

DESCRIPTIONS OF NEW LEPIDOPTERA FROM THE KUMAON HIMALAYA<sup>1</sup>PETER SMETACEK<sup>2</sup><sup>1</sup>Accepted February 2003<sup>2</sup>Jones Estate, Bhimtal, Nainital 263 136, Uttaranchal, India. Email: petersmetacek@rediffmail.com

*Comostola hauensteini* sp. nov., *Neptis miah varshneyi* ssp. nov., *Anambulyx elwesi kitchingi* ssp. nov., *Hypochrosis hyadaria* forma *stigmata* nov., the Wet Season Form male and both seasonal forms of the hitherto undescribed female of *Garaeus parva discolor* Warren are described from the Kumaon Himalaya.

**Key words:** new species, new subspecies, Lepidoptera, Kumaon, Himalaya

## INTRODUCTION

Kumaon consists of a section of the Himalayan range west of Nepal. The specimens discussed in this paper were all taken in the Bhimtal valley in Nainital district in Uttaranchal, where the main study site is located at Jones Estate (1,500 m above msl; 29° 20' 41" N, 79° 36' 17" E) and the adjoining Sattal valley (1,200 m) and Ranibagh valley (700 m, Bhujiaghat), where some specimens of *Neptis miah* Moore were taken.

All specimens were taken by the author and are in the author's collection.

1. *Neptis miah* Moore (Nymphalidae: Limenitidinae)

*Neptis miah* has been reported from Central Nepal eastward along the Himalaya, through western China south to Borneo, Mentawi Islands, Java and Bali. Along this range, Eliot (1969) recognized seven geographical races. Within the Indian sub-region, two races are recognized, the nominate race known from central Nepal to the hills of northeast India (described from a male from Darjeeling) and the race *nolana* Druce, recorded from Myanmar to Thailand (described from a female from Chantaboon, Thailand).

The hitherto unreported population of *miah* in the Kumaon Himalaya bears a strong resemblance to *Lasippa viraja* Moore, with which it appears to have been confused in the past (Hannington 1910; Evans 1932; Wynter-Blyth 1957). The following is a description of this population.

*Neptis miah varshneyi* ssp. nov.

**Material Examined:** Holotype: Male 21.v.1988 Bhimtal. Forewing Length: 25 mm. Expanse 54 mm. Paratypes: 36 exs.: 14.iv.1982 Bhimtal; 1.v.1982 Bhimtal ♂; 28.iv.1984 Bhimtal ♂; 30.iv.1982 Bhimtal ♂; 14.v.1982 Bhimtal ♂; 7.iv.1985 Bhimtal ♂; 30.iv.1992 Sattal ♂; 1.v.1992 Sattal ♂; 2.v.1992 Sattal x 4; 4.v.1992 Sattal x 3 ♂; 5.v.1992 Bhimtal ♂; 21.v.1992 Sattal ♀; 22.v.1992 Sattal; 2.vi.1992 Bhimtal ♀; 3.vi.1992 Sattal ♀; 4.vi.1992 Bhimtal ♀; 8.x.1992 Sattal x 2; 28.iii.1994 Bhimtal ♀; 18.iv.2003 Bhimtal ♂; 5.v.2003 Bhujiaghat

x 2; 2.vi.2003 Bhujiaghat ♀; 4.vi.2003 Bhujiaghat; 7.vi.2003 Bhujiaghat ♂; 11.iv.2004 Bhimtal ♂; 16.iv.2004 Bhimtal ♀; 16.iv.2004 Bhimtal ♂; 18.iv.2004 Bhimtal ♂; 22.iv.2004 Bhimtal ♀; 17.v.2004 Bhujiaghat ♀.

Forewing Length: 26-30 mm; Expanse: 56-64 mm.

**Diagnosis:** Both sexes with eyes brown; head, thorax and abdomen dorsally black, ventrally pale greyish. Legs pale greyish. *Recto* surface of wings black with orange yellow markings, which are not sharply defined. On forewing the upper margin of cell streak with a medial indentation in some individuals. Postmedial spots in interspaces 1 and 2 conjoined and extend into interspace 3, more or less meeting lower end of subapical series at vein 4. The erect submarginal orange yellow line usually not prominent. Apical cilia white.

