilam, Panchthar, Taplejung (Mechi province); Solukhumba, Khotang, Okhaldunga (Sagarmatha province) comprising parts of Eastern Nepal, Sindhupalchak, Nuwakot, Rasuwa, Dhading (Bagmati province); Ramechhap, Dolakha (Janakpur province); Makwanpur (Narayani province) of Central Nepal and Myagdi, Baglung (Dhaulagiri province); Gorkha, Lamjung, Kaski, Manang (Gandaki province) of Western Nepal. Provinces Dagana, Tsirang, Wangduephodrang of Central Bhutan; Monggar, Trashigang, Samdrup Jongkhar of Eastern Bhutan; Sarpang, Zhemgang, Trongsa of Southern Bhutan (except *P. costalis*) and Haa, Samtse of Western Bhutan were predicted to have very high suitable areas. Apart from these, additional major districts in India for the predicted highly suitable habitats for the *Phlogophora* species comprises of Tawang, Tirap of Arunachal Pradesh; Nainital, Bageshwar, Uttarkashi, Almora of Uttarakhand. Districts Pyuthan, Rolpa, Rukum (Rapti Province), Bheri (Jajarkot Province), Kalikot (Karnali Province) of Mid-Western Nepal; Mahakali (Darchula Province), Bajura, Bajhang, Doti (Seti Province) of Far Western Nepal along with provinces Punakha, Gasa (Central Bhutan); Lhuentse, Pemagetsel (Eastern Bhutan); Paro, Thimphu, Chhukha (Western Bhutan) falls under the predicted high suitable areas for the six modelled *Phlogophora* species (Fig. 6.1).

Predicted very high suitable habitats covering 8.9% of the extant for *Phlogophora conservuloides* ranged from Western to Central to Eastern and North Eastern Himalayan ranges. Additionally, the north eastern part of India comprising of districts East and West Siang, Lower Dibang Valley, Tawang, Papum Pare, Lower Subansiri and Lohit (Arunachal Pradesh) along with parts of adjoining Kachin State and Sagaing Division of Myanmar is also included under this area. Temperature annual range was same as that of *P. pectinata*. Elevated areas of 2200 m, with a range of 400 m to 3600 m was found to be most suitable for the species.

Temperature annual range accounts for the very high suitable predicted distribution of *Phlogophora costalis* across the Central Himalaya covering 1.66% of the extant decreasing to moderately suitable areas in the NW Himalayan range along with high suitable distribution in the North Eastern Himalaya covering 1.95% of the extant. Species occurrence was predicted to be highest between a temperature annual range of 1.0 °C to 2.2 °C with a gradual decline till 2.8 °C after which the species will be hard to find. A steady increase in the species occurrence was predicted between 800–2700 m of altitude.

Temperature annual range of 1.7 °C and precipitation seasonality of 20 mm to 155 mm contributes towards the very high distribution of *Phlogophora distorta* in the entire 2C Indian biogeographical province, Eastern, Central and Western Nepal, Western and Central Bhutan along with

patches in NW and NE Himalaya. 1.34% and 1.61% of the extant accounts for the very high and high predicted suitable areas for the species presence.

The preliminary study findings show that the predicted distribution range for most of the species are majorly governed by temperature dependent variables. The values of these governing variables were more or less similar to that of the collected field data temperature and elevation. Approximately, 2.3 °C variation in annual temperature range accompanied by a moderate variation in temperature seasonality shows that these species exist in an even and mild climatic range.

Table 6.3: Contributing Bioclimatic Variables and area of suitable habitats of selected Phlogophora spp.

