

REVISIONAL NOTES ON THE GENUS *HELIOPHORUS*
(*LYCÆNIDÆ*) WITH DESCRIPTIONS OF NEW FORMS

BY

N. D. RILEY

British Museum (Natural History), South Kensington

(*With twenty-eight text-figures*)

The best attempt at a complete revision of this essentially Himalayan genus hitherto published is that by Fruhstorfer (1918). It is accompanied by photographs of the ♂ genitalia of certain species, and is based upon a study of these parts. In the light of a fuller examination of the ♂ genitalia, however, certain of his conclusions appear no longer tenable, and as, further, he misidentified several of the species concerned, the following notes, which, it is hoped, will render these very beautiful little *Lycænidae* more readily and certainly identifiable, may not be out of place.

Col. Evans has recently (1927) published an excellent key of the Indian representatives of this genus, amending his earlier key (1925) after seeing the material in the British Museum and making full use of the information on synonymy that had since become available. The following notes are in the main in agreement with his revised key. Col. Evans quite rightly removes *Heliophorus* from the *Theclinæ* and associates it with the *Coppers* (*Heodes*), with which, as pointed out by Fruhstorfer, it is indeed very closely allied.

In writing these notes I have been very greatly assisted by the material placed at my disposal by Major-General Sir Harry Tytler and by Mr. G. T. Bethune-Baker. But for the loan of preparations made some years back by Mr. Bethune-Baker *Heliophorus bakeri* might yet have remained unrecognized.

KEY TO THE SPECIES OF *Heliophorus*

1. (2) Underside dull ochreous with very wide orange marginal band and 2 prominent black spots, 1 costal, the other in 1c, of hindwing ... *sena.*
2. (17) Underside bright ochreous, red marginal band clearly continued, less broadly than on hindwing, to apex of forewing; no prominent black spots; discal line represented in areas 2-5 of hindwing by white splashes.
3. (8) Upperside deep shining purple.
4. (5) Purple area occupying less than two-thirds of forewing; oblique subapical red bar sometimes present ... *epicles* ♂.
5. (6) Same area occupying much more than two-thirds of forewing.
6. (7) Forewing below much suffused with orange-red ... *ila* ♂.
7. (6) Not so, uniformly ochreous ... *kohimensis* ♂.
8. (3) Upperside deep brown, with red markings.
10. (13) Red markings consisting of an oblique subapical bar on forewing, and marginal band on hindwing, only.

11. (12) Underside forewing red marginal band extending to beyond vein 6 ... *epicles* ♀.
subsp. *indicus*, *chinensis*,
phænicoparyphus and
matsumuræ.
12. (11) Same band barely extending beyond vein 5; red markings of upperside very dull, not bright red ... *kohimensis* ♀.
13. (16) Red markings of forewing forming large circular discal patch, but not extending to base.
14. (15) Hindwing upperside without discal red scales ... *epicles* ssp. *sumatrensis* ♀
15. (14) With discal red scales ... *epicles* subsp. *epicles*
and *hilima* ♀♀.
16. (13) Forewing red markings extending to base; hindwing also mostly red ... *ila* ♀.
17. (18) Underside ochreous with red marginal band of equal width on both wings; outer two-thirds of hindwing above grey-blue; tail long, white ... *kiana*.
18. (17) Underside forewing with, at most, a very narrow red marginal line; no white splashes on hindwing disc beneath; faint discal lines and lines at cell ends generally traceable on both wings, but often absent.
19. (24) Hindwing with a tooth only, no tail, at vein 2; ♂ above non-metallic blue; ♀ as usual in genus.
20. (21) Underside discal lines straight, prominent (especially on forewing), dark; forewing disc in both sexes flushed orange ... *oda*.
21. (20) Discal lines absent, or if faintly indicated then consisting of a series of fine arched lines most readily seen in areas 2 and 3 of forewing ... *bakeri*.
22. (23) Hindwing underside red marginal band evenly irrorated with white scales throughout. ♂ upperside forewing at least two-thirds blue ... *bakeri* f. *vernalis*.
23. (22) Hindwing marginal band not so. ♂ upperside forewing basal half only blue ... *bakeri* f. *bakeri*.
24. (19) Hindwing distinctly tailed at vein 2.
25. (50) Upperside with at least basal metallic scaling, generally for the most part some shade of brilliant metallic blue, green, bronze, or coppery—
MALES.
26. (27) Upperside golden coppery ... *brahma* ♂.
27. (28) Upperside brassy-green ... *hybrida* ♂.
28. (37) Upperside silvery blue.
29. (34) Silvery blue barely extending beyond cell-end ... *androcles rubida* ♂.
30. (31) Underside hindwing marginal red band entirely irrorated with white ... *a. rubida* f. *gemma* ♂.
31. (30) Same band irrorated with white only on inner half.
32. (33) Hindwing upperside with only two narrow red lunules ... *androcles tytleri* ♂.
33. (32) Hindwing upperside with five wide lunules ... *androcles rubida* ♂.

34. (29) Silvery blue extending directly beyond cell-end for (as a rule) at least 2 mm.
35. (36) Underside marginal red band entirely and evenly irrorated with white scales *androcles coruscans f. langii* ♂.
36. (35) Same band not so irrorated *androcles coruscans* ♂
37. (44) Upperside deep blue.
38. (41) Upperside hindwing blue area extending narrowly into area 1c, not reaching marginal red lunule broadly, if at all.
39. (40) Underside hindwing marginal band entirely and evenly irrorated with white scales; no discal line either wing *androcles moorei* ♂
40. (39) Same band not so irrorated; discal lines present *androcles moorei f. scintillans* ♂.
41. (38) Upperside hindwing blue area occupying practically the whole of area 1c, and broadly reaching red marginal lunule.
42. (43) Underside hindwing marginal band entirely and evenly irrorated white scales *saphir saphir* ♂.
43. (42) Marginal band not so irrorated. A larger form *saphir f. marica* ♂.
44. (45) Upperside silvery green *androcles androcles* ♂.
45. (44) Upperside forewing at least basally frosted with green scales.
46. (47) Frosted area moderately dense, occupying approximately basal half of forewing *tamu tamu* ♂.
47. (46) Frosted area much less; sometimes represented by a few scales only.
48. (49) Hindwing upperside without marginal red lunule in area 3 *tamu kala* ♂.
49. (48) With red lunule in area 3, and sometimes also in 4 *tamu eventa* ♂.
50. (25) Upperside without metallic colouring, but with prominent red or orange markings—FEMALES.
51. (54) Hindwing underside red marginal band evenly irrorated throughout with white scales.
52. (53) Underside without discal lines *saphir f. saphir* ♀.
53. (52) Discal lines present *androcles* spring or dry season forms ♀.
54. (51) Hindwing underside marginal band not so irrorated.
55. (58) Upperside marginal lunules narrow—less than 1 mm. wide in area 2; fine grey marginal line continued into area 5.
56. (57) Hindwing underside discal lines prominent, marginal red band narrow, moderately even, the white lunules bordering it inconspicuous *tamu* ♀.
57. (56) Discal lines almost absent, marginal band unusally broad (at least 2 mm. at narrowest point), very uneven between vein 3 and 7, white lunules large and prominent *saphir f. marica* ♀.

