

Key to the Indian species of *Zephyrus*.

- A. Hindwing not furnished with a tail, outer margin scalloped, apex of first median nervule slightly produced tooth-like. Male brilliant metallic green on upperside of both wings. Female unknown.
863. *Z. KHASIA*, Khasi Hills.
- B. Hindwing furnished with a filament tail from the termination of the first median nervule.
- a. Males brilliant metallic green on upperside of both wings.
- a¹. Male, upperside, both wings with the coloration very deep green, powdery; underside, both wings dull fuliginous-black. Female unknown.
864. *Z. zoa*, Sikkim.
- b¹. Males, upperside, both wings with the green coloration lighter and of a more brassy hue, evenly spread, not powdery.
- a². Male, underside pure silvery white, no distinct discal bands. Female unknown.
865. *Z. ATAXUS*, Western Himalayas, ? Darjiling.
- b². Male unknown. Female, upperside, forewing with large shining purple-blue patch towards base of wing, two discal orange spots, underside, dark brown, discal band of hindwing broken in the middle.
866. *Z. KATURA*, Western Himalayas.
- c¹. Male, underside, rufous-brown, forewing with large orange triangular patch from near inner margin. Female unknown.
867. *Z. ABSOLON*, India.
- d¹. Male, underside pale brown glossed with silvery, with distinct discal bands, the one on hindwing including dark line defining disco-cellular nervules. Female, upperside, dark brown, forewing with discal orange spots as in *Z. katura*, but no blue towards base of wing.
868. *Z. DUMA*, Sikkim, Sylhet.
- e¹. Male, smaller, discal band on underside of hindwing quite distinct from dark line defining disco-cellular nervules. Female, upperside, forewing shining blue on disc and base.
869. *Z. SYLA*, Himalayas.
- f¹. Male, still smaller, underside greyish-fawn colour, not at all glossed with silvery. Female, upperside, forewing with only faint traces of blue on disc and base, two pale bluish-white subapical (or discal) spots; underside as in male.
870. *Z. BIRUPA*, Western Himalayas.
- δ. Males, metallic green in some lights, violet in others, on upperside of both wings.
- a¹. Both sexes with discal band on underside of hindwing broad, including dark line defining disco-cellular nervules, not outwardly prominently defined by silvery line.
871. *Z. ICANA*, Western Himalayas.
- b¹. Both sexes with discal band on underside of hindwing narrow, quite separate from red line defining disco-cellular nervules, outwardly prominently defined by silvery line.
872. *Z. DOHERTYI*, Western Himalayas.
- c. Male, upperside touched with obscure violet close to base of forewing only, hindwing entirely black. Female unknown.
873. *Z. MANDARA*, Kumaon.
- d. Males, upperside, forewing blue or purple on disc and base, with two spots on disc placed obliquely.
- a¹. Both sexes, upperside, both wings, blue, obliquely-placed spots on forewing white.
874. *Z. ZIHA*, Western Himalayas.
- b¹. Male, upperside, forewing, peacock purple, obliquely-placed spots on forewing orange; hindwing entirely black. Female unknown.
875. *Z. PAVO*, Bhutan, Upper Assam.

863 *Zephyrus khasia*, n. sp.

HABITAT: Khasi Hills.

EXpanse: ♂, 1.55 inches.

DESCRIPTION: MALE. UPPERSIDE, both wings rich metallic green, the veins black, the outer margins with a broad regular black border. Forewing with the costa very narrowly black, the outer black border broadest at apex. Hindwing with the costal margin broadly black, the outer margin waved, no tail, but the termination of the first median nervule slightly produced tooth-like. UNDERSIDE, both wings silvery-white. Forewing with a fuscous bar closing the discoidal cell, a discal curved and waved fuscous band from the costa to the first median nervule, its outer edge sharply defined, its inner edge somewhat diffused; a submarginal increasing macular fuscous band from near the costa to the submedian nervure, becoming

obsolete before it reaches the costa. *Hindwing* with a faint darker line defining the disco-cellular nervules; a discal sinuous macular fascia composed of narrow fuscous fragments outwardly defined with whitish placed between the veins; a submarginal increasing series of six fuscous lunules placed between the veins; an anteciliary fuscous line, becoming obsolete towards the costa. *Cilia* white, becoming fuscous towards the apex of the forewing.

This beautiful insect differs from every Indian species of the genus in possessing no filiform tail to the hindwing; the markings of the underside are also entirely peculiar. On the upperside it is hardly distinguishable from *Z. syla*, Kollar. It is probably nearest to "*Thecla*" *saphirina*, Staudinger,* from the island of Akkold, Corea, and Yezo, Japan, which however has a distinct though short tail, the outer black marginal border of the forewing on the upperside very much narrower, and on the underside of the hindwing some yellow submarginal markings towards the anal angle, which are entirely wanting in *Z. khasia*.

Described from a single example in the collection of the Revd. Walter A. Hamilton.

864. *Zephyrus zoa*, de N.

Z. zoa, de Nicéville, Journ. Bomb. Nat. Hist. Soc., vol. iv, p. 1, n. 6, pl. A, fig. 3, male (1889).

HABITAT: Sikkim.

EXPANSE: ♂, 2.0 inches.

DESCRIPTION: "MALE. UPPERSIDE, both wings black. Forewing with all but the outer margin (which is somewhat broadly and evenly of the ground-colour) and the veins (which are black) clothed with powdery rich metallic iridescent dark green scales (exactly as in *Ilerda viridipunctata*, mihi); this colour in some lights is quite invisible. *Hindwing* with a patch of similar green scales in the middle of the wing, the costa and outer margin being broadly of the ground-colour, the abdominal margin a little paler fuscous. UNDERSIDE, both wings dull fuliginous black. Forewing with a deeper black disco-cellular mark outwardly defined by a fine silvery white line; an indistinct, somewhat broad, straight, blackish discal band from the costa to the first median nervule outwardly defined by a fine silvery white line; an indistinct blackish submarginal band which widens out on either side of the first median nervule, and is there rather prominent. *Hindwing* with a short blackish bar near the base of the costal interspace inwardly defined by a fine silvery white line; a narrow disco-cellular line outwardly surrounded with white, the usual W-shaped discal prominent line, silvery white inwardly, slightly defined by a narrow blackish line; the outer margin broadly sprinkled with white scales; a prominent marginal large oval deep black spot circled with orange in the first median interspace, an anal deep black spot crowned with orange, which latter colour extends on one side to the first median nervule, on the other in a narrow line for some short distance up the abdominal margin, where it is inwardly bounded by a fine black line and then by a line of turquoise-blue; a fine anteciliary white line, obsolete towards the apex. Thorax above anteriorly clothed with ferruginous hairs in some lights, posteriorly with green hairs; abdomen black above, pale fuscous below."

"This species belongs to the group which contains *Thecla* [*Zephyrus*] *tsangkie*, Oberthür, and *T. desgodinsi*, Oberthür,† from Thibet, but appears to be quite distinct from either. It differs from the former in being larger; it has no brilliant blue spots on the margin of the hindwing on the upperside on either side of the tail, and the colour of the underside is black, not brown. From the latter (of which the female only is known) it also differs in the ground-colour of the underside, and in the discal white lines being straight, instead of outwardly convex, as in *T. desgodinsi*, and in the presence of the bar in the costal interspace on the hindwing. *T. diamantina*, Oberthür,‡ which is also of this group, appears to have the green colour on the upperside of the male less powdery, and extended much nearer to the outer margin.

* Mémoires sur les Lépidoptères, vol. iii, p. 135, pl. xvi, figs. 4, 5, male; 3, female (1887); id., Fryer, Rhop. Nihonica, p. 14, n. 37, pl. iv, figs. 9A, male; 9B, female (1888).

† Etudes d'Ent., vol. xi, pp. 20, 21, pl. vii, figs. 54-56 (1886).

‡ Id., vol. v, p. 28, n. 45, pl. i, fig. 1, male (1880).

It was described from the Isle of Askold. From the description alone *Z. zea* appears to come very near to '*Dipsas japonica*, Murray,* but that species is said to have no disco-cellular markings on the underside, and has also a third black spot with whitish scales in the middle between the two large ones on either side of it on the underside of the hindwing near the anal angle not found in my species. To judge of it also from the late Mr. H. Pryer's figures in his "Rhopalocera Nihonica" the male has the green coloration of the upperside much more extensive than in *Z. zea*."

"A single specimen has been obtained by Mr. A. V. Knyvett on Tiger's Hill, above Darjiling, at 8,000 feet elevation, on 20th June, 1888." (*de Nickville*, 1 c)

865 *Zephyrus ataxus*, Doubleday and Hewitson.

Dipsas ataxus, Doubleday and Hewitson, Gen Diurn Lep., vol. II, p. 482, n. 2, pl. lxxiv, fig. 7, male (1852); id., Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. I, p. 31, n. 37 (1857); id., Hewitson, Ill. Diurn. Lep., p. 65, n. 2, pl. xxvi, fig. 6, male (1855); *Thecla ataxus*, Moore, Proc. Zool. Soc. Lond., 1888, p. 247.

HABITAT: Simla (*Westwood*); North India and Darjiling (*Horsfield and Moore*); Northern India (*Hewitson*); N.-W. Himalayas (*Moore*).

EXPANSE: ♂, 1.7 to 2.0 inches.

DESCRIPTION: MALE. UPPERSIDE, *forewing* with the apex broadly and outer margin less broadly and evenly black, the rest of the surface brilliant metallic green. *Hindwing* with the costa and abdominal margin broadly pale fuscous, the outer margin broadly black bearing a fine white line towards the anal angle, the rest of the surface brilliant metallic green; *tail* black, tipped with white. *Cilia* pure white throughout except from the first median nervule to the anal angle of the hindwing, where they are dusky, and along the inner margin of the forewing, where the cilia are very long and fuscous. UNDERSIDE, *both wings* shining silvery white. *Forewing* with the disco-cellular nervules defined with a fuscous line, a straight discal fuscous line from the costa to the third median nervule, often obsolete, two irrorated fuscous spots near the margin in the first median and submedian interspaces, the lower spot often absent. *Hindwing* with a broad fuscous line on the disco-cellular nervules, sometimes continued to the costa, a line parallel to it nearer the base of the wing sometimes connected at its lower end to the outer line, a spot below near the middle of the submedian interspace, still another spot below the latter recurved upwards in the internal interspace, and a small round spot above this last on the abdominal margin; a double submarginal lunular fascia, beyond which in the first median interspace is a round black spot surrounded with deep orange, the anal lobe black, outwardly defined by an orange patch, which latter is continued as a narrow line for a short distance up the abdominal margin. *Cilia* on both wings white, with a very fine black anteciliary line, which becomes broader and more prominent towards the anal angle of the hindwing.

Z. ataxus is a very rare species. In the Indian Museum, Calcutta, is a North Indian specimen from the old East Indian Museum, and three without history. In Colonel Lang's collection are four specimens taken at Masuri, 7,000 feet, in July, 1868, and Mr. P. W. Mackinnon has sent me a single specimen taken in June, 1884, and another in June, 1888, also at Masuri, which are all the specimens I have seen. I did not come across it in four years collecting in Simla, nor have I ever seen a Darjiling specimen. It is almost certain that the next species, *Z. katura*, Hewitson, is the hitherto unknown opposite sex of *Z. ataxus*.

866 *Zephyrus katura*, Hewitson.

Dipsas katura, Hewitson, Ill. Diurn. Lep., p. 65, n. 4, pl. xxvi, figs. 1, 2, female (1855).

HABITAT: India (*Hewitson*); Kulu, Masuri.

EXPANSE: ♀, 1.5; to 1.85 inches.

DESCRIPTION: "FEMALE. UPPERSIDE, *both wings* brown. *Forewing* pale blue from the base to the middle, followed by two small spots of orange. *Hindwing* rufous-brown. UNDERSIDE,

* Ent. Month. Mag., vol. xi, p. 269 (1875).

forewing pale rufous-brown, an oblong spot at the end of the cell of darker brown, bordered on both sides with white; a broad white transverse band beyond the middle, also bordered with darker brown; a broad submarginal band of white traversed by an indistinct line of pale brown, the margin dark brown. *Hindwing* white, with the base pale rufous-brown, crossed before the middle by a broad short band of dark brown, with below it a round spot, and near the abdominal margin a lunular spot of the same colour, a small brown spot between the lunular spot and the base of the wing; crossed beyond the middle by a broad band of brown marked near the anal angle by lunular white spots, a spot near the base of the tail, and also at the anal lobe, black bordered with orange; the outer margin and a submarginal band brown." (*Hewitson*, l. c.)

I should describe the upperside of the forewing as being fuscous; the discoidal cell, a small spot at the base of the second median interspace, a larger one at the base of the first median interspace, a long streak filling the basal two-thirds of the submedian interspace and the same portion of the internal area, rich shining purple blue; a large orange spot placed outwardly against the disco-cellular nervules, and a rather larger quadrate spot at the middle of the second median interspace.

Z. katura is almost certainly the hitherto unrecognised female of *Z. ataxus*, Doubleday and Hewitson. The probable reason why this has not been suggested before is that the brown underside of *Z. katura* presents such a different aspect from that of *Z. ataxus*, which is shining silvery white. The markings too are very different, though they occupy the same positions exactly. In the Indian Museum, Calcutta is a small specimen taken by Mr. A. Grahame Young in the Kulu Valley, and two without history; in Colonel Lang's collection are two specimens taken in July at 7,000 feet in Masuri; and Mr. P. W. Mackinnon has sent me a single female taken in June, 1884, and another in June, 1888, also in Masuri. It will be noted that all the Masuri specimens were taken at the same time as the specimens of *Z. ataxus* mentioned above.

867. *Zephyrus absolon*, Hewitson.

Dipsas absolon, Hewitson, Ill. Diurn. Lep., p. 65, n. 3, pl. xxx, figs. 11, 12, male (1865).

HABITAT: India (*Hewitson*).

EXPANSE: ♂, 1.6 inches, (actual measurement of figure 1.8 inches).

DESCRIPTION. "MALE UPSIDE, *both wings* gold-green. *Forewing* with the apical half dark brown. *Hindwing* with the margins brown. *UNDERSIDE, both wings* rufous-brown. *Forewing* with a large triangular space of orange on the inner margin, a pale linear rufous spot at the end of the cell, a transverse linear band of white beyond the middle bounded inwardly by rufous-brown, and a submarginal rufous band terminating beyond the middle in two dark brown spots. *Hindwing* crossed obliquely at the middle by a linear band of white, taking the form of a V near the anal angle, crossed beyond the middle by a broad rufous band bordered on both sides with indistinct lunular white spots, the black spots near the base of the tail and at the anal angle bordered with orange, the margin white. *Cilia* rufous."

"This beautiful species, with the brilliant green of *D. syla* [= *Z. syla*], Koller, and *D. ataxus*, Doubleday and Hewitson, on the upperside, has on the underside a near resemblance to *D. betula*, Linnæus" [a common European and Northern Asiatic species]. (*Hewitson*, l. c.)

I have never seen this species. From Hewitson's figure of it the apex and outer margin of the forewing on the upperside are much more broadly black than in any other male Indian *Zephyrus*, and the "rufous-brown" underside is also distinctive.

868. *Zephyrus duma*, Hewitson.

Dipsas duma, Hewitson, Ill. Diurn. Lep. Suppl., p. 13, n. 14, pl. vi Suppl., fig. 15, male (1869); id., Staudinger, Ex. Schmett., p. 273, pl. xcv, male (1888).

HABITAT: North India (*Hewitson*); Sikkim (*Staudinger*); Sylhet.

EXPANSE: ♂, 1.75 to 2.00; ♀, 1.60 to 1.80 inches.

DESCRIPTION: "MALE. UPPERSIDE, *both wings* brilliant gold-green. *Forewing* with the costal margin near the apex and the outer margin dark brown [black]. *Hindwing* with one tail, the margins dark brown [black], rather broad. UNDERSIDE, *both wings* grey-brown, with a linear spot at the end of the cell, crossed beyond the middle by a broad band of dark brown, bordered outwardly with white, and below this a second band of brown. *Hindwing* with a linear band of brown, bordered inwardly with white near the base, the band at the end of the cell touching the broad medial band, the lobe black, crowned with orange, the black spot near the base of the tail circled with orange, the space between the lower brown band and the outer margin irrorated with black and white, a submarginal line of white."

"This may be only a variety of *D. [=Z.] smaragdina*, [Bremer, from Amurland and Japan]. It is, however, much larger, and, instead of having on the underside, as Bremer describes his species, a band of white bordered with brown, this has a broad brown band slightly bordered with white. Mr. Moore has an example which does not agree with either of these, shewing that there are either several very closely-allied species, or that *D. smaragdina* is subject to much greater variety than is usual in this group." (Hewitson, l c)

FEMALE. UPPERSIDE, *both wings* dark brown; *cilia* paler brown. *Forewing* with a discal oblique orange band beyond the cell, divided by the black veins, a little variable in size. UNDERSIDE, *both wings* marked as in the male, but the ground-colour dark brown instead of grey-brown, and with no silvery gloss.

The males are fairly common in Sikkim in July, the females are very much rarer. I do not know any other locality for this fine species except Sylhet, Colonel C. Swinhoe having two male specimens in his collection from that region.

369. *Zephyrus syla*, Kollar.

Thecla syla, Kollar, Hügel's Kaschmir, vol. iv, pt. 2, p. 414, n. 4, pl. iv, figs 7, 8, male (1848); id., Doherty, Journ. A. S. B., vol. iv, pt. 2, p. 130, n. 153 (1886); *Dipsas syla*, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. 1, p. 30, n. 36 (1857), id., Moore Proc. Zool. Soc. Lond., 1865, p. 508, n. 114, also p. 774, *D. syla*, Hewitson, Ill. Diurn. Lep., p. 64, n. 1, pl. xxvi, fig. 3, female (1865); *Dipsas pholus*, Doubleday (ined.), List Lep. B. M., pt. 2, p. 25, *Amblypodia enphranor*, id. (ined.), l c (1847)

HABITAT: Himalayas (Kollar); Northern India (Hewitson); Simla (Westwood); N.-W. Himalayas, Darjiling (Moore); Dhankur, 9 11,000 feet. N.-W. Kumaon (Doherty).

EXPANSE: ♂, 1.4 to 1.8; ♀, 1.4 to 1.7 inches.

DESCRIPTION: MALE. "UPPERSIDE, *both wings* greenish-bronze, with the border black. *Cilia* whitish. UNDERSIDE, *both wings* whitish silvery, with abbreviated fuscous fasciæ, *Hindwing* one-tailed, with two golden ocelli at the anal angle, spotted with black." (Kollar, l c) MALE UPPERSIDE, *both wings* brilliant shining metallic green with a bronzy lustre in some lights, the outer margins broadly and evenly black. *Hindwing* with the costal and abdominal margins broadly fuscous, tail black with white cilia on its inner side and the tip white. UNDERSIDE, *both wings* silvery greenish-whitish, with pale fuscous markings. *Forewing* with a broad spot on the disco-cellular nervules, a discal band from the costa to the first median nervule, attenuated posteriorly, a broad submarginal band increasing in width posteriorly. *Hindwing* with a fine transverse line near the base of the subcostal interspace, two fine double lines at the end of the discoidal cell, a discal straight line from the costa to the first median nervule, attenuated posteriorly, outwardly defined with a fine white line, posteriorly continued in a W-shaped line to the abdominal margin; an evenly curved submarginal band, with a round black spot beyond it in the first median interspace surrounded by a broad orange ring, and another black spot at the anal angle, inwardly with an orange patch, which latter is continued as a narrow line for a short distance up the abdominal margin. *Cilia* white throughout, on the underside of both wings with a fine blackish anteciliary line. FEMALE. UPPERSIDE, *forewing* with the costa somewhat broadly, the apex and outer margin widely black, the rest of the wing shining bluish-purple crossed by the black veins; a pale bluish or whitish patch beyond the end of the cell; with another less prominent patch placed outwardly below it in the second median interspace; sometimes a small orange

spot below this again in the first median interspace. *Hindwing* black, more or less streaked with blue between the veins. **UNDERSIDE**, *both wings* like the male, but the orange spots at the anal angle of the *hindwing* of the male a deeper colour in the female.

"This species varies considerably in size, in the breadth of the brown margin on the upperside, and in the colour and position of the bands on the underside." (Hewitson, l. c.)

This is a widely-distributed species in the Himalayas, occurring on the outer ranges from Murree to Sikkim at any rate. I have always taken it flying about low oak-trees; Colonel Lang writes of it "Observed in a richly-wooded North-West Himalayan glen, flitting up and down the stream, pitching on moist rocks or pieces of wood in mid-stream." Also "Rare in Kumaon, taken in June at the top of Cheena, Naini Tal, 8,600 feet." In Sikkim it appears to be rare. Mr. Otto Möller possesses two pairs only.

870. *Zephyrus birupa*, Moore.

Dipsas birupa, Moore, Ann. and Mag. of Nat. Hist., fourth series, vol. xx, p. 51 (1877); *Thecla* (or *Zephyrus*) *birupa*, Doherty, Jour. A. S. B., vol. iv, pt. 2, p. 132, n. 132 (1886).

HABITAT: Masuri, N.-W. Himalaya (Moore); Outer Himalayas, Pyra and Ramgarh, 4,000-7,000 feet, Kumaon (Doherty).

EXPANSE: ♂, ♀, 1.30 to 1.65 inches.

DESCRIPTION: "MALE. **UPPERSIDE**, *both wings* metallic green, broadly margined with brown. **UNDERSIDE**, *both wings* greyish fawn-colour, with a transverse pale-bordered brown disco-cellular streak, a straight discal and a lunular submarginal band, the discal band on the *forewing* short, the discal band on the *hindwing* straight till where it reaches the sinuous angle, two anal black-centred bright orange spots. *Cilia* whitish. **FEMALE**. **UPPERSIDE**, *both wings* dark brown. *Forewing* slightly tinged with blue at the base, two subapical bluish-white spots." **UNDERSIDE**, *both wings* as in the male.

"Distinguished from *D.* [= *Z.*] *siha*, Hewitson (of which, at present, I know only the female), in the underside being differently-coloured, the submarginal band on the *forewing* being uniform in colour and without the terminal spots, and in the discal transverse band on the *hindwing* being quite straight to where the sinuous portion turns off to the abdominal margin." (Moore, l. c.)

Z. birupa is usually a smaller species than *Z. syla*, Kollar, the male on the upperside of the *forewing* has the outer black marginal band broader and more curved; the female has much less blue on the upperside; the colour of the ground on the underside is quite different, being greyish fawn-colour in both sexes in *Z. birupa*, silvery greenish-whitish in *Z. syla*.

I have taken this species somewhat commonly at Simla about midsummer flying round small oaks, Colonel Lang has met with it at Masuri in June and July at 7,000 feet, and Mr. Doherty reports it from the outer ranges of Kumaon. It appears to be a rarer species than *Z. syla*, with a more restricted range.

871. *Zephyrus icana*, Moore.

Dipsas icana, Moore, Proc. Zool. Soc. Lond., 1874, p. 575, pl. lxvii, fig. 3, male; *Thecla icana*, Butler, Proc. Zool. Soc. Lond., 1880, p. 149; id., Doherty, Jour. A. S. B., vol. iv, pt. 2, p. 130, n. 154 (1886).

HABITAT: N.-W. Himalaya (Moore); Dhankuri, 9-11,000 feet, N.-W. Kumaon, also in Chudans, N.-E. Kumaon (Doherty).

EXPANSE: ♂, 1.40 to 1.60; ♀, 1.50 to 1.66 inches.

DESCRIPTION: "MALE. **UPPERSIDE**, *both wings* dark brown. *Forewing* with the interior portion purplish-green, metallic only in certain lights, and traversed by the dark brown veins. *Hindwing* slightly sprinkled with metallic green scales. **UNDERSIDE**, *both wings* pale sap-brown. *Forewing* with a dark brown broad spot at the end of the cell, a transverse discal band decreasing in width and terminating one-third from the posterior angle, being bordered outwardly by a narrow pale line; a narrow paler brown submarginal fascia and outer border. *Hindwing* with a dark brown broad median transverse band including a disco-cellular spot, the band pale-bordered on both sides and terminating above the anal

angle in a zigzag line, a paler brown lunular submarginal fascia and outer band, a black, bordered orange patch at the anal angle containing two black spots joined by a blue streak." (Moore, l. c.) "FEMALE, rather larger than the male. UPPERSIDE, both wings dark smoky brown. Forewing with two bright ochreous spots placed obliquely beyond the discoidal cell." Otherwise as in the male. (Butler, l. c.)

On p. 268 of the "Mémoires sur les Lépidoptères," vol. iii, Dr. C. Fixsen states that "*Dipasa*" *micans*, Bremer and Grey, = *icana*, Moore. Unfortunately I have not seen the former species, which occurs in China, but to judge from the figure of it in Ménétrier's Cat. Lep. Mus. St. Peters., pl. iv, fig. 3, seems to be distinct from *Z. icana*. On the underside of the forewing in *Z. icana* the discal band is wider and ends at or before the first median nervule, in *Z. micans* it extends to the submedian nervure; on the hindwing the discal band in *Z. icana* more or less includes the disco-cellular mark, in *Z. micans* the discal band is much narrower, and is well-separated from this mark. *Z. micans* shows an orange submarginal spot on the upperside of the hindwing in the first median interspace, this is absent in *Z. icana*.

Colonel A. M. Lang, R. E., took this species at Narkunda, near Simla, 9,000 feet, at the end of July and beginning of August; I took it on the Jalauri pass, between the Kulu and Simla districts, at the end of July; Mr. A. Grahame Young has taken it in Kulu at 7,000 feet in July, and at 8,000, 8,800, and 9,000 feet in September; and Mr. Doherty has taken it in Kumaon. It does not appear to be a very common species.