Species	AUC value	Contributing Bioclimatic Variables			Area of suitable habitats (sq. Km)		
		Variable	% Contrib.	Range	Very high	High	Mode-rate
<i>P. conservu- loides</i>	0.913	BIO7	72.2	1.5°C - 3.1°C	108.8 X 10 ³	134.1 X 10 ³	188.7 X 10 ³
		DEM	7.1	400m - 3600m			
		BIO2	16.5	0.7°C - 1.6°C			

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Species	AUC value	Contributing Bioclimatic Variables			Area of suitable habitats (sq. Km)		
		Variable	% Contrib.	Range	Very high	High	Moderate
<i>P. costalis</i>	0.972	BIO7	38.2	1.0°C - 2.8°C	20.3 X 10 ³	23.8 X 10 ³	52.7 X 10 ³
		DEM	24.5	800m - 2700m			
		BIO4	21.6	2.5°C - 5.9°C			
<i>P. distorta</i>	0.966	BIO7	61.3	1.2°C - 3.6°C	16.3 X 10 ³	19.7 X 10 ³	32.8 X 10 ³
		BIO15	13.9	20mm - 155m			
		DEM	13.4	600m - 3200m			

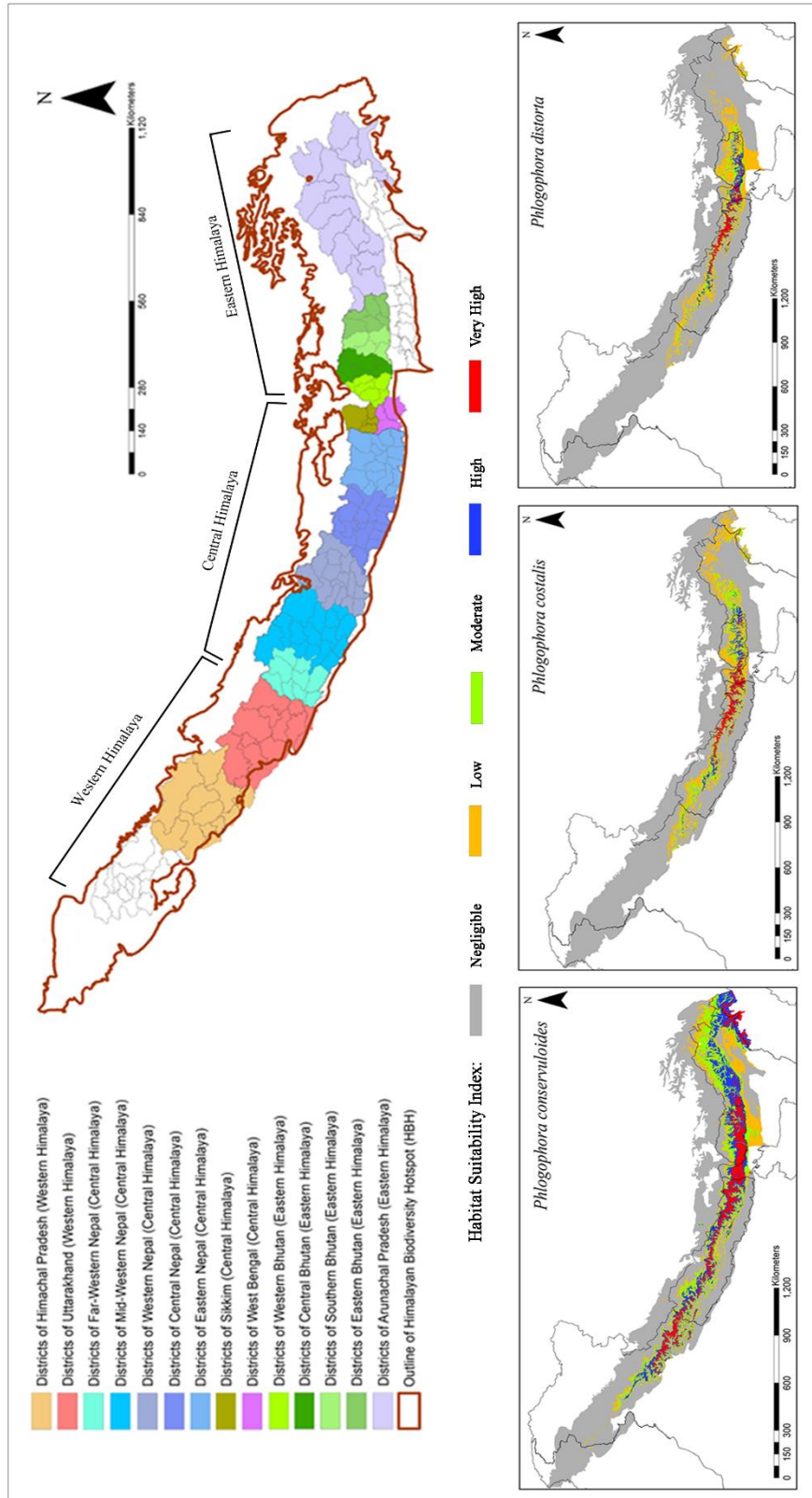


Fig. 6.1: Predicted suitable areas for three *Phlogophora* spp. in the Himalayan Biodiversity Hotspot under current climatic condition

CHAPTER 7: SYNTHESIS

7.1 Overview

This study has been aimed to contribute towards the knowledge of Himalayan moth fauna and is very important for the better understanding of the conservation needs of these charismatic creatures. Although there are a few studies that has investigated this very species-rich group of nocturnal insects, but the detailed quantitative analysis of the diversity structure along the altitudinal gradient and the effects of the environmental factors on their assemblage gave the perspective of the need for conservation of these species in the multi-diverse Himalayan ecosystem. Besides discussing about the most important findings of this study, this chapter aims to comment on the biogeographical affinity of the species assemblage sampled through light trapping in the area.

7.2 Inventory and assemblage pattern

The current study significantly contributed towards the knowledge about the moth fauna of the area. The area has a very high species richness. A total of 895 species under 494 genera belonging to 83 subfamilies of 22 families within 10 superfamilies were recorded which was previously known to be 364. The species compilation with their specific altitude, habitat information and distribution produce the baseline data which will accelerate the rate of description, documentation and understanding of Himalayan moth diversity. Along with this, 35 species of moths were recorded for the first time