58. (55) Upperside marginal lunules wider, fully 1 mm. wide in area 2; grey marginal line only present in areas 1c and 2.
59. (60) Hindwing upperside marginal band ending at vein 6, and not noticeably wider there than elsewhere ... *androcles* ♀.
60. (59) Same band noticeably wider at vein 6 than elsewhere, and always continued to vein 7, sometimes further ... *brahma* ♀.

SYSTEMATIC ACCOUNT OF THE SPECIES

GROUP I.—Clasps simple, without teeth or strong spines.

1. HELIOPHORUS SENA Koll. 1848

Ilerda cadma Dbl. List Lep. B.M. (nom. nud.) 1847.

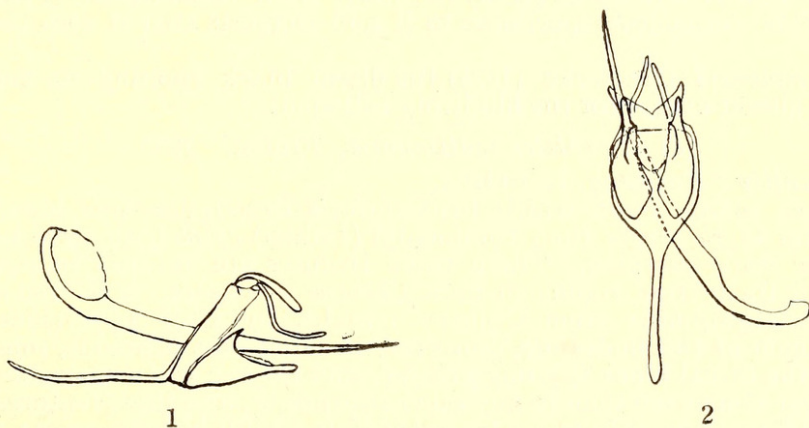
Type locality: 'In Himalaya, Massuri, Belaspur.' Obtained in both places by Hugel.

Fruhstorfer (1918) gives a very good photograph of the ♂ genitalia of this species, showing well the short, stout and bluntly terminated clasps. *H. sena* has the most simple ♂ genitalia of any species in the group; its geographical range (Chitral to Kumaon) is distinctly different from that of any other species; and it is stated to frequent more open ground than the other species and to have rather different habits. The larva feeds on *Rumex*. It is in fact a somewhat isolated form.

2. HELIOPHORUS EPICLES, Godt. 1823

Type locality: Java.

Fruhstorfer (1918) gives a good figure of the genitalia of this species, taken apparently from a Formosan specimen. He is also responsible for most of the named forms.



Outline drawings of ♂ genitalia.

FIG. 1.—*Heliophorus epicles indicus*, lateral aspect, from the left.

„ 2. „ ventral aspect.

Outline drawings of the ♂ genitalia, showing lateral and ventral aspects (Figs. 1 & 2), and made from dissections of a ♂ from Darjeeling, are given for the sake of comparison with the next three species. The long, narrow distal portion of the valve in particular should be noted.

(a) *H. epicles indicus*, Fruhst. 1908

Type locality: Originally given (1908) as Sikkim, Bhutan, Assam, Annam. Modified by Fruhstorfer (1912) to Sikkim to Assam, Bhutan, Kumaon and Burma; and again (1918) to Kumaon to Upper Burma. Sikkim should be taken as the type locality.

Fruhstorfer's description appears to have been based upon dry season (? early spring or late autumn) specimens from Sikkim. At the same time he described

the commonest (? wet season form) as *f. latelimbata*, and as *ab. rufonotata* males with red subapical patch on the forewing upperside. The characteristics distinguishing *f. indicus* and *f. latelimbata* apply throughout the genus. In the former, as in spring examples of other species, the marginal bands on the underside are narrow and almost completely and evenly irrorated with white scales; on the hindwing upperside the marginal band is very fully developed. In *f. latelimbata*, as in the summer broods of the other species also, the marginal red band of the upperside of the hindwing is much reduced, sometimes almost absent, but, on the underside, wide and well developed and only irrorated with white scales in its outer half.

Ab. rufonotata is a very common form among summer brood examples. Fruhstorfer remarks that it occurs in *f. indicus* and *f. latelimbata*, yet, although I have examined some hundreds of specimens from India, Burma and Assam, I only know of one case of its occurrence in *f. indicus*, a ♂ from Sikkim. About half the *latelimbata* examples exhibit the *rufonotata* character in Sikkim, Bhutan and Assam, but it is rarer in Burmese specimens.

H. epicles indicus occurs from Kumaon to Burma (as far south as Tenasserim at least), in the Middle Andaman, W. Siam and Yunnan. Fruhstorfer (1908) stated that it also occurred in Annam, but later (1912) referred Annamese specimens to the next subspecies.

(b) *H. epicles chinensis*, Fruhst. 1908

Type locality: West China.

The brief diagnosis runs: 'Separable from *indicus* by the more reduced, strongly narrowed subapical transverse red band of the forewing of the ♀.' This character holds good in most cases. To it should be added that the colour of this band is duller than in *epicles indicus*, and that the blue areas of the upperside in the male are less extensive, especially on the hindwing. It is at best however but a feebly marked race and may well prove untenable when further material comes to hand.

It is in the B.M. from Chia-ting-fu (Leech Coll.), Kiang-Si and Siao-lou (Oberthür Coll.). Draesecke (1925) records it from Omei-Shan. Fruhstorfer (1912) refers Annamese specimens to it and suggests that it also occurs in Tonkin.

In *ab. stotzneri* Draesecke (1925) the discal black spotting on the under surface is absent except for the hindwing cell-spot.

(c) *H. epicles matsumurae*, Fruhst. 1908

Type locality: Formosa, L. Suisha.

Formosan males, upon which Fruhstorfer's description was based, were said by him to be larger than continental (Indian) *epicles*, to have less blue and wider dark margins. These three features are far too inconstant to distinguish them from Indian or even Chinese examples. The females are quite indistinguishable from Chinese females by their uppersides. The ground-colour of the underside, however, is much less ochreous, much more greenish, the discal black spotting greater, and the red of the marginal bands much duller vinous red than in any other subspecies, and these features should serve to differentiate *matsumurae* (= *sakai* Mats., 1910) in both sexes; they are constant in a series of 10 ♂♂ and 6 ♀♀ derived from a number of different localities.

(d) *H. epicles phænicoparyphus*, Holl. 1878

Type locality: Hainan.

Under this name should be united both Hainanese and South Chinese specimens. In the ♂ they are well characterized by the pronounced development of the red sub-apical bar, the rather light purple, and by the wide and almost complete red hindwing margins; the ♀ resembles strongly marked Indian and Burmese *epicles*, but the sub-apical red patch of the forewing is occasionally extended almost to the margin along veins 2, 3 and 4. The underside ground-colour is rich ochreous, and very free of spotting—Hainan, Hong Kong, Ting-Wa-Shan.

(e) *H. epicles sumatrensis*, Fruhst. 1908

Type locality: W. Sumatra, Pad. Bovenland.

The ♀ is barely distinguishable from Javan *epicles* (see key), resembling best the E. Javan subspecies *hilima*. The ♂ differs from Javan *epicles* only in

having much less red on the forewing, or none at all; about 50 per cent of the examples examined clearly show it, the others having only a trace or none.

(f) *H. epicles epicles*, Godt. 1823

Type locality: Java (W. Java teste Frushtorfer).