Hindwing *recto* with relatively broad discal line. Postmedial band always extends into interspace 6. Submarginal line faintly marked, almost obsolete in some individuals (Fig. 1).

On *verso* surface, markings as in nominate race, but pale bands correspondingly broader and pale yellow, especially postdiscal spots in interspaces 1 and 2 on forewing.

**Comparison with nominate subspecies:** The subspecies *varshneyi* may be distinguished from the nominate race by the broader orange yellow markings on the wings, which are about 25% wider than nominate *miah*; the conjoined spots in interspaces 1 and 2 on the forewing *recto* which are not



Fig. 1: *Recto* surface of holotype of *Neptis miah varshneyi* ssp. n. and *N. miah miah*

separated by a black vein; and the pale markings on the verso surface, which are yellowish, not whitish. In *miah*, the non-lilac pale markings on the *verso* surface vary from off-white to white on both wings, the discal band on the hindwing being pure, almost shining white.

**Remarks:** On the basis of the type series, ssp. *varshmei* is a little larger than the nominate race which, according to Evans (1932), has a wingspan of 45 to 60 mm. Atkinson (1882) and Hannington (1910) did not record *miah* from Kumaon, but Hannington recorded *L. viraja* as not rare. I am unaware of any extant specimen of *viraja* from Kumaon. In fact, *viraja* has not been recorded from Nepal either (Bailey 1951; Smith 1989, 1993), though a specimen of *viraja* has been figured as *miah* by Smith (1993), according to the late J.N. Eliot (*in litt.*). Therefore, it seems likely that the *viraja* recorded from Kumaon was the local race of *miah*, which is described here. Evans (1932) and Wynter-Blyth (1957) appear to have reported *miah* erroneously as *viraja* from Kumaon.

*N. miah varshmei* is not rare in the Kumaon Himalaya, where it has been recorded in the outermost range between 700 and 1,500 m above msl in forests of Himalayan oak (*Quercus leucotrichophora* A. Camus and *Q. glauca* Thunb.) and Sal (*Shorea robusta* Gaertn.). The flight is weak, very like *Pantoporia hordonia* (Stoll) or *P. sandaka* (Butler), although *miah* may be distinguished by its relatively larger wingspan. Individuals do not stay in one place for long.

According to Smith (1989), the nominate race of *miah* is not common at low elevation in Nepal, where he has recorded it up to 762 m (2,500 feet) above msl. However, of the two specimens recorded by Bailey (1951), one was collected at Bhimpedi at 610 m (2,000 feet) in October and the other at Kathmandu at 1372 m (4,500 feet) in May. In Kumaon, it has not been recorded below 1,200 m, although it probably occurs at low elevation in areas not surveyed so far.

In Kumaon, there are two annual broods, the first on the wing from mid-April to the end of June and the second through October to mid-November. There appears to be no seasonal variation between these broods, although according to Smith (1989), this butterfly is on the wing during the southwest monsoon months from July to September, in addition to the summer and autumn generations in Nepal. In the event that ssp. *varshmei* has an additional generation on the wing during the monsoon, seasonal variation similar to the nominate race may occur.

The autumn generation is comprised of fewer individuals than the summer generation in Kumaon.

The subspecies is dedicated to Dr. R.K. Varshney, formerly of the Zoological Survey of India.

## 2. *Comostola hauensteini* sp. nov.

(Geometridae: Geometrinae)

The genus *Comostola* Meyrick is largely Indo-Australian with two or three species in the Palaearctic Region. The genus has been treated comprehensively by Seitz (1908-1928; 1954). Besides the wing pattern and bright colours, the genus is distinguished by the unusual shape of the discocellular veins, which are similar to *Berta* Walker.

The genus is divided into two sections. The typical section has a straight forewing margin. The hindwing is slightly angled but never tailed at vein 4 and the pattern is similar to *Comostolopsis* Warren; the second section has rounder wings with a characteristic pattern. The present species belongs to the typical section.

**Material examined:** Holotype: Male 11.viii.1997. Bhimtal.

Forewing Length: 11 mm. Expanse 24 mm.

Paratype: Female 27.ix.1999. Bhimtal.