in India from Askot WLS along with 121 species which were not previously recorded from Uttarakhand. The study also contributed to the description of one new species, viz. *Donda unispinosa* of Noctuidae. It also updated the status of the species *Sarbanissa dissimilis* as a good species which was earlier considered as the junior subjective synonym of *S. transiens*. The diagnostic database of 164 Noctuids along with the male genitalia illustration of 140 species will also help future workers for the better understanding of the species and will decrease the chances of misidentification. Also, the habitus illustration of all the collected Noctuidae species will also not only help to identify the species correctly but also the availability of that database will increase the local level knowledge and help in conservation efforts. Among the collected species, Geometrids showed the highest number (310) with nearly 31.5% relative abundance, followed by Erebids (183) and Noctuids (164). Site-wise highest number of species was encountered at Chipla Kedar with 40 species followed by Kanar_18 with 34 and Jauljibi with 32 species respectively. Whereas, alpha diversity was highest at Jauljibi [Fisher's alpha 44.13; Simpson (1-D) 0.9579; Shannon 3.326]. Kanar_18 was found to be the next most diverse site [Fisher's alpha 28.18; Simpson (1-D) 0.9568; Shannon 3.335].

7.3 Seasonal Pattern

Climatic attributes, especially precipitation and temperature, are significant determinants for changing plant phenology which in turn influences abundance of phytophagous insects, like moths. As a result,

Noctuidae richness and relative abundance showed a general seasonal trend along altitudinal bands and was significantly governed by average monthly rainfall. For both pre-monsoon and post-monsoon, the relative abundance in Low altitude group was comparatively very less but the alpha diversity was high which indicates the congregation of singleton and doubleton species in the low altitudinal areas. The majority of the sites sampled in both pre-monsoon and post-monsoon also showed similar seasonal ensembles depicting a major influence of Annual Mean Temperature (Bio1), Annual Precipitation (Bio12), Average Monthly Precipitation and NDVI. Also, the pair wise ANOSIM test showed that statistically significant difference in species composition occurred between pre-monsoon and post-monsoon season.