The ♂ is almost identical with *phænicoparyphus* of Hainan and S. China, the red sub-apical patch being, however, perhaps rather more diffuse, and broader, very rarely suffused blackish and inconspicuous. The ♀ is at once recognizable by the extension of the sub-apical bar to form a large orange-red rounded discal patch occupying the greater part of the wing-surface; the disc of the hindwing is also often much invaded by orange-red. On the forewing the orange area extends broadly across vein 2 almost as far as vein 1.

(g) *H. epicles hilima*, Fruhst. 1912

Type locality: E. Java, Mt. Tengger.

In both sexes smaller than *epicles epicles*, male otherwise the same; ♀ with reduced and rather duller orange-red patch extending only diffusely across vein 2 about centre of area 1b.

Fruhstorfer stated (1912) that the species occurs in the Celebes and that he saw it commonly on the Pic of Bonthain, but this has not yet been confirmed.

3. *HELIOPHORUS KOHIMENSIS*, Tytler. 1912.

Type locality: Naga Hills, Kohima.

Several constant features serve to distinguish the males of this species from those of *H. epicles indicus*. Chief amongst these is the great extent of the violet suffusion of the upperside, and its much duller, softer tone. On the

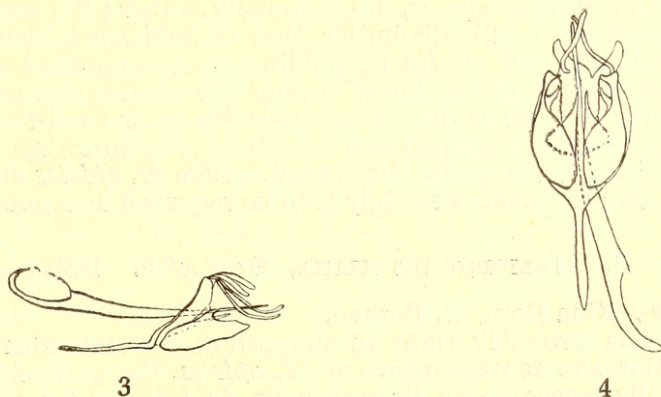


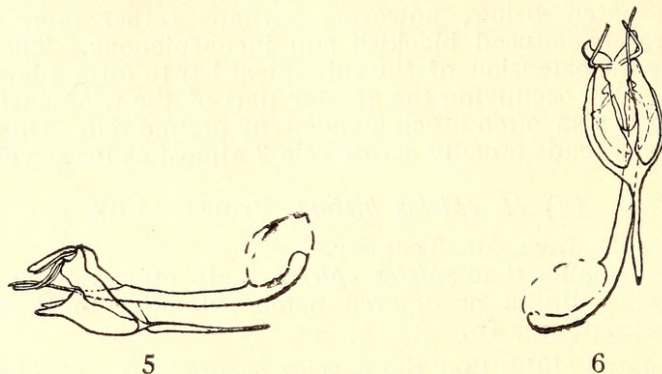
FIG. 3.—*H. kohimensis*, lateral aspect, from the left.
,, 4. ,, ventral aspect.

underside the red marginal band of the forewing does not reach the apex so fully as in *epicles indicus*, the ground-colour is paler, and the discal lines of the hindwing (black in area 7, white in 4 and 5) are further from the marginal red band. The only apparently constant characters by which to distinguish the females are the duller red, almost orange colour of the upperside markings and the shorter (than in *epicles*) red marginal band on the underside of the forewing; in addition, the outer edge, as well as the inner, of the forewing subapical patch seems always to be sinuous, and the red lunules of the hindwing border on the upperside, though forming a continuous waved band, do not as a rule extend so far from the margin as in females of *epicles indicus*.

The ♂ genitalia (Figs. 3 and 4) are of the *epicles* type, but present many clear differences, mainly in the shape of the claspers, that should be readily appreciated from the accompanying drawings.

A solitary ♂ of this species was obtained at Boac-Kan, Tonkin, in January 1927, by Delacour and Lowe. Formerly it was known only from the Naga Hills, Assam, where it flies together with *epicles*.

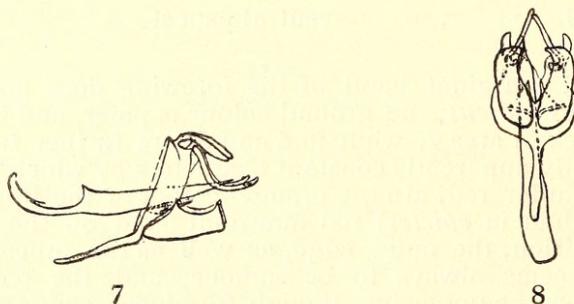
4. HELIOPHORUS ILA, de Niceville. 1895.

H. epicles nila, Fruhst. (1918) ; *Ilerda nila*, Seitz, ix, p. 933, 1923.*Type locality* : Battack Mts., N. E. Sumatra.On the evidence of a very poor preparation of the ♂ genitalia, which he reproduced, Fruhstorfer (1918) sinks this species as a Sumatran race of *epicles*,FIG. 5.—*H. ila*, lateral aspect, from the right.

,, 6. ,, ventral aspect.

misspelling the name *nila*, in which he is followed by Seitz (1923). If it is to be allied with any other species it should be with *kohimensis* Tytler rather than with *epicles* Godt., as may be judged by the resemblances of the claspers in those two species. The uppersides of the males of *kohimensis* and *ila*, in the extent of their purple areas, are extremely similar ; the female uppersides on the other hand are totally dissimilar, that of *kohimensis* being deceptively like *epicles indicus*, that of *ila* resembling an exaggerated *epicles epicles*, in which not only most of the forewing, but the greater part of the hindwing also is bright orange. *Ila* is always recognizable by the red-tinted underside, and the wide and even marginal red border of the forewing underside. It occurs commonly in Padangsche Bovenland, where *H. epicles* also flies, and in view of all the circumstances certainly is to be regarded as a good species.

5. HELIOPHORUS KIANA, Gr. Smith. 1889.

Type locality : Kina Balu, N. Borneo.Fruhstorfer was probably right in suggesting that this aberrantly marked species is the Bornean representative of *H. epicles*, the underside markings of which are readily traceable on its underside, in spite of the whitening of theFIG. 7.—*H. kiana*, lateral aspect, from the left.

,, 8. ,, ventral aspect.

greater part of the normally red border. The development of blue on the upperside of the hindwing in the ♂, and of grey-blue in the female, marks a considerable departure from the normal appearance of *Heliophorus*, and is probably to be explained by association with the similarly coloured *Theclinæ*

of Mt. Kina Balu, such as *Zeltus etolus* Fab., *Sinthus amata* Dist. and *S. skapani* Druce, *Marmessus surindra* Druce, *Virgarinia scopula* Druce and others.

Except for the expanded and truncate distal portion of the claspers, the genitalia are essentially like those of the other members of the *epicles* group of *Heliophorus*.

6. HELIOPHORUS BAKERI, Evans.

Heliophorus oda bakeri (Riley MS.), Evans, Ident. Ind. Butt. p. 158. 1927.

Ilerda eos? Doubl. List Lep. B.M. ii. p. 25, 1847 (nom. nud.).

Type locality: Murree Hills.