Forewing Length: 13 mm. Expanse 28 mm.

**Diagnosis:** Vertex of head green. Frons and palpi white. Antennae of male pale brown, bipectinate to two-thirds the length, the rami long. Collar white. Thorax pale green, abdomen with first segment dorsally green. Remainder of abdomen shining white. Legs white.

Forewing *recto* with the costa prominently white and unmarked. Ground colour of wing pale green with a white ringed rust-coloured spot on the discocellulars. An incomplete and very indistinct antemedial series of creamy spots, the two above the dorsum discernable. Postmedial series of faint creamy spots on the veins, not reaching the costa.

Hindwing *recto* pale green, with a white-ringed, rust-coloured spot on the discocellulars. Postmedial series of creamy spots obscure.

Both wings with a marginal rust-coloured line. Cilia white.

*Verso* surface shining white with a rust coloured spot on the discocellulars of each wing. Dorsum of both wings with a fringe of long green hair.

Female larger than male, antennae simple. Palpi much longer than in male, the second joint reaching above the head (Fig. 3). Both sexes with a pair of tibial spurs on hindleg.

**Remarks:** *Comostola hauensteini* can be immediately distinguished from other known members of the genus by the prominently white forewing costa. In other respects, it is similar to other members of the section.

Only a single pair is known, hence genitalia were not examined. It is rare in the type locality, where it has a single annual generation during the second half of the southwest monsoon.

With reference to the antennae and palpi, the difference between the sexes is similar to that found in *Comostola*

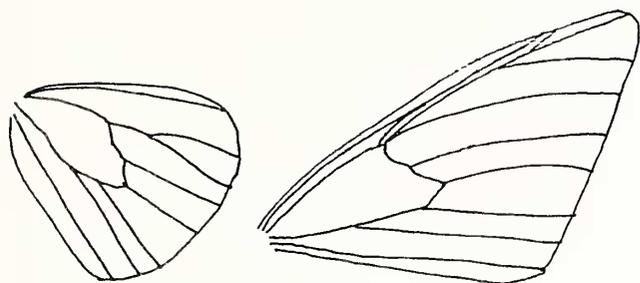


Fig. 2: Forewing and hindwing venation of holotype of *Comostola hauensteini* sp. nov. (not to scale)

*subtiliaris nympha* Butler, where the female has simple antennae and longer palps than the male.

In Fig. 2, the characteristic venation of the cells of both wings of *C. hauensteini* is illustrated. The subcostal venation of the forewing is not depicted, since it is not diagnostic.

The species is dedicated to Armin Hauenstein of Untermünkheim-Schönenberg, Germany.

### 3. *Garaeus parva* von Hedeman (Geometridae: Ennominae)

*Garaeus parva* is a polytypic Asian moth, with a recorded distribution from Siberia and Japan southward through China to the hills of northeast India. Recently, it has been recorded from Jones Estate. These records extend the known distribution of the species considerably westward along the Himalaya.

Wehrli (1940) recognized six subspecies of this moth, four from the Asian mainland and two from Japan: the nominotypical race from Manchuria and Siberia; *distans* Warren and *kiushiuana* Hori from Japan; *notia* Wehrli from Central and Southern China; *sutschana* Wehrli from the Sutschan (=Sushan) area in Ussuri, Russia and *discolor* Warren from West China and northeast India. Hampson (1895) gave the Khasi

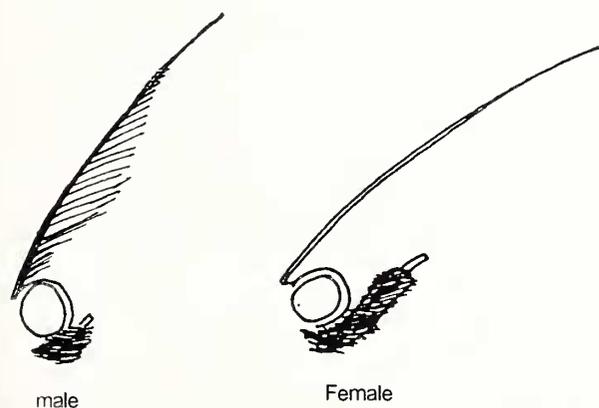


Fig. 3: Head of male and female of *Comostola hauensteini* sp. nov. (not showing sections of labial palpi)

and Naga Hills as localities for *discolor*. The original and subsequent descriptions of *discolor* (Hampson 1895; Prout 1915; Wehrli 1940) are of what appear to be Dry Season Form males. Although both sexes of the remaining subspecies appear to be known, the female of *discolor* was unknown. The following is a description of Wet Season Form (WSF) males and both the WSF and Dry Season Form (DSF) of the female.