7.4 Factors governing assemblage

Environmental factors apart from the seasonal variables have great effect on the species assemblage of the area. The altitudinal distribution box plot showed that members of the major subfamilies like Noctuinae ranged from 1600–4200 m with majority being distributed in between 3000–4200 m. For Xyleninae, the species were majorly distributed within 2600–4200 m with a mean distribution at 3200 m. Sampled sites in different altitudinal zones shows unique species ensembles especially in the low altitudinal zones by forming different cluster with no/minimum overlapping. Also, the Global R statistics from ANOSIM showed that the overall difference between six major

habitat types were large and statistically significant. Altitude had a direct positive effect on the species richness whereas NDVI played a negative role.

7.5 Indicator species analysis and climatic suitability

Moths have already been proven to be suitable model group of herbivorous insects to observe the extent of vegetation changes around the world. Their presence in primary forest habitats to agricultural lands denotes the quality of a particular habitat depending upon the particular indicator species. Among 164 Noctuidae species selected from 7 altitudinal zone, 14 species met the indicator criteria while 7 species met the criteria of detector species. 5 species showed maximum indicator percentage (100) value, all of which are found only in the highest altitude zone (>3500 m) indicating strict specificity towards the alpine habitat. This study has replicated the effectiveness of moths as indicators of habitat disturbances also in the unique and fragile Himalayan landscape of Askot WLS. For all the three *Phlogophora* species modelled, very high suitable regions in the Indian Himalaya were predicted to fall majorly under districts of West, South, East and the non-trans Himalayan zones of North Sikkim; Darjeeling and Kalimpong districts of West Bengal; West and East Kameng of Arunachal Pradesh; Chamoli, Pithoragarh and Pauri Garhwal districts of Uttarakhand. The preliminary study findings show that the predicted distribution range for most of the species are majorly governed by temperature dependent variables. The values of these governing variables were more or less similar to that of the collected field data temperature and elevation.

7.6 Biogeographic and Zoogeographic affinities

The moth assemblage of Askot WLS was chiefly Oriental (97%) with 71% species having distributions in Palearctic region also. 19% species were shared with Australian realm, whereas 11% species had affinity for Ethiopian realm. Among Indian Biogeographic Zones and Provinces, only 20% species were shared with two Trans-Himalayan habitats (Ladakh Mountain- 1A and Tibetan Plateau- 1B), whereas, 80% species were distributed in Central Himalaya (2C), followed by 66% and 54% species shared with North-Western Himalaya (2A) and Eastern Himalaya (2D) respectively. 57% species were also distributed in North Eastern Hills and Valleys; 33% and 25% shared with Deccan Peninsula and Western Ghats respectively.