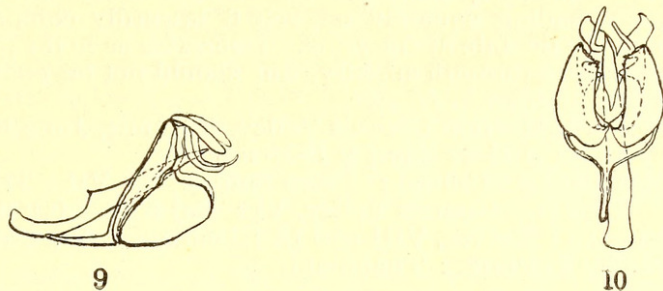


FIG. 9.—*H. bakeri*, lateral aspect, from the left.

„ 10. „ ventral aspect.

(a) Wet season form *bakeri*.

♂. Upperside, both wings rich deep blue, non-metallic, rather silky, with very wide black margins; cilia black, tipped with pale grey between the veins. *Forewing* blue area occupies the whole of cell, three-fourths of areas 1a and 1b, basal two-fifths of area 2, one-third of area 3, and is represented by a few scattered scales just beyond cell-end, *i.e.* it occupies little more than basal half of wing: its outer edge is very uneven, there being a strong projection in area 1b and another on vein 4. *Hindwing* patch leaving a black margin almost exactly 2 mm. wide all round, except along costa, where it is somewhat wider; narrow deep red lunules are present against margin in areas 1c and 2, but they are heavily obscured with black scales; hind margin slightly dentate at extremities of veins 1b–5, but no tail present. *Underside*, both wings grey-green ochreous; cilia as above. *Forewing* with a faint line at cell-end and discal line faintly present in areas 2 and 3, rarely very faintly indicated also in area 4; a prominent black tornal spot, inwardly bordered with white, and similar, narrower, progressively smaller spots in 2 and 3; a very narrow black marginal line. *Hindwing* with a black point in cell, another below it in 1c; a very faint line across cell-end, and a very indefinite (or absent) discal line; border deep, clear red, moderately dentate outwardly, comparatively even inwardly; white lunules bordering its inner edge prominent and edged with dusky; outer white crescents narrow and not heavily surrounded with black; a very narrow marginal black line.

♀. *Upperside*, both wings dark brown; cilia as in ♂, or slightly darker. *Forewing* with a very dark spot at cell-end, immediately followed by a rather narrow, outwardly evenly curved, inwardly angulate, crescentic orange band ending in a blunt point a little short of vein 2. *Hindwing* with a series of narrow, but strongly arched lunules in areas 1c to 4 (or 5) of a more reddish orange than band on forewing. *Underside* as in the male.

Type ♂ from Murree, 15. VIII. 86, in B.M.; ♀, Murree, VIII. 1919 in Gen. Tytler's collection.

(b) Dry season form *vernalis*.

♂. Differs from typical *bakeri*, as described above, as follows: *Upperside* both wings with much more extensive and brighter blue areas; cilia much paler. *Forewing* blue patch extends into costal area, reaches to within 4–5 mm. of apex, and about 1 mm. of anal angle, its outer edge evenly curved,

but slightly indented at each vein, *Hindwing* black border only 1-1.5 mm. wide except along costa; red marginal lunules (in 1c and 2) less obscured with black, rather flattened, not strongly arched. *Underside* clearer and rather brighter ochreous, the discal lines and those closing cells virtually absent; narrow marginal black line very faint; cilia paler. *Forewing* anal black spot slightly smaller, those in areas 2 and 3 much smaller and mainly replaced outwardly by reddish. *Hindwing* red border densely irrorated with white, the white lunules bordering its inner edge reduced and almost devoid of their dusky edging, the outer white crescents similarly modified, very inconspicuous.

♀. Differs from the typical ♀ on the *upperside* in having the *forewing* orange subapical band slightly paler, approximately twice as broad, and just reaching vein 2. *Hindwing* marginal red lunules fused into a solid band, running up to, and ending squarely on, vein 6, inwardly comparatively even, outwardly moderately dentate at the veins. *Underside* as in the ♂. The orange band of forewing shows through slightly, but should not be confused with the orange flush in this position in *H. oda*.

Types, ♂ and ♀ in B.M. from Goorais Valley, Kashmir, June 1887.

Length of forewing: ♂ 14-17 mm.; ♀ 15-18 mm.

Localities: KASHMERE: Chitral: Utzen Nullah, VI. VII; Tarben Nullah, 8,000 ft. Goorais Valley, VI; Kaj Nag, 7,000 ft. VI.

PUNJAB: Murree, VIII and IX; Dalhousie, V; Campbellpor.

N. W. F. PROV.: Thandiani.

H. bakeri shows little variation apart from the seasonal differences alluded to above. It is most easily confused with *H. oda*, under which species will be found a note on the characters that serve most readily to distinguish the two. Col. Evans has recently (1927) published a brief diagnosis of this species (under the name of *H. oda bakeri*, although *bakeri* and *oda* are unquestionably distinct species), in the belief that my description had already appeared. *Bakeri* is therefore to be attributed to him.

GROUP II.—Claspers slightly or strongly inflated; tegumen with at least a protruberance in upper half laterally, directed backwards.

7. HELIOPHORUS ODA Hew. 1865.

Type locality: 'India'. Simla should be taken, as Hewitson's specimens most probably were from that district.

♂. *Upperside*, both wings rich deep blue, non-metallic, rather silky, with wide black margins; cilia pale grey, darker at extremities of the veins.

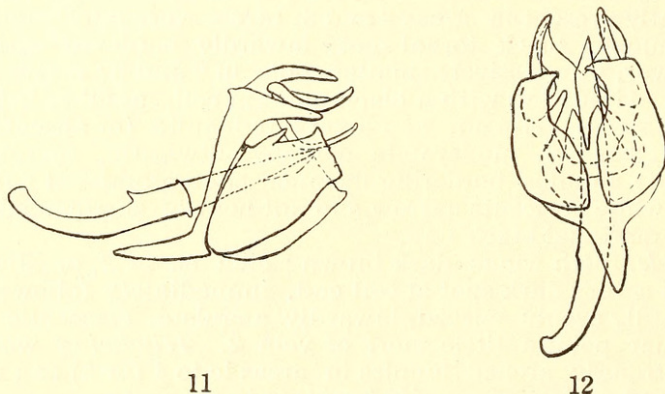


FIG. 11.—*H. oda*, lateral aspect from the left.

„ 12. „ ventral aspect.

Forewing black margin narrows from about 6 mm. at apex to 1.5 at anal angle, and extends narrowly along costa; outer edge of blue area evenly curved but somewhat indented at veins 2 and 3. *Hindwing* black margin occupies whole of costal area above vein 6, except for a small basal portion of area 6, and tapers thence strongly to margin at vein 2, continuing as a marginal black line

interrupted by the red submarginal lunules; prominent and strongly arched red submarginal lunules are present in 1c and 2 (and indicated sometimes in 3), that in 1c being noticeably expanded at anal angle; they are not obscured by black scales. *Underside*, as described for *H. bakeri* but with the following differences:—Ground-colour brighter ochreous. *Forewing* line at cell-end more sharply defined; discal line prominent, and continued to costa; tornal spot surmounted by a series of very shadowy, often reddish tinged spots, which can be traced almost to costa; margin narrowly tinged with red; the lower discal area with a distinct and extensive orange flush. *Hindwing* discal line obvious, but not so prominent as on forewing; outer two-thirds of red border irrorated with white scales, inner third clear; marginal line red; margin rather more dentate, especially at vein 2, but no tail present.