#### *Garaeus parva discolor* Warren

1893. *Proc. zool. Soc. Lond.*: 400, pl. 32, fig. 19.

Wet Season Form Male

**Material Examined:** Holotype: 7.viii.1997.

Forewing Length: 17 mm; expanse: 38 mm.

Paratype: 5 exs.: 23.vii.2000; 3.vii.2002; 14.viii.2001; 24.viii.1997; 19.ix.2000.

Forewing Length: 15-17 mm; expanse: 32-38 mm.

**Diagnosis:** Head grey, collar brownish grey, thorax and abdomen grey and coppery. Antennae grey. Forewing *recto* ground colour bright coppery to reddish-brown with some dark irroration. Costa greyish white as far as postmedial white mark. Base suffused with grey, especially on costa. Prominent grey antemedial band angled below costa. A dark medial line, which is not prominent in some specimens, arising from costa, angled at discocellular spot, whence it runs obliquely to inner margin. Diffused grey postmedial band arising from a white spot on costa and bordering dark medial line from discocellular spot to inner margin. A white stigma before apex. Some greyish submarginal suffusion above tornus. Cilia of both wings dark brown.

Hindwing *recto* coppery brown suffused with pale grey, particularly near the dark antemedial line. A series of dark medial spots terminating in a black and white mark on inner margin. Postmedial series of large, irregular, white-ringed coppery spots not reaching costa, coppery colour replaced by brown in some individuals.

Forewing *verso* brown suffused with pale grey. Subbasal area with some chocolate brown suffusion on costa and below cell. Sinuous, diffused but prominent chocolate brown medial band. Triangular chocolate brown subapical costal patch bordered with white. Indistinct pale postmedial and crenulate submarginal bands.

Hindwing *verso* brown irrorated with grey. Prominent chocolate brown antemedial band. Medial spots and postmedial rings of *recto* surface present, though not as prominent.

*Comparison with dry season form males:* The most striking difference is in the coppery suffusion on the *recto* surface and the prominent markings on both surfaces of the WSF. The markings are greatly reduced or obscured in the DSF. While the antemedial and medial bands on the forewing

*recto* are almost obsolete in the DSF, they are well developed in the WSF. The grey postmedial band, which is indistinguishable in the DSF, is prominent though with diffused edges in the WSF.

On the hindwing *recto*, the most prominent difference between the seasonal forms is in the postmedial series of white-ringed coppery spots, which are prominent in the WSF and almost obsolete in the DSF. On the *verso* surface, these spots are vaguely distinguishable and were referred to by Hampson (1895) as an "indistinct wavy submarginal white line".

*Comparison with other subspecies:* The WSF of *discolor* is very similar to the race *sutschana* Wehrli described from material from Sutschan (=Sushan), Ussuri (east of Vladivostok, Russia) which, incidentally, is at the opposite extreme of this insect's range. The similarity lies chiefly in the ground colour of the *recto* surface, which according to Wehrli (1940) is olive-grey red-brown dull-coppery, faintly suffused with whitish in *sutschana*. Besides this, the prominent dark red brown medial line on the forewing, lightly suffused with dark grey, agrees well with that of the WSF of *discolor*, as does the dark band on the *verso*, which is chocolate brown in *sutschana* as well as in the WSF of *discolor*.

In the Himalaya, *G. parva* is on the wing throughout the year, while in Siberia, Manchuria and Japan, it has been recorded in late June and July. Presumably it is on the wing only during the summer months in the northern part of its range. Therefore, it is unlikely that distinct seasonal forms occur there, as they do in the Himalaya.