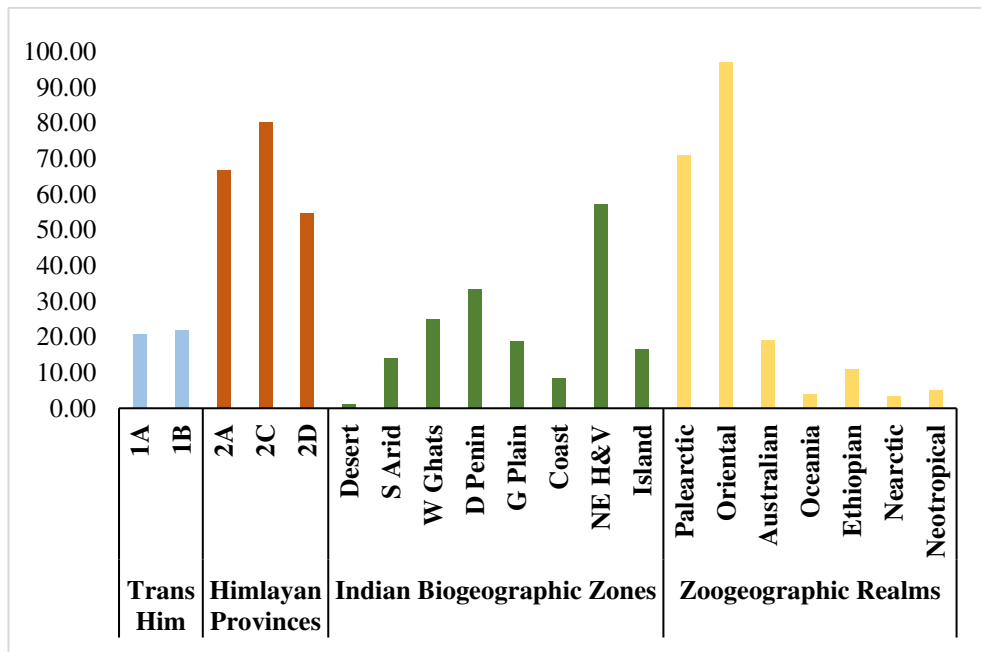


Fig. 7.1: Biogeographic Affinities (% representation) of Askot WLS moths with other Himalayan Provinces, Indian Biogeographic Zones and World Zoogeographic Realms

7.7 Conclusion and scope for future studies

Although the current study is the first ever extensive attempt to document the huge diversity of the largest herbivorous insect taxa, several relevant aspects were left unattempted due to lack of time and scope. The study managed to compile a consolidated inventory of the 895 species of moths from Askot WLS which is undoubtedly one of the hyper-diverse areas in the western Himalayan region. However, this inventory does not include the micro-moth family members, which definitely comprise a substantial part of the moth diversity in any habitat, due to lack of taxonomic expertise. As many of the micro-moths are very good indicators of degraded habitats it is very important to work out their diversity in different parts of the study area. This leaves a major scope for the future workers to assess the assemblage of these micro-moths thus identifying the different degraded habitats which are in need of immediate restoration or conservation. Also, more studies involving molecular tools like DNA barcoding should be undertaken to resolve the cryptic species complexes more easily and effectively which in turn will contribute in more effective knowledge on moth diversity of the Himalayas as well as India.

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APPENDIX

List of Publications

Journal Articles:

- **Bandyopadhyay, U.**, Dey, R., Bhattacharyya, K., Mallick, K., Mazumder, A., Gayen, S., Das, M., Raha, A., Sanyal, A. K., Kumar, V. and Uniyal, V. P., Chandra, K. 2021. Taxonomy and ecology of genus *Phlogophora* Treitschke, 1825 (Lepidoptera: Noctuidae) in Indian Himalaya with description of a new species. *Zootaxa*, 5004(2): 311–342.
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- **Bandyopadhyay, U.**, Raha, A., Sanyal, A. K., Gayen, S., Chandra, K. 2019. Description of a New Species of *Donda* Moore, 1882 (Lepidoptera: Noctuidae: Pantheinae) from The Western Himalayas, India. *Entomological News*, 129(1): 49–54.
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- Mallick, K., **Bandyopadhyay, U.**, Mazumder, A., Dey, R., Raha, A., Sanyal, A. K., Gupta, S. K., Uniyal, V. P., Chandra, K. First Record of *Xenortholitha falcata* Yazaki, 1993 (Geometridae: Larentiinae) from India. *Records of the Zoological Survey of India* (Accepted).

Conference Proceedings:

- **Bandyopadhyay, U.**, Kumar, V., Chandra, K. Altitudinal distribution pattern of Moth fauna of Askot Wildlife Sanctuary, Western Himalaya: A general study. *Proceedings of the 1st Himalayan Researchers Consortium*, 2018, Volume 2: 107–118.

Book Chapters:

- Ali, M., Das, G. N., Mallick, K., Mazumder, A., Bhattacharyya, K., **Bandyopadhyay, U.** 2019. Ladakh, Jammu & Kashmir, Trans-Himalaya. In: Chandra *et al.* (Eds.). *Assemblage of Lepidoptera in Selected Protected Areas across Indian Himalaya through Long Term Ecological Monitoring Plots*: 25–38. Published by Director, Zoological Survey of India, Kolkata, India.
- Mallick, K., Mazumder, A., **Bandyopadhyay, U.**, Sajan, S., Ghosh, D. 2019. Great Himalayan National Park, Himachal Pradesh, North-Western Himalaya. In: Chandra *et al.* (Eds.). *Assemblage of Lepidoptera in Selected Protected Areas across Indian Himalaya through Long Term Ecological Monitoring Plots*: 39–54. Published by Director, Zoological Survey of India, Kolkata, India.