872. *Zephyrus dohertyi*, de N. (PLATE XXV, FIGS. 140 ♂, 141 ♀).

Z. dohertyi, de Nicéville, Journ. A. S. B., vol. lvi, pt. 2, p. 278, n. 7, pl. xiv, figs. 1, male; 2, female (1888).
HABITAT. Western Himalayas.

EXPANSE: ♂, ♀, 1'5 to 1'7 inches.

DESCRIPTION: "MALE. UPPERSIDE, both wings black. Forewing with the black area confined to the costa narrowly, the outer margin broadly and increasingly to the anal angle, and the inner margin narrowly; the rest of the surface extremely dark iridescent green varying to iridescent purple according to the play of the light, crossed by the black veins. Hindwing with some streaks of the same colour between the veins on the disc; anal lobe and tail (the latter tipped with white) obscure reddish. UNDERSIDE, both wings reddish-brown, sometimes ochreous-brown; the discoidal cells closed by a narrow red band outwardly defined with black. Forewing with a wavy discal red band, its outer edge irregular, and defined with a fine black, then a silvery line, extending from the costa to the first median nervule; a submarginal increasing macular dark fascia, the apical half of the outer margin reddish. Hindwing with a broader discal red band than in the forewing prominently outwardly defined with a silvery line; a submarginal lunular red band, which is bent upwards at the anal angle and continued some distance along the abdominal margin, where it is inwardly defined, as are also the two lunules next it on both sides, with a fine silvery line; a series of red lunules on the margin; tail red. Cilia cinereous throughout. FEMALE. UPPERSIDE, both wings black. Forewing with an irregular orange spot placed outwardly against the disco-cellular nervules, and another similar spot placed below and beyond it in the second median interspace, sometimes extending diffusely into the interspace below; the discoidal cell and a patch in the middle of the submedian interspace rich purple (never green in some lights); this colour sometimes entirely absent. Hindwing unmarked. UNDERSIDE, both wings as in the male."

"May at once be distinguished from *Z. icana*, Moore, by the discal band of both wings on the underside being narrower and outwardly defined with a bright silvery line; the two lunular marginal bands in *Z. dohertyi* on the underside of the hindwing are also more prominent and deep vermilion throughout, in *Z. icana* they are more orange, and that colour is confined to the anal angle. The discal band on the hindwing below is always distant

from the disco-cellular band, in *Z. icana* the two are run into each other, owing to the much greater breadth of the bands."

"I possess numerous specimens, including four females, of *Z. dohertyi* taken by Mr. P. W. Mackinnon at Tehri Gurhwal, near Masuri, 8,500 feet, in June; I also took four males on the Jalauri Pass, at about 9,000 feet, on the Kulu side, in July. As Mr. W. Doherty first pointed out the distinctness of this species," I have much pleasure in naming it after him." (*de Nicolle*, l. c.)

The figures show the upper and undersides of both sexes of the type specimens from Tehri Gurhwal in my collection.

873. *Zephyrus mandara*, Doherty.

Thela mandara, Doherty, Journ. A. S. B., vol. lv, pt. 9, p. 130, n. 155 (1886).

HABITAT: Kumaon.

EXPANSE: Not given.

DESCRIPTION: MALE. "Allied to *Z. icana*, Moore, but whereas that species is [on the upperside] metallic over the disc of the hindwing and most of the forewing, interrupted by black veins, and appears green in some lights and violet in others, this species is only touched with obscure violet close to the base of the forewing; the disc has a faint lustre, as if greasy. UNDERSIDE more rufous than *Z. icana*, the transverse discal line [of the forewing] extends to the first median nervule, slightly bent inwards at its lower end; the discal band of the hindwing is straight, the submarginal band rounded, both are tinged with reddish; a blurred, obsolescent ocellus of black and reddish anally and subanally. Outer margin of the forewing strongly convex, sinuous; outer margin of the hindwing not scalloped, abdominal margin not excavated, but straight or slightly convex. The prehensores, though generally resembling those of *Z. icana*, are quite distinct. Both are distinguished from *Z. syla*, Kollar, and *Z. birupa*, Moore, by the uncus seen from the side being divided horizontally; in *Z. icana* the upper lobe is slender, bent downwards, and projects beyond the lower; in *Z. mandara* the upper lobe is straight, and shorter than the long and massive lower lobe; the clasp (which in both species tapers obliquely upwards) here ends in a blunt, almost vertical point, while in *Z. icana* it ends in a sharp horizontal beak; the uncus in *Z. birupa* and *Z. syla* is very different, being broad and entire, when viewed from the side." (*Doherty*, l. c.)

I have not seen this species, but it can be easily discriminated apparently from its allies by the metallic coloration of the upperside being very restricted in the forewing, altogether absent in the hindwing. Mr. Doherty does not state in what part of Kumaon he took it.

874. *Zephyrus siha*, Hewitson.

Diphas siha, Hewitson, Ill. Durn. Lep., p. 66, n. 5, pl. xvi, figs. 4, 5, female (1865).

HABITAT: Unknown (*Hewitson*); Kulu, Simla, Masuri.

EXPANSE: ♂, ♀, 1'2 to 1'5 inches.

DESCRIPTION: MALE and FEMALE. "UPPERSIDE, both wings grey-blue, the veins black. Forewing with the outer half dark brown, marked with two white spots. Hindwing with the outer margin broadly brown traversed by a line of white. Cilia white. UNDERSIDE, both wings white, with a spot at the end of the cell and a transverse band of brown beyond the middle, both with the outer margin and two submarginal bands of brown. Forewing with two large spots of brown near the anal angle. Hindwing with a black spot near the base of the tail, also a black spot at the angle, both bordered with orange." (*Hewitson*, l. c.)

I have seen but seventeen specimens of this species, one taken by Mr. A. Grahame Young in Kulu, one in Simla on 30th May by Colonel G. F. L. Marshall, three in Masuri at 7,000 feet, in June and July, 1868, by Colonel A. M. Lang, and twelve also in Masuri by Mr. P. W. Mackinnon in May and June, 1888-89. On the upperside they are almost exactly like females of *Z. syla*, Kollar; but agree in size and also in the character of the markings,

* Journ. A. S. B., vol. 17, pt. 9, p. 131 (1886).

with females of *Z. disrupta*, Moore, differing in the colour of the ground of the underside, which is white, and in the lower portion of the submarginal band of the forewing being composed of two large quadrate black spots, the lower the larger. The sexes are alike, I can only discriminate between them by examining the primary sexual organs.

875. *Zephyrus pavo*, de N.

Z. pavo, de Nicéville, Proc. Zool. Soc. Lond., 1887, p. 460, pl. xl, fig. 11, female.

HABITAT: Bhutan; Margherita, Upper Assam.

EXPANSE: ♀, 1·35 inches.

DESCRIPTION: "FEMALE. UPSERSIDE, both wings black. Forewing with the costa somewhat widely, the apical third of the wing, and the outer margin at the anal angle black, the rest of the wing rich peacock-purple; a quadrate spot beyond the end of the cell, and an elongated one beyond and below it in the second median interspace, orange. Cilia black. Hindwing unmarked, the tail black tipped with white. Cilia white, tipped with black, except at the termination of the veins from the second median to the second subcostal nervule, where the cilia are entirely white. UNDERSIDE, both wings brownish-fuscous. Forewing with the disco-cellular nervules defined with a white line on each side; an obscure darker broad discal fascia from the costa to the first median nervule outwardly defined with a narrow white line, beyond which the wing is sprinkled with pale violet scales; another dark fascia from near the anal angle, decreasing in width from the inner margin to the third median nervule, where it becomes obliterated, also outwardly defined with a whitish line. Hindwing sprinkled almost throughout with pale violet scales; a broad irregularly wedge-shaped discal fascia, free of violet sprinkling, broad on the costa, narrowing to a bluntly rounded point above the anal angle, its margins defined with a fine violet-white line; another similar fascia beyond, inwardly defined with violet-white lunules; two subbasal ring-spots, one of which is within the discoidal cell, and a pair of lines on the abdominal margin, all violet-white; a submarginal oval black spot in the first median interspace, surrounded by a deep orange ring; a deep orange patch at the anal angle extending a short distance up the abdominal margin; a fine anteciliary dark line, inwardly defined by a white line."

"*Zephyrus pavo* is nearly allied to the *Z. katura* of Hewitson,* that species being probably the female of *Z. ataxus*, Doubleday and Hewitson, but differs on the upperside of the forewing in having the basal area of a richer shade of purple, of greater extent, and not divided by the black veins; on the underside the silvery bands in *Z. katura* are replaced in *Z. pavo* by violet irrorations; the two species also differ in other minor particulars."

"The type specimen is unique, and is deposited in Mr. A. V. Knyvett's collection, by whose native collectors it was obtained near Buxa in Bhutan." (de Nicéville, l. c.)

Mr. W. Doherty has recently taken a male specimen of this species near Margherita in Upper Assam, at 400 feet elevation only. It agrees closely with the type, but is a little larger. The specimen I described may also be a male; it is very singular however, that the male of *Z. pavo* should put on the pattern of markings and coloration of the females of several Indian species, though it is probably to be accounted for by the fact that they represent the primordial coloration of the group, and that the green colour of the upperside of the males of several species has been, it lately acquired by that sex.

Genus 136.—EUASPA, Moore. (PLATE XXVII.)

Euspa, Moore, Journ. A. S. N., vol. liii, pt. 2, p. 29 (1884).

"FOREWING, short, broad; costa arched from the base; exterior margin erect, convex; posterior margin long, straight; first subcostal nervule emitted at two-sixths, and second at one-sixth before the end of the cell, second bifid at two-thirds from its base, fourth and fifth from the end of the cell; disco-cellular nervule very slender, erect, waved; discoidal nervule from its middle; discoidal cell broad, extending to half length of the wing; second median nervule from near the end of the cell, first median at one-third before the end; submedian nervure straight.

* *Dipta katura*, Hewitson, Ill. Diurn. Lep., *Lycanidæ*, p. 65, n. 4, pl. xxvi, figs. 1, 2, female (1865).

HINDWING, short, very broad, *exterior margin* convex and slightly sinuous, with a single slender *tail* from the end of the first median nervule; *costal* and *subcostal nervures* joined together at their base, the former much arched from the juncture; *discoidal cell* broad, extending to half length of the wing; *first subcostal nervule* emitted at one-fifth before the end of the cell; *disco-cellular nervule* very slender, erect; *discoidal nervule* from near its middle; *second* and *third median nervules* from the end of the cell, *first median* at one-third before the end; *submedian nervure* curved; *internal nervure* short, recurved. **BODY**, short; *palpi* porrect, second joint long, extending half beyond front of the head, pilose beneath, third joint slender, one-fifth as long as the second; *legs* slender; *antennæ* thickened at the end, tip blunt." *Eyes* finely hairy. (Moore, l. c.)

The above diagnosis appears to me to give a very erroneous account of the neururation of this genus, which is somewhat peculiar. The second subcostal nervule of the forewing most certainly is not bifid, if any it is the third; nor do I understand how Mr. Moore makes the fourth and fifth subcostal nervules originate from the end of the cell. He only describes one disco-cellular nervule in each wing with the discoidal nervule from its middle, of course there are two, in the forewing the lower discoidal, in the hindwing the single discoidal nervule originate from their point of junction. In the hindwing there is nothing peculiar about the costal and subcostal nervures being joined together at their base, it is a common feature for these two veins to run side by side for some little distance from the base of the wing before they take different courses; the disco-cellular nervules are not erect, but outwardly oblique. I should describe the neururation as follows:—In the forewing the costal nervure terminates opposite the apex of the discoidal cell; the first subcostal nervule originates at about two-thirds of the length of the cell from the base; the second subcostal originates half as near to the origin of the middle disco-cellular as to the base of the first subcostal; the third subcostal is short, originates nearer to the apex of the wing than to the base of the upper discoidal; the upper discoidal is given off from the subcostal nervure some little distance beyond the cell, which character is only found amongst Indian *Lyranide* in the genera *Gerydus*, *Paragerydus*, *Logania*, some species of *Poritia*, *Zephyrus* and *Liphys*; the middle disco-cellular nervule springs necessarily therefore from the subcostal nervure, is short, straight, upright; the lower disco-cellular is about one-fourth longer than the middle disco-cellular, upright, concave; the second median nervule given off a short distance before the lower end of the cell. In the hindwing the first subcostal nervule is given off quite close to the apex of the cell; the disco-cellular nervules are outwardly oblique, concave, the upper slightly shorter than the lower; the second median nervule given off exactly at the lower end of the cell. The male has no secondary sexual characters.

The genus *Euaspa* contains but a single species, which is strictly confined to the outer ranges of the Western Himalayas. In general appearance it is a "Blue" rather than a "Hair-streak," the apex of the forewing broadly black on the upperside, both wings with a broad discal white band, the rest of the wings blue. The underside is pale brown, the white discal band narrower, longer and very clearly defined, some white markings on the margin, the hindwing with a black spot in the first median interspace near the margin surrounded with a bright orange ring, with a streak of the same colour on the abdominal margin. The flight of *E. miltonia*, Hewitson, is weak, and I have only found it amongst trees and bushes, upon which rather than on the ground it frequently settles. The sexes are alike.

876. *Euaspa miltonia*, Hewitson. (PLATE XXVII, FIG. 203 ♀).

Myrina miltonia, Hewitson, Ill. Diurn. Lep., Suppl., p. 5, n. 55, pl. iii, Suppl., figs. 79, 80, male (1869); *Hypoclypea miltonia*, Moore, Proc. Zool. Soc. Lond., 1882, p. 249; *Euaspa miltonia*, Moore, Journ. A. S. B., vol. III, pt. 2, p. 29 (1884).

HABITAT: Simla (Hewitson); Kangra Valley, 9,000 feet; Nepal (Moore).

EXPANSE: ♂, ♀, 1·3 to 1·5 inches.

DESCRIPTION: "MALE. UPPERSIDE, both wings cerulean blue. Forewing with a large medial white spot, the apical half dark brown. Hindwing with one tail, a large spot

of white at the costal margin, the apex and outer margin rufous-brown; a submarginal line white. *Cilia* white. **UNDERSIDE**, both wings rufous-brown, crossed by a common band of white, with conical submarginal spots of white centred with brown. *Forewing* with three dark brown spots at the anal angle. *Hindwing* with the anal angle irrorated with white, and marked by three black spots surrounded with orange, the orange bordered above with black and blue." (Hewitson, l. c.) The FEMALE does not differ from the male except in its rather broader wings.

I met with this species in one spot at Kujar, near Dalhousie, at the end of May, 1879. Mr. A. Grahame Young has sent many specimens from Kulu, as also has Mr. P. W. Mackinnon from Masuri. It appears to be single brooded, occurring in May and June only. Mr. Moore records it from Nepal; so far I have no certain knowledge of its occurring east of Masuri, neither Colonel Lang nor Mr. Doherty have met with it in Kumaon.

The figure shows both sides of a female specimen from Masuri in my collection.

Genus 137.—CHÆTOPROCTA, nov. (PLATE XXVII).

FOREWING, triangular; *costa* regularly and evenly arched, *outer margin* slightly convex, *apex* slightly acute, *inner margin* straight; *costal nervure* terminating opposite the end of the discoidal cell; *first subcostal nervule* given off at about one-third before the end of the discoidal cell, *second subcostal* originating near the end of the cell, much nearer to the apex of the cell than to the base of the first subcostal, *third subcostal* originating from the subcostal nervure about midway between the end of the cell and the apex of the wing; *no upper disco-cellular nervule*, *middle disco-cellular* concave, *lower disco-cellular* also concave, rather longer than the middle disco-cellular; *lower discoidal nervule* from their point of junction, *upper discoidal* exactly from the apex of the cell; *second median nervule* given off before the end of the cell; *submedian nervure* straight. **HINDWING**, oval; furnished with a short *tail* at the termination of the first median nervule; a very small *anal lobe*; *first subcostal nervule* originating a short distance before the apex of the cell; *upper and lower disco-cellular nervules* in one straight line, in the male outwardly oblique, the lower not quite twice as long as the upper; *second median nervule* given off a little before the apex of the cell. In the female the lower disco-cellular nervule of the hindwing is not quite so outwardly oblique as in the male, consequently the cell is shorter and blunter. *Antennæ* short, less than half the length of the costa of the forewing, with a well-formed long gradually-thickened club. *Palpi* short, porrect, not ascending above the lower edge of the eyes, second joint densely scaly, third joint naked. *Abdomen* in the female furnished with a very dense and large tuft of closely-packed pale ochreous-brown hairs.

Chatoprocta is nearest allied to *Zephyrus*, Dalman, from which in both sexes it may at once be known in that the upper discoidal nervule of the forewing has its origin from the subcostal nervure exactly at the apex of the discoidal cell, whereas in *Zephyrus* it springs from the subcostal some distance beyond the end of the cell; in *Zephyrus* also the abdomen of the female is normal, whereas in *Chatoprocta* it is furnished with a dense velvety tuft of closely-packed hairs at its end, which is, as far as I know, a unique character amongst butterflies, though obtaining in many bombycid moths.

Chatoprocta contains but a single species, which might be called the "Indian purple hair-streak," being somewhat similarly marked to *Zephyrus quercus*, Linnæus. The upperside of both wings in both sexes is black, with a large discal and basal patch of shining purple. Underside greenish-white, with prominent discal bands, the disco-cellular nervules defined on both sides by a brown line, and some yellow markings towards the anal angle of the hindwing. The markings of the underside are almost precisely similar to those of *Zephyrus siva*, Hewitson, a species in which the ground-colour is greyish-white, while in *C. odata* it is distinctly glossed with greenish. It occurs in the Western Himalayas, Kashmir, and adjoining territories wherever walnut trees grow, its larva feeding on that tree. I have described its transformations when describing the species.

877. *Chætoprocta edata*, Hewitson. (PLATE XXVII, FIG. 304 ♀).

Diptera edata, Hewitson, Ill. Diurn. Lep., p. 66, n. 6, pl. xxx, figs. 13, 14, male (1862); id., Moom, Proc. Zool. Soc. Lond., 1865, p. 307, n. 113; idem, id., l. c., 1874, p. 272, n. 71.

HABITAT: Western Himalayas.

EXPANSE: ♂, ♀, 1'2 to 1'4 inches.

DESCRIPTION: "MALE. UPPERSIDE, both wings with the basal half violet-blue, the outer half dark brown, paler on the hindwing. *Cilia* white. UNDERSIDE, both wings grey-white. *Forewing* with a pale linear spot at the end of the cell, two small dark brown spots near the middle of the inner margin, a transverse rufous band beyond the middle, bordered on both sides with white, and a submarginal band of pale brown terminating near the anal angle in two large black spots. *Hindwing* with a spot at the end of the cell, a medial transverse rufous band and a submarginal brown band, both bordered with white; two lunular orange spots near the base of the tail, bordered above and below with black, the outer margin brown. FEMALE does not differ from the male, except that the whole of the *hindwing* is rufous-brown." (Hewitson, l. c.)

LARVA when full-grown about '6 of an inch in length; onisciform, nearly cylindrical; coloration a pale rose pink, vinous or pale yellowish-green; second segment anteriorly rounded, third, fourth, and fifth slightly progressively wider, thence slightly tapering to the anal segment, which is about subequal in width to the third and rounded posteriorly; the divisions between the segments fairly well marked; the entire upper surface widely pitted throughout, covered with minute tubercles bearing very short bristly hairs, the latter much longer on the lateral edge of the body; spiracles inconspicuous, concolorous; head small, entirely retracted beneath the second segment, anteriorly and laterally black, smooth, shining, posteriorly ochreous, the ochreous colour extending on to the middle of the head in a square figure, the entire head sparsely covered with rather long white hairs; the body is practically unmarked, there being only a slightly darker dorsal line; the under surface is pale green. Mr. Mackinnon describes the larva as possessing "a yellow dorsal stripe, wide on the second segment, narrower to sixth, from thence to anal segment narrow." Feeds on the walnut. PUPA of the usual lycaenid shape, nearly cylindrical, head rounded, thorax very slightly humped and constricted posteriorly, abdomen ending in a blunt point; coloration dark reddish-brown, sparsely covered above with short hairs.

The above description has been drawn up from numerous specimens sent me in spirit, and a few alive, and a single live pupa, by Mr. P. W. Mackinnon of Masuri. He informs me that the larvæ are not attended by ants, though he has watched them carefully for many days, and this is probably correct, as I can find no trace with a strong magnifying glass of the special organs affected by ants, nor can I, by pressure, make the live larvæ extend those often found on the twelfth segment.

Mr. Wood-Mason has given me the following note on the clusters of eggs of this butterfly which have been sent me by Mr. P. W. Mackinnon from Masuri for examination:—"The abdomen bears at its extremity a huge smoothly convex semioval mass nearly as large as the thorax. This mass is made up of innumerable modified scales which are so arranged and so closely packed together that their united free ends form a smoothly rounded dead whitish brown solid-looking velvety surface. The scales are whitish-brown in their apical half, black in their setiform basal half. A number of them is attached by the black end fanwise nearly all round the oral pole of each egg, so as to conceal all except a small (less than a fourth part) of it."

"The eggs are attached to the surface of the walnut twigs in elongated masses, consisting of five longitudinal rows, which appear to be covered with quincuncially-arranged imbricated scales throughout, except at one end, where a portion of one egg is left exposed. A study of an egg-mass shows that the first four or five eggs are laid in a line transverse to the long axis of the completed mass, and so that their fanned sides are turned away from, and their exposed sides turned towards, the end of the insect's body, then four or five more are added so that their fans cover the exposed portions of the first row, and so on till the mass is finished, the last egg of which is necessarily left partially exposed, for the eggs as they pass out of the oviduct are coated

with the secretion of the glue-glands and passing in this sticky state through, or rubbing against the hairy mass, simply agglutinate a layer of the highly deciduous fluffy material composing it to those parts of their periphery only that come into relation therewith, the insect apparently not interfering in the matter even so far as to cover the last egg, the exposed condition of which may even act advantageously by concentrating the attack of ichneumons, etc., on the one weak spot of the egg-armour."

"This species I have caught in Upper Kunawar, in July and August, frequenting the orchards of the charming villages of that fine country, at altitudes of 8,000 to 10,000 feet. They settle in great numbers on the walnut trees; sometimes on neighbouring apricots and poplars. As one strikes the boughs, troops of these little black-purple hair-streaks, with silvery-grey underside, flit about the thick foliage like a cloud of tortrices shaken out of an oak: they settle again at once. They fly about thus till very late." (Note by Colonel A. M. Lang, R.E.)

The female of *C. odata* has the purple coloration of the forewing much more restricted than in the male, and the hindwing often has a patch of purple colour in the middle. It does not occur further to the east, as far as I know, than Masuri, but it is common to the westwards, always near walnut trees. It is best obtained by beating the lower branches of those trees, or other trees in their neighbourhood, as it is rather a sluggish insect, and does not appear to fly much. Mr Mackinnon informs me that the species is certainly single-brooded, the larvæ eating the young leaves only of the walnut. They do an immense amount of damage to the trees, and for the last two years Mr. Mackinnon has noticed that the first flush of leaves on about one hundred trees near his house in Masuri has been entirely eaten by them. The second flush of leaves which appears in May after the larvæ are full-fed and in the pupal or imaginal state are never eaten. He says also that the imagines are extremely active in the evening, though quiescent during the day. They are very difficult to catch in really perfect condition; they seem to become worn very quickly after emergence.

The figure shows both sides of a female example from Masuri in my collection.

Genus 138.—CHRYSOPHANUS, Hubner (PLATE XXVII).

Chrysophanus, Hubner, Verz. bek. Schmett., p. 72 (1816), id., Westwood, Gen. Diurn. Lep. vol. ii, p. 497 (1852); id., Trimen, Rhop. Af. Aus., p. 258 (1861-66), idem, id., South Af. Butt., vol. ii, p. 90 (1887); *Lycæna*, sect. 3 (part), Fabricius, Ill. Mag., vol. vi, p. 285, n. 32 (1807); id., Kirby, Syn. Cat. Diurn. Lep., p. 340 (1871); *Cupido*, sect. A, Schrank, Fauna Boica, vol. ii, pt. 1, pp. 153, 206 (1801); *Polyommatus* (part), Latreille, Hist. Nat. Crust. et Ins., vol. xiv, p. 116 (1805), idem, id., Enc. Méth., vol. ix, p. 11 (1819); id., Boursuval and Leconte, Lep. Amer. Sept., p. 122 (1831); id., Boursuval, Gen. et Ind. Méth., p. 9 (1840); id., Lang, Butt. of Eur., p. 86 (1884); *Heodes* (part), Dalman, Kongl. Vetensk. Acad. Hand., vol. xxxvii, pp. 63, 91 (1826).

* General characters of *Lycæna*, Fabricius, but with the eyes naked, and the upperside of the wings generally copper-coloured. HEAD, small, hairy, palpi obliquely porrected, of moderate length, the basal and middle joints thickly clothed with bristly hairs, terminal joint slender, elongate, nearly naked, of nearly equal length in both sexes; antennæ of moderate length, slender, middle joints long, ringed with white, terminated by a distinct elongate-ovate club, not or scarcely spoon-shaped. FOREWING, somewhat elongated, and more acute at the tip than in *Lycæna*, with the veins and their branches arranged as in that genus, the position of the slender disco-cellular nervules closing the discoidal cell indicated by a transverse black spot on the underside, which is also generally much ocellated. HINDWING, ovate, with the anal angle more prominent than in *Lycæna*, the extremity of the first median nervule is also often produced into a slight angle, especially in the males, marked beneath with black spots similar to those of the forewing. FORELEGS, nearly alike in size in both sexes, scaly; tibiae armed with numerous short acute spines, set on irregularly, the tip not produced into a hook; tarsi on the underside also armed with still more numerous spines, those of the male exarticulate, and terminating in an obliquely curved horny point, those of the female articulated, the first joint about equal in length to all the others united, and rather swollen, terminal joint armed with acute claws, rather dilated and angulated near the base.