However, taking into consideration that the "subspecies" *sutschana* is known from an area well within the range of *G. parva parva*, the similarity between *sutschana* and the WSF of *discolor*, and that *sutschana* differs from *parva* more or less in the same manner that WSF *discolor* differs from DSF *discolor*, it appears possible that *sutschana* is a form of the subspecies *parva* rather than a good subspecies.

## Female

**Material Examined:** Holotype: 30.xi.1998.

Paratypes: 5 exs.: 23.i.1999; 5.v.1999; 18.xi.1996; 1 ex. no date; 16.x.2003.

Forewing Length: 17-19.5 mm, expanse: 38-44 mm.

**Diagnosis:** Antennae ochreous, bipectinate to apex, rami dark brown, shorter than those of males. Head, thorax and abdomen ochreous. Collar darker.

Basal half of forewing costa arched. Apex acute, outer margin excised below apex. Hindwing with outer margin crenulate and tornus lobed.

Forewing *recto* with ground colour ochreous. Traces of pale antemedial band angled below costa. Medial dark

streak on costa. Black speck at end of cell. Triangular white postmedial costal mark, defined by dark brown, from which a prominent, oblique dark line arises and terminates at middle of termen. Black speck on  $M_1$  (vein 6) beyond postmedial line. A white striga from apex. Some individuals with diffuse dark submarginal spot below  $M_3$  (vein 4), below which submarginal area is suffused with greyish brown.

Hindwing *recto* ochreous, costal area pale. Antemedial straight dark line in continuation of forewing's oblique dark line. Barely discernable incomplete medial series of dark specks terminating in a V-shaped dark mark on inner margin or termen. Distal half of wing evenly suffused with greyish-brown, crossed by irregular ochreous postmedial band from apex to tornus. Cilia of both wings dark brown.

Forewing *verso* light brown, suffused with dark brown scales. Sub-basal darker brown area distally defined by antemedial line. Sinuous, excurved brown medial band, dark speck at end of cell. Prominent dark sub-apical triangular patch on costa. Dark spot below triangular mark on  $M_1$  (vein 6). Submarginal area suffused with dark brown with ill-defined, crenulate submarginal line and diffuse, dark submarginal spot below  $M_3$  (vein 4), extending to margin in some individuals.

Hindwing *verso* with proximal half ochreous, with some dark brown suffusion along costa. Straight, dark antemedial line and dark speck at end of cell. Distal half of wing suffused with darker brown beyond medial series of dark specks. Crenulate, ochreous postmedial line and some ochreous suffusion at and below apex.

## Individual and seasonal variation

*Recto:* The specimen from January is the darkest, with the postmedial dark suffusion on both wings prominent. The specimen from May has the least dark suffusion and lacks postmedial markings on the forewing. On the hindwing, these markings are faint. The November specimens, including the type, have hardly any dark suffusion on both wings and have a rufous tinge. The Wet Season Form females (16.x.2003 and the undated specimen) are suffused with rufous instead of dark brown, and are the largest of the six specimens. The white subapical mark on the costa of the undated specimen is almost wholly suffused with dark brown. I have an identical specimen, unfortunately in pieces with the abdomen and one hindwing missing, these having been devoured by a Tit, which was taken on 28.ix.2003.

*Verso:* On the *verso* surface, too, the specimen from January is the darkest, with well-defined markings. Next in order is the May individual, while the two November specimens are paler with some obsolete postmedial markings on both wings. The Wet Season Form females are suffused with rufous instead of dark brown, and the subapical triangular

patch on the forewing is rufous in one case. On the forewing, a postmedial series of specks on the veins is discernable.

**Remarks:** The females described above differ superficially from males, especially in the ochreous ground colour, the uniform colouration and the prominent dark medial line on the forewing *recto*. They closely resemble the form *nigrilineata* Prout, an unusual form described from Lienping, northeast of Canton in China. The ground colour of females of *discolor* is a little more irrorated with grey or rufous, depending upon the season, than in the *nigrilineata* illustrated on Plate 25 f of the Palaearctic Geometridae (Supplement) in Seitz (1954), the oblique postmedial band on the forewing *recto* is a little further away from the discocellular spot in females of *discolor* than in the illustrated *nigrilineata* and the latter lacks the dark postmedial speck on  $M_1$  (vein 6).