- **Bandyopadhyay, U.**, Das, G. N., Gayen, S., Mallick, K., Bhattacharyya, K. Askot Wildlife Sanctuary, Uttarakhand, Western Himalaya (Kumaon). In: Chandra *et al.* (Eds.). *Assemblage of Lepidoptera in Selected Protected Areas across Indian Himalaya through Long Term Ecological Monitoring Plots*: 71–86. Published by Director, Zoological Survey of India, Kolkata, India.
- Bhattacharyya, K., Chatterjee, P., **Bandyopadhyay, U.**, Mazumder, A., Dey, R., Ali, M. 2019. Neora Valley and Singalila National Park, West Bengal, Central Himalaya. In: Chandra *et al.* (Eds.). *Assemblage of Lepidoptera in Selected Protected Areas across Indian Himalaya through Long Term Ecological Monitoring Plots*: 87–102. Published by Director, Zoological Survey of India, Kolkata, India.
- Sanyal, A. K., Raha, A., Mallick, K., Mazumder, A., **Bandyopadhyay, U.**, Das, G. N., Singh, N. & Chandra, K. 2019. Assemblage Pattern & Biogeographic Affinities of Himalayan Lepidoptera. In: Chandra *et al.* (Eds.). *Assemblage of Lepidoptera in Selected Protected Areas across Indian Himalaya through Long Term Ecological Monitoring Plots*: 135–148. Published by Director, Zoological Survey of India, Kolkata, India.
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Conference/Workshop Attended



- Participated at the 6th Asian Lepidoptera Symposium held at The Zoological Survey of India, Kolkata, India in 2019.
- Participated at the 5th Asian Lepidoptera Symposium: Impacts of Climate Change on Asian Lepidoptera held at The University of Hong Kong, Hong Kong in 2018.
- Participated in the 1st Himalayan Researchers Consortium held at Dehradun, India in 2018.
- Participated in the Workshop on Economic and Ecological Impacts of Invasive Alien Species held at Indian Statistical Institute, Kolkata in 2018.
- Participated in the Biological Sciences Graduate Congress, held at the National University of Singapore, Singapore in 2017.



Taxonomy and ecology of genus *Phlogophora* Treitschke, 1825 (Lepidoptera: Noctuidae) in Indian Himalaya with description of a new species



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
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

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Abstract

The Genus *Phlogophora* Treitschke, 1825 (Noctuidae: Xyleninae), widely distributed in Palaearctic and Oriental realms, is especially diverse within Indian Himalaya with 12 known species till now. Current communication reports three species new to India viz. *P. meticulodina* (Draudt, 1950), *P. nobilis* Hreblay & Ronkay, 1998 and *P. szecsényii* Hreblay & Ronkay, 1998 and a new species *P. similis* Bandyopadhyay, Mallik, Sanyal & Chandra **sp. nov.**, thus bringing the species number to 16 for the country, along with taxonomic key with morphology and genitalia-based diagnosis for all the Indian/Himalayan species. Out of those species, partial mitochondrial Cytochrome C Oxidase I (COI) sequences were generated for 6 species, of which 5 were novel to the NCBI GenBank. The genus had maximum species richness and abundance in Eastern Himalayan Temperate Forest spanning 1800–2500 m in Central Himalayan landscape of Darjeeling-Sikkim and Nepal. Current Habitat suitability model of six *Phlogophora* species indicated that temperature dependent variables like Temperature Annual Range, Temperature Seasonality and Elevation are the most contributing factors for their predicted distribution range. The genus comprising of both Polycyclic and Monocyclic species became most abundant during Post-monsoon, in cold (9–11 °C) and humid (87–91%) nights, in areas with Annual Mean Temperature ranging within 4.6–19.9 °C and Annual Precipitation of 1000–2800 mm.