Pseudonymchia moderate-sized, strongly bifid, the divisions conical, finely setose. *Pulsillus* large. MIDDLE and HINDLEGS, rather short, *tarsi* with the basal joint long, and often swollen in the males, claws and their appendages formed as in the forelegs."

"LARVA, elongate-ovate, swollen, onisciform, generally finely hairy, head small; feeding upon docks, grasses [?], and low herbage. PUPA, short, thick, and entire, with the head-case obtuse."

"This group is unquestionably very closely allied to *Lycæna*; but the splendid coppery colours of the upper surface of the wings, the naked eyes, and the very spinose feet, seem to warrant their generic separation. *C. phleas*, Linnæus, is remarkable for the dilated basal joint of the four hind tarsi of the male." (*Westwood*, l. c.)

Chrysophanus may be known from *Lycæna* as restricted in this work by the upper discoidal and middle disco-cellular nervules of the forewing having a common origin, i.e., spring from the same point, this latter nervule in *Lycæna* arising from the upper discoidal some little distance from the base of the latter. I know of no character by which *Chrysophanus* can be separated structurally from *Ilerda*, Doubleday. As a rule, the species comprised in it are of a brilliant coppery colour on the upperside, but this coloration is often reversed in the sexes, being in *C. phleas* brightest in the female, in *C. pavana* brightest in the male; in the species given in this work it is most brilliant in *C. aditya*, Moore, least so in *C. kasyapa*, Moore, except in the very aberrant *C. caspius*, Lederer, var. *transiens*, Staudinger, in which there is no copper colour on the upperside of either sex. The outline of the wings also is very variable. *C. phleas* has a distinct tooth (more prominent in the male) at the termination of the first median nervule of the hindwing, and the anal angle also produced; these characters are less noticeable in *C. pavana*; *C. aditya* and *C. kasyapa* have the hindwing evenly rounded; whilst the aberrant *C. caspius*, var. *transiens* has a distinct long narrow tail. The latter species in both sexes has the basal area of both wings glossed with purple, and in every way looks more like a "blue" than a "copper" on the upperside. The markings and coloration of the underside are so various in the Indian species of the genus that there can be no difficulty whatever in distinguishing any of them at a glance. The genus has an immense range, and inhabits every great geographical division of the earth. Mr. W. H. Edwards gives seventeen species as inhabiting North America north of Mexico,* one inhabits Chili in South America, Dr. Lang gives twelve species and many varieties as inhabiting Europe, several species occur in North Africa, one in Abyssinia in East Africa, one each in Tropical and extreme South Africa, numerous species inhabit the Palearctic regions of Asia, but none in the Indo-Malayan region, as far as I know; one species has been recorded from Queensland in Australia, and four from New Zealand. *C. phleas* is one of the widest-ranging of butterflies, as it occurs under various forms in Japan, China, and thence across Asia through Europe to North America, and is the commonest Indian species of the genus.

Key to the Indian species of *Chrysophanus*.

- A. Both sexes more or less copper-coloured or orange on upperside; no distinct long narrow tail to hindwing.

a. Anal angle and termination of first median nervule of hindwing produced into a tooth.

a¹. Underside, hindwing without a white outer-discal band.

878. *C. PHLEAS*, Western Himalayas, Biluchistan.

β¹. Underside, hindwing with a prominent white outer-discal band.

879. *C. PAVANA*, Western Himalayas, Kashmir.

A. Hindwing evenly rounded.

a¹. Underside, hindwing dull greyish-white

880. *C. ADITYA*, Ladak, Baltistan.

β¹. Underside, hindwing metallic greenish-blue.

881. *C. KASYAPA*, Western Himalayas, Kashmir.

- B. Both sexes without copper coloration on upperside, basal half of the wings glossed with purple; a distinct long narrow tail to hindwing at termination of first median nervule.

882. *C. CASPIUS*, var. *TRANSIENS*, Persia, Afghanistan.

* Butterflies of North America, vol. i, Synopsis of N. A. Butterflies, p. 32 (1873).

878. *Chrysophanus phlaas*, Linnaeus. (PLATE XXVII, FIG. 205 ♂).

Papilio phlaas, Linnaeus, Faun. Suec. p. 285, n. 1078 (1761); idem, id., Syst. Nat., ed. xii, vol. 1, pt. 2, p. 793, n. 252 (1767); id., Esper, Schmett., vol. 1, pt. 1, pl. xxii, fig. 1 (1777); id., Hübner, Eur. Schmett., vol. 1, figs. 369, 363 (1803-1804); *Polyommatus phlaas*, Godart, Enc. Méth., vol. ix, p. 670, n. 167 (1823); id., Elyes, Proc. Zool. Soc. Lond., 1881, p. 827; id., Leech, Proc. Zool. Soc. Lond., 1887, p. 414, n. 51; id., Pryer, Rhop. Nihonica, p. 16, n. 49, pl. iv, fig. 21, female (1888); *Chrysophanus phlaas*, Westwood, Gen. Diurn. Lep., vol. ii, p. 498, n. 4 (1852); id., Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 27, n. 28 (1857); id., Swinhoe, Trans. Ent. Soc. Lond., 1885, p. 340, n. 14; *Polyommatus phlaas*, Kollar, Stöckel's Kaschmir, vol. iv, pt. 2, p. 417, n. 4 (1848); *Chrysophanus phlaas*, Moore, Proc. Zool. Soc. Lond., 1874, p. 271, n. 61; idem, id., l. c., 1882, p. 247; *Papilio virganeus*, Scopoli, Ent. Carn., p. 180, n. 462 (1763); id., Fourcroy, Ent. Paris, vol. ii, p. 246, n. 35 (1785); *Papilio timeus*, Cramer, Pap. Ex., vol. ii, p. 137, pl. cxxxvi, figs. E, F, female (1777); *Chrysophanus timeus*, Moore, Proc. Zool. Soc. Lond., 1865, p. 506, n. 109; id., Butler, l. c., 1886, p. 368, n. 52; *C. timeus*, Doherty, Journ. A. S. B., vol. iv, pt. 2, p. 290, n. 149 (1886); *C. stygius*, Butler, Proc. Zool. Soc. Lond., 1880, p. 408, n. 14, pl. xxxix, fig. 3, male; *C. phlaas*, var. *stygius*, id., Ann. and Mag. of Nat. Hist., fifth series, vol. ix, p. 208 (1882); *C. baralacha*, Moore, Journ. A. S. B., vol. liii, pt. 2, p. 25 (1884).*

HABITAT: Palearctic and Nearctic regions; in India, Biluchistan, and the Western Himalayas at suitable elevations.

EXPANSE: ♂, ♀, 1·2 to 1·6 inches (Indian specimens).

DESCRIPTION: Typical race, *C. phlaas*, Linnaeus. **EXPANSE:** ♂, ♀, 1·2 to 1·4 inches.

MALE. UPPERSIDE, forewing dark shining copper overlaid with blackish scales; with a somewhat broad even black band on the outer margin; a small black spot near the base of the discoidal cell, a quadrate one in the middle, and an oblong one at its end; a discal series of seven rounded spots placed in echelon, the three upper ones from the subcostal nervure to the third median nervule, the next two in the median interspaces, the last two (usually more or less conjoined) in the submedian interspace. **Hindwing** blackish; the disco-cellular nervules marked with a linear deep black spot; a broad coppery submarginal band from the anal angle to the middle of the second subcostal interspace, inwardly marked with a series of cordiform black spots placed against the band, sometimes with a discal series of blue irrorated spots, generally four in number; the outer edge of the orange band deeply scalloped. **UNDERSIDE,** forewing bright ochreous, the apex broadly, outer and inner margins less broadly, brownish-grey; the black spots as above, but surrounded by a pale ochreous line; the inner edge posteriorly of the outer marginal band with three increasing black spots placed against it. **Hindwing** brownish-grey, with a few indistinct darker spots scattered evenly over the surface; with the coppery band of the upperside but much narrower and obscure. **Cilia** cinereous on the upperside, brownish-grey on the underside. **FEMALE. UPPERSIDE,** forewing with the copper coloration brighter and clearer than in the male, the black spots smaller and better defined. **Hindwing** with the coppery band broader. **UNDERSIDE,** forewing with four instead of three black spots placed against the outer brownish-grey marginal band. **Hindwing** like the male.

This description has been taken from typical Prussian specimens. As far as I am aware, the typical form occurs in Europe and North-Western Asia only, where however it has several local forms or races which have received distinctive names. It is the common "Small Copper" of Great Britain.

LARVA. "The colour of the head dingy green, with a few dark brown markings; of the body, opaque apple-green, the warts being white, and the bristles sienna-brown; in some specimens the green is interrupted by three stripes of a delicate purplish-pink, one of them medio-dorsal, the others marginal." This description has been drawn up by the late Mr. E. Newman, and quoted by Dr. Lang in Butt. of Europe, p. 96, pl. xxviii, figs. 3, larvæ and pupa. He states that it "feeds on various species of *Rumex*" (sorrels and docks). **PUPA.** "Dirty white, speckled with black or dark brown." (Lang, l. c.)

Local race, C. timeus, Cramer. EXPANSE: ♂, ♀, 1·3 to 1·7 inches. **DESCRIPTION: MALE.** Larger than the typical form. **UPPERSIDE,** forewing very much darker, the coppery colour almost

* The above does not give the entire synonymy of this species, I have omitted all references to the Worthen American forms, and also to the varieties a to f given in Mr. Kirby's Syn. Cat. Diurn. Lep., pp. 243, 244.

entirely overlaid with blackish; the black spots larger. Otherwise as in the typical form. FEMALE. Larger. UPPERSIDE, *forewing* with the lower basal area thickly overlaid with blackish scales, having the apical and outer portions alone of the coppery ground-colour quite clear. *Hindwing* with the discal blue spots often very large and prominent. Otherwise as in the typical form.

Regarding this form Colonel Lang notes as follows.—"This species has a wide distribution in the N.-W. Himalayas; common in the outward ranges, Kasauli, &c.; appearing here and there, up to Upper Kunawar, in very various climates. It, however, disappears in certain gaps, as it were, which are occupied by *C. pavana*," Kollar. Mr Butler notes:—"Major Yerbury says that the species is 'common at Murree and along the hills to Thundiani in August and September' *C. timeus* has been identified for him as *C. phlaas*; it appears, however, to be a tolerably constant form, so far as I can judge from our present series; on the upperside it much resembles *C. stygianus*, Butler, of Kandahar, but the darker colour and red band on the underside of the hindwing at once separate it." Mr. Butler records *C. timeus* from Kandahar also. Colonel Lang reports it to be "common at Naini Tal at 5,500 to 7,000 feet;" and Mr Doherty remarks on Kumaon specimens:—"Comparing the prehensores of my specimens [of *C. timeus* (*timeus*), Cramer] with those figured by Dr. White, I should suppose the species distinct from the European *C. phlaas* (*phlaas* ?), Linnaeus." He says he met with it at "Naini Tal, 6 7,000 feet, above Garhyan, and at Kalapani, N.-E. Kumaon, 11-15,000 feet."

This form was described by Cramer from Smyrna in Asia Minor; there are numerous specimens of it from Persia in the Indian Museum, Calcutta; and it occurs from Kashmir to Naini Tal at any rate at suitable elevations on the outer ranges of the Himalayas. Mr. Moore has recorded it from Darjiling, but this is incorrect, though it may possibly occur on the inner ranges of Sikkim at a suitable elevation. Mr. Moore also states that it occurs in Bhutan, but I have seen no specimen of the genus taken further east than Naini Tal.

Local race, *C. stygianus* Butler. EXPANSE: ♂, 1.33; ♀, 1.42 inches. DESCRIPTION: "MALE. UPPERSIDE, *both wings* smoky brown. *Forewing* in certain lights shot with fiery copper; spotted with black as in *C. timeus*, Cramer (*cleus*? Fabricius); two small orange spots beyond the interrupted black discal series. *Hindwing* with a slender undulated deep reddish-orange band on a black ground near the outer margin; above it a series of four or five pale blue hastate spots, and above these again beyond the end of the cell two black dots; a black dash at the end of the cell. *Cilia* greyish-white. *Body* blackish. UNDERSIDE *both wings* very like *C. timeus*, but considerably paler. *Forewing* with the submarginal black spots less distinctly white-bordered; the apex and outer margin very pale grey. *Hindwing* with the ground-colour very pale grey. FEMALE. Larger than the male. UPPERSIDE, *forewing* with the outer third of the cell and the subapical area bright orange, the black spots larger, otherwise similar. UNDERSIDE, *both wings* slightly yellower in tint all over, so that the ground tint of the *hindwing* has a pale brownish rather than greyish hue."

"This species is comparatively larger than *C. phlaas* [= *phlaas*, Linnaeus], and has the costal margin of the *forewing* longer" (Butler, l. c. in Proc Zool Soc. Lond., 1880). "An examination of the forty-one examples of this species obtained at Kandahar in October, and submitted to me for examination, has shown that the form named by me *C. stygianus* cannot be specifically separated from *C. phlaas*" (Butler, l. c. in Ann and Mag. of Nat. Hist.) Colonel Swinhoe writes of it:—"Quetta, September; Kandahar, October to January. Very common. With a long series such as I have, containing the typical forms of *C. phlaas*, Linnaeus, *C. timeus*, Cramer, and *C. stygianus*, Butler, it is absolutely impossible to separate them."

In the Indian Museum, Calcutta, are a pair of this species which have been named *C. stygianus*, Butler, by Mr. Moore, which were taken by me at Darcha in Lahoul in July, 1879. Major Howland Roberts found it common at Kandahar in April and May, abundant in June. In my collection are many specimens of both sexes from Quetta (September), and Kandahar (October and November) taken by Colonel Swinhoe; from Bushire in Persia

taken in April; from Astor, 7,700 feet, taken in September by Colonel Biddulph; and from Pangri taken by Mr. Ellis in October; all these examples are larger than typical *C. phlaas*, the male on the upperside of the forewing darker, and the underside of both wings paler. They are smaller than the local form *timens*, the male on the upperside of the forewing brighter, in the female bright orange rather than coppery. If the local races of *C. phlaas* are to be discriminated by a separate name, *C. stygianus* appears to me to deserve to be so separated as much as *C. timens* or *C. baralacha*, though the describer himself has failed to find characters of sufficient specific value to enable him to keep it distinct from *C. phlaas*.

Local race, *C. baralacha*, Moore. EXPANSE: ♀, 1.37 [1.5] inches DESCRIPTION: "FEMALE. Differs from specimens of the same sex of *C. phlaas*, Linnaeus (var *stygianus*, Butler), taken in the neighbouring country of Lahoul. UPPERSIDE, forewing golden-yellow, with a blackish quadrate spot in the middle of the cell, a larger spot at its end, three oblique subapical spots and three lower discal spots, the lowest spot being the longest and curved; from the three subapical spots some black speckles proceed to the disco-cellular spot; the costal edge is very narrowly bordered with brown, and the exterior margin has a narrow macular brown border of half the width of that of the above-mentioned species. Hindwing golden greyish-brown, with a broad pale red outer marginal band, which is very slightly indented with black at the end of the veins on its outer border, and on the inner border by a row of indistinct blackish spots surmounted by blue-grey scales, above which is a discal row of five or six smaller black spots and also a black lunule at the end of the cell. UNDERSIDE, both wings of similar colour to that of the above species. Forewing with the spots as on the upperside, but pale-bordered, also a spot at the base of the cell two small spots on the costa above the discal series, and three linear spots on the exterior margin above the angle, these latter spots being nearer the margin. Hindwing with less defined red-streaked marginal band, the discal and other spots also comparatively larger."

"Baralacha Pass, 16,060 feet, Ladak. Taken in July, 1879, by Mr. L. de Nicéville." (Moore, l. c.)

The type and only known specimen of this local race is in the Indian Museum, Calcutta. It is of large size (true expanse 1.5 inches, i.e., when measured from apex of forewing to centre of thorax and then doubling the amount, this being the mode by which I take the expanse of all insects described by me), coloration a little paler than in the same sex of *C. stygianus*, the black spots on the upperside of the forewing larger, and the costal and outer borders narrower.

To sum up *C. phlaas*. There is no doubt that the local races of this species are the immediate effect of the different climates in which they live, the darkest form, *C. timens*, occurs where the rainfall is heaviest and the vegetation consequently most luxuriant, *C. stygianus* and *C. baralacha* inhabiting far more barren and rainless regions. It is also certain that an absolutely complete gradation of forms between all the Indian races at any rate could be shown were sufficient material available, but that does not prevent the local races being distinct and capable of discrimination at their respective head quarters. Mr. Pryer (l. c.) makes some excellent remarks on the seasonal variability of this species in Japan.

The figure shows both sides of a male specimen of the local race *timens* from Masuri in the collection of the Indian Museum, Calcutta.

879 *Chrysopterus pavana*, Kollar.

Polyommatus pavana, Kollar, Hügel's Kaschmir, vol. iv, pt. 2, p. 416, n. 2, pl. 7, figs. 5, 6, male (1848); *Chrysopterus pavana*, Horsfield and Moore, Cat. Lep. Mos. E. I. C., vol. i, p. 28, n. 29 (1857). id., Moore, Proc. Zool. Soc. Lond., 1865, p. 306, n. 210; idem, id., l. c., 1874, p. 271, n. 62, idem, id., l. c., 1882, p. 247; *Thalia pavana*, Westwood, Gen. Diurn. Lep., vol. ii, p. 487, p. 423 (1852).

HABITAT: Western Himalayas.

EXPANSE: ♂, ♀, 1.3 to 1.5 inches.

DESCRIPTION: "Wings entire, forewing of the male fulvous, bordered with fuscous, hindwing and of the female both wings fuscous on upperside, forewing with nine black dots, hindwing with a marginal dentate fulvous fascia; underside, forewing yellowish, hindwing cinereous, with numerous black ocellate dots, the fulvous fascia of the hindwing margined with yellow on both sides." (Kollar, l. c.)

MALE. UPPERSIDE, forewing rich copper red, the costa narrowly, the outer margin broadly black, the black colour extending up the veins a short distance; on either side of the submedian nervure powdered with fuscous scales; three black regularly-increasing spots in the discoidal cell, the basal one often obsolete; a discal series of seven spots placed in echelon, three towards the apex, two divided by the second median nervule, and two in the submedian interspace conjoined. *Hindwing* coppery, but thickly overlaid with black scales except a small portion in the middle of the disc; a linear black spot at the end of the cell, two similar spots beyond it divided by the discoidal nervule; a strongly lunular or arch-formed submarginal copper-coloured band. *Cilia* of the forewing white, of the hindwing white marked with black at the end of the veins. **UNDERSIDE, forewing** bright orange, the outer margin cinereous, bearing an outer series of black dots and an inner series of prominent black spots; other black spots as on the upperside but encircled by a fine pale yellow line, an additional dot to the subapical series. *Hindwing* brownish-grey, with prominent black spots surrounded by a narrow whitish ring, three towards the base, three on the disc, two at the end of the cell, and nine beyond in an irregular linear series; beyond these latter is a prominent white band, then a series of black spots divided on the veins by the white colour of the band, then a series of orange lunular spots, with a round black spot on a band of the ground-colour placed outwardly against them, and lastly a fine anteciliary white line. *Cilia* of both wings pale fuscous, more or less tipped with white on the hindwing. **FEMALE. UPPERSIDE, forewing** differs from the male in the outer black border being broader, its inner edge more irregular, the black colour not extending along the veins, the base and lower inner half of the disc black, but divided by the orange-coloured veins, and a narrow streak in the submedian interspace; all the black spots much larger. *Hindwing* like the male, but with no trace of copper colour on the disc, sometimes with a series of violet lunules placed close to the inner edge of the submarginal orange lunulated band, which in the male is represented by a purple suffusion in some specimens. **UNDERSIDE, both wings** like the male.

C. pavana is a fairly common species occurring throughout the summer on the outer ranges of the Western Himalayas from Kashmir to Naini Tal at any rate. Mr. Doherty reports it from "Kumaon generally 4,500-13,000 feet, local," and Colonel Lang "Naini Tal and Almora 6,000 to 7,000 feet, June to August." The prominent white band on the underside of the hindwing will distinguish this species from any other "Copper" known to me.

880. *Chrysopterus aditya*, Moore.

C. aditya, Moore, Proc. Zool. Soc. Lond., 1874, p. 571, pl. lxvi, fig. 1, male.

HABITAT: Dras valley (between Tashgam and Korkitchoor), Ladak (Moore); Baltistan.

EXPANSE: ♂, 1.37 inches (1.65, actual measurement of figure).

DESCRIPTION: "Allied to *C. hypothod*, Linnaeus, [which occurs in Northern and Central Europe and in Siberia]. **MALE. UPPERSIDE, both wings** brilliant metallic brassy copper-red. *Cilia* black, edged with white. *Forewing* with a narrow jet-black costal edge and outer marginal band, the band expanded at the apex and maculate between the veins. *Hindwing* with a marginal jet-black line and prominent conical spots; abdominal margin greyish. **UNDERSIDE, forewing** pale golden-yellow, brightest on the disc; two pale-bordered black spots within and a larger spot crossing the end of the cell; [three decreasing spots on the disc,] a curved series of four black spots from the costa before the apex, a submarginal series of black dentate lunules, and a marginal row of small black spots. *Hindwing* dull greyish-white; two black spots above, two below, two within, and a geminated spot at the end of the cell; a transverse interrupted

discal series of nine black spots, a submarginal row of black dentate lunules bordered outwardly with golden-yellow, and a marginal row of small spots." (Moore, l. c.)

C. aditya is very close indeed to the "*Polyommatus solskyi* of Erschoff,* from Maracanda in Turkestan, described in the same year. It differs however in its larger size (1.65 as against 1.45 inches, taken from the figures) the marginal black band on the upperside of the forewing in *C. aditya* is narrower, especially at the apex; on the hindwing also narrower and separated into distinct spots between the veins; the markings of the underside are very similar. It is probably this species that Mr Leech and I took (four males and one female) on 29th and 30th July, 1887, near Braldo in Baltistan, at 11,700 feet elevation, also three males and a female on August 10th and 11th on the first two marches out of Skardo towards the Deosai Plains, but I have not the specimens now with me to determine. Whether distinct or not from *C. solskyi*, it is totally different from any of the other Indian representatives of the genus by reason of the brilliant golden brassy colour of the upperside.

881. *Chrysophanus kasyapa*, Moore.

C. kasyapa, Moore, Proc Zool. Soc Lond., 1865, p. 506, n. 111, pl. xxxi, fig. 10, male, id., Standinger, Ex. Schneit., p. 270, pl. xciv, male (1888). *C. sariazpa*, Moore, Proc. Zool. Soc Lond., 1874, p. 271, n. 64.

HABITAT: Western Himalayns

EXPANSE: ♂, 1.12 to 1.60; ♀, 1.30 to 1.60 inches.

DESCRIPTION: "MALE. UPPERSIDE, both wings bright coppery red, with purple reflexions. Forewing with the extreme edge of the costa and the exterior margin black, the latter submarginally bordered with purple; a black spot within the discoidal cell, a second transversely closing the cell, four near the apex obliquely from the costa, and four others descending the disc. Hindwing with the anterior and exterior margins black, bordered submarginally with purple, which latter colour also borders the anal margin; a minute dot within the discoidal cell, a narrow streak closing the cell, and a series of five discal spots black. Body black. UNDERSIDE, both wings metallic greyish-blue, with greenish reflexion at the base of the hindwing. Forewing with the black spots as above, also a short black submarginal streak from the posterior angle, between which and the discal spots the space is ferruginous. Hindwing with a discal series of minute black dots. Body and legs white. Cilia white" (Moore, l. c.) FEMALE. UPPERSIDE, forewing orange, very variable, in some specimens (one from Chini in particular) clear bright orange, usually very dusky, the outer margin broadly black, the base also black more or less diffused over the disc; the spots as in the male but larger. Hindwing dusky black, sometimes with the veins orange; the black spots of the underside more or less showing through, sometimes with a submarginal series of beautiful violet spots, beyond which there is sometimes a narrow marginal orange line. UNDERSIDE, forewing with the apex and outer margin only metallic greenish-blue, the base just dusted with this colour, the rest of the wing bright clear orange; the black spots as on the upperside, a submarginal series of three or four black spots towards the anal angle placed against the green marginal band. Hindwing as in the male.

"Very uncommon. It occurs in June, in richly wooded country, in Lower Kunawar, 7,000 to 8,000 feet altitude. The female is much darker brown." (Note by Colonel A. M. Lang, R. E.). I have taken it in the summer in many places in Kashmir, usually from about 7,000 to 10,000 feet elevation. It occurs also in Chumba, Lahoul, Chini, and on the Hindustan and Thibet Road near Simla. It does not appear to occur as far west even as Masuri, and is really confined to a comparatively small area. It is one of the most beautiful of the "Coppers" and has no near ally to my knowledge, unless the *C. sariazpa* of Moore described below† should hereafter be found to be distinct.