♀ *Upperside*, both wings dark brown; cilia as in ♂. *Forewing* with a dark bar at cell-end immediately followed by a broad (3 mm.) orange subapical band, the inner edge of which is almost straight but not sharply defined, in line with bar at cell-end; its outer edge runs straight from vein 7 to vein 4, where it is sharply angled to run parallel with the margin to vein 2. *Hindwing* lunular band equally wavy on both sides from anal angle to vein 4, thence broadening a little and thickening to vein 6, above which it is represented only by scattered scales. *Underside* as in the ♂.

Length of forewing:—♂ & ♀, 16-17 mm.

A full description is given of this species in the hope this may prevent further errors of identification in the future. *Bakeri*, *oda*, the Chinese species *saphir* and the Sikkim *moorei* are superficially very much alike in both sexes and have in the past been hopelessly confused. Examination of very long series of *bakeri* and *oda* indicates that the surest guide for their separation is furnished by the markings of the underside, particularly the discal line of the forewing. This seems quite reliable. With regard to the males, confusion may possibly arise between *oda* and *bakeri* f. *vernalis* but the arched hindwing lunule in the former is quite different from the broader flattened lunule of the latter. The width of the black border in the ♂, said by Evans to distinguish the species, only applies to the wet season form of *bakeri*; in *oda* I cannot distinguish two seasonal forms, and all the specimens I have examined have black borders of the same width as those of the spring form (*vernalis*) of *bakeri*. The female uppersides are not readily distinguishable, but it would seem that strongly arched hindwing red lunules only occur in *bakeri* in the wet season, and are then accompanied by a very small subapical forewing band, whereas in *oda*, the subapical band is invariably very large. The hindwing in *bakeri* is noticeably more rounded than in *oda*.

The ♂ genitalia (see Figs. 11 and 12) are abundantly distinct. The distal portion of the clasp in *bakeri* is evenly rounded, as in many of the species of the next group, whilst in *oda* it is expanded and squarely cut off after the fashion of *kiana*; the shape of the upper portion of the tegumen of *bakeri* is like that of *epicles*, *kohimensis*, *kiana* and *sena* in being devoid of the strong lateral lobes that characterize *oda* and the species of the *androcles* group. The ventral aspects of the claspers also emphasize the affinity of *oda* with the *androcles* group, and of *bakeri* with the *epicles* group, but the relative length of the penis in both species would associate them with the *androcles* group rather than with *epicles*.

Localities: CASHMERE: Chumba State.

PUNJAB: Bushahr: Rala, VI, VIII; Kulu: Chini, VI, etc., Simla: Simla, Narkanda.

UNITED PROVINCES: Dehra Dun: 'Mussorie and Nag Tiba, only on bare spots in VI, V and X'; Garwhal; Kumaon; Naini Tal.

8. HELIOPHORUS BRAHMA, Moore. 1857.

Type locality: Darjeeling.

The brilliant metallic upperside colour of the ♂, changing from fiery red to greenish bronze serves to distinguish this species at once. The female is less easy to recognize, but has a brighter red subapical patch and hind wing band than its nearest allies, and the latter is extended practically to the apex of the wing and is more solid-looking anteriorly than in *androcles*, *tamu*, etc.

Autumn specimens from Assam (August–November) are consistently larger than those from Kumaon or Sikkim, and might be considered a good race were it not for the fact that in March–May they are replaced by a form exactly like that of Sikkim. They agree with Chinese examples in having a rather more

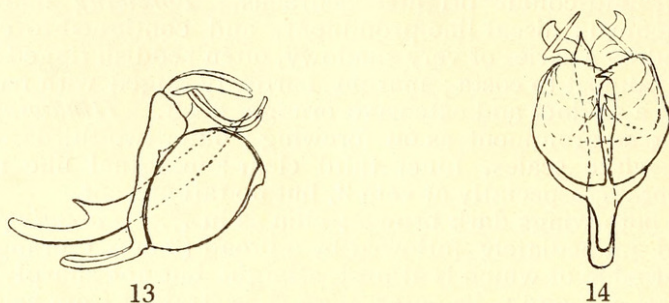


FIG. 13.—*H. brahma*, lateral aspect from the left Teeth on distal edge of claspers not shown.

„ 14.—*H. brahma* ventral aspect.

fiery colour and the marginal band of the hindwing above fairly well indicated in area 6. In examples from farther south (Ruby Mines, etc.) the red band is continued prominently into area 6 and indicated also in 7. In both Assamese and Burmese specimen there is, as a rule, a fairly prominent black spot at the anterior edge of area 7 on the underside of the hindwing, above the cell spot, and it is often produced towards the cell by a dusky line. This spot and line are rarely discernible in Himalayan examples.

The ♂ genitalia exhibit the strongly inflated claspers that characterize this and the new two species, but the upper portion of the tegumen, though moderately expanded, is devoid of the large projection to be seen in *androcles*, *tamu* and even in *oda*. Fruhstorfer (1918) gives a very good figure of them.

9. HELIOPHORUS HYBRIDA Tytler. 1912.

Type locality: Kohima, Naga Hills, Assam.

In addition to the two specimens in General Tytler's collection there is a male from Darjeeling in the British Museum, and another from the Naga Hills in Mr. Joicey's collection. Possibly also the two specimens mentioned by De

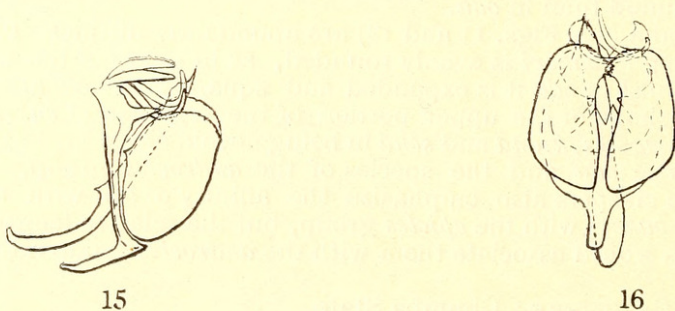


FIG. 15.—*H. hybrida*, lateral aspect of ♂ genitalia.

„ 16. „ ventral aspect.

Niceville (1890, p. 330) should be placed here as well. The four specimens I have seen agree exactly in external features. They are intermediate in colour and markings between Assamese *androcles* and *brahma*, the metallic colouring of the upperside being bronze, but decidedly greenish. The red marginal band on the hindwing upperside is half the width of that of *brahma*, slightly broader than in the wet season *androcles* from Assam and Darjeeling, and it extends continuously up to vein 6.

The ♂ genitalia of the single specimen examined are almost exactly intermediate between those of *androcles* and *brahma*, which will be appreciated from the figures (Figs. 15 and 16) more readily than otherwise (the profile drawing

of *brahma* is inaccurate in that it does not show the distal 'saw-edge' of the clasper). The outline of the claspers seen in profile, and of the upper halves of the tegumens should be carefully compared.

In the present state of knowledge it is not possible to decide whether these insects are hybrids, as suggested by Tytler, or not. The fact that four (possibly six) are known to exist rather militates against that view, but the precision with which *hybrida* shows the exact middle line between *brahma* and *androcles* both in external and internal characters (so far as ascertained) strongly suggests a hybrid.