From a comparison of the sexes of *discolor*, it is quite evident that, besides being sexually dimorphic, it is also seasonally variable. Prout (1915) and Wehrli (1940) do not note this. Although the sex and date of collection of *nigrilineata* is not noted, the illustration is that of a female, judging by the antennal characters. It seems possible that it is a Wet Season Form female of subspecies *notia* Wehrli, which is found in the area.

According to Prout (1915), *parva* emerges in July in Manchuria, Vladivostok and Japan. From this, it appears that the moth is univoltine in the northern part of its range. It is, therefore, obvious that there will be no seasonal variation, although there may be some individual variation. The present records are from an area with sharply defined dry and wet seasons, the latter being the period when the southwest monsoon is in progress from June to late September. The species has been recorded in January, May, August, September, October and November in Bhimtal, indicating that there are at least three annual generations. It seems likely that there is a fourth or even fifth generation between August and November.

The series of five females from different months show a range of variation encompassing the form *nigrilineata* from the Omei-Shan (Lienping) and the Japanese *distans* Warren depicted in Seitz (1954), especially in the forewing markings.

Both Prout (1915) and Wehrli (1940) did not mention sexual dimorphism in this species, but noted that very little material had been examined as specimens were scarce, from which one may assume that, unlike the case in the Himalaya, the sexes are superficially similar in eastern China, eastern Russia and Japan.

This assumption is strengthened by the illustrations of this species in Seitz (1954) where, on the basis of the antennae and size, it can be suggested that females of *parva*, *nigrilineata*, *notia* and *distans* have been depicted, while

*discolor* and *sutschana* Wehrli are represented by males. From these, it seems likely that sexual dimorphism is not present in *parva*, but might be so in *distans*, and by the form *nigrilineata* in subspecies *notia*.

**Ecology:** This moth is rather rare in collections. Wehrli (1940) noted that it is not common in Manchuria and Vladivostok, while only a few had been collected in Japan, on which the subspecies *distans* and *kiushiuana* Hori were based.

In the Bhimtal valley, it is rare at mercury vapour light, where males are attracted. Females are not attracted to artificial light and it is likely that males, too, are not often attracted. If the latter proves to be the case, the moth might be commoner than has been assumed over most of its range. This is borne out by the observation that males, even when attracted to artificial light (from mercury vapour lamps), generally settle in light shadow some distance (up to 5 m) from the light source. The females recorded were found within rooms (specimen dated 18.xi.1996 and the undated Wet Season Form) or in the open during the daytime. The undated female was found on a windowsill of a disused room during the late 1970s, lacking its head and antennae. Male specimens collected during the 1970s have been identified from photographs, so the moth has probably been present in the Kumaon Himalaya for at least 30 or 40 years, probably longer.

Prout (1915) noted that the larval host plant of ssp. *parva* is *Ligustrum ibota*. Three species of *Ligustrum* L. have been recorded from Kumaon between 5,000 ft (1,524 m) and 9,000 ft (2,743 m), with one species, *L. nepalense* Wall. descending to 3,000 ft (914 m) in the central and inner ranges (Osmaston 1927). However, it is equally likely that the species feeds on some other plant, perhaps belonging to Oleaceae, in the Himalaya.

That it is a species capable of great adaptation is evident not only from its distribution, but also from its flying period, from January (the day when the specimens were recorded the minimum and maximum temperatures were 11 °C and 14 °C respectively), to May (the day when the specimen was recorded the minimum and maximum temperatures were 25 °C and 36 °C respectively). Relative humidity varies from 6% to 1% (reaching 1% when warm summer breezes blow) during April and May, to 100% on foggy days during the southwest monsoon. Given its Palaearctic distribution, this moth will almost certainly also be found at higher elevation in this area, i.e. up to 2,500 m, if not higher. However, this moth has been recorded so far only from Jones Estate.

The present specimens, along with a series of DSF males in my collection, constitute the first Himalayan records for this moth, and it will almost certainly be found all along the range eastward, i.e. in Nepal, Sikkim, the hill districts of

West Bengal, Bhutan and Arunachal Pradesh. It is not known whether it occurs west of Jones Estate, but given its rather stable population here, it is likely to be found in some neighbouring valleys to the west also.