Key words: Phlogophorini, Central Himalaya, DNA Barcoding, Himalayan Temperate Forest, Seasonality, Habitat Suitability

Introduction

The genus *Phlogophora* Treitschke, 1825 (Noctuidae, Xyleninae: Phlogophorini) with designated type species *Phalaena meticulosa* Linnaeus, 1758 is widely distributed throughout zoogeographic realms of the world, especially diverse within few specific “centres of diversity”. Within Palaearctic region, Western-Central Europe including Azores group of islands and Japan, Korea extending to South East Siberia are two major centres. In the transition zone of Palaearctic and Oriental realm, another diversity hotspot exists centred around Central/Southern Himalayan

A new species of *Nerice* Walker, 1855 and further additions to the catalogue of Indian Notodontidae Stephens, 1829 (Lepidoptera: Noctuoidea) from Himalaya with report of range extensions

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Abstract

The present work deals with the additional species of Notodontidae recorded from different provinces of Indian Himalaya subsequent to the publication of Catalogue of Indian Notodontidae which provided systematic account of 242 species and 10 subspecies. Current communication comprises: (I) Description of a new species of genus *Nerice* Walker, 1855, *Nerice (Nerice) mishmiensis* Mazumder, Raha, Chandra & Schintlmeister **sp. nov.**, from Eastern Himalayan landscape of Dihang-Dibang Biosphere Reserve, Arunachal Pradesh, along with a comparative diagnosis with two other congeners viz. *N. aemulator* Schintlmeister & Fang, 2001 and *N. upina* Alpheraky, 1892; (II) Reporting of 3 species new to the Indian fauna from Eastern and Western Himalaya: *Periergos genitale* Schintlmeister, 2002, *Honveda nepalina* Nakamura, 1976 and *Syntypistis nigribasalis tropica* (Kiriakoff, 1974) with their diagnosis and genitalic illustrations; (III) Addition of 5 species and 1 more subspecies to the existing list from various literature; (IV) Additional distribution records of 40 species detected through primary sampling along with details of the materials examined; among which 3 species viz. *Pseudallata laticostalis* (Hampson, 1900), *Baradesa lithosioides lithosioides* Moore, 1883 and *Prilodon flavistigma* (Moore, 1879) showed unusual altitudinal records around 3000 m. Thus, altogether Indian Notodontidae fauna has been updated to 247 species (including nominotypical subspecies) and 15 subspecies under 116 genera of 10 subfamilies.

Key words: Notodontids, Himalaya, Altitudinal Record, New Locality Report, Dihang-Dibang Biosphere Reserve, Himalayan Biogeographic Provinces

Introduction

Notodontidae fauna of India has so far been represented by 242 species (including nominotypical subspecies) and 10 subspecies under 116 genera of 10 subfamilies (Chandra *et al.* 2018), which includes 162 species from Himalayan region. Subsequent field sampling and light trapping sessions in selected Protected Areas falling under different Biogeographic Provinces of Indian Himalaya, viz. Trans Himalaya (1A & 1B): Hemis National Park (NP) and adjacent areas in Jammu & Kashmir; North-West Himalaya (2A): Great Himalayan NP in Himachal Pradesh; West Himalaya (2B): Govind Wildlife Sanctuary (WLS) and Askot WLS in Uttarakhand; Central Himalaya (2C): Neora Valley NP and Singalila NP in West Bengal; East Himalaya (2D): Dihang-Dibang Biosphere Reserve and Namdapha NP in Arunachal Pradesh, resulted in further additional materials, details of which are compiled in present communication. Hence, focus of this communication are as follows: (I) Description of a new species of genus *Nerice* Walker, 1855 from Eastern Himalayan landscape of Dihang-Dibang BR, Arunachal Pradesh, (II) Reporting of 3 species as new records to the Indian Notodontid fauna from primary sampling (Fig. 1), (III) Addition of 5 species and 1 more subspecies to the existing list from various literature and (IV) Additional distribution records of 40 species detected through primary sampling along with comments on their range extensions. Altogether, the present

**DESCRIPTION OF A NEW SPECIES OF *DONDA* MOORE,
1882 (LEPIDOPTERA: NOCTUIDAE: PANTHEINAE)
FROM THE WESTERN HIMALAYAS, INDIA¹**

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Subrata Gayen,^{2,6} and Kailash Chandra^{2,7}**

ABSTRACT: The genus *Donda* Moore, 1882 (Noctuidae: Pantheinae) consists of six species of which the taxonomic status of two species are doubtful. In the present study, a new species of the genus, viz. *Donda unispinosa* Bandyopadhyay, Raha & Chandra sp. nov. is described from the Indian Himalayas with a detailed description of male genitalia structure. This brings the legitimate species number to five. A key based on the morphology and male genitalia of all the known species of the genus is also provided here for future confirmation of species.