10. HELIOPHORUS ANDROCLES, Dbl. and Hew. 1852.

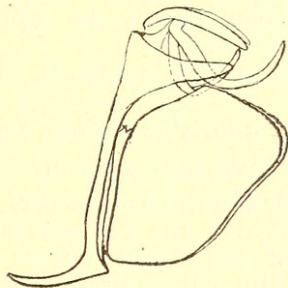
Type locality : Sylhet, Assam.

The various subspecies of *androcles* have been at one time or another very much confused. The W. Himalayan *coruscans* has been generally identified with the Assamese *androcles*, or with *tytleri* (see below), even Swinhoe so lately as 1911 repeating this mistake. Fruhstorfer (1918) recognized it as a good subspecies, but treated the connecting link, *moorei* of Darjeeling and Sikkim, as a distinct species, relying apparently upon a very poor preparation of the male genitalia. Many authors, including even Draesecke so recently as 1925, have regarded *moorei* as conspecific with the Chinese species *saphir*.

I regard *androcles* as consisting of five distinct sub-species, three of which have well marked seasonal forms. Some of these seasonal differences were recognized by Swinhoe (1911). Swinhoe's descriptions, so far as they go, are moderately accurate, but his figures are so misleading that I have considered it advisable to refer to them in detail (see p. 401).

(a) *H. androcles coruscans*, Moore

This is the subspecies of the W. Himalayas, being found at Mussooree, Kangra, Kulu, Rala, Almorah, Kali, Busahir, etc. It occurs in two well-marked seasonal forms (w.s.f. *coruscans* and d.s.f. *langii* Moore), both of which are, in the ♂, pale silvery blue on the upperside, and to be distinguished from the



17

FIG. 17.—*H. androcles coruscans*, lateral aspect of ♂ genitalia.

similarly coloured Assamese *tytleri* by the fact that this blue colour extends well beyond the cell on the forewing. The seasonal differences are those common to other species in the genus, i.e. w.s.f. upperside with narrow red hindwing lunules, usually in areas 1c and 2 only in ♂, and a narrow marginal red line in ♀, d.s.f. with wider and longer red marginal line in both sexes and underside red marginal band completely irrorated with white scales in both sexes in the d.s.f., only partially so in w.s.f.

(b) *H. androcles moorei*, Hew.

The typical form of this subspecies, the range of which extends from Sikkim and the neighbouring region of Tibet to a point just north of Burma (Seinghku valley), appears to be excessively rare, which may account to some extent for the failure of many authors to recognize it. It is the dry season form, and it is characterized by an almost immaculate yellow underside except for the completely frosted marginal band of the hindwing; only the unique ♂ type is known to me. The black borders on the upperside are very much wider than in any

saphir I have seen. The much commoner wet season form may be described as

f. *scintillans*, nov.

♂. *Upperside* quite deep metallic blue, the blue on the forewing extending a little beyond the cell and there sometimes expanding slightly towards costa, on the hindwing of the same extent as usual in the species; red lunules distinctly narrow and very rarely extending at all beyond vein 3. *Underside* clear but

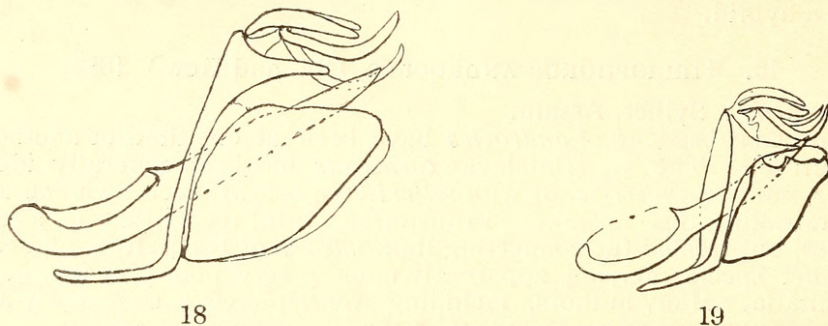


FIG. 18.—*H. androcles moorei*, lateral aspect.

„ 19.

lateral aspect, another view.

rather dull ochreous,¹ with discal and discocellular lines well-developed and conspicuous; *forewing* tornal black spot prominent and with well-marked prolongation in areas 2-3; *hindwing* red border not wide, irrorated with white scales only in its outer half in areas 3-6, white lunules present and clearly black-edged inwardly; black marginal triangles moderately prominent, marginal line black, tail rather more than 1 mm. long, only basally red, then black, tipped with white.

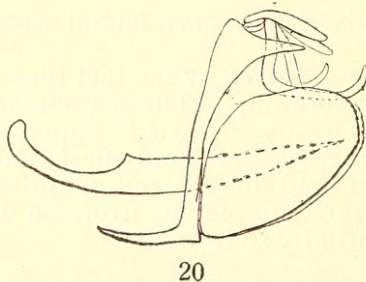
♀. Only distinguishable from the female or typical subsp. *coruscans* by the richer ochreous tint of the underside and the frequently red-tinted discal hindwing line—characters that can hardly be appreciated except from the examination of a series of specimens.

The type ♂ and ♀ allotype from Sikkim, in B. M.

(c) *H. androcles rubida*, ssp. nov.

Wet season form.

♂. *Upperside* slightly paler than in ssp. *moorei*, almost as in ssp. *coruscans*, the blue extending a little beyond the cell-end on the forewing. *Hindwing* with a well-developed series of broad red lunules extending as far as vein 6. *Underside*, discal and discocellular lines present, broad, but somewhat diffuse, outer half only of marginal red band irrorated with white in areas 3-6.



20

FIG. 20.—*H. androcles rubida*, lateral aspect of ♂ genitalia

♀ *Upperside* subapical band broad, short; hindwing marginal band little wider than in ♂. *Underside* as in ♂.

¹ The underside colour differences are most readily appreciated under ordinary electric light.

Type ♂ from Lankhaung, Upper Burma (A. E. Swann); ♀ Fengyueh-ting, C. Yunnan (H. M. B.); both in B. M.

Dry season form *gemma* nov.

♂. Hindwing red marginal band much wider (1.5 mm. at vein 6) than in the wet season form, and, on the underside, completely irrorated with white scales.

Type ♂ from Langkhaung, Upper Burma, 4,000 ft. 7.3.23 (A.E. Swann).

This little race is well characterized by possessing a complete hindwing marginal red band in both dry (spring) and wet (summer) season forms. In colour it is intermediate between *moorei* and the next subspecies. There are only 5 ♂♂ and 1 ♀ in the B.M., from a restricted area in northern Burma, and from central Yunnan, but from the latter locality there is a long series in Mr. Joicey's collection. More recently General Tytler has obtained good series from Sadon (Fort Harrison), and Htawgaw, N. Burma, both lying to the east of the 'triangle' and also from Konglu (7,800 ft., June-July 1925), which lies to the north of the triangle, a little east of Fort Hertz. All these specimens are referable to ssp. *rubida*. Though many do not show such a complete red band on the hindwing as is present in the types, its development is always greater than in ssp. *tytleri*.

(d) *H. androcles tytleri* ssp. nov.

Wet season form.