* Lep. Turkestan, p. 8, n. 10, pl. i, fig. 7, male (1874)

† *Chrysophanus sariazpa*, Moore, Proc Zool Soc Lond., 1874, p. 271, n. 64. HABITAT: Sonamarg, N.-E. Kashmir. EXPANSE: Male 1.13 inches. DESCRIPTION: "MALE. Allied to *C. kasyapa*, Moore, but is a smaller insect, and differs on the UPPERSIDE in having the black spots smaller and the marginal borders

The next species belongs to a very aberrant group, which is distinguished by possessing a long filamentous tail to the hindwing. The Rev. R. P. Murray in discussing the importance of tails in the *Lycenida* for generic purposes, makes the following remarks regarding this tailed group of "Coppers":—"The tailed hindwings appear at first sight of more importance [than the presence of one or two metallic spots at the anal angle of the hindwing on the underside sometimes considered to afford a generic character], being certainly, to some extent, a structural character; but a careful consideration of many interesting species, both in *Lycena* and the allied genus *Chrysopterus*, has forced me, somewhat reluctantly, to the conclusion that this, too, must be abandoned as a generic character. In *Chrysopterus* the hindwing ordinarily presents a more or less marked projection on the first median nervule, which, however, cannot be designated a tail. In *C. orus*, Cramer, from South Africa, this projection is wanting, so that the outline of the hindwing is rounded. On the other hand, we are unexpectedly met, in Persia, by a group of species, which are undoubtedly true *Chrysopteri*, but which possess a tail, at least as well developed as in any known species belonging to the so-called genus *Lampides*, Hubner. These species are named *C. lampus*, Lederer, *C. phanicurus*, Lederer, and *C. caspius*, Lederer. The last two are very distinct species, to which it is unnecessary to refer further. But *C. lampus* is so closely allied to *C. ochimus*, Herrich-Schäffer, that it can with difficulty be distinguished from it, except by the possession of a long filiform tail. This curious tendency to produce tailed forms seems confined to Persia, so far as the genus *Chrysopterus* is concerned (the Persian *Lycena* do not share the character), since none either of the European or Himalayan species present the character, and the only new *Chrysopterus* discovered by M. Fedtchenko in Eastern Turkestan (*C. solskyi*, Erschoff) is equally destitute of a tail." (Trans. Ent. Soc. Lond., 1874, p. 528.)

882. *Chrysopterus caspius*, Lederer, var. *transiens*, Staudinger. (PLATE XXVII, FIG. 206 ♂).

Polyommatus caspius, Lederer, Hor. Soc. Ent. Ross., vol. vi, p. 76, pl. iv, fig. 3, male (1869); *P. caspius*, var. *transiens*, Staudinger, Stett. Ent. Zeit., 1886, p. 207; *Chrysopterus susannus*, Swinhoe, MS.

HABITAT: (var. *transiens* only) Samarkand; Gunduk, Quetta, Biluchistan.

EXPANSE: ♂, ♀, 1'0 to 1'1 inches.

DESCRIPTION: MALE. UPSIDE, both wings purplish-brown; a fine anteciliary black line. Forewing with the basal two-thirds glossed with dull purple, the spots of the underside more or less showing through by transparency. Hindwing with a large patch of glossy dull purple in the middle of the wing, the disco-cellular nervules marked with a black line, a submarginal series of round black spots, beyond which is a narrow white line towards the anal angle, tail black tipped with white. UNDERSIDE, both wings sordid white, a prominent fine black anteciliary line. Forewing with a round spot towards the base of the cell, with a similar one immediately below it, a larger oval spot across the middle of the cell, with a round spot just below it, a large quadrate spot closing the cell, with three unequal-sized spots below it divided by the median nervules, the middle one the largest; an S-shaped subapical series of four conjoined spots, the two upper ones small; a submarginal regularly-curved somewhat narrow macular fascia, placed outwardly against it is an orange increasing band, a marginal series of round spots between the veins—all the spots and the submarginal fascia black. Hindwing

broader, the latter being suffused inwardly with purplish blue, this colour in certain lights pervading the entire wings. On the hindwing the spots are preceded by bluish black streaks pointing inwards. On the underside the spots are also smaller, and the coppery red bordering the three spots at the posterior angle is much brighter. (Moore, l. c.)

In the Indian Museum, Calcutta, is a single male of this species so identified by Mr. Moore which I took in the Sind Valley, Keshmir, at the end of June. It certainly has the outer margin of the forewing on the upperside more broadly black than is usual in *C. kaszapa*, and the black spots in the median interspaces are very small, in *C. kaszapa* they are usually elongated into streaks completely filling the base of the interspaces. Mr. Moore describes *C. arisippa* as having the marginal border suffused inwardly with purplish blue, "which character he gives in other words for *C. kaszapa*," "the exterior margin black, submarginally bordered with purple." All the characters Mr. Moore gives are evidently so slight, and, from my series of nearly forty male specimens, so variable, that I feel sure that *C. arisippa* cannot be considered to be even a local form of *C. kaszapa*.

with a regular subbasal series of four spots, the posterior but one the smallest, a similar inner discal series, but the spots much larger, an oblong spot closing the cell, an outer discal series of six spots placed in pairs, but with a minute dot in the second median interspace added anteriorly to the posterior pair—all these spots black; the rest of the markings much as in the forewing, but the orange band is narrower. *Cilia* white throughout. *Body* concolorous with wings above and below. **FEMALE.** **UPPERSIDE,** both wings with the dull glossy purple area not sharply defined as in the male. *Forewing* with a prominent black spot in the middle and another at the end of the cell. *Hindwing* with the disco-cellular nervules marked with a black line, an obscure orange marginal fascia towards the anal angle. **UNDERSIDE,** forewing very differently marked and coloured to that of the male, the base and outer margin only sordid white, the disc bright orange, the submarginal orange band of the male consequently absorbed in the ground-colour, all the spots much smaller, less numerous and differently arranged to those of the male, the three spots in the cell as in the male but smaller, a single very small spot only below the cell just below the point where the first median nervule originates; a nearly regular discal series of from six to eight spots, the uppermost on the costa sometimes absent, and the one in the submedian interspace sometimes divided into two; a double submarginal series of black spots, the inner series large and oblong, the outer series small and linear. *Hindwing* marked as in the male, but the spots a little smaller.

C. caspius, var. *transiens* is nearest to *C. phanicurus*, Lederer,* from Astrabad in Persia and from Kouldja in western China,† the male differing on the upperside of the hindwing in having but the barest trace of a submarginal orange fascia, and on the underside in having all the spots much larger, more numerous, and differently arranged; in *C. caspius*, var. *transiens*, the spots form a series of four transverse equidistant bands, and, judging from the figure alone of *C. phanicurus*, the submarginal black fascia in *C. caspius*, var. *transiens* is further from the outer margin, and the orange band beyond it is broader. The female differs on the upperside of the hindwing in having an obsolete submarginal orange band towards the anal angle only, in *C. phanicurus* it is a broad prominent lunular band enclosing rounded spots of the ground-colour and extending almost to the apex of the wing. The underside of the forewing is quite different in the two species, being alike in both sexes of *C. phanicurus*, and different in the opposite sexes of *C. caspius*, var. *transiens*. It is also less near to *C. caspius*, Lederer,‡ which occurs on the shores of the Caspian Sea, and still more distantly to *C. athamanthis*, Eversmann, from Western Siberia, and the Steppes north of the Aral Sea.

Numerous specimens of both sexes of this species were obtained by Lieutenant E. Y. Watson at Gunduk in June. He informs me that it occurs also at Qazeta.

I wrote the description above under the impression that my specimens represented a new species. Mr. H. J. Elwes informs me, however, that they agree "perfectly with the var. *transiens* of Staudinger, which he considers to be a variety of *C. caspius*, Lederer." I have therefore adopted this name. Colonel Swinhoe also considered the species to be new, and sent me a description of it after mine was written. He does not say what sex he described, but it was probably a female. I append Dr Staudinger's description§ and also Colonel Swinhoe's,

* *Polyommatus phanicurus*, Lederer, Hor. Soc. Ent. Ross., vol. viii, p. 8, pl. 1, fig. 4, male, 5, female (1871).

† Alphéraky, Hor. Soc. Ent. Ross., vol. xvi, p. 377, n. 30 (1887).

‡ *Polyommatus caspius*, Lederer, Hor. Soc. Ent. Ross., vol. vi, p. 76, pl. iv, fig. 3, male (1859).

§ *Chrysophanus (Polyommatus) caspius*. Lederer var. *transiens*, Staudinger Stett. ent. Zeit., 1886, p. 202. **HABITAT.** Samarkand. **EXPANS.** Not given. **DESCRIPTION.** "Lederer first described *Polyommatus caspius* from a flown (i. e. worn) male and called the forewings of this species 'Copper red, with a faint violet sheen.' This specimen was plainly so represented, and this species is not at all to be recognized from this. Subsequently he says that the male from which he copied was 'somewhat flown' (worn) and that 'fresh specimens have a beautiful violet blue sheen.' According to this, this North Persian species, which now a-days is diffused through all the larger collections, is to be at once recognized. Unfortunately, Lederer when he received later fresh specimens must have given away this original *caspius*, as it no longer remains in his collection. In 1882, I received from Habenbauer a greater quantity of specimens of this species, taken in July near Samarkand in the mountains lying southerly of that place, which on the upperside look exactly the same as the North Persian *caspius*, only they bear mostly at the inner angle of the hindwings one or two reddish spots before the outer margin, which are entirely wanting in the Persian *caspius*. So much the more different are they

as foot-notes* The latter compares it with *C. pavana*, Kollar to which it has not even a distant relationship.

The figure shews both sides of a male example from Gundak, Beluchistan, in my collection.

Genus 139.—ILERDA, Doubleday. (PLATE XXVIII).

Ilerda, Doubleday, List Lep. B. M., vol. ii, p. 25 (1847), id., Hewitson, Ill. Diurn. Lep., p. 27 (1865).
Heliophorus, Geyer, in Hübner's Zutrage, vol. iv, p. 40 (1832)†

FOREWING, triangular, *costa* gently curved, male with the *apex* acute (much rounded in *I. sena*, Kollar), *outer margin* nearly straight or somewhat convex (much rounded in *I. sena*), *inner margin* straight; in the female the apex is more rounded than in the male, and the outer margin is very convex, *costal nervure* terminating about opposite to the apex of the discoidal cell; *first subcostal nervure* well removed from the costal nervure, originating at about two-thirds of the length of the discoidal cell from its base; *second subcostal* with its base nearer to that of the upper discoidal than to that of the first subcostal, *third subcostal* somewhat long, given off about midway between the apex of the cell and of the wing, *upper discoidal nervure* originating exactly at the point where the middle disco-cellular nervure is given off; *middle* and *lower disco-cellular nervures* nearly straight and nearly upright, the lower rather longer than the middle, *second median nervure* given off a short distance before the lower end of the cell; *submedian nervure* straight. **HINDWING**, somewhat lengthened, usually furnished with a moderate sized *tail* at the termination of the first median nervure; the tail, however, is reduced to a mere tooth in some species; *outer margin* somewhat varying in outline; in some species it is scalloped, in others oblique from the apex to the termination of the second subcostal nervure, thence to first median nervure straight, in others again it is evenly rounded throughout, *costal nervure* much arched at base, terminating at the apex of the wing; *first subcostal nervure* given off some little distance before the apex of the cell; *disco-cellular nervures* straight and somewhat outwardly oblique, the upper a little shorter than the lower; *second median nervure* given off a little before the lower end of the cell; *submedian nervure* straight; *internal nervure* recurved. Male with no secondary sexual characters.

Although *I. sena* differs considerably in outline and somewhat in style of markings from the other species of *Ilerda*, it has exactly the same neurulation as has *I. epicles*, Godart, which is the type of the genus, in which therefore it is retained as a slightly aberrant species.

Professor Westwood (Gen. Diurn. Lep., vol. ii, p. 482 (1852) describes the *Ilerda* as "beautiful Indian species with naked eyes, setose palpi antennæ with long joints ringed with

on the underside, where they seem at first glance extremely similar to *phanicurus*, Lederer as on this side the hindwings are light yellow or ash grey with red marginal spots. In the Persian *caspicus* they are darker yellowish brown with brownish marginal spots which only very seldom turn into reddish. Also the underside of the forewings is in the variety *transiens* lighter grey, with more yellowish red on the outer part than in *caspicus* (Staudinger, l. c.)

* "*Chrysophanus rufus* n. sp. HABITAT: Gundak Beluchistan, June, 1885. EXPANSION: 1 inch. Allied to *C. phanicurus*, Lederer. **UPPERSIDE**. Both wings smoky brown, with the copper colour shewing through. **Forewing** paler than the hindwing and of a more copper hue. Both wings darker towards the base, the few markings on the wings above caused by the markings below shewing through the wing. **Forewing** with three spots in the cell, one being at each end and one in the middle, costal margin and hinder margin deeper brown, and a band of the same colour on the outer margin. **Hindwing** with a faint submarginal band of reddish, clearer towards the anal angle, tail as in a *C. philaus*, Linnaeus, but long and produced like a *H. stigmata*. **Head** white with a brown centre, collar white, eyes and body brown. **antennæ** brown with white bands. **UNDERSIDE**, both wings coloured and marked somewhat as in *A. pantra*, Westwood [*C. pavana*, Kollar], all the spots and lines black surrounded with whitish. **Forewing** pale copper yellow, fading to whitish at the base, three spots in a line in the cell, one in the interspace below, just underneath the centre cell spot, marginal line black, a submarginal macular band with a thinner macular line between, but not reaching the hinder margin, and a discal corresponding row of spots smaller than the submarginal row. **Hindwing** coloured and marked almost exactly as in *C. pavana*, two spots at the end of the cell, and five rows of spots and macular lines on the wing, subbasal row consisting of two spots, ante-medial row of four spots almost in a line, passing just inside the two spots at the end of the cell, a curved row of discal spots, a submarginal macular line, a band of white between these rows; another macular line close to the border line, which is also black with a red band between." (Swinhoe, MS.)

† *Heliophorus* has fifteen years priority over *Ilerda*, but as the former name has never since it was invented by Geyer for a species of this genus been used for the genus, I prefer to leave undisturbed the well-known name *Ilerda* for this group of butterflies.

white, and a very well-marked club, and with three branches to the postcostal vein [=subcostal nervure] of the forewing."

Mr. Doherty very justly remarks* "This genus is very close to *Chrysophanus*, Hübner, the prehensores being generically the same, though each species has its characteristic form." So much so is this the case, that I am unable to find a single even slight difference in *neurulation* in the two genera by which they may be separated. *Facies* therefore is, in this case, the only guide to generic separation, and here there is difference enough; the genus *Chrysophanus* comprises butterflies which are usually of a brilliant copper colour on the upperside; this colour however is often wanting entirely in the female, and in several species allied to *C. caspius*, Lederer, there is no copper colour at all, these latter are in fact coloured above as in the aberrant species of this genus, *I. sena*, which thus becomes a distinct connecting link between the two genera, though the markings on the underside of *I. sena* are quite different from those of any *Chrysophanus*, they are also a good deal different from those of any other *Ilerda*; and, moreover, *I. sena* differs widely from all the other known species of the genus in having a female with no orange patch on the disc of the forewing on the upperside. If *I. sena* be omitted, the other species of the genus are distinguished in the males by a richness of colouring as various as it is beautiful. *I. epicles*, Godart, is a beautiful shining purple, *I. tamu*, Kollar, is rich ultramarine blue on the upperside, *I. moores*, Hewitson, is brilliant metallic blue, *I. androcles*, Doubleday and Hewitson, is resplendent metallic green, *I. viridipunctata*, mihi, is also green but of a duller cast, and *I. brahma*, Moore, is magnificent metallic golden bronze.

The imagines almost always affect ground which has been disturbed by man, and a coarse herbage has sprung up. Their flight and habits are very similar to those of their almost congeners the "coppers," they have a rather quick flight but seldom for any distance, usually settling on leaves, and seem to be particularly fond of rubbing their hindwings over and over in the way affected by many of the *Lycenidæ*. The genus is found all along the outer ranges of the Himalayas, but never at any very great elevation, 9,000 feet being probably the highest point it reaches; it occurs also in Assam and Upper Burma, (but not in the Malay Peninsula), in Java, and again in China. Every known species is included in this work.

The transformations of *I. sena*, Kollar, are described below. The larva and pupa are of the usual lycenid shape, and agree very closely with the description of the preparatory stages of *Chrysophanus phleas*, Linnaeus.

Key to the species of *Ilerda*.

- A. Male, upperside, both wings shining but dull violet; female fusous, with no oblique orange discal fascia on forewing.

883. *I. SENA*, Western Himalayas.

- B. Females, upperside, forewing with an oblique orange discal fascia.

a. Male, upperside, both wings rich shining deep purple in some lights.

884. *I. EPICLES*, Kumaon to Upper Assam, Arracan Hills, Upper Burma, Java, Hainan.

b. Male, upperside, both wings rich deep ultramarine blue.

885. *I. TAMU*, Western Himalayas.

c. Male, upperside, both wings bright iridescent metallic blue.

886. *I. MOOREI*, Native Sikkim, Bhutan.

d. Male, upperside, both wings bright iridescent metallic green.

887. *I. ANDROCLÉS* Western Himalayas, Assam.

e. Male, upperside, both wings duller iridescent metallic green than in *I. androcles*; the green scales on the hindwing sparsely scattered on the disc only.

888. *I. VIRIDIPUNCTATA*, Kumaon, Sikkim.

f. Male, upperside, both wings magnificent iridescent golden bronzy.

889. *I. BRAHMA*, Kumaon, Sikkim.

883. *Ilerda sena*, Kollar.

Polyommatus sena, Kollar, Hügel's Kaschmir, vol. iv, pt. 2, p. 415, n. 2, pl. v, fig. 3. 4, male (1844); *Ilerda sena*, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. 1, p. 28, n. 30 (1857). *I. cadima*, Doubleday, List Lep. B. M., vol. ii, p. 25 (1847).

HABITAT: Western Himalayas from Kashmir to Kumaon.

* Journ. A. S. B., vol. iv, pt. 2, p. 130, n. 148 (1886).

EXPANSE: ♂, 1'2 to 1'3; ♀, 1'3 to 1'4 inches.

DESCRIPTION: MALE. "UPPERSIDE, both wings fuscous shot with violet. Hindwing tailed, a marginal dentate fulvous fascia. UNDERSIDE, both wings cinereous, a common fulvous fascia near the margin, outwardly dotted with black, inwardly margined with whitish. Hindwing with two black dots." (Kollar, l. c.)

MALE. UPPERSIDE, both wings shining violet. Forewing with a well-defined rather broad outer black margin. Hindwing with the costa and outer margin rather broadly black, the latter bearing a prominent series of orange lunules enclosing rounded black spots, the last outwardly marked with fine bluish-white dots; an intensely black anteciliary line. UNDERSIDE, both wings dull ochreous, a fine black anteciliary line. Forewing with a submarginal orange lunulated band from the first median nervule decreasing to the apex, inwardly defined by a narrow white lunular line, which latter is bounded on both sides by a fine black thread, a marginal series of oval black spots between the veins, the one in the submedian interspace very large, out of line, nearer the base of the wing. Hindwing with the outer margin similarly marked to that of the forewing but all the markings broader, the inner white band carried down the veins in sharp points towards the outer margin; a prominent round black subcostal subbasal spot, and another near the middle of the submedian interspace; tail black tipped with white; cilia throughout alternately black and white; body fuscous above, white beneath; legs white, outwardly fuscous. FEMALE. UPPERSIDE, both wings dull fuscous, with no trace of the shining violet coloration present in the male; the orange lunulated submarginal fascia on the hindwing as in the male, but more or less continued on to the forewing towards the anal angle, on the hindwing with a fine blue line following its inner margin, sometimes present in the male. UNDERSIDE, both wings as in the male.

LARVA when about half-grown pale yellowish-greenish, the whole surface thickly shagreened and covered with rather long brownish bristly hairs, which are longer on the anterior and posterior segments and along the sides than elsewhere; there is a narrow dark dorsal line, but no other markings. In shape the larva is about as high as broad, of very nearly equal breadth throughout, hardly tapering at either end, the fourth segment rather wider than the rest, the constrictions between the segments slight. The full-fed larva is just half an inch in length when walking, of the usual lycenid shape, flattened, broader than high, both ends rounded, the segments (except the second and last) of almost equal breadth, the constrictions between the segments shallow, the whole larva pale dirty greenish mottled with dirty dull crimson, the narrow dorsal line also dull crimson, that being the only conspicuous marking possessed by the animal; the whole surface is covered with minute whitish dots, also with short fine brownish hairs, which are placed more thickly at the sides and on the posterior segment of the larva; head entirely hidden as usual under the second segment, pale greenish, anteriorly becoming rather dark; all the legs also pale greenish. Feeds on a species of sorrel. PUPA exactly 4 of an inch in length, of the usual lycenid shape, bluntly rounded at both ends, the thorax slightly humped, a little constricted where it joins the first abdominal segment; coloration pale greenish, profusely sprinkled with blackish, entirely without markings, the whole surface roughened, being covered with minute points, but not hairy.

I am indebted to Mr. P. W. Mackinnon for the two larvæ and a pupa described above. He observed a female *I. sena* ovipositing on sorrel leaves, and on searching found three larvæ, one of which turned to a pupa on the long journey to me by post of 1,000 miles, occupying three days in transit. These specimens were obtained at Masuri, in the Western Himalayas, at 6,000 feet elevation early in March. Mr. Mackinnon assures me that ants do not attend this larva, and I was unable to find any extensile tubercles on the twelfth segment, or a mouth-like opening on the eleventh segment. Dr. G. King has kindly identified the food-plant for me as *Rumex hastatus*.

I. sena is without doubt the commonest species of the genus in the Western Himalayas, occurring to the eastwards certainly as far as Kumaon, and from about 3,000 to 9,000 feet elevation. Mr. Moore records it from Darjiling, but this is probably a mistake. Mr. Doherty

has noted that it "frequents drier and more open ground than the other species" of the genus. In Simla it used to frequent my verandah amongst the pots of flowers, and could easily be caught with the fingers. It is an aberrant species in shape and markings, and apparently more constant in the latter respect than the other species.

884. *Ilerda epicles*, Godart.

Polyommatus epicles, Godart, Enc Méth., vol ix, p. 646, n. 109 (1823); *Thacla epicles*, Horsfield, Cat. Lep. E. I. C., p. 92, n. 25, pl. 1, fig. 3, female (1829); *Ilerda epicles*, Hewitson, Ill. Diurn. Lep., p. 58, n. 4 (1865); *Heliopterus belenus*, Hübner, Zutr. Ex. Schmett., figs. 785, 786, female (1832).

HABITAT: Kumaon, Nepal, Sikkim, Bhutan, Assam, Arracan Hills, Upper Burma, Java, Hainan (China).

EXPANSE: ♂, ♀, 1.20 to 1.55 inches.

DESCRIPTION. "MALE. UPPEXSIDE, both wings blackish brown, with a violet reflexion, which is of a deeper shade towards the base. Forewing bearing a large irregularly-rounded rufous-orange spot on the medial areola, which is smaller than in the female, consisting of a transverse cloud. Hindwing marked with a posterior border of the same colour, narrowed and undulated at the inner edge, being composed of confluent lunules; a narrow undulated black streak passes along the posterior margin. Cilia white interrupted with black at the veins, and in the forewing evanescent towards the outer apical angle. UNDERSIDE, both wings bright sulphureous yellow, with a sanguineous posterior border, which in the forewing is narrow and uniform, until it approaches the inner apical [= anal] angle, where it is terminated by a short black streak edged on both sides with white; in the hindwing it is broader and ornamented internally by a series of white arcs delicately edged on both sides with black; a series of small wedge shaped black spots, bedded in an oblong submarginal cloud of white irroration, is arranged parallel with the black marginal thread, which is confined by the extreme fringe; a minute black dot stands between the disc and base, and two more obscure ones are distantly arranged along the inner margin. Forewing has besides a very faint [discal] series of brown lituræ. Hindwing [has a discal series of] interrupted white streaks parallel with the post-marginal border; the anal appendage is terminated by a black spot, and the tail has a white tip. Body brown above and hoary underneath; legs alternately white and black; antennæ black with delicate white bands to the commencement of the club. FEMALE. UPPEXSIDE, forewing has a short transverse black stigma before the disc. Hindwing has, near the middle, a faint orange dash." (Horsfield, l. c.)

"MALE. UPPEXSIDE, both wings dark brown. Forewing with the basal half glossed with violet-blue. Hindwing with a broad submarginal band of conical scarlet spots."

"There is a variety of this species from Northern India in which the males are without the orange submarginal band of the forewing on the upperside, and the females, instead of the large medial orange spot of the forewing, have an oblique band of the same colour." (Hewitson, l. c.)

I. epicles is certainly the commonest and probably the most variable species of the genus, it has likewise the widest range, being the only species which occurs beyond the Himalayas. In the male on the upperside of the forewing there is sometimes a faint orange irroration on the disc, this is sometimes developed into a moderately-sized spot, sometimes the spot is as large as in the female; in this case, however, the male will be at once recognised by the beautiful purple colour seen in some lights, which is restricted to a well-defined area at the base from the inner margin to the subcostal nervure, leaving the outer third of the wing and the costal area black. In the hindwing the rich vermilion-orange lunules on the outer margin vary much in number and size, the purple area being confined to a small patch on the disc. On the underside the sanguineous outer margin of both wings varies much in width and prominence, in the forewing the discal black lituræ are often absent, as are also the discal white spots on the hindwing. The female varies in the size of all the orange markings on the upperside, and of course lacks the purple coloration of the male. On the underside it varies exactly as in the male.