The moth has a weak, fluttering flight, and settles in shady places with wings outspread, in the manner typical of most Geometrids. It is eaten by birds, and I have found bitten-off wings after Tits (*Parus major* L. and *Parus xanthogenys* Vigors) fed on moths attracted overnight to the verandah light. All the specimens discovered outdoors were settled among low scrub and bushes, where they look remarkably like dry leaves. This is not to say that they do not fly at higher levels, for example among the canopies of trees, since these have not been examined.

#### 4. *Hypochrosis hyadaria* Guenée (Geometridae: Ennominae)

1857. *Hist. Nat. Ins. Lep.: Uran. Et Phal.* 2: 537.

The Geometrid moth *Hypochrosis hyadaria* Guenée was recorded by Hampson (1895) from Sikkim, Khasi Hills, Nilgiris and Sri Lanka. It is also well established in the Kumaon Himalaya west of Nepal, where it has been recorded at Jones Estate at 1,500 m above msl.

The moth is quite variable, and Hampson (1895) while synonymising nine names under *hyadaria*, retained four names for different forms in addition to the typical form, and an unnamed variety. These are *tinctaria* Walker from Shillong (Meghalaya), which is dark greyish-purple, with the costal area of the hindwing *recto* reddish-orange and the underside redder than the typical form. This form has also been recorded at Jones Estate. The Nilgiri and Sri Lankan forms *sulphurescens* Moore and *galbulata* C. & R. Felder are greenish, especially between the ante- and postmedial lines of the forewing, which in *galbulata* approach each other towards the inner margin. The form *flavifusata* Moore has the medial and outer areas of the forewing yellow except at the outer angle. The latter two forms have not been recorded from Kumaon in the present study.

Hampson's unnamed variety, which he recorded from the Khasi Hills, has the lines of the forewing dark at the costa and a large submarginal black blotch on the inner area. This form, which has been recorded in the present study, is referred to as *stigmata* forma nov.

**Material examined:** This species was collected at a single location in Jones Estate, Bhimtal, over a period of thirty years. All specimens were attracted to mercury vapour lamps. Sixty-three specimens were examined, as well as photographs of twenty specimens collected at the same location.

The species has been recorded in every month from February through October. It is relatively common and well established, most abundant in March and April and seen in

smaller numbers during the remaining period.

**Remarks:** The moth is seasonally variable. The typical form has only been recorded during the dry season before and after the southwest monsoon, and is therefore the Dry Season Form. The form *tinctaria* has only been recorded during the southwest monsoon months from July to September and is therefore the Wet Season Form. In the material examined, there are very few females of the typical form, i.e. two recorded in February. The normal female form in this area may be referred to the form *sulphurescens* as it has the basal and distal (outer) area of the forewing brown and the area between the ante- and postmedial lines greenish-yellow. No males of this form have been recorded in the present study. In just a few individuals, there is an obscure dark mark at the forewing tornus in the same place as in form *stigmata*. In only one female specimen of *sulphurescens*, recorded on 25.iii.2001, is the tornal mark prominent. This individual is included in the type series of *stigmata* further on.

This form is paler during the dry season and darker during the wet season, and the two seasonal forms have numerous intergrades, so that it is not possible to say with certainty where the WSF begins and the DSF ends.

The form *stigmata* has been recorded in every month except February, September and October. During the dry season the ground colour is that of the typical form, but during the wet season, what may be described as *stigmata* x *tinctaria* are on the wing alongside normal *tinctaria*.

The holotype of *stigmata* is a Dry Season Form individual taken on 26.v.1998 with a forewing length of 18 mm and an expanse of 38 mm.

Paratypes: 11 exs.: 4.iii.1999; 14.iii.2001; 25.iii.2001 (♀ *sulphurescens* x *stigmata*); 29.iii.2001; 22.iv.2001; 1.vi.2000; 8.vi.2000; 17.vii.1990; 26.vii.2000; 29.vii.2000; 9.viii.2000.

Forewing length 17-21 mm; expanse 36-44 mm.

On the whole, the specimens examined in the present study are larger than those examined by Hampson (1895), who gave an expanse of 34 to 40 mm for the species. The present material measures 36 to 46 mm, with the length of the forewing varying from 17 to 21 mm.