♂. Upperside rather light metallic sky-blue, much as in ssp. *coruscans*, but the blue hardly extending (sometimes not at all, anteriorly) beyond cell-end. Hindwing red lunules very narrow, never present above vein 3. Underside dull, dusky ochreous, the lines comparatively broad, smoky black; marginal band of 'wet' type.

♀. Resembles *rubida* ♀ most closely. Subapical band large, broad, its inner edge scarcely sinuous, reaching vein 2; hindwing marginal band widened anteriorly, thick, reaching vein 6. Underside as in ♂.

Types ♂ and ♀ from Kohima, Naga Hills, 5-6,000 ft., Sept. 1908, both in General Tytler's collection.

No dry season form is known. It appears to be common in the Naga Hills. Rarely specimens occur with the characteristic green tint of true *androcles*, serving to emphasize the close relationship of the two subspecies.

This race has been almost invariably regarded as identical with *coruscans*. Moore, which it closely resembles. The discontinuous distribution of that form then presented a difficulty which, however, is removed by recognizing that its two halves are distinct subspecies of *androcles* connected by the intermediate *moorei* and *rubida*.

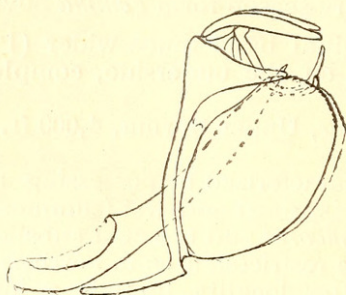
It is possible that Fruhstorfer's '*H. saphir birmana*' (1918) applies to a specimen of this or the preceding subspecies. His description is based apparently upon 2 ♂♂ alleged to have come from Upper Burma and stated to be darker blue than *saphir* and to have wider blacker borders, and, on the underside, narrow red marginal bands. The last two characters are of no value; they are extremely variable judging by the series of over 100 males in the B.M. The first seems to exclude the possibility of either *rubida* or *tytleri* being Fruhstorfer's *birmana*, for both are very much *paler* than *saphir*. Fruhstorfer figures the ♂ genitalia of *H. saphir* but fails to state definitely whether they are of *saphir saphir* or of '*saphir birmana*.' The key to the plate, however, attributes them to the latter, and as they are unquestionably those of *saphir* and not those of any *androcles* form, I can only conclude that the name *birmana* rests upon a Chinese *saphir* bearing an erroneous locality label—there are unfortunately many such current in collections—for it is inconceivable that if *saphir* really exists in any part of Burma none should have found its way to the British Museum.

(e) *H. androcles androcles*.

Ilerda androcles viridis Evans 1912.

Type locality: Sylhet.

The males are readily recognizable by the green tint of upperside, the underside being like that of ssp. *tylleri*. The female has a rather narrow subapical band, a moderate marginal hindwing band, both of rather dull colour, and an

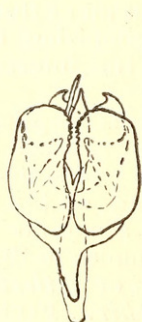


21

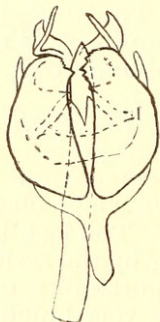
FIG. 21.—*H. androcles androcles*, lateral aspect of ♂ genitalia.

underside like that of the male. Only the wet season form is known. Its range extends from the Khasia Hills to Mt. Victoria, Burma. Presumably it occurs at moderate altitudes only.

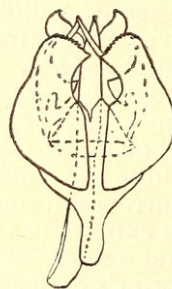
Genitalia. The ♂ claspers in this species are very much dilated so that it is extremely difficult in unmounted material to obtain the precisely similar views necessary for an exact comparison. No two specimens mounted in canada balsam ever present exactly the same aspect. Figs. 17 to 21 are outline drawings of the profiles of four subspecies. It will be noticed that *androcles androcles* and *androcles rubida* are perhaps the closest in the form of the clasper, but that *gemma* exhibits in the outline of the upper and distal edges a slight flattening, as compared with *androcles*, that may be regarded as an approach to *moorei*. The teeth in this region are also far less prominent than in *androcles androcles*. In *coruscans* from the other extremity of the Himalayas there is a recrudescence of the bulge on the dorsal edge of the claspers, and of other irregularities which however are hardly to be called teeth. Incidentally the close similarity of the ♂ genitalia of *coruscans* to those of *oda*, with which species *coruscans* would appear to fly, is worthy of note; but for the possession of a large and very strong spine on the near end of the upper edge of the clasper *oda* might almost be mistaken at first sight for *coruscans*.



22



23



24

FIG. 22.—*H. androcles coruscans*. ventral aspect of ♂ genitalia.

„ 23.—*H. androcles moorei*, ventral aspect.

„ 24.—*H. androcles tylleri*, ventral aspect.

The ventral aspects of the claspers of these subspecies (Figs. 22, 23, 24), so far as examined, also show an interesting gradation. The distal portions of the approximated edges in *coruscans* are gently curved and furnished with short blunt teeth. In *moorei* they are produced somewhat towards each other and more strongly toothed, but in *androcles tylleri* the process has gone much further, and, owing to the excavation of the adjacent edges of the claspers

beneath the tips, a quite different appearance is produced. The example illustrated in this third figure may, however, be unusually extreme; others examined do not show such a great departure from the *moorei* type of formation.

It has already been mentioned that *moorei* has very generally been associated with the Chinese *saphir*. Comparison of the outline drawings of the ♂ genitalia of the two species will make it quite clear, it is hoped, that there can be no such association in reality, as Fruhstorfer (1918) has already pointed out. But that *moorei* is only a subspecies of *androcles* is a little less easy to demonstrate. Fruhstorfer denied their affinity, but I think this must have been due to misleading preparations of the genitalia. Figs. 18 and 19 show slightly different views of the ♂ genitalia of the same specimen of *moorei*, representing a rotation of approximately 15°. If Fig. 19 of *moorei* alone were compared with, e.g. Fig. 17 of *coruscans* it is excusable that they should be regarded as representing distinct species.

The modifications in the ♂ genitalia of the different subspecies appear to be of no greater order or importance than those of their external appearance and hence I consider the arrangement suggested above to be the most natural at present attainable. There is little evidence of the different subspecies overlapping, which one would expect where they met, but this is probably to be attributed in the main to the lack of material from the border regions. On the other hand they are surprisingly constant and confined to easily delimited geographical regions.

HELIOPHORUS TAMU, Koll. 1844

Ilerda viridipunctata De Nicev. 1890.

Ilerda hewitsoni Moore MS.