Its most westerly range appears to be Eastern Kumaon, where Mr. Doherty took it in the Kali Valley, 2-4,000 feet, at Askot, 5,000 feet, and the Dhoaj Mountain 6,000 feet; it is extremely common in Sikkim and Assam at low elevations, and Dr. Horsfield notes that it "is not unfrequent in the acclivities near the confines of the extensive medial plain of Java." It has also been recorded from the Island of Hainan.

885. *Ileria tamu*, Kollar.

Polymnarchus tamu, Kollar, Hügel's Kaschmir, vol. iv, pt. 2, p. 417, n. 3, pl. v, figs. 7, 8, male (1844); *Ileria tamu*, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 28, n. 31 (1857); id., Butler, Proc. Zool. Soc. Lond., 1886, p. 368, n. 53; *Ileria oda*, Hewitson, Ill. Diurn. Lep., p. 58, n. 3, pl. xxiv, figs. 9, 10, male (1865). id., Moore, Proc. Zool. Soc. Lond., 1865, p. 508, n. 115, pl. xxxi, fig. 28, female; idem, id., l. c., 1882, p. 249; id., Staudinger, Ex. Schneitz, p. 274, pl. xcv, male (1888), (*I. androcles* on plate).

HABITAT: Western Himalayas from Kashmir to Kumaon.

EXPANSE: ♂, 1'20 to 1'55; ♀, 1'20 to 1'45 inches.

Kollar's original description of tamu.

MALE. "UPPERSIDE, both wings dark brown, glittering with blue at the base. Hindwing with a short tail, with two orange-red lunules at the anal angle. UNDERSIDE, both wings greenish-yellow, a median blackish streak. Hindwing with a marginal orange-red fascia." (*Kollar*, l. c.)

Hewitson's description of oda.

"MALE. UPPERSIDE, both wings lilac-blue without metallic lustre, broadly bordered with dark brown. Hindwing with two lunular black spots crowned with orange at the anal angle. UNDERSIDE, both wings ochreous-yellow. Forewing with a spot at the end of the cell, and a transverse band beyond the middle, brown; a submarginal band of pale brown, a black spot bordered with white at the anal angle. Hindwing with the outer margin broadly scarlet fringed with white and bordered above and below by lunular spots of black and white. FEMALE. UPPERSIDE, both wings dark brown. Forewing with a broad band of orange near the apex. Hindwing with a broad submarginal band of orange. UNDERSIDE, both wings like the male."

"This species seems to be distinct from *I. tamu*, Kollar, and *I. brahma*, Moore, and, besides its different colour, has the orange band at the outer margin on the underside of the hindwing much broader, as in *I. epicles*, Godart." (*Hewitson*, l. c.)

Moore's description of oda.

"MALE. UPPERSIDE, both wings black, basal portion clear blue. Hindwing with or without an indistinct reddish streak at the anal angle. UNDERSIDE, both wings greenish saffron-yellow. Forewing with three decreasing black, white-bordered spots, ascending from posterior angle. Hindwing with a broad ochrey-red marginal band, bordered on both sides with white, black-bordered lunules. Cilia black, slightly margined with white. FEMALE. UPPERSIDE, both wings blackish-brown. Forewing with a short, subapical, medially oblique, broad red band, a distinct black spot closing the discoidal cell. Hindwing with a broad, marginal, sinuous red band. Cilia brown. UNDERSIDE, both wings dull greenish-yellow. Forewing with the medial portion reddish-yellow, a short narrow blackish line subapically from the costa, and a second elongated spot closing the discoidal cell; a black spot with white inner border at the posterior angle. Hindwing with a broad marginal red band, bordered inwardly with a linear series of white and externally with black lunules, an indistinct transverse discal dark line." (*Moore*, l. c. in Proc. Zool. Soc. Lond., 1865.)

"Frequents rich deep forests north of Simla, occurring with *I. tamu** in sunny glades carpeted with strawberry-blossoms, in May." (*Note by Colonel A. M. Lang, R. E.*)

Butler's description of tamu.

"Common, according to Major Yerbury, but certainly not so in European collections; it has been named *I. cornucans* for him, but is not even nearly allied to that species, of which

* Colonel Lang informs me that the species referred to is *I. androcles*, Doubleday and Hewitson, and was so named in his original MS. note.

we possess the types. Kollar's figure is not good, having been taken from a worn and broken specimen, but the identity of the species is settled by the "sky-blue gloss" of the basal half of the wings (in *I. coruscans* the colour is shining metallic emerald-green); as a matter of fact the colour is ultramarine, but a little inaccuracy in colouring is perhaps admissible in the description of a rubbed insect. Kollar says, 'We possess only a single example of this beautiful species, and it has suffered severely in transport, so that in fact only the wings are preserved,' and from the description we find that the hindwings, at least, are 'badly rubbed.' (Butler, l. c.)

A good deal of confusion has arisen with regard to the correct identification of this species, owing to Messrs Hewitson and Moore in 1865 applying the name *tamu* to a glittering green insect, which must be incorrect, as in Kollar's Latin diagnosis he speaks of it as blue (*cyaneus*), and in the German as sky-blue (*himmelblauen*). Kollar uses the word *cyaneus* for *Thalaimila*, *T. rama*, and *Apatania ambica*, all of which are more or less blue insects, certainly not green ones. As far as I know there is only one sky-blue *Ilerda*, so there can be no doubt about its identification. *I. moorei*, Hewitson, is blue, but of a resplendent metallic sheen quite different from *I. tamu*, and moreover *I. moorei* does not occur in the country from which Baron Von Hugel brought the types of Kollar's *tamu*.

I find that *I. tamu* is a somewhat variable species. In the male the breadth of the outer black margin of the upperside in both wings is double as broad in some specimens as it is in others, my broadest specimens being from Murree, my narrowest from Ulwas in the Chumbab State, and from Naini Tal. Every gradation exists between the broadest and narrowest black-bordered specimens, the width of the border is of no specific value. On the underside the differences are even greater. The outer vermilion border varies in width just as does the black border of the upperside, there is often a prominent black disco-cellular line and a discal line on the forewing, these are often more or less obsolete, sometimes entirely absent, giving a very different appearance to the wing. In the hindwing also there is sometimes a discal black line, which is often entirely absent. The female of *I. tamu* is easily known from the females of the other species of the genus by the presence of a rich orange irrorated patch on the disc of the forewing on the underside.

I. tamu does not appear to be anywhere common, but has a wide range in the Western Himalayas between the altitudes of 7,000 and 10,000 feet, and occurs throughout Kashmir in suitable spots. Mr. Moore (Cat. Lep. Mus. E. I. C.) records it from Bhutan, but this is probably a mistake. He correctly identified it at that date (1857), as he wrote "Upperside of wings with glittering blue patches," though this description would apply better perhaps to *I. moorei*, Hewitson, a species which occurs in Bhutan, but had not at that date been described.

886. *Ilerda moorei*, Hewitson

I. moorei, Hewitson, Ill. Diurn. Lep., p. 58 n. 5 (1865).^{*} *Thaeta sapphir*, Blanchard, Comptes Rendus, vol. lxxii, p. 811, note 1 (1871); *Ilerda sapphir* Elwes, Proc. Zool. Soc. Lond., 1882, p. 402, pl. xxv, figs. 9, male; 10, female.*

HABITAT: Bhutan (Hewitson), Native Sikkim

EXPANSE: ♂, ♀, 1.35 to 1.50 inches.

DESCRIPTION: "MALE. UPPERSIDE, both wings brilliant metallic blue. Forewing with the apical half dark brown, the costal margin rufous-brown. Hindwing with the margins broadly rufous-brown, the anal angle with two or more scarlet lunules, the two only at the base of the tail distinct, the inner one marked below by a line of blue. UNDERSIDE, both wings orange-yellow, the outer margins rufous. Cilia white. Forewing with a spot of brown bordered with white near the anal angle. Hindwing with the outer margin broadly scarlet irrorated throughout with white, marked by indistinct lunules of brown and a submarginal line of white." (Hewitson; l. c.) FEMALE. UNDERSIDE, both wings differ from the same sex of *I. brahma*, Moore, and *I. viridipunctata*, mihi, in the ground-colour being of a darker shade of orange-yellow.

* Mr. H. J. Elwes notes that he has seen a specimen of the true *I. sapphir*, Blanchard, from Moupin, and that it is near to, if not identical with, *I. tamu*, Kollar.

"I am at present not able to say with certainty what is the proper name of this species, of which I received a fair series of both sexes [from Native Sikkim]. I have examined the specimens in the British Museum and in the Hewitson's collection, as well as Mr. Moore's. In that gentleman's opinion it is a new species between *I. moorei*, Hewitson, and *I. hewitsoni*, Moore, and resembles the former very closely above, but not below. The male has a more purple tinge on both wings than *I. hewitsoni*, but the female is hardly, if at all, to be distinguished from this species, which I have taken at Darjiling in December. The genus is a very difficult one, as there are four or five very nearly allied species in the Himalaya." (*Elwes*, l. c.)

I have had much difficulty in arriving at any conclusion regarding the identification of this species. The male specimens I possess from Native Sikkim on the upperside in their "brilliant metallic blue" colour agree with Hewitson's description, but may prove to differ therefrom on the underside in not having the rather prominent line defining the disco-cellular nervules and the more distinct discal line on both wings which are present in my specimens, but are not mentioned in that description. Mr. Moore may be correct in thinking these Sikkim specimens are distinct from *I. moorei*. I cannot find a description of the *I. hewitsoni* mentioned above. M. Blanchard's description of *I. saphir* from Moupin, Eastern Tibet is so short that the species can never be identified by it. However, whatever name these specimens may ultimately be known by, they represent a species quite distinct from any other in the genus. It is very rare in collections; the only specimens known to me have been obtained from the interior of Native Sikkim.

887. *Terda androcles*, Doubleday and Hewitson.

Thacla androcles, Westwood, Gen. Diurn. Lep., vol. ii, p. 487, n. 247, *Terda androcles*, Doubleday and Hewitson, l. c., pl. lxxv, fig. 2, male (1852); id., Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. ii, p. 89, n. 32 (1857); *I. coruscans*, Moore, Proc. Zool. Soc. Lond., 1882, p. 248, id., Doherty, Journ. A. S. B., vol. iv, pt. 2, p. 130, n. 247 (1885), *I. langii*, Moore, Proc. Zool. Soc. Lond., 1883, p. 526.

HABITAT: Sylhet (*Westwood*); Western Himalayas from Kashmir to Kumaon; Shillong.

EXPANSE: ♂, 1.10 to 1.65; ♀, 1.35 to 1.50 inches.

DESCRIPTION: MALE. UPPERSIDE, *forewing* green [turning to a rich metallic blue in some lights impossible to be shown in the figure, though there has been some attempt to do this by colouring part of the hindwing blue], with the costa narrowly and increasingly, the apex very widely, and the outer margin decreasingly black. *Hindwing* with the disc and base green [of the same metallic shade and turning to blue in some lights as in the forewing], the costa and outer margin broadly black, bearing at the anal angle two orange lunules.

This description is taken from Mr. Hewitson's figure of the type specimen, which Mr. Westwood says came from Sylhet. I possess numerous specimens from Shillong which agree with this figure, except that only one of them has two orange lunules to the hindwing; all the rest have more, but this is so obviously a varietal character in every species of the genus, that it may be set aside at once as being of no specific value whatever. Mr. Moore has described as *I. coruscans* specimens from the Western Himalayas which do not appear to me to differ in the least from *I. androcles*. I append his description as a foot-note.* I do not think it necessary to criticise his diagnosis of *I. coruscans* word by word, as I possess specimens so identified by him which are identical with others from the district where the type of *I. androcles* was obtained. With regard to *I. langii*, which Mr. Moore has also described from the Western Himalayas, the only character apparently that Mr. Moore relies on as of much value for separating it from *I. androcles*, is

* *Terda coruscans*, Moore, Proc. Zool. Soc. Lond., 1882, p. 248; id., Doherty, Journ. A. S. B., vol. iv, pt. 2, p. 130, n. 247 (1885). HABITAT: N.W. Himalaya, Bisahur, between Sarhan and Irada; Dharmala. EXPANSE: 1.3 inches. DESCRIPTION: "Smaller than *I. androcles*, Doubleday and Hewitson. MALE. UPPERSIDE, *both wings* of a denser blackish-brown colour. *Forewing* with the lower basal and discal areas, and the medial area of the *hindwing* entirely covered with glittering metallic blue scales, which in some lights are of a small blue tint, two slender, short, red anal lunules. FEMALE. UPPERSIDE, *both wings* paler brown than in the male. *Forewing* with a narrow red oblique band. *Hindwing* with a marginal sinuous red band." (*Moore*, l. c.)

Mr. Doherty notes regarding this species that it "is shining greenish blue well beyond the cell, and to the hind margin of the forewing, and over the disc of the hindwing. The clasp of the pre-hensores, seen from the side, is truncate and apparently unarmed."

the presence of four or five broad continuous red lunules to the hindwing on the upperside. As I have said above, this character is a most variable one and of no specific value whatever. I append a description of *I. langii*.*

There is little to distinguish *I. androcles* on the underside from its allies. Both wings are yellow, with a discal dark somewhat narrow lunular line, which in the forewing does not extend below the first median nervule, in the hindwing is brought round to the abdominal margin in a well-rounded curve, and is often absent altogether; the forewing has a disco-cellular line, a submarginal dark line, beyond which the wing is sometimes marked slightly with vermillion, the usual conspicuous oval black spot inwardly defined by a narrow white line at the anal angle, beyond which is a fine narrow black line defined by a narrow white line on both sides; in the hindwing are the usual small indistinct dark dots scattered over the disc and base, the usual broad marginal vermillion band variable in width inwardly defined by white lunules, which themselves are bounded on both sides by a black line, the vermillion band anteriorly irrorated with white, bearing outwardly towards the anal angle two or three black lunules. The female on the upperside is dull smoky-black, the forewing with a small orange discal lunule, which however varies a good deal in size, hindwing with an orange marginal band, which in my numerous specimens of this sex is not exactly the same in any two. Underside, both wings as in the male.

I. androcles has a very wide range, occurring in Kashmir, Pangi, Chumba, Middle Kumaon, and throughout the outer ranges of the Western Himalayas eastwards as far as Kumaon at any rate. It occurs again in Sylhet and Shillong, from which latter locality I possess many specimens captured by Dr. E. K. Johnson. In 1857 Mr. Moore appears to have correctly identified this species, as he describes it as "Upperside of wings with glittering green patches," and gives Sylhet as one locality for it correctly. He also cites Darjiling for it, but I have never seen a specimen from there which could be taken for *I. androcles*, though the allied *viridipunctata*, mihi, is common enough, and it is probably this species Mr. Moore took for *I. androcles*. This is certain at least with regard to the specimen captured by Lieutenant Hugo James, which is now in the Indian Museum, Calcutta, and is a true *viridipunctata*, mihi, it is referred to under *I. androcles* in the 1857 Catalogue of the Lepidoptera in the Museum of the East India Company.

888. *Ilerda viridipunctata*, n. sp. (PLATE XXVIII, FIG 207 ♂).

I. tamu, Hewitson (nec Kollar), Ill. Diurn. Lep., p. 57, n. 1 (1855); id., Moore, Proc. Zool. Soc. Lond., 1865, p. 773; idem, id., l. c., 1881, p. 248; id., Doherty, Journ. A. S. B., vol. IV, pt. 2, p. 130, n. 146 (1886).

HABITAT: Kumaon, Sikkim.

EXPANSE: ♂, 1·3 to 1·7; ♀, 1·5 to 1·6 inches.

DESCRIPTION: "Allied to *I. androcles*, Doubleday and Hewitson. MALE. UPPERSIDE, both wings blackish-brown, with the medial, basal, and discal areas of the forewing and the medial area of the hindwing sparsely covered with dull metallic greenish-blue scales, these scales scarcely appearing below the submedian nervure on the forewing, and being less thickly disposed on the hindwing. Hindwing with the anal red lunules narrow and distinct. UNDERSIDE dull saffron-yellow, markings similar to those of *I. androcles*. FEMALE. UPPERSIDE, both wings paler brown than in the male. Forewing with an oblique discal slightly-curved short red band. Hindwing with a marginal narrow sinuous red band." UNDERSIDE, both wings as in the male. (Moore, l. c. in Proc. Zool. Soc. Lond., 1882.)

Mr. Doherty describes the male of this species as follows:—"It is merely powdered with shining greenish-blue on the upperside, which does not extend on the forewing beyond the

* *Ilerda langii*, Moore, Proc. Zool. Soc. Lond., 1883, p. 536. HABITAT: Masuri, N.-W. Himalayas. EXPANSE: Male, 1·25 inches. DESCRIPTION: MALE. "Near to *I. moorei*, Hewitson. UPPERSIDE, both wings with the metallic area of the same extent and shape as in that species, the metallic colour being of a greenish tint of nearly the same intenseness as that of *I. androcles*, Doubleday and Hewitson. Hindwing, marginal red band composed of four or five broad continuous lunules, in both the former named species the marginal band is composed of only two lunules. UNDERSIDE, both wings of a much darker yellow than in the former species." (Moore, l. c.)

cell or to the hind-margin, and is nearly obsolete on the hindwing. This species can easily be distinguished by the prehensores, the clasp seen from the side is very broad and rounded at the end, with a line of strong, bent hooks. The uncus seen from the side is shorter than in *I. coruscans*, and its branches are more bent. I name *I. tamu* with great doubt, being unable to distinguish between *I. tamu*, *I. androcles*, *I. moorei*, and *I. langii*. It is so difficult to describe, and so impossible to figure the colouring of an *Ilerda*, that I think that it will be very hard for the student to separate the four species mentioned, except by examination of the prehensores, which ought to be figured." From my point of view there is no great difficulty in dealing with these four species. Mr. Doherty's *tamu* is my new species, *moorei* is blue not green, *androcles* and *langii* are one species, which is green.

"FEMALE. UPSIDE, both wings dark brown. Forewing with a narrow band of orange at a distance from the apex. Hindwing with a narrow lunular submarginal band of orange, and under each lunule a line of pale blue. UNDERSIDE, both wings like the male." (Hewitson, l. c.)

The three descriptions given above apply exactly to this very distinct species, which as far as I know is confined to Kumaon and Sikkim, but is almost sure to occur in the unexplored intervening country of Nepal. The only difficulty I have had with this species is the localities given for it by Mr. Moore when he redescribed it under the name of *tamu*, namely, "N.-W. Himalayas, Masuri (*Lang*); Dharmasala (*Hocking*). There are no specimens which at all agree with this species from the Western Himalayas now in Colonel Lang's collection, and neither Colonel Lang nor I have ever seen any examples from that region which could be confounded with it. I can in no way account for the error, if it be one, of locality, given by Mr. Moore. The only characters I can give to distinguish the females of *I. viridipunctata* and *I. brahma*, Moore, are that the former is a larger insect, with the ground-colour of the underside darker, and of a greenish tinge. In Sikkim, however, the two species do not usually occur together, *I. viridipunctata* being found at much higher elevations than *I. brahma* ever attains. Mr. Otto Möller possesses two curious aberrations or "sports" (or perhaps hybrids) of the male of this species which are in some lights almost as rich a bronzy colour as obtains in *I. brahma*, only of a more greenish-brassy shade. They were taken in Sikkim with *I. viridipunctata*, so I note them under that species, though they are exactly intermediate between the two.

The figure shows both sides of a male specimen from Sikkim in my collection.

889. *Ilerda brahma*, Moore.

I. brahma, Moore, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 89, n. 33, pl. 1a, fig. 4, male (1887); id., Staudinger, Ex. Schmett., p. 274, pl. xcv, male (1888).

HABITAT: Sikkim; Naini Tal; Loharkhet, Kumaon, 5-7,000 feet.

EXPANSE: ♂, 1.3 to 1.4; ♀, 1.2 to 1.5 inches.

DESCRIPTION: "Differs from *I. androcles*, Doubleday and Hewitson, and *I. tamu*, Kollar, in having the patches of the wings [on the upperside] glittering coppery-gold colour, and a broader and longer exterior red band to the hindwing." (Moore, l. c.) FEMALE. UPSIDE, differs only from that sex of *I. epicles*, Godart, in the orange patch on the forewing and the lunulated fascia on the hindwing being rather paler or more yellow in shade. On the UNDERSIDE it may at once be known by the absence of the marginal reddish-orange band on the forewing, and by the presence of a discal continuous dark line across both wings, in *I. epicles* there is occasionally a discal series of disconnected short black lines forming a fascia; the ground-colour of both wings, and the marginal band on the hindwing also paler. The distinctions between the females of *I. viridipunctata* and *I. brahma* are given above, but the markings on the underside of these species in both sexes are identical.

I. brahma occurs commonly in Sikkim in February, March, September, October, and November. In Naini Tal Colonel Lang says that "it occurs at the same time and places as *I. tamu*, Kollar, in April and May at 7,000 feet altitude, but is much less common." *I. brahma*

is one of the most lovely butterflies in the world, the brilliant golden patches on the upperside of the male having no counterpart amongst butterflies, though they are distantly rivalled by some species of the genus *Plusia* of the tribe *Noctues* in Moths. Its range is very restricted: it is rare in Kumaon at an elevation of 5,000 to 7,000 feet, but common in Sikkim at an elevation of about 4,000 feet.

The second subgroup of the *Thecla* division of the Indian *Lycanidæ* contains twelve genera, all of which have two short filiform tails to the hindwing under half an inch in length in both sexes, arising from the terminations of the submedian nervure and first median nervule, except in the single genus *Mota*, mihi, in which the tails spring from the apices of the first and second median nervules respectively. One genus, *Zesius*, Hübner, is aberrant, in that the female has a third short tail from the end of the second median nervule. In the genus *Thamala*, Moore, both tails, but especially the outer one, are longer in the female than in the male.

The first genus, *Zesius*, Hübner, is the last of the three Indian genera (of which the two others are *Amblypodia*, Horsfield, and *Iraota*, Moore) to exhibit sexual variability with regard to the number of subcostal nervules present in the forewing, the male having four and the female three. As noted above, the number of the tails to the hindwing is one more in the female than in the male. The male has no secondary sexual characters. The coloration of the upperside of the only species which the genus contains is markedly dissimilar in the opposite sexes, the male being brilliant coppery, the female dull bluish. It is found throughout South India and Ceylon, occurring only in North India in one locality, *vis.*, the Malda district.

The next two genera, *Dacalana*, Moore, and *Arrhenothrix*, mihi, may be spoken of together, as the males exhibit a sexual character not found in any other Indian genera of the *Lycanidæ*, both having a tuft of long white hairs on the upperside of the forewing in the middle of the submedian interspace lying downwards over a patch of modified and probably glandular scales; both also have in the males a second large tuft of white hairs attached to the underside near the middle of the inner margin of the forewing and turned under and upwards, that portion of the wing being bowed outwards at the point of attachment of these hairs; further in both there is a large glandular patch of differently-formed scales on the upperside of the hindwing below the costa. In the first genus, *Dacalana*, the forewing of the male has four subcostal nervules, while the second genus, *Arrhenothrix*, has but three. It is most unfortunate that the species of both genera should be so rare, especially the females, which I have not seen. It is very desirable that the distribution of these genera should be correctly ascertained, also if the females of both have the same neururation as their respective males. At present *Dacalana* is recorded from Burma and the Malay Peninsula, but I doubt the correctness of this, and suspect that the specimens so recorded belong to the genus *Arrhenothrix*. *Dacalana* occurs also in many of the Islands of the Malay Archipelago. Two species only have been described as belonging to it. A single species of *Arrhenothrix* only is known, which occurs in Assam and the Malay Peninsula. The males of all the species of these two genera are rich cerulean blue on the upperside, the costa and apex of the forewing broadly black; underside dull brown, with a prominent pure white discal line across both wings, and a fine dark line beyond.

The next genus, *Camena*, Hewitson, shares with the two genera which immediately precede it the peculiarity of the lower disco-cellular nervule of the forewing being much longer than the middle disco-cellular; both sexes possess three subcostal nervules to the forewing. The males have a tuft of hairs turned under and upwards on the forewing near the base of the inner margin, the margin being bowed outwards opposite the point of attachment; on the hindwing on the upperside below the costa there is a glandular patch of modified scales varying in size. All the males are blue on the upperside, as in the two preceding genera, of a richer shade than in the females. The genus appears to occur throughout India, in Burma, Ceylon, and Nias Island, but so far has not been recorded from the Malay Peninsula.

The next genus, *Maneca*, mihi, is monotypic, and occurs only in Sikkim. It differs from *Canina* in possessing no secondary sexual characters on the forewing in the male, but has a glandular patch of modified scales on the hindwing in the usual position. It is dull slaty-blue on the upperside in both sexes, with the usual broad outer black margins, the underside is bluish-white, with a narrow discal broken lunular black line across both wings. Both sexes have three subcostal nervules to the forewing.

The next genus, *Mota*, mihi, is also monotypic. The single species it contains is unique, in that its two tails spring from the apices of the first and second median nervules of the hindwing instead of from the submedian nervure and first median nervule. So far the species has only been found in Bhutan and Assam. It is very rich ultramarine blue on the upperside, with the usual black outer margins, the underside being most unusually marked, as will be seen by a reference to the figure. The male has no secondary sexual characters, and both sexes possess three subcostal nervules to the forewing.