Males have a 5 mm long, hairy, white pair of coreomata that can be extruded from near the ventral tip of the abdomen.

#### 5. *Anambulyx elwesi* Druce (Sphingidae: Sphinginae)

1882. *Entomol. Mon. Mag.* 19: 17.

The monobasic genus *Anambulyx* Rothschild & Jordan is known from Thailand (Cadiou and Kitching 1990), the Khasi Hills (Bell and Scott 1937), Darjeeling (type locality), and Kumaon (Smetacek 1994). The species occurs roughly between 1,500 m and 2,300 m above msl. The Kumaon population belongs to the western extreme of the insect's

known range. Due to some consistent differences between the fascies of the Bhimtal population and the populations from the east, it is desirable to treat the Bhimtal population as a subspecies of *elwesi*. The following is a description of material from the Bhimtal valley.

*Anambulyx elwesi kitchingi* ssp. nov.

**Material Examined:** Holotype: male 30.vi.1990. Kumaon Himalaya (Wet Season Form).

Forewing Length: 40 mm. Expanse: 90 mm.

Paratypes: Female 16.iii.1999 (Dry Season Form); 4 males 11.vi.1996; 25.vi.1992; 10.vii.1989; 17.viii.1995.

Forewing Length: Female: 52 mm (apex of both forewings missing); males: 40-45 mm.

Expanse: Female: 116 mm; males 90-100 mm.

**Diagnosis:** Antennae light brown. Head, thorax and abdomen grey, lightly tinged with brown. Broad, triangular, dorsal, dark brown patch on thorax, broadest towards abdomen. Abdomen with narrow dorsal dark line. Legs brown, upper edges of femur flushed with pink.

Forewing *recto* with apex produced. Irregular dark brown basal patch. Lime green patch extending from basal patch, into which it sends two dentitions, to nearly halfway along costa, lower edge of green patch extending along a narrowing spur to tornus. An obscure, sinuous antemedial line, broadening into prominent green patch on inner margin. Green stigma at end of cell. Sinuous postmedial and double submarginal lines, the former faintly marked. All three lines distally edged with grey powdering.

Hindwing *recto* with proximal half rosy pink, distal half brown with grey stigma near tornus. Inner margin paler.

Forewing *verso* brown, with rose pink flush on basal half. Subapical grey patch from which an almost straight postmedial line arises.

Hindwing *verso* brown suffused with grey, suffusion lacking between antemedial and medial lines. Slight basal pink suffusion in interno-medial interspace. Evenly curved, brown postmedial line arising from just before apex, terminating above tornus. Area around tornus darker than rest of wing.

Dry Season Form: (female): Differs from WSF described above in the grey and brown areas being generally paler,

except dorsal thoracic brown patch. On forewing *recto*, oblique green patch extends distad in cell causing irregularity in border of patch.

Forewing *verso* with costa flushed with green, postmedial line on both wings distally bordered with green. Hindwing *verso* faintly flushed with pink.

A female of the Wet Season Form measured in an earlier paper (Smetacek 1994) is smaller, with a forewing length of 49 mm compared with 52 mm despite the missing apex of the present specimen.

*Comparison with the nominate subspecies:* It is well known that in many Lepidoptera there exists a cline along the southern face of the Himalaya, with darker races in the humid eastern Himalaya and pale forms in the drier western Himalaya. The present case seems to be another example of this, for ssp. *kitchingi* differs from the nominate subspecies primarily in being paler, so that the markings on the forewing are easily discernable, especially the postmedial and submarginal lines. In addition, the dark dorsal triangular mark on the thorax contrasting with the paler greyish-brown of the sides and the paler abdomen easily distinguish ssp. *kitchingi* from ssp. *elwesi*, which has a uniform dark thorax and a similar dark abdomen.

The green markings on both surfaces of the forewing fade to ochreous in a few years in stored specimens, hence earlier descriptions (including the original description) of *elwesi* refer to the lime green areas as ochreous.

The subspecies appears to be restricted to the Himalaya west of Nepal, where it has only been recorded from Bhimtal so far.

The subspecies is dedicated to Ian J. Kitching of the Natural History Museum, London.

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