KEY WORDS: Lepidoptera, Noctuidae, Pantheinae, *Donda*, New species, Indian Himalaya

INTRODUCTION

The genus *Donda* Moore, 1882 (Noctuidae: Pantheinae), designated with the type species *Dandaca eurychlora* Walker, 1858 is a typical Oriental genus and represented by a morphologically similar species group. It is characterized by the light green ground color of the forewing and subcosta, apical and tornal dark brown patches and the broad brown terminal band in the hindwing with yellow ground color. The genus was placed under Catocalinae and Ophiderinae by some earlier workers, but Kobes (1992) placed *Donda* and some allied genera in Pantheinae. Later, Holloway (2009) reviewed the genus and placed it under the *Belciana* generic group of Pantheinae with some other related taxa. The latest revisionary work provides a list of four prominent species viz. *D. eurychlora* (Walker, 1858), *D. sailendra* Kobes, 1983, *D. continentalis* Behounek, Han & Kononenko, 2012 and *D. sundana* Behounek, Han & Kononenko, 2012 with two other dubious species, *D. ornata* (Moore, 1883) and *D. lichenoides* (Hampson, 1894) under the genus (Behounek et al., 2012). From India, only *D. eurychlora* was earlier reported by Hampson (1894) under the genus *Polydesma*. *D. ornata* and *D. lichenoides* were also included from India under the genus along with *P. striatovirens* Moore, 1883 and *P. thoracica* Moore, 1882 (Hampson, 1894) which was later listed under *Donda* by Poole (1989) in the World Noctuidae Catalogue. The last two have been excluded from the genus *Donda* as *D. striatovirens* has

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Catalogue of Indian Notodontidae Stephens, 1829 (Lepidoptera: Noctuoidea)

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Mr. Kaushik Mallick:

We have reached a decision regarding your submission to Records of the Zoological Survey of India, "First Record of *Xenortholitha falcata* Yazaki, 1993 (Geometridae: Larentiinae) from India".

Our decision is to: Accepted for Publication

Managing Editor
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**First Record of *Xenortholitha falcata* Yazaki, 1993
(Geometridae: Larentiinae) from India**

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Abstract

The genus *Xenortholitha* Inoue, 1944 is mainly distributed in the Sino-Japanese and Indian Himalayan region (IHR). The current communication reports the first distributional record of *Xenortholitha falcata* Yazaki, 1993 from western Himalaya, India extending its range far westwards from its previously known range in Eastern Nepal. We provide a brief differential diagnosis of both external and male genitalia morphology of the species along with their photographic illustrations.

Key Words: Larentiinae, Cidariini, *Xenortholitha*, Lepidoptera fauna, Range extension.

Introduction

The genus *Xenortholitha*, belonging to one of the largest tribes Cidariini of subfamily Larentiinae, was established by Inoue in 1944 with the type species *Cidaria propinguata* Kollar. Currently, the genus consists of 13 known species/subspecies worldwide including 3 species/subspecies from mainland India (Table 1). Inoue (1944) suggested the genus members to be separated from the ancestor genus *Ortholitha* Hübner, 1821 mainly based on the male genitalia characters, like the shape of uncus and valvae. Although the monophyly of the genus has not yet been defined (Choi, 2004), the members of the genus can be easily diagnosed by having dark greyish wings, a smooth blackish postmedial line, a row of white dots on subterminal area and often having a strongly falcate forewing apex with an apical streak. The majority of the species are described from the Sino-Himalayan region, with few species known from Taiwan, Japan, Russia and Philippines. The species of the genus shows many geographical variations, most prominent in case of