Of all the Indian genera, *Aphnaeus*, Hubner, has given me the greatest trouble and leaves my hands in the least satisfactory condition. Much of this difficulty is due to the considerable extent of the sexual dimorphism which obtains in it, the full amount of which awaits investigation by local observers. The genus is very ordinary as far as structure goes; it has three subcostal nervules to the forewing, the upper discoidal and middle disco-cellular nervules have a common origin (this is perhaps rather an unusual character), and the male has no secondary sexual characters. The genus is very wide-spread, occurring plentifully in Africa, in Asia Minor and Persia, almost throughout India, even in the desert tracts, in Ceylon, the Andaman Isles, Burma, and the Malay Peninsula and Archipelago. India may be considered to be its head-quarters, as about thirty species have been recorded from that region. The males are almost always glossed with iridescent blue on the upperside, this coloration never appearing in the females. Any species of the genus can at a glance be recognised as belonging to it, from the quite unique style of markings. These consist of broad bands (usually) on the underside of both wings, very often marked with silver.

Tajuria, Moore, is probably a large genus and probably also has a wide range, but it has been constituted so lately that I can give neither fact with accuracy. The neururation is very ordinary; the length of the third subcostal nervule of the forewing is variable, being much longer in some species than in others; both sexes have three subcostal nervules only to the forewing; the middle disco-cellular nervule is shorter than the lower; and, except in one species, the males have no secondary sexual characters. All the species are of some shade of blue or purple on the upperside, richer and brighter in the males than in the females. *Tajuria* occurs with certainty almost throughout the Indo-Malayan region.

The next genus, *Suasa*, mihi, is probably larger than is at present known to the writer; up to this but a single species has been placed in it. The neururation of the type species is unusual, the third subcostal nervule of the forewing being very short, while the internal nervure of the hindwing is very long. The forewing has three subcostal nervules only in both sexes. *S. linderi*, Hewitson, is quite a small butterfly, but it has the inner tail longer than in any genus of the *Thecla* group. The male is black on the upperside, with an orange discal patch, the base of the wing blue, as is also the greater portion of the hindwing. The female is sooty-brown on the upperside, the anal region of the hindwing white, bearing two large round black spots. The species is known from Assam and Burma only.

The three genera which follow have two subcostal nervules to the forewing only in both sexes. *Thamala*, Moore, contains two described species, which are probably really one, occurring in Burma, the Malay Peninsula, Sumatra, and Borneo. The male has a small stream of modified scales along the submedian nervure towards the base of the forewing on the underside. The tails of the female are longer than those of the male, especially the outer one. The male is brilliant scarlet on the upperside, with the costa, apex, and outer margin of the forewing broadly black; the female has the disc of the forewing dull red, the anal half of the hindwing white, the rest of the wing black.

The next genus, *Hypolycaena*, Felder, contains but three species in India, which occur in Sikkim, Assam, Burma, the Andamans and Nicobars, South India, and Ceylon; two of these are found also in the Malay Peninsula and Archipelago. The male of one species has a glandular discal patch of modified scales on the upperside of the forewing, the others do not possess any secondary sexual characters. *H. erylus*, Godart, is deep blue above in the male, the female is smoky black. *H. thecloides*, Felder, and *H. nilgirica*, Moore, are reddish-brown on the upperside in both sexes. The genus occurs throughout the Malay Peninsula, and probably also in Africa.

The last genus of the subgroup is the *Chliaria* of Moore. The neuration is a little aberrant, as the first subcostal nervule of the forewing almost touches the costal nervule for some little distance, the two veins being inclined towards one another; the males have no secondary sexual characters. All the species contained in the genus are small, and are more or less blue on the upperside in the males. The females of two out of the four species known to belong to the genus are dull brown on the upperside with no trace of blue coloration, and have the discal areas of both wings often whitish. *Chliaria* occurs in the Himalayas, Assam, Burma, Bombay, and the Andaman Isles.

Genus 140.—ZESIUS, Hübner. (PLATE XXVIII).

Zesius, Hübner, Verz. bek. Schmett., p. 77 (1816), id., Moore, Lep. Cey., vol. 1, p. 100 (1881); *Iaimenus* (part), Hewitson, Ill. Diurn. Lep., p. 53 (1865).

"FOREWING, triangular; costal nervure short, curved; first subcostal nervule emitted at one-half, second subcostal at one-third before the end of the discoidal cell; third subcostal trifid, emitted close to the end of the cell; fourth subcostal at one-half and fifth subcostal at beyond two-thirds; disco-cellular nervule slightly recurved; upper discoidal nervule from the end of the cell; lower discoidal from the middle of the disco-cellular nervule; discoidal cell short, broad; second median nervule at one-sixth before the end of the cell, first median at nearly half before the end; submedian nervure nearly straight. HINDWING, short, broadly produced hindward; apical margin [costa] very convex, exterior margin angled at the end of the second and first median nervules and at the submedian nervure, with a slender tail from the first median nervule and submedian nervure in the male, and a third tail from the second median nervule in the female; costal nervure much arched from the base; first subcostal nervule emitted at one-half before the end of the cell; disco-cellular nervules slightly obliquely recurved; discoidal nervule from their middle; discoidal cell broad; second median nervule from one-sixth, and first median at nearly one-half before the end of the cell; submedian nervure straight, internal nervure much recurved. BODY stout; palpi long, slender, porrect, squamose, second joint projecting half beyond the head, third joint very slender, one-fourth the length of the second, pointed; legs squamose; antennæ with a lengthened club gradually thickening to the tip. Eyes smooth. Type, *Zesius chrysomallus*, Hübner." (Moore, l. c.)

In the forewing the costal nervure terminates opposite to the apex of the discoidal cell; the base of the second subcostal nervule is equi-distant between the bases of the first subcostal and upper discoidal nervules, the third subcostal nervule originates about midway between the apices of the cell and of the wing, the fourth subcostal nervule (present in the male only) is very short, shorter than the terminal portion of the subcostal nervure (which latter reaches the outer margin below the apex of the wing in the male), and is given off near to the apex of the wing; in the male the middle disco-cellular nervule is given off from the upper discoidal nervule close to its base, in the female the middle disco-cellular and upper discoidal nervules have a common origin; the disco-cellular nervules are slightly concave, nearly upright, the middle one not quite as long as the lower; the second median nervule has its origin a little before the lower end of the cell. In the hindwing the disco-cellular nervules are of about equal length, the upper recurved, outwardly oblique, the lower slightly concave, nearly upright; the second median nervule originates a little

before the lower end of the cell. In both sexes the tail from the third median nervule is the longest, twice as long as the one from the submedian nervure, the additional tail present in the female only from the second median nervule is the shortest of all.

In this genus the sexes are equally balanced, the male has an extra subcostal nervule to the forewing, the female has an extra tail to the hindwing. It is strange that Mr. Moore should have overlooked the dissimilarity in the number of subcostal nervules to the forewing which exists in the opposite sexes of the type species of this genus, though it was pointed out by Mr. Hewitson. The dissimilarity in the coloration of the sexes on the upperside is also remarkable, the male being brilliant coppery, the female dull blue and black. The genus contains but a single species, which occurs in the Malda district of Bengal, several parts of the Bombay Presidency, in Ganjam, throughout south India, and in Ceylon. The transformations of *Z. chrysomallus* are described when treating on that species.

890. *Zesius chrysomallus*, Hübner. (PLATE XXVIII, FIGS. 208 ♂, 209 ♀).

Z. chrysomallus, Hübner, Zutr. Ex. Schmett., figs. 301, 302, male (1823); id., Moore, Lep. Cey., vol. i, p. 100, pl. xi, figs. 4, male; 4a, female. 4b, larvæ and pupa (1881). *Chrysophanus* ? *chrysomallus*, Westwood, Gen. Diurn. Lep., vol. ii, p. 499, n. 28 (1852); *Dipsas chrysomallus*, Moore, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 33, n. 41 (1857). *Talmenus chrysomallus*, Hewitson, Ill. Diurn. Lep., p. 55, n. 5, pl. xxiv, figs. 4, 5, female (1865).

HABITAT: Malda, Bombay, Ganjam, Nilgiris, Ceylon.

EXPANSE: ♂, 1'3 to 1'7; ♀, 1'6 to 1'9 inches.

DESCRIPTION: "MALE. UPPERSIDE, both wings pale cupreous, outer margins brownish; at anal angle of hindwing three blackish spots. Three [two] tails. UNDERSIDE, both wings pinkish creamy-white, a band composed of roundish pinkish spots disposed irregularly across the wings. Forewing with five, and hindwing with eight pinkish spots towards the base; anal angle with three spots, the two outer ones black banded above with red, and the middle one bluish; near the outer margin is a line of indistinct marks; extreme outer margin and tails pinkish. FEMALE larger, wings more square. UPPERSIDE, both wings brown, tinged with bluish at the base; spots on the UNDERSIDE as in the male, but of a brighter colour." (Moore, l. c. in Cat. Lep. Mus. E. I. C.)

"LARVA elongated, dorsally thickened, sloping at both ends; green, the segments with lateral purple-brown small pointed tubercles, which are stouter and longer on the anterior segments; a pale yellowish lateral line between the tubercles. Earlier stage purple-brown. Feeds on *Terminalia*. PUPA green, spotted with purple-brown." (Moore, l. c. in Lep. Cey.)

This species is quite unmistakable, having no near allies, but I give as a foot-note a more detailed description of it.* Mr. W. H. Irvine has taken it in large numbers at Bholahât in the Malda district of Bengal, a singularly isolated locality in which to find it, and as far as I know it occurs nowhere in the surrounding country for hundreds of miles. In the Bombay Presidency it occurs at Alibagh in January and March, also at Hasvira, Kolaba district, in January. It is found also in North Canara in September, in Ganjam, and in the Nilgiris in April at 2,000 feet elevation. In Ceylon it occurs at "Colombo on cashew-trees in the cinnamon gardens. Flight rapid, darting from tree to tree, often settling in the cashew and cinnamon leaves" (Hutchinson). "Kandy, Hambantotte, Colombo, settles on rather high bushes; when disturbed circles round and soon returns. Common" (Wade).

* "MALE. UPPERSIDE, both wings pale cupreous red, costal and outer borders narrowly brown. Hindwing with three black spot, from the anal angle bordered by a marginal slender greyish-blue line. UNDERSIDE, both wings greyish buff-white. Forewing with two pale reddish-brown spots within the cell, another below the cell, a paler disco-cellular lunule, a transverse catenulated band, and a less distinct submarginal lunular line. Hindwing with two reddish-brown spots on the inner side of the costal nervure, two within the cell, two below the cell, one on the abdominal margin, a paler disco-cellular lunule, a broken catenulated discal band bent up at the lower end, and a submarginal lunular line, three anal black spots, the first and third with a red inner border, the middle spot almost obliterated by blue-grey speckles. Body and palpi above brown. FEMALE. UPPERSIDE, both wings violet-brown, the basal and discal medial areas, including the cell, pale blue. Hindwing with an outer marginal slender black and white line, and blackish pale bordered spots, the second and third anal spot darkest, the third bordered within by a red lunule; tails with red and white borders." UNDERSIDE, both wings as in the male. (Moore, l. c. in Lep. Cey.)

Figure 208 shews both sides of a male specimen from Ceylon, and figure 209 both sides of a female example from Bholahât, both in my collection.

Genus 141.—*DACALANA*, Moore.

Dacalana, Moore, Journ. A. S. B., vol. liii, pt. 2, p. 36 (1884); id., Distant, Rhop. Malay., p. 240 (1884).

"**MALE. FOREWING**, comparatively more triangular than in typical *Iolaus* (*I. helius*, Fabricius, a West African species), the exterior margin being somewhat oblique, and the posterior margin shorter; *venation* similar; on the upperside of the typical species, between the median and submedian nervures, is a tuft of fine hairs covering a small glandular-scaled spot, and on the underside there is also a tuft of hairs on the middle of the posterior margin. **HINDWING**, comparatively broader, being less produced hindward, the apex more convex, and the glandular subcostal spot less prominent. Type, *D. vidura*, Horsfield." (Moore, l. c.)

With reference to this diagnosis, Mr Distant remarks that *Iolaus helius*, Fabricius, "has four [*i.e.*, three, if the terminal portion of the subcostal nervure is not counted as an additional subcostal nervule] subcostal nervules, whilst the typical species of *Dacalana* possesses five [*i.e.*, four] subcostal nervules." This I can partially confirm, as I possess a male of *D. vidura* Horsfield, from Western Java, which certainly possesses four subcostal nervules to the forewing, and it is from the lack of this additional nervule that I have separated off the genus *Arrhenothrix* which follows from *Dacalana*.

I do not consider it necessary to describe the venation of this genus in full, as the difference in the number and position of the subcostal nervules in it and in *Arrhenothrix* (which I have fully described) are the only points of difference between the two genera as far as I know. They are the only genera occurring in India which have a tuft of hairs in the male on the upperside of the forewing.

Dacalana occurs in Burma, the Malay Peninsula, Nias Island, Sumatra, Java, Bantam, and Borneo. Two species only have hitherto been placed in the genus, both of which are described below.

891. *Dacalana burmana*, Moore.

D. burmana, Moore, Journ. A. S. B., vol. liii, pt. 2, p. 36 (1884).

HABITAT: Moulemein.

EXPANSE: ♂, 1.5 inches.

DESCRIPTION: **MALE**. "UPPERSIDE, both wings differ from typical *D. vidura*, Horsfield, from Java, in its darker blue colour. **UNDERSIDE**, both wings differ also in being brighter and of an ochreous brown tint, the transverse white band is somewhat broader, the submarginal black line composed of short curved portions between the veins, and the whole series forms a more curved line in crossing each wing. *Hindwing* has the black subanal and lobe-spot slightly smaller, and the former is but very slightly surmounted with red." (Moore, l. c.)

I have not seen this species. On rediscovery it is very desirable that the number of subcostal nervules in the forewing possessed by it should be noted and recorded, as the species may belong to the allied genus *Arrhenothrix*.

I give below a description *D. vidura*, Horsfield, the type and only other known species of the genus, which occurs in the Malay Peninsula and Archipelago.*

* *Dacalana vidura*, Horsfield. *Amblypodis vidura*, Horsfield, Cat. Lep. E. I. C., p. 113, n. 45. *Thecla vidura*, l. c. pl. 1, figs. 6, 6n, male (1829); *Iolaus vidura*, Hewitson, Ill. Diurn. Lep., p. 43, n. 10 (1865); id., Kheil, Rhop. Nias, p. 31, n. 101 (1884); *Dacalana vidura*, Moore, Journ. A. S. B., vol. liii, pt. 2, p. 36 (1884); id., Distant, Rhop. Malay., p. 241, n. 1, pl. xxi, fig. 27, male (1884). **HABITAT**: Java (Horsfield), Sumatra (Hewitson), Nias Island (Kheil), Borneo (Distant); Penang, Malacca, Singapore, Bantam (Distant). **EXPANSE**, Male, 1.2 to 1.9 inches. **DESCRIPTION**: "MALE. UPPERSIDE, both wings bright azure with a snowy refulgence spread as a delicate white powder over the surface, while the ground-colour assumes in a different aspect a pale sea-green cast. *Forewing* ornamented with a delicate white brush-like appendage, reflected and closely applied to a blackish spot on the middle of the disc; the margins are black, gradually increasing in breadth to the tip, being separated by a curved boundary from the azure ground. *Hindwing* with the posterior border marked with a black thread extending to the anal appendage, which bears besides a black lunule; the extreme cilia are gray; in the exterior [costal] margin is a hemispherical

Genus 142.—ARRHENOTHRIX, nov. (PLATE XXVIII).

MALE. FOREWING, *costa* considerably arched, *apex* rather acute, *outer margin* slightly outwardly oblique from apex to termination of lower discoidal nervule, then straight to inner angle, *inner margin* sinuous, produced into a bluntly rounded lobe near the middle, to which is attached on its extreme outer edge a tuft of long white hairs lying flat against the underside of the wing and turned upwards; in addition to this there is another tuft of long white hairs attached to about the middle of the submedian interspace on the upperside of the wing, which is turned downwards, lying across a patch of dark scales differently formed to the other scales on the wing; *costal nervure* terminating opposite to the apex of the discoidal cell, *second subcostal nervule* with its base equidistant from the bases of the first subcostal and upper discoidal, *third subcostal* arising a little nearer to the apex of the wing than to the apex of the cell; *middle disco-cellular nervule* arising from the upper discoidal a little beyond its origin, *lower disco-cellular* upright, in the same straight line as the upper disco-cellular, about twice as long as that nervule; *second median nervule* arising just before the lower end of the cell, *first median* arising near to the second; *submedian nervure* straight. HINDWING with two filamentous *tails* about $\frac{1}{2}$ of an inch in length from the apices of the submedian nervure and first median nervule; *costa* much arched, *apex* very rounded, *outer margin* nearly straight, posteriorly indented between the veins, a well-formed *anal lobe*, just above which the *abdominal margin* is emarginate, then convex to base of wing; a large rounded patch of dark differently-formed scales on the upperside of the wing in the costal interspace, which covers the base of the subcostal interspace and also extends somewhat into the discoidal cell; *costal nervure* arched, not reaching the apex of the wing; *first subcostal nervule* slightly arched, reaching the apex; *upper disco-cellular nervule* straight, slightly outwardly oblique, *lower disco-cellular* also straight, outwardly oblique, but even less so than the upper disco-cellular, a little longer than the upper; *second median nervule* arising immediately before the lower end of the cell; *submedian nervure* straight; *internal nervure* recurved. *Antennæ* exactly half the length of the costa of the forewing, with a long, gradually-formed slender club. *Eyes* naked. *Palpi* rather long, porrect, not rising above the level of the middle of the eyes, scaly.

denuded silvery spot, corresponding with a delicate brush of lengthened hairs on the underside of the forewing; the interior border is covered with a delicate whitish down, slightly fringed with gray. **UNDER-SIDE,** both wings grayish brown with a very faint livid lustre; a strongly pronounced broad snow-white band passes in a straight line through the middle of both wings to the anal region of the hindwing, where it becomes narrower, and after several minute curves, stretches obliquely to the interior margin; between this and the hinder margin is a very delicate blackish thread composed of small linear fragments, in close contact, arranged in a regular curve across the forewing, slightly interrupted and curved in the hindwing, forming in the anal region a delicate edge along the medial white band. Hindwing further marked within the posterior margin with a row of oblong spots of the ground-colour enclosed within a double series of white lunules, and continued in the anal region by two very large circular black ocellate spots, the exterior one being surmounted by a large oblong patch of a bright orange tint abruptly terminated at its contact with the black striga, the interior one occupying the anal appendage, being covered internally with a white arc sending off a short oblique line along the inner margin; the space between the ocelli is gray, irregularly irrorated with black and marked in the middle by an indistinct white lunule, a brilliant white thread passes along the entire anal region, exterior to which is a continued black marginal thread, and finally a grayish *cilia*. *Body* with a varying bluish or sea-green tint above, covered with a yellowish down underneath. *Antennæ* brown, with a closely catenulated lateral white line extending to the origin of the club, the tip of which is ferruginous. *Tails* black with a white tip and grayish *cilia*.

"This species, as appears from a drawing in the possession of General Hardwicke, is also found on the continent of India. In Java it is comparatively rare, a single male specimen was brought to England." (Horsfield, l. c.)

"Male with the tuft of hair at the meeting of the wings white. FEMALE like the male, except that it is of a paler blue."

"Female variety. With the margins of the forewing broader and paler, a white spot at the end of the cell. Hindwing rufous-brown, the middle only blue." (Hewitson l. c.)

My knowledge of this species is confined to a single male from Western Java in my collection. Mr. Hewitson records the species from Sylhet, but in all probability he failed to detect that the allied species I have described as *Arrhenothrix penicilligera* differs in structure and markings from the true *D. vidua*, Horsfield. It is more than doubtful I think that the specimens Mr. Distant records from the Malay Peninsula belong to this genus rather than to the *Arrhenothrix penicilligera*, mihi, as I possess a specimen from the Straits Settlements which has both the nervation and markings of the latter species, and not of *Dacalana vidua*, in favour of which supposition is the fact that in the specimen figured by Mr. Distant as *D. vidua* the white discal band on the underside of both wings is of the same width as in *A. penicilligera*. It would be a little remarkable if two such closely-allied genera should be found to occur side by side.

Arrhenothrix differs from *Dacalana*, Moore, in possessing three subcostal nervules only to the forewing instead of four, and the third subcostal arising consequently nearer to the apex of the wing. Type, *Arrhenothrix penicilligera*, mhl.

As far as I am aware, *Arrhenothrix* is confined to Assam and the Malay Peninsula; but the *Dacalana burmana* of Moore may belong to this genus, in which case its range would be extended to Burma. Mr. Distant records *Dacalana vidura*, Horsfield, from the Malay Peninsula, but I consider it more than probable that that genus does not occur in the Straits Settlements, but is replaced by the type species of the genus under notice, as I possess a single male from Selangor, which agrees almost exactly with specimens from Sylhet.

892. *Arrhenothrix penicilligera*, n. sp. (PLATE XXVIII, FIG. 214 ♂).

Dolans vidura (part), Hewitson, Ill Diurn. Lep., p. 43, n. 10 (1865).

HABITAT: Sylhet (Hewitson), Assam, Malay Peninsula.

EXPANSE. ♂, 1.5 to 1.6 inches.

DESCRIPTION. MALE. UPPERSIDE, both wings clear rather pale azure blue. Forewing with the costa almost up to the subcostal nervure, the apex very broadly, the outer margin decreasingly and ending in a point at the anal angle deep black. Hindwing with the costa broadly whitish, the apex of the wing black, the outer margin bearing a black thread, the anal lobe blackish, the abdominal margin whitish. UNDERSIDE, both wings rather pale brown crossed by a narrow pure white band at the middle, beyond which is a narrow blackish line broken up into fragments between the veins. Forewing with the inner margin broadly whitish, highly polished. Hindwing with small whitish marks placed outwardly against each section of the narrow blackish line from the costa to the first median nervule, below which vein the blackish line is strongly zigzagged and bordered on both sides by a white line; a submarginal series of small whitish spots from the costa to the second median nervule; a small rounded black spot in the first median interspace, anteriorly bordered with a broad rust-red ring; the submedian interspace from the discal line to the margin thickly sprinkled with white and black scales, which extend into the interspace beyond below the black spot; anal lobe black; tails black, tipped with white, body blue above, ochreous whitish below.

My knowledge of this species is confined to four male specimens captured by the Rev. Walter A. Hamilton in the Khasi Hills, three of which he has presented to me, and one from Selangor in the Malay Peninsula. *A. penicilligera* differs from a West Javan specimen of *Dacalana vidura*, Horsfield, kindly given to me by Mr. H. J. Liwa on the underside of both wings in having the ground-colour darker, and the white discal band less than half as wide, and its edges more clearly defined, the black spot in the first median interspace of the hindwing smaller, with the anterior rust-red lunule smaller and less prominent. The female is unknown.

Mr. Doherty in writing of this species under the name of *D. vidura* says that it "has the habit of alighting on the underside of leaves (with closed wings), disappearing in the act as if by magic. *D. vidura* is a ground-butterfly, living amongst bushes. *Neomyrina himalaia*, Godman and Salvin, which alights in precisely the same manner, is on the other hand a tree butterfly, and rarely descends within reach of the net." He also notes that *A. penicilligera* is rare in Assam, but *D. vidura* is common in the Malayan region.

Mr. Hewitson, in speaking of *D. vidura*, says that "examples of this species from Sylhet have the anal angle of the hindwing longer than those brought by Mr. Wallace from Sumatra." This character is not observable as compared with a Javan specimen of that species, but my single example from the Malay Peninsula certainly has the hindwing more rounded and less produced than specimens from the Khasi Hills.

The figure shows both sides of the type male specimen from the Khasi Hills in my collection.

Genus 143.—CAMENA, Hewitson. (PLATE XXVIII).

Camena,^{*} Hewitson, III Diurn Lep., p. 47 (1863), id., Moore, Proc. Zool. Soc. Lond., 1883, p. 379; *Pratapa*, Moore Lep. Cey., vol. 1, p. 108 (1881).

"FOREWING, triangular, *costal margin* nearly straight, *outer margin* slightly curved outwards, shorter than the other margins, *inner margin* slightly projecting near the base, where it is clothed with a tuft of hair on its underside; *costal nervure* extending to the middle of the margin, *subcostal nervure* with three branches, two before the end of the cell, the third at a distance from the apex; *discoidal cell* half the length of the wing, closed by two *disco-cellular nervules* in a straight line, the second [lower] three times as long as the first [middle], joining the third median nervule a little beyond its base; the *upper discoidal nervule* leaves the subcostal nervure before the end of the cell. HINDWING, with two slender tails; the abdominal fold and anal angle clothed thickly with long hair; *costal nervure* continued to the apex of the wing, *subcostal nervure* branched before the end of the cell, *discoidal cell* short closed obliquely by *disco-cellular nervules* of equal length, [the lower] joining the third median nervule a little beyond its base. HEAD, large, eyes smooth, the space between them prominent, thickly clothed alternately with black and white hair, *palpi* smooth, very erect, long, the second joint compressed, rising above the head, the terminal joint of the male as long as the second; *antennæ* of moderate length, with numerous short joints indicated by white on the underside. BODY, robust."

"The species of this genus, though nearly allied to those of *Deutolix* [= *Deudorix*, Hewitson], differs from them in having its eyes smooth, its antennæ shorter, and in being without the distinct lobe of the hindwing. It resembles nearly some of the species which compose the second section of the genus *Myrina*, Fabricius, but differs from them also in its smooth eyes, in possessing a third subcostal nervule [to the forewing], and in the greater length of the terminal joint of the palpi. In colour, and in having the tuft of hair between the wings, it appears to come near *Jolaus*, Hubner, but has very different palpi." (Hewitson, l c)

"FOREWING, triangular, *costa* arched at the base, apex pointed, *exterior margin* convex below the apex, *posterior margin* convex in the middle and with a tuft of hair beneath; *discoidal cell* recurved, long; *first subcostal nervule* emitted at half length of the cell, *second* at one-third, *third* at one-eighth, *fourth* at one-half from below third, *fifth* from the end of the cell; *upper disco-cellular nervule* short, oblique, *lower disco-cellular* slightly concave; *discoidal nervule* from their angle, *second median nervule* from one eighth and *first median* from one-third before the end of the cell; *submedian nervure* straight. HINDWING, broadly conical, with a glandular depression at the base of the subcostal nervure; *costa* much arched, *exterior margin* sinuous, *abdominal margin* long; furnished with two tails, anal angle lobed, *costal nervure* abruptly arched at the base and curved towards the middle, *first subcostal nervule* emitted at one-half before the end of the cell; *discoidal cell* broad; *disco-cellular nervules* obliquely recurved; *discoidal nervule* from their middle, *second median nervule* emitted at one-fifth, and *first* at nearly one-half, before the end of the cell, *submedian nervure* straight, *internal nervure* much recurved. BODY very robust, *abdomen* short; *palpi* perfect, second joint not extending beyond the head, third joint very long, two-thirds the length of the second, slender and pointed at tip; club of *antenna* stout, femora of the forelegs slightly pilose beneath. Type *C. ctesia*, Hewitson." (Moore l c in Proc. Zool. Soc. Lond.)

In the forewing the costal nervure terminates opposite to the apex of the cell, the second subcostal nervule has its base rather nearer to that of the first subcostal than to that of the upper discoidal, the third subcostal is long, arises about midway between the apices of the cell and of the wing, the middle disco-cellular nervule arises from the upper discoidal soon after the origin of the latter, is very short, half (or less) the length of the lower disco-cellular, slightly outwardly oblique, the lower disco-cellular upright, slightly concave, second

* Mr. Scudder says that *Camena* is preoccupied through *Cinamoa*, the latter name having been used three years earlier by Baly for a genus of *Coleoptera*. As, however, the name has been adopted in the key to the genera which has already been printed off, it could not without inconvenience be discarded here in favour of *Pratapa*, Moore, which latter should hereafter be used.

median nervule arising a little before the lower end of the cell. In the male the tuft of hairs attached to that portion of the inner margin which is strongly bowed outwardly is very long and thick. In the hindwing in the male is a large circular glandular patch of scales, the centre of which is usually the area formed at the junction of the subcostal nervules, but the patch extends much beyond this triangular space in every direction; the upper disco-cellular nervule is outwardly oblique, the lower of equal length, straight, outwardly oblique, but less so than the upper disco-cellular.

This genus is fully distinct from *Iolais*, Hübner, as described by Mr. Moore,* which, though it appears to have much the same male secondary sexual characters, is described as having four subcostal nervules to the forewing; it is also distinct from the same genus as described by Mr. Trimen†, who states that the South African species have usually the male sexual characters of *Camena*, and the same number of subcostal nervules (three) to the forewing, but have the disco-cellular nervules of the forewing "of about equal length," while in *Camena* the middle disco-cellular is always less than half the length of the lower. It would appear therefore that true *Camena* does not occur in South Africa, but is replaced by *Iolais*, Hübner, and by two genera as yet unnamed, one with, the other without, male secondary sexual characters, the species of which Mr. Trimen places under *Iolais*. No more needed work exists in the way of systematisation of the *Rhopalocera* than as revision of the genera of the *Lycenidae* of the world. At present, workers at local faunæ appear hardly ever to agree as regards generic nomenclature, unless the classification of fifty years ago is alone accepted, and their work is made all the more difficult from the impossibility of obtaining for examination the types of the various genera which have been described.

I have no hesitation in sinking the genus *Pratapa*, Moore, under *Camena*. As will be seen from the description below,‡ the characters relied on to separate them are very slight, chiefly confined to outline of wings; the neurulation is precisely the same, as also are the male secondary sexual characters, as I have ascertained by bleaching specimens of the type species of both genera. I have also added to *Camena* the *Iolais cotys* of Hewitson, which Mr. Moore has recently placed in his genus *Dacalana*. This species, however, lacks the secondary sexual characters of the male, unique amongst Indian *Lycenidae*, consisting of a tuft of hair on the upperside of the forewing in the submedian interspace, which is typical of *Dacalana*.

None of the species of *Camena* can be said to be really common, though the males of *C. ctesia*, Hewitson, are met with in Sikkim in considerable numbers owing to their habit of coming down to the water-side to suck up moisture from the sand. All have a very swift flight and settle on the leaves of trees and bushes. *C. cleobis* in Calcutta is much attracted—as are almost all *Lycenidae*—by the clear honey-like fluid distilled by the flowers of the *Poinsettia*, otherwise the butterfly is seldom seen. All the species are rich blue on the upperside, with a more or less broad black costal and outer margin to both wings. The underside is white, dull sordid white, or brown, always with a discal series of spots or a line, sometimes with the disco-cellular nervules defined by a dark line, always with two black spots crowned with orange towards the anal angle of the hindwing. The females on the upperside are also always blue but of a paler duller shade than in the males, often with a submarginal series of black spots between the veins on the hindwing. I am unable to give any indication of the distribution of the genus as understood by me outside Indian limits, though I may note that it is remarkable that no species has as yet been recorded from the Malay Peninsula. It is almost sure to occur in the Malay Archipelago also.

* Journ. A. S. B., vol. liii, pt. 2, p. 34 (1884).

† South-African Butterflies, vol. ii, p. 125 (1887).

‡ Genus *Pratapa*, Moore, Lep. Cey., vol. i, p. 108 (1881). "Allied to *Iolais*, Hübner, and *Camena*, Hewitson. From the latter it differs in having the forewing narrower and comparatively longer, the costa straighter. Hindwing, shorter, less produced hindward, the exterior margin below the apex even. Palpi with second joint longer and the third joint shorter. MALE with a tuft on the posterior margin of the forewing and a glandular costal patch on the hindwing as in *Camena*. From typical *Iolais* (*I. helius*, Fabricius) this genus differs in the more triangular form of the forewing, the hindwing having a uniformly arched costa with the costal nervule extending to its apex; the discoidal cell is less triangular, the disco-cellular nervules shorter and recurved. Type, *P. deus*, Moore." (Moore, l. c.)

Key to the Indian species of Camena.

- A. Underside, both wings brilliant metallic polished silvery.
 893. *C. cippus*, Bhutan, Assam.
- B. Underside, both wings white, dull white, or brown, not highly polished.
 a. Male, upperside, forewing with the blue area marked with a prominent large oval black spot on the disc, and another on the inner margin.
 94. *C. ctesia*, Sikkim, Assam.
- b. Male, upperside, forewing never marked with prominent black spots on the disc and inner margin.
 a¹. Underside, both wings with the ground-colour white or dull white
 a². Male, upperside, both wings light blue, that colour occupying half the forewing; discal line on the underside much broken.
 895. *C. deya*, Himalayas, Malda, Kanara, Ceylon, Burma, Nias Island.
 896. *C. lila*, Sylhet.
- b². Male, upperside, both wings dark blue, that colour much restricted on the forewing; discal line on the underside nearly continuous.
 897. *C. icitas*, Himalayas.
- c¹. Underside, both wings with the ground-colour pale brown.
 a³. Underside, both wings with a broad white discal band.
 898. *C. lotys*, Nepal, Sikkim, Sylhet.
- c². Underside, both wings with no broad white discal band.
 899. *C. clionis*, Western Himalayas, Bengal, Assam, Nilgiris.
 900. *C. ister*, India.

893. *Camena cippus*, Fabricius.

Hesperia cippus, Fabricius, Ent. Syst., vol. v. Suppl., p. 429, n. 43-4 (1798); *Polyommatus cippus*, Godart, Enc. Méth., vol. ix, p. 634, n. 62 (1823); *Iolana cippus* (part), Butler, Cat. Fab. Lep. B. M., p. 186, n. 2 (1869); id., Hewitson, Ill. Diurn. Lep., Suppl., p. 11, pl. Suppl. iv, figs. 39, 40, male (1869); *Camena cippus*, Moore, Proc. Zool. Soc. Lond., 1883, p. 530.

HABITAT: East Indies (*Fabricius*), Ceylon (*Butler*), Simla (*Hewitson*), Nepal (*Moore*), Bhutan, Assam.

EXPANSE: ♂, 1'4 to 1'7 inches.

DESCRIPTION: "MALE. UPPERSIDE, both wings brilliant blue. Forewing with the costal margin, the apex, and outer margin, black, the inner margin (under which there is a large tuft of dark brown hair) slightly projecting. Hindwing with one [two] tail, the apex dark brown. UNDERSIDE, both wings grey-white, highly polished, crossed beyond the middle by an indistinct brown linear band, broken into spots on the hindwing. Hindwing with the spot near the base of the tail and the lobe black, crowned with orange" (*Hewitson*, l. c.)
 ♀ unknown.

The specimen which Mr. Hewitson described and figured must have been mutilated, as *C. cippus* has two tails of about equal length. I have seen but six specimens of this beautiful species, four from Assam, two in the Indian Museum, Calcutta, obtained at Sib-sagar by Mr. S. E. Peal, and two in my own collection sent me from Jorehât by Mr. J. L. Sherwill, lastly two from Buxa, Bhutan, obtained by Miss Wyllie. The highly-polished silvery underside of this species makes it very readily recognisable. Mr. Butler gives Ceylon as a habitat for it, which is almost certainly incorrect. Even Simla is doubtful; I have never taken it there myself, nor have I seen a specimen from thence.

894. *Camena ctesia*, Hewitson. (PLATE XXVIII, FIG. 215 ♂).

C. ctesia, Hewitson, Ill. Diurn. Lep., p. 48, pl. 11, figs. 1, 2, male (1865); id., Moore, Proc. Zool. Soc. Lond., 1883, p. 530; id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 394, n. 299, pl. viii, fig. 6, female; id., Standinger, Ex. Schneitt., p. 275, pl. 107, male (1888).

HABITAT: Northern India (*Hewitson*); Sikkim; Jaintia Hills (*Elwes*).

EXPANSE: ♂, 1'5 to 1'8; ♀, 1'7 inches.

DESCRIPTION: "MALE. UPPERSIDE, both wings brilliant ultramarine blue, all the margins broadly dark brown. Forewing marked by a triangular dark brown spot [on the inner margin, and a large rounded spot on the middle of the disc] Hindwing with the apex dark

brown, an apical brown spot irrorated with white. **UNDERSIDE**, *both wings* glossy grey, with a brown spot at the end of the cell, crossed beyond the middle by a band of dark brown spots bordered with white, with a band of brown (scarcely visible on the forewing) near the outer margin. *Hindwing* with a submarginal band of brown spots, the two apical [anal] spots crowned with orange." (Hewitson, l. c.) **FEMALE**. **UPPERSIDE**, *forewing* differs from the male in the absence of the two black spots. Otherwise as in the male.

The males of this beautiful species are very common in Sikkim, where it occurs in June and October. As far as I am aware, it occurs nowhere else, though Mr. Elwes records it from the Jaintia Hills. Mr. Hewitson describes the markings of the upperside as dark brown. They are really very deep black, and the *forewing* presents the appearance of a blue area marked in the middle with a large round black spot, and another oblong one on the middle of the inner margin. I have never seen a female.

The figure shows both sides of a male specimen from Sikkim in my collection.

895. *Camena deva*, Moore.

Amblypedia deva, Moore, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 46, n. 74 (1857); *Isolans deva*, Hewitson, Ill. Diurn. Lep., p. 42, n. 8 pl. xviii, figs. 4, 5, male; 3, female (1865); *Pratyapa deva*, Moore, Lep. Cey., vol. i, p. 108 (1881), vol. iii, p. 531, pl. ccx, figs. 2, male; 2a, female (1887); id., Doherty, Journ. A. S. B., vol. lv, pt. 2, p. 128, n. 139 (1886).

HABITAT: Canara, Ceylon (Moore), Kaptot, Kumaon, 4,000 feet (Doherty), Dehra Dun, Malda, Sikkim, Burma, Nias Island.

EXPANSE: ♂, 1.25 to 1.50; ♀, 1.40 to 1.60 inches.

DESCRIPTION: "**MALE**. **UPPERSIDE**, *forewing* with the discoidal cell and posterior base brilliant deep blue intersected by the dark median and submedian nervures, costal margin and anterior half of the wing to beyond the posterior angle dark brown. *Hindwing* with the middle from the base brilliant deep blue, a broad anterior and narrow exterior margin of dark brown, along the exterior margin are disposed some blackish marks, a black spot at the anal angle, surrounded with whitish, abdominal margin pale brown; *tails* two, brown; *celia* whitish. **UNDERSIDE**, *both wings* cream-colour, with a series of interrupted marks disposed in an undulating line across the wings, and terminating in a zig-zag manner abdominally on the hindwing. *Hindwing*, anal angle with a black spot, bordered anteriorly with red, and another of the same a short distance off on the exterior margin. **FEMALE**. **UPPERSIDE**, *both wings* paler blue, and with lighter brown margins" (Moore, l. c. in Cat. Lep. Mus. E. I. C.)

Mr. Doherty notes that a female taken by him in Kumaon "resembles a specimen from Sikkim [terai] in the Indian Museum, being much darker than those from Canara and the plains of Bengal, the blue on the forewing covering only the lower half of the base of the cell, paler blue from the hind margin to just above the second median nervule, broken by black veins, the margin broad and black. Hindwing bluish as in *P. [=C.] deva*, but powdered with grey scales, and interrupted by black veins, and by a submarginal line of joined dark lunules, the costal border widely dark. Owing to my ignorance of the male, I am unwilling to describe the species as new." As regards the Sikkim specimen referred to above, I do not at all think that it represents one sex of a new species, it is simply a melanoid varietal form only. As in the case of *C. cleobis*, Godart, females in this genus appear to vary a good deal in the extent of the black coloration on the upperside.

The distribution of this species is probably much more extensive than the localities given above would appear to indicate. It occurs at three distant points on the Himalayas, and two even more distant spots in the plains of India, and in Ceylon. It may be expected to turn up in all intermediate localities. In Sikkim it is very rare, Mr. Otto Möller possesses one male and four females, one of the latter was taken in November, and the one from the Terai referred to above in August. In Ceylon it has been taken at Balangada, Bamagalla, Goonambill in July, and at Wattigama in February, by Mr. Mackwood. A specimen of this species in the collection of the Indian Museum, Calcutta, has been identified as the next species by Mr. Moore, but as a true *C. deva*.

896. *Camena lila*, Moore.

Pratapa lila, Moore, Proc. Zool. Soc. Lond., 1883, p. 59 pl. xlix, fig. 9, male.

HABITAT: Silhet, Eastern Bengal.

EXPANSE: ♂, 1.5 [actual measurement of figure 1.8]; ♀, 1.62 inches.

DESCRIPTION: "Near to the South Indian *P. [= C.] deva*, Moore. UPPERSIDE, both wings with the blue of a purple tint, less metallic in lustre, and confined to a smaller space on the lower basal area, thus giving a broader black outer border. UNDERSIDE, both wings of a darker tint, with much more prominent transverse black sinuous line, and brownish marginal fasciæ. Hindwing with the anal spots also larger and broader-bordered with red. FEMALE. UPPERSIDE, both wings also with a broader brown border." (Moore, l. c.)

In the Indian Museum, Calcutta, is a male specimen from Upper Tenasserim named by Mr. Moore "*Tajuria* [sic] *lila*" It is very small, measuring only 1.45 inches in expanse, while the figure given by Mr. Moore measures 1.8 inches. It does not agree at all with Mr. Moore's description of this species, and is in fact a *C. deva*. I very much doubt *C. lila* being a distinct species, all the characters given as distinctive appearing to be very trivial.

897. *Camena icetas*, Hewitson.

Isolans icetas, Hewitson, Ill. Diurn. Lep., p. 44, n. 14, pl. xviii, figs. 6, 7, male (1865); *Pratapa icetas*, Moore, Proc. Zool. Soc. Lond., 1882, p. 251

HABITAT: India (Hewitson); Kangra Valley (Moore).

EXPANSE: ♂, 1.4 to 1.5; ♀, 1.5 to 1.6 inches

DESCRIPTION: "MALE. UPPERSIDE, both wings brilliant ultramarine blue. Forewing with more than the outer half dark brown; the tuft of hair at the meeting of the wings black. Hindwing with the costal and outer margins brown. UNDERSIDE, both wings grey paler towards the outer margins, crossed beyond the middle by a linear band of brown (apart where the wings meet), and by an indistinct submarginal band of rufous-brown, the outer margin rufous. Hindwing with the two black spots near the anal angle crowned with orange."

"Nearly allied to *I. [= Tajuria] longinus*, Fabricius, but easily distinguished from it by having the tuft of hair where the wings meet." (Hewitson, l. c.) FEMALE. UPPERSIDE, both wings black. Forewing with the lower basal and discal areas pale blue, rather darker towards the base of the wing. Hindwing with the disc more or less pale blue, some indistinct black submarginal spots, anal lobe bright ochreous as in the male. Cilia whitish throughout. UNDERSIDE, both wings as in the male.

This very beautiful species appears to be confined to the Himalayas. Mr. R. Ellis took it in Chumba, Mi. A. Grahame Young has sent many specimens from Kulu, I have taken it sparingly on Tarwa Devi, a mountain opposite Simla, about 6,000 feet elevation, Mr. P. W. Mackinnon has sent me males from Masuri taken in May, I possess a male specimen taken in Naini Tal in August, and Colonel A. M. Lang took a very large and dark female there at 6,500 feet elevation on 30th August, and lastly Mr. A. V. Knyvett has obtained three male specimens near Darjiling. These are all the certain records I possess of its capture. The female is much rarer than the male.

898. *Camena cotys*, Hewitson.

Isolans cotys, Hewitson, Ill. Diurn. Lep., p. 43, n. 11, pl. xix, figs. 19, 20, male (1865); *Dacalana cotys*, Moore, Journ. A. S. B., vol. liii, pt. 2, p. 36 (1884).

HABITAT: Nepal, Sikkim, Sylhet.

EXPANSE: ♂, 1.55; ♀, 1.60 to 1.70 inches.

DESCRIPTION: "MALE. UPPERSIDE, both wings cerulean blue. Forewing with the costal and outer margins and apex broadly dark brown, the tuft of hair where the wings meet dark brown. Hindwing with the apex rufous-brown. UNDERSIDE, both wings rufous-grey, crossed at the middle by a broad band of white, beyond the middle by a line of dark brown, and by a submarginal obscure rufous band, the two black spots near the

anal angle [of the *hindwing*] crowned with orange, the space between the said spots brown-ferrated with white."

"This species, though closely allied to *I.* [= *Dacalana*] *vidura*, Horsfield, differs from it in many respects. It has, though a male, all the appearance of a female in colour, and is without the tuft of white hair on the upperside of the forewing. On the underside it has the white band much broader." (*Hewitson*, l. c.) The white band is not so broad as in Javan specimens of the true *D. vidura*.

FEMALE. UPPERSIDE, *both wings* of a paler and less shining blue than in the male. *Forewing* with the costa and outer margin more broadly black, a white spot at the end of the cell, extending to the first median nervule. *Hindwing* with the costal margin more broadly black, the veins also black, and a series of submarginal black spots between the veins; a large prominent white spot on the middle of the costal margin. **UNDERSIDE** as in the male, except that the broad white discal band of the *forewing*, owing to the absence of the shining pale space on the inner margin in the male, is continued widely on to the margin.

A rare species in Sikkim, obtained once only in fair numbers by Mr. Otto Møller; and the Rev. Walter A. Hamilton has obtained it in Sylhet. It cannot belong to the genus *Dacalana* in which it has been recently placed by Mr. Moore, as it has only three subcostal nervules to the forewing instead of four, and the male does not possess the tuft of white hairs on the upperside of the forewing which is such an anomalous feature of *D. vidura*, Horsfield. *C. cotys* is nearly allied to the "*Iolaus*" *anysis* of Hewitson* from Macassar, but that species has the male tuft of hairs on the underside of the forewing black instead of dark brown, and the outer black border on the upperside of the forewing in the male is fully twice as broad. On bleaching a male specimen of *C. cotys*, I find that the granular patch of scales on the upperside of the hindwing is placed in a different position to the patch in *C. cleobis*, Godart, and in *C. deva*, Moore; instead of occupying the triangular area formed by the bases of the subcostal nervules, and more or less extending beyond it, the greater portion of the patch is placed in the subcostal interspace above the point where the subcostal nervules originate.

899. *Camena cleobis*, Godart.

Polyommatus cleobis, Godart, Enc. Méth., vol. ix, p. 634, n. 61 (1823); *Iolaus cleobis*, Hewitson, Ill. Diurn. Lep., p. 43, n. 12, pl. xviii, figs. 8, 9, male; 10, female (1865). *Amblypodia hypatada*, Moore, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. 1, p. 45, n. 72 (1857).

HABITAT: Bengal (*Godart*), Northern India (*Hewitson* and *Moore*), Masuri, Malda, Dinajpur, Calcutta, Assam, Nilgiris.

EXPANSE: ♂, 1.20 to 1.60; ♀, 1.30 to 1.55 inches.

DESCRIPTION. "MALE. UPPERSIDE, *forewing* with the discoidal cell and the posterior base to posterior angle brilliant light sky-blue, rest of wing dark brown. *Hindwing* brilliant light sky-blue, with brown *cilia*, abdominal margin cream colour. **UNDERSIDE**, *both wings* light creamy-brown, with a well-defined narrow undulating band of reddish-brown crossing the wings, terminating abdominally in a zig-zag manner on the hindwing; near exterior margins an indistinct line; near anal angle [of *hindwing*] two black spots, bordered anteriorly with red, and posteriorly with powdered white. Tails black tipped with white" (*Moore*, l. c.) **FEMALE.** UPPERSIDE, *both wings* differ from those of the male in their pale duller blue coloration, that colour being more extensive on the forewing. *Hindwing* with the costa broadly black, the outer margin bearing a series of black spots. **UNDERSIDE**, *both wings* as in the male.

"Variety male. With the spots near the anal angle on the underside of the hindwing entirely orange, without the black spots." (*Hewitson*, l. c.)

C. cleobis in the male is a somewhat variable species, the shade of blue in some Bholahat specimens being almost as light as in the female; it is very dark and rich in a single unusually large specimen sent me from the Nilgiris by Mr. G. F. Hampson. It is probable that the range of this species is very imperfectly known. Mr. P. W. Mackinnon has taken it at Masuri in

* Ill. Diurn. Lep., p. 42, n. 9, pl. xix, figs. 17, 18, male (1865).

September; Mr. W. H. Irvine has captured it in considerable numbers at Bholahât in the Malda District; it is fairly common in the winter in Calcutta on the crimson flowers of the *Ponsettia*; Mr. A. V. Knyvett has taken it largely at Dinajpur in June; Mr S. E. Peâl has sent me a single specimen from Sibsagar in Upper Assam; and Mr. G. F. Hampson reports it as "rare on the slopes of the Nilgiris, 3,000-6,000 feet, October. Nilgiri specimens have the discal band on the underside not bounded outwardly by a white line, and the markings at the anal angle obsolescent as compared with North Indian specimens."

900. *Camena later*, Hewitson.

Iolus later, Hewitson, Ill Diurn. Lep., p. 43, n. 13, pl. xix, figs. 15, 16, female (1865).

HABITAT: India (Hewitson).

EXPANSE: ♀, 1·3 inches.

DESCRIPTION: "FEMALE. UPSIDE, both wings cerulean blue. Forewing with the apical half dark brown. Hindwing with the apex pale rufous-brown. UNDERSIDE, both wings rufous or grey-brown, crossed beyond the middle by a linear band of rufous-brown bordered outwardly with grey-white. Hindwing with the apical [anal] spots broadly bordered above with orange, the space between them white irrorated with black, and slightly crowned with orange."

"This, though a female, has all the characters of a male. It is closely allied to *I. [=C.] cleobis*, Godart, but differs in colour from both sexes of that species. It resembles the male of *I. cleobis* in the position of the band of the underside, less circular than that of the female. Its wings are not so broad as are those of the female, and it is without the black spots near the anal angle of the hindwing" [on the upperside] (Hewitson, l. c.)

I find that every character given by Mr. Hewitson as distinguishing this species from the female of *C. cleobis*, Godart, breaks down when compared with my long series of that species. In *C. cleobis* the shade of blue on the upperside is very variable, the wings of some specimens are distinctly broader than in others, and on the upperside of the hindwing in some specimens there is a complete series of round black spots, as figured by Hewitson, sometimes only one or two are present, or all are absent. An examination of the type specimen will probably show that it is only a varietal form of *C. cleobis*.

Genus 144.—*MANECA*, nov. (PLATE XXVIII).

Differs from *Camena* in having the inner margin of the forewing in the male straight, not outwardly bowed, and lacking the tuft of hairs attached to the margin present in the males of that genus, but agrees with *Tajuria* in this respect; differing from the latter, however, but agreeing with *Camena*, in possessing, in the male, a glandular patch of scales on the upperside of the hindwing at the base of the subcostal nervules extending anteriorly into the costal interspace, posteriorly into the discoidal cell; outer tail one-third shorter than the inner one. Type, *Pratapa bhotea*, Moore.

The genus, as far as I know, contains but a single species, which is confined to Sikkim. The upperside of both sexes is dull slatey-blue with the outer margin black, underside bluish-white, marked by a fine discal macular blackish band. The anal lobe to the hindwing on the upperside is prominently rich ochreous, on the underside black. *Maneca* is exactly intermediate between *Camena* and *Tajuria*, it disagrees with the former in the forewing, agreeing with it in the hindwing; with regard to *Tajuria* the conditions are reversed, it agreeing with it in the forewing, differing in the hindwing. The differences in venation are so slight that I consider it useless to describe them, especially as they would probably not hold good if every species of the genera *Camena* and *Tajuria* were examined.

901. *Maneca bhotea*, Moore. (PLATE XXVIII, FIG. 216 ♂).

Pratapa bhotea, Moore, Journ. A. S. B., vol. liii, pt. 2, p. 37 (1884).

HABITAT: Sikkim.

EXPANSE: ♂, 1·3 to 1·4; ♀, 1·5 to 1·6 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* dull slatey-blue. *Cilia* white. *Forewing* with the costa somewhat narrowly (broadly at the outer end of the discoidal cell), the apex very broadly, the outer margin broadly and decreasingly black. *Hindwing* with a broad even outer black margin, the veins black, the abdominal margin whitish, the anal lobe prominently bright ochreous. *Tails* black ciliated with white. A glandular patch of black scales occupying the triangular area formed by the bases of the subcostal nervules, and extending a short distance into the subcostal interspace above. **UNDERSIDE, both wings** as in the female. "**FEMALE.** UPPERSIDE, *both wings* purpurascant greyish-blue. *Forewing* with the anterior margin from the costal nervure, the apex broadly, and the exterior margin violet-brown. *Cilia* grey. *Hindwing* with a marginal row of narrow violet-black spots ending in a red anal lobe-spot, a slender black marginal line; the two *tails* black with white cilia. *Cilia* greyish white. **UNDERSIDE, both wings** glossy purpurascant greyish-white. *Forewing* with an indistinct darker bluish-grey streak at the end of the cell, and two slender lunular fasciæ along the exterior margin; a transverse discal slender prominent black broken sinuous line. *Hindwing* with a similar cell streak and outer marginal fasciæ, the latter darkest at the anal end; a jet-black anal lobe-spot, on which are a few scarlet scales and some turquoise-blue scales along its inner border; a transverse discal zigzag slender black broken line ending upwards above the anal lobe" (Moore, l. c.)

Of this rare species the type female is in the Indian Museum, Calcutta; Mr. A. V. Knyvett possesses another female taken in 1883, and seven males taken by himself on the Observatory Hill in Darjiling, 7,500 feet, on 15th May, 1888. These are all the specimens of *M. bhotes* with which I am acquainted.

The figure shows both sides of a male specimen from Sikkim in my collection.

Genus 145.—MOTA, nov. (PLATE XXVIII).

WINGS, short, broad. **FOREWING**, *costa* evenly arched, *apex* acute, *outer margin* convex, *inner margin* slightly convex; *costal nervure* terminating opposite the apex of the discoidal cell; *first subcostal nervule* lying nearer to the costal nervure than to the second subcostal nervule; *second subcostal* with its base nearer to the origin of the upper discoidal than to that of the first subcostal; *third subcostal* rather short, arising nearer the apex of the wing than of the cell; *disco-cellular nervules* almost upright, concave, the middle disco-cellular very slightly longer than the lower; *second median nervule* arising a short distance before the lower end of the cell. **HINDWING**, *costa* arched at base, thence straight to apex, *outer margin* to base of upper tail at almost right angles to the costa, waved, from base of upper tail to anal angle almost at right angles again; *anal lobe* large; *abdominal margin* excavated somewhat deeply above the anal lobe, then convex; *tails* two, from the termination of the first and second median nervules, short, the upper one a little shorter than the lower; *costal nervure* arched at base, thence straight to the apex of the wing; *first subcostal nervule* originating rather close to the apex of the cell; *upper disco-cellular nervule* very slightly concave and outwardly oblique, *lower disco-cellular* straight, upright, equal in length to the upper; *second and third median nervules* with a common origin at the lower end of the cell; *submedian nervure* very straight; *internal nervure* short, strongly recurved. *Antenna* short, less than half the length of the costa of the forewing. *Eyes* naked. *Palpi* long, porrect, reaching to about the level of the middle of the eyes, covered with very closely-set adpressed scales, longer in the female. *Body* moderately robust. Type, *Myrina massyla*, Hewitson.

The male of the type species lacks secondary sexual characters. The genus is restricted at present to a single species, which occurs in Bhutan and Assam.

902. *Mota massyla*, Hewitson. (PLATE XXVIII, FIG. 210 ♀).

Myrina massyla, Hewitson, Ill. Diurn. Lep., p. 7, n. 59, Suppl. pl. iii, figs. 87, 88, male (1869).

HABITAT: Cherrapunji (Hewitson); Bhutan.

EXPANSE: ♂, 1'15 to 1'40; ♀, 1'20 to 1'55 inches.

DESCRIPTION: "MALE. UPPERSIDE, *both wings* violet-blue. *Forewing* with the costal and outer margins, and a spot at the end of the cell dark brown. *Hindwing* with two tails; the costal margin, which is broad, the outer margin and a submarginal line, dark brown; the anal lobe large and prominent. UNDERSIDE, *forewing* pale yellow-brown clouded with darker brown near the outer margin, a spot at the end of the cell and a band beyond the middle dark brown, a submarginal line of white. *Hindwing* broken into spots of different shades of brown, the costal margin and two spots touching it pale yellow, the wing irrorated with white near the outer margin, the margin pale brown, a submarginal line of white." (Hewitson, i. c.) FEMALE. UPPERSIDE, *both wings* purplish-black. *Forewing* with a small basal patch of violet occupying less than half the area of the wing. *Hindwing* with a fine marginal white line obsolete anteriorly (present in the male). *Cilia* alternately black and white. UNDERSIDE, *both wings* like the male.

The opposite sexes are at once distinguished by the hindwing being almost entirely blue in the male and black in the female. The markings of the underside of the hindwing are extremely complicated, but can be easily followed by an examination of the figure I have given. It is a rare species, Mr. Otto Moller possesses a single female taken in Bantan in May, there is another in the Indian Museum, Calcutta, from Upper Assam, and the Revd Walter A. Hamilton has sent me numerous examples of both sexes from Sylhet.

The figure shows both sides of a female specimen from Bhutan in Mr. Otto Moller's collection.

Genus 146.—APHNÆUS, Hübner. (PLATES XXV and XXVIII).

Aphnæus, Hübner, Verz. bek. Schmettl., p. 81 (1816); id. (part), Hewitson, Ill. Diurn. Lep., p. 60 (1865); id., Moore, Lep. Cey., vol. i, p. 105 (1881). *Cigaritis* (part), Lucas, Explor. Alg., Zool., vol. iii, p. 352 (1849); id., Trimen, South-Afr. Butt., vol. ii, p. 146 (1887). *Spindasis*, Wallengren, Lep. Rhop. Caffr. in Kong Sv. vet.-akad. Hand., vol. 21, p. 45 (1857). id., Distant, Rhop. Malay., p. 242 (1884). *Amblypodus* (part), Westwood, Gen. Diurn. Lep., vol. 11, p. 477 (1852); idem, id., Trimen, Rhop. Afr. Austr., vol. ii, p. 226 (1866).

"WINGS, small. FOREWING, triangular; *first subcostal nervule* emitted at one-half and *second* at one-third before the end of the discoidal cell, *third* and *fifth* emitted together at a short distance beyond the end of the cell, *fourth* at two-thirds from below the third and terminating at the apex; *disco-cellular nervules* obliquely recurved, radial [*lower discoidal*] nervule from their middle; *second median nervule* close to the end of the cell, *first median* at one-half before the end; *submedian nervure* straight. HINDWING, conical; *costa* gently arched, *abdominal margin* long, *anal angle* lobed; furnished with two tails; *costal nervure* arched at base and curved to apex; *first subcostal nervule* at one-fourth before the end of the discoidal cell; *disco-cellular nervules* recurved; *discoidal nervule* from their middle; *second median nervule* from close to the end of the cell; *first median* at one-half before the end, *submedian nervure* straight, *internal nervure* recurved. BODY, short, robust; *palpi* porrect, squamose, second joint long, third short; *legs* squamose, femora slightly pilose beneath; *antennæ* with the club long, stout. Eyes smooth. Type, *A. orcas*, Drury," from Sierra Leone. (Moore, i. c.)

In *A. syama*, Horsfield, the costal nervure ends opposite to the apex of the discoidal cell, the first subcostal nervule is slightly arched upwards towards the costal nervure, but does not touch it, the base of the second subcostal nervule is nearer to the base of the first than to the base of the upper discoidal, the third subcostal is rather short, and is emitted nearer the apex of the wing than of the cell; middle and lower disco-cellular nervules very upright, of equal length, the middle slightly concave, the lower straight, the middle (there is no upper disco-cellular) meeting the costal nervure just at the point where it gives off the upper discoidal, this vein being Mr. Moore's fifth subcostal nervule, second median nervule given off from the median nervure a short distance before the lower end of the cell. Hindwing has the tail rather long, springing from the terminations of the first median nervule and submedian nervure, sometimes of equal length, often with the inner tail twice as long as the outer. The palpi in the females are longer than in the males.

LARVA fusiform, slightly hairy, constrictions between the segments not prominent, head large, twelfth segment with prominent pillar-like organs extruding tentacula. PUPA of the usual lycænid shape, smooth, rounded, humped on the middle of the thorax.

"The species of this genus have hitherto been placed in the genus *Aphnæus*, the type of which is the African *A. orcas*, Drury, which has five [four from my point of view, six from that of Moore] subcostal nervules to the forewing, and consequently is quite distinct from *Spindassus*, which has but four [three]. The late Mr. Hewitson pointed out the difference in the neurulation, and though Mr. Moore, in his 'Lepidoptera of Ceylon,' describes the genus *Aphnæus* on the characters of Ceylon species, and correctly gives the type of the genus as *A. orcas*, he must have been unable to examine a specimen of that species."

"There has been, however, no necessity to make a new generic name, as Wallengren proposed his *Spindassus* for the species hitherto known as *Aphnæus natalensis*, Doubleday and Hewitson, and under that generic name the Eastern species will find their natural classification." (*Distant*, l. c.)

In this contention I think Mr. Distant is wrong. Mr. Moore correctly describes the species of the genus with three subcostal nervules to the forewing, but he takes *orcus* of Drury as the type, which has quite a different neurulation; hence as he does not correctly describe his type species, which has four subcostal nervules, I think his action in fixing the type as *orcus* may be disregarded. Hubner placed two species only in his genus *Aphnæus*, viz:—*vulcanus* and *orcus*. The first should be taken as the type, and *orcus* and *hutchinsoni*, Trimen, be placed in a new genus, for which I propose the name *Aphnamorpha**, Type, *orcus*, Drury. Wallengren's name *Spindassus* cannot be used for the species with three subcostal nervules to the forewing, as his type and only species is his *masilikasi*, which I gather from Mr. Roland Trimen's "South-African Butterflies," vol. ii, p. 147, has the normal neurulation of the genus *Aphnæus*. To prevent misunderstanding, I should point out that Mr. Trimen considers that *A. natalensis*, Doubleday and Hewitson, and *A. masilikasi*, Wallengren, to be distinct species, the latter being usually placed as a synonym of the former.

Aphnæus is a large and rapidly increasing genus, of which I am quite unable to estimate the number of known species. Mr. Moore has recorded six from Ceylon, and a seventh certainly occurs there. Mr. Distant gives only one from the Malay Peninsula, several occur in the Malay Archipelago, about thirty species have been recorded from India, one or two occur in Persia and Asia Minor, and Mr. Distant says that the genus is "particularly well represented in Africa." The genus is a most compact one, and no one can fail instantly to recognise any species as belonging to it, all having a *facies* peculiarly their own. In the greater number of species, the males have the upperside more or less most beautifully glossed with rich iridescent blue, which is only visible in certain lights. In no female does this coloration occur. The male has no secondary sexual characters. In the case of species which have no blue coloration in the male, the male can be known from the female by its more pointed forewing, with the outer margin nearly straight; the latter sex having the apex more rounded, the outer margin convex, and the wings generally broader. All the species have the underside traversed by several bands, usually of a darker colour than the ground, often outwardly defined with black, and bearing a medial metallic silvery line. The anal angle of the hindwing is produced into a lobe, which is usually marked with orange on both sides, and bears two black spots. All the species have two tails, and the abdomen is striped. The flight of all the species of the genus is immensely rapid, and can barely be followed by the eye, but they seldom fly far and frequently settle with closed wings on low-growing flowers or on bushes. In Sikkim males may be taken in large numbers, sucking up moisture on damp spots in the partially dried-up beds of streams, &c. Species of the genus appear to occur almost everywhere; in the plains they are found even in the desert tracts as well as in the regions of heavy rainfall, and

* Generic name and *μόρφη*.

profuse vegetation, in the Himalayas they occur throughout the outer ranges up to an elevation of about 8,000 feet.

Key to the Indian species of *Aphnæus*.

- A. Male, upperside, forewing not glossed with iridescent blue.
 - a. Both sexes, upperside, black, usually with tawny bands on forewing.
 - a¹. Male, upperside, hindwing (normally) not glossed with blue.
 - 903. A. VULCANUS, India (except desert tracts, Assam and Burma), Ceylon, Java.
 - b¹. Male, upperside, hindwing glossed with blue.
 - a². Both sexes, underside, red bands broad; female, upperside coloured like the male, except that the hindwing is not blue-glossed.
 - 904. A. FUSCA, Ceylon.
 - b². Both sexes, underside, red bands narrow; female, upperside, both wings more or less sprinkled with plumbeous scales.
 - 905. A. SCHISTACEA, Ceylon, Bombay, Nilgiris.
 - f. Both sexes, upperside, tawny, with black bands.
 - 906. A. HYFARGYRUS, Sind, Kutch, Afghanistan.
- B. Male, upperside, forewing glossed with iridescent blue.
 - a. Male, upperside, glossed with pale iridescent blue.
 - a¹. Female, upperside dull dusky brown, unmarked.
 - 907. A. LILACINUS, Malda, Bombay, Central India.
 - b¹. Female, upperside black; forewing with lower discal area, hindwing almost throughout, irrorated with plumbeous-silvery.
 - 908. A. ABNORMIS, Nilgiri Hills.
 - f. Male, upperside, glossed with dark bluish-purple.
 - a¹. Underside, forewing with mark at base of cell entire, clavate.
 - 909. A. SVAMA, Sikkim, Bhutan, Assam, Burma, Orissa, Java, Philippines.
 - b¹. Underside, forewing with mark at base of cell T-shaped, hook-shaped, disconnected (short streak with round spot beyond), or absent.
 - a². Both sexes, underside, hindwing with subbasal band entire; female, upperside, dull fuscous, the bands of the underside showing through, and with no orange markings on forewing.
 - a³. Bands of underside red.
 - a⁴. Bands distinct, prominent, on a yellow ground.
 - 910. A. LOKITA, Himalayas, Assam, Burma, Malay Peninsula, Orissa, South India, Ceylon, Sumatra, Java, Philippines.
 - b⁴. Bands blurred, indistinct, on a reddish ground.
 - 911. A. CONCANUS, South India.
 - b². Bands on underside black.
 - 912. A. ZOILUS, Andaman Isles.
 - a². Both sexes, underside, hindwing with subbasal band broken up into three well-separated ring-spots; female, upperside more or less sprinkled with plumbeous silvery scales, usually with orange markings on forewing.*
 - 914. A. ICTIS, Kashmir, N India, Ceylon.
 - 915. A. TRIFURCATA, Western Himalayas.
 - 916. A. KHURDANUS, Calcutta, Orissa.
 - 917. A. NUBILUS, Ceylon.
 - 918. A. LUNULIFERA, Sikkim.
 - 919. A. ELIMA, Western Himalayas, Karachi, Bombay, Central India.
 - 920. A. UNIFORMIS, Western Himalayas.
 - 921. A. RUKMA, Sikkim.
 - 922. A. NIPALICUS, Nepal, Sikkim.
 - 923. A. ZAFFRA, Western Himalayas.
 - 924. A. SANI, Sikkim.
 - 925. A. RUKMINI, Sikkim.

* I am sorry I am unable to give a key to the twelve last species above given. The first seven run into each other take what distinguishing character you may, the other five are, I believe, quite distinct. The key below will suffice to distinguish the latter from one another, but I fear it is insufficient to distinguish them from all specimens, from all localities, where the first seven occur, though I believe these five species to be perfectly good

903. *Aphnanus vulcanus*, Fabricius.

Papilio vulcanus, Fabricius, Syst. Ent., p. 519, n. 323 (1775); idem, id., Sp. Ins., p. 124, n. 499 (1781); idem, id., Mant. Ins., vol. ii, p. 66, n. 622 (1787); id., Donovan, Ins. Ind., pl. xxxviii, figs. 3, female (1800); id., Herbst, Pap., pl. cccii, figs. 5, 6, female (1804); *Hesperia vulcanus*, Fabricius, Ent. Syst., vol. iii, pt. 1, p. 264, n. 22 (1793); *Polyommatus vulcanus*, Godart, Enc. Méth., vol. ix, p. 644, n. 101 (1823); *Aphnanus vulcanus*, Hübn., Samml. Ex. Schmett. (1816-1841); id., Butler, Cat. Fab. Lep. B. M., p. 182, n. 1 (1869); *Amoly-jodia vulcanus*, Horsfield, Cat. Lep. E. I. C., p. 106, n. 37 (1819); *Papilio stotus*, Cramer, Pap. Ex., vol. iii, pl. ccviii, figs. E, F, female (1779); *Aphnanus stotus*, Hewitson, Ill. Diurn. Lep., p. 61, n. 2, pl. xxv, figs. 3, 4 male (1865); *A. bracteatus*, Butler, Proc. Zool. Soc. Lond., 1883, p. 147, n. 12, pl. xxiv, figs. 10, female; 11, male; id., Swinhoe, l. c., 1886, p. 428, n. 60; *A. tigrinus*, Moore, Journ. A. S. B., vol. liii, pt. 2, p. 25 (1884); id., Swinhoe, Proc. Zool. Soc. Lond., 1885, p. 134, n. 75; id., Waterhouse, Ald. vol. ii, pl. clxiii, figs. 2, 2a, female (1885); *Splendax tigrina*, de Nicéville, Journ. A. S. B., vol. liv, pt. 2, p. 49, n. 89 (1885).

HABITAT: Outer Himalayas; throughout India (except the desert tracts, Assam and Burma); Ceylon; Java.

EXPANSE: ♂, ♀, '85 to 1'30 inches.

DESCRIPTION: MALE AND FEMALE "UPPERSIDE, both wings fuscous fringed with hoary, somewhat shot with violet in the male. Forewing with four abbreviated unequal undulate fulvous striae. Hindwing with a fulvous anal patch marked with two black ocelli, the inner one bordering on a silvery lunule. UNDERSIDE, both wings sulphury, with broad fulvous fasciæ, each adorned with an interrupted median silvery streak, and bordered with a sub-undulate black line. Forewing with the fasciæ six in number; the two apical [outer-marginal] complete, parallel with the margin, the exterior one unadorned; the third almost halved; the fourth complete, increased in the costal area by a shortened striga, and thence outwardly bifid; the fifth almost halved, broken off in the anal area; the sixth basal oblique smallest. Hindwing with six fasciæ, two marginal; of which the outer one is interrupted; the second complete, archedly produced to the interior margin; the third halved, joined with the second at the middle; the fourth and fifth complete, suddenly inflected in the anal region; the sixth narrow basal contiguous to the body; the anal region fulvous, bearing two most black cellular dots."

"*A. vulcanus*, Fabricius, is prominently marked above, in the forewing of both sexes, by four short unequal waving striae of a fulvous colour: underneath, in the forewing the third band is short, tending towards and touching the second band; the fourth is complete, and has, at the costal extremity, a short accessory band, whence it appears to be bifid exteriorly; in the hindwing the third band is midial and loosely united, behind the base, with the second; but the most striking distinctive character of this species is a deep black marginal thread, which passes in an undulated course along the edge of all the broader bands." (Horsfield, l. c.)

LARVA when full-grown appears to be rather large, considering the size of the butterfly, and is $\frac{5}{16}$ of an inch in length. Colour pale green, the body of nearly equal width throughout, the fourth segment rather the widest, the constrictions between the segments hardly visible, the head large (much larger than in any lycaenid larva known to me), black, and shining.

and restricted to limited areas. The difficulty with the others probably arises from their wide distribution and the various climates to which they are in consequence subjected, and to their not being confined to any distinct geographical or climatic areas, whence much local and seasonal variability has arisen.

♂. Male, upper-side, forewing glossed with iridescent blue.

♂. Male, upper-side glossed with dark bluish-purple; female, upper-side more or less sprinkled with plumbeous silvery scales.

♂¹. Underside, both wings with all the markings broad.

♂². Underside, light orange-yellow, bands deeper orange, not traversed by a silvery line, except at anal angle of hindwing.

A. RUKMA, Sikkim.

♂³. Underside pale or dull sulphur-yellow.

♂⁴. Underside, bands darker than ground, somewhat purpurascens-yellow.

A. NIPALICUS, Nepal, Sikkim.

♂⁵. Underside, bands concolorous with ground.

A. ZAFFRA, Western Himalayas.

♂⁶. Underside dull Indian-red, bands darker red.

A. SANI, Sikkim.

♂. Underside, both wings with all the markings very attenuated.

A. RUKMINI, Sikkim.

hardly hidden beneath the second segment, being quite visible from in front; the second segment marked with a large shining blackish patch which is divided in the dorsal line by a whitish line, with two similar but broader lines on each side; the third segment is anteriorly similarly marked: there is a double line dorsal and subdorsal dark green line, and a lateral single line; the three posterior segments are marked above much as are the second and third; the twelfth segment bears two prominent blackish pillars, from the upper edge of which spring several strong bristles. When frightened, the larva protrudes a somewhat long pale green tubercle from each pillar, which bears at its apex a few fine hairs. The pillars and tubercles are larger in this species than in any other known to me except *Curetis thetis*, Drury. The mouth-like opening in the dorsal line on the posterior edge of the eleventh segment is very conspicuous under a magnifying glass. The whole body is finely shagreened, and the lateral edge and anal segment bear a fringe of numerous somewhat stout colourless hairs. The larva in Calcutta feeds on *Clerodendron siphonanthus*, R. Br. PUPA, always found in a spun-up leaf or leaves, is either green or dark brown, of the usual lycænid shape, smooth and shining, the head rounded, the thorax anteriorly slightly humped and angled at the sides, the abdomen gradually tapering posteriorly.

There is much of interest in the habits of the larvæ of *A. vulcanus*. They are most carefully tended by two somewhat small species of black ants, which Dr. A. Forel of Geneva has identified for me as *Pheidole quadrispinosa*, Jerdon, and *Crematogaster*, n. sp. (*nicevillei*, Forel, MS.) A full dozen of these ants may be seen all at once on the body of a full-grown larva, and many others round about, so covering the larva that little else but ants is visible; the larvæ do not seem to mind the ants at all. The larvæ pass most of their time in rolled-up leaves (only issuing forth when hungry to eat the surrounding leaves, always returning to their shelters when the meal is over), several in each shelter, four being the greatest number I have seen in any one shelter. Larvæ of very different ages are to be found in the same shelter. Some of these nests are formed of two separate leaves spun together with silk, but usually the outer edges of a single leaf are spun together. When about to pupate, the full-grown larva spins a cocoon between two leaves. It is very slight and both ends are left open, it is made of white silk, the entire structure being exactly like the nests certain green spiders spin between leaves in which they lie in wait for prey. The ants which attend these larvæ make a nest in the stem of the plant on which the larvæ feed, often in a single branch of the plant. There is a only one hole to the nest, far too small for a full-grown *Aphnæus* larva to enter, but the ants take the small larvæ inside.

A. vulcanus is one of the widest spread as well as the commonest species in the genus. In Indian specimens I have seen but few males shot with blue on the upperside as described by Dr. Horsfield; very often the forewing has only three abbreviated fulvous bands on the upperside, sometimes none at all; the third and fifth fasciæ from the outer margin on the underside of the forewing are sometimes constricted in the middle, often entire. The breadth of the bands also differs very widely, and their fulvous colour is sometimes light, sometimes very dark, almost ferruginous. Two of these varietal forms have been described as distinct species, but I cannot admit them to be such, as the characters on which they are based are quite inconstant, and the specimens displaying them are not confined to any geographical region. I append their descriptions as foot-notes.* The female of *A. vulcanus* may be known from

* *Aphnæus bracteatus*, Butler. HABITAT: Mhow, October to June. EXPANS: Male, 1½; female, 1½ inches. DESCRIPTION: "Allied to *A. vulcanus*, Fabricius (the male of *A. citolus*, Cramer), from which it may be distinguished as follows:—MALE, UPPERSIDE, both wings with the tawny bands almost as well developed as in the female of that species. Hindwing paler, showing the markings of the underside as dark grey bands, the tawny submarginal streak continued to apex. UNDERSIDE, both wings creamy-white, not so sordid as in *A. vulcanus*, the bands narrower and of a darker duller red colour so as to show up the silver spangles distinctly. the fifth band on the forewing free, not united to the sixth as in *A. vulcanus*. Hindwing with the large orange anal patch wanting, so that the elbowed continuation of the fifth or submarginal band is distinctly seen; the abbreviated fourth band is also free, not united to the fifth. FEMALE, UPPERSIDE, forewing tawny excepting along the inner margin, and crossed by black bands corresponding with those of the underside. Hindwing paler than in *A. vulcanus*, showing the markings of the underside as dark grey bands, the tawny submarginal streak continued to apex and for the most part white. UNDERSIDE, both wings as in the male.