Hewitson (1865), Moore (1865 and 1882) and Doherty (1886) correctly identified this species, but the mistake made by de Niceville (1890) has been copied

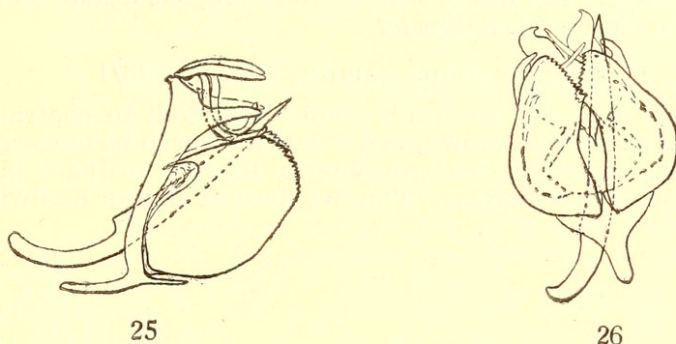


FIG. 25.—*H. tamu*, lateral aspect of ♂ genitalia.
,, 26. ,, ventral aspect.

by all subsequent authors. Through the kindness of Dr. Rebel of the Vienna Museum I have been enabled to examine the type of Kollar's '*Polyommatus tamu*' and have found that it is unquestionably the species subsequently described by De Niceville as *viridipunctata*. De Niceville's name is certainly the better as it very well describes the frosted, powdery green appearance of the ♂ upperside, a feature that renders that sex of the species unmistakable. The female is extraordinarily like those of *H. androcles* and *H. brahma*. It is however generally duller than either species and usually larger than any of the others in any given locality where they occur together; but the best character is provided by the continuation of the fine white anteciliar line on the hindwing upperside beyond vein 3, sometimes as far as vein 6.

This species appears to inhabit the same region as *H. androcles moorei* and *H. a. tytleri*, but at slightly lower altitudes, and with an extension westwards as far as Gahrwal and eastwards to Szechuen. Three subspecies are distinguishable, the characters which are given in the key; (a) and (b) are more widely separated than (b) and (c).

(a) *H. tamu tamu*

Garhwal to Sikkim and Bhutan.

(b) *H. tamu kala* Tytler 1912

Naga Hills, Assam.

(c) *H. tamu eventa* Fruhst. 1918

Northern Yunnan and W. China.

f. *verna* nov.

I have seen only two specimens that can with certainty be attributed to the spring brood. Both are small males with very little green powdering on the upperside, and with the red hindwing marginal band extending to vein 6 on the upperside and uniformly irrorated with white on the underside in the manner usual to spring specimens. Both are from the Oberthür collection. One specimen, the Type, is labelled 'Thibet, Ta-ho, printemps 1895', the other 'Vallée due Tong-ho, 15 Avril—15 Mai 1893'.

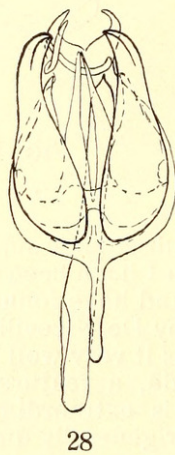
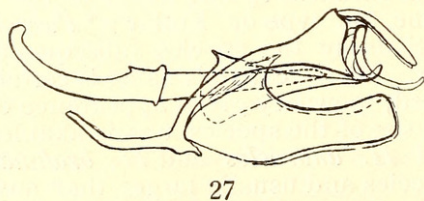
♂—*ab. rufa* nov.

A considerable proportion of the males of ssp. *eventa* show at least traces on the upperside of the forewing of an orange band like that of the female. In the Type (Tse-kou, N. Yunnan, 1895) it extends from vein 2 to vein 5, but it is seldom so well developed; usually it is a good deal duller than in the female.

The ♂ genitalia (figs. 25 and 26) exhibit a greater degree of inflation of the claspers than those of any other *Heliophorus*. They are very like those of *H. androcles androcles*, but broader, and well characterized by the strong anteriorly directed projection arising from the dorsal edge of the claspers, and the greater length of the toothed edge; the ventral aspects of the two show obvious differences in shape. The base of the tegumen projects distad, as well as basad, which is not the case in *H. androcles*.

HELIOPHORUS SAPHIR, Blanch. 1871

This extremely beautiful species is confined entirely to central and western China, so far as at present known, and would appear to be moderately common there. The male is at once recognizable by its very brilliant blue upperside and narrow costal black border. The red lunules of the hindwing upperside

FIG. 27.—*H. saphir*, lateral aspect of ♂ genitalia.

,, 28. ,, ventral aspect.

(in both sexes) are more flattened than in any *androcles* race, being in this respect reminiscent of *bakeri*. In both sexes there is an almost complete absence of discal spots on the underside. For the rest, the characters given in the key should serve to distinguish the species.

Fruhstorfer (1918) has inadvertently treated *saphir* as the wet (summer) form, *marica* Leech, as the dry season form. In fact, the opposite is correct. Leech based his *marica* on summer specimens; Blanchard's figure clearly indicates a spring brood specimen. The identity of Fruhstorfer's '*H. saphir birmana*' has already been referred to under *androcles* (see p. 14). For the present *birmana* should be treated as synonymous with *marica*.

The ♂ genitalia, as already pointed out by Fruhstorfer, are very interesting. The relation of the saccus to the tegumen, and its length, suggest the *epicles* group; but the strong lateral projection in the dorsal half is clearly of the *androcles* type. The shape of the claspers, seen in profile, is unique in the genus, resembling *kiana* more closely than any other species. But the most remarkable feature is presented by the production of the penis funnel to form a pair of long narrow sharp-pointed projections reaching almost to the level of the extremities of the claspers, and possibly to be considered analogous to the organs found in *Heodes* (*Chrysophanus*) and described by Bethune-Baker as *virgæ excitatæ*. I have been unable to find the 'sharp vertical double-tooth in the median part' of the clasper mentioned by Fruhstorfer. The claspers are unusually devoid of projecting surfaces or organs of any kind. In his figure the lateral projections of the upper part of the tegumen are so placed that they might be mistaken for parts of the claspers; or on the other hand it would be easy to mistake the modified penis funnel extensions as part of the claspers.

Identification of the *Heliophorus* figured in Moore's *Lepidoptera Indica*, vol. viii.

Plate 662.

Figs. 4, 4a, 4b. *H. sena*.

Plate 663.

Fig. 1, 1b. *H. brahma* ♂.

1a, 1c. *H. androcles coruscans*, d. s. f. *langii*. The actual specimen figured is in the British Museum.

2. *H. epicles indicus*. A normal wet season ♂, f. *latilimbata* Fruhst.

2a. *H. epicles indicus*. Probably a dry season female.

2b. Underside of fig. 2.

2c. *H. epicles indicus* ab. *rufonotata*. ♂. This may be either a wet or a dry season ♂, as the aberration *rufonotata* occurs in both, though much more rarely in the latter. The extent of the red marginal band on the hindwing, however, suggests that the specimen is the rarer form. More probably it is Javan.

2d. *H. epicles indicus*. A normal wet season female (f. *latilimbatus*).

Fig. 3, 3b. *H. tamu tamu* ♂.

3a. *H. tamu tamu* ♀.

Plate 664.

Fig. 1, 1b. ♂, 1a ♀. *H. oda*. In fig. 1 the red hindwing lunules are shown less arched than usual.

1c. *H. bakeri* f. *bakeri* (wet season form) ♂.

1d. Not identifiable. Probably a small ♀ of *H. oda*.

Fig. 2, 2b. *H. androcles coruscans* ♂. The artist has quite failed to indicate the true extent of the blue area of the upperside. The specimen figured is in the British Museum.

2a, 2c. *H. oda* ♀. The specimen figured is in the British Museum.

Fig. 3, 3b. *H. androcles moorei* f. *scintillans* ♂.

3a. Probably the ♀ of 3.

3d, 3e. According to the statement by Swinhoe on p. 107 these figures should represent the dry season form of *H. androcles* ssp. *moorei* (i.e. typical *moorei*) from Sikkim. Actually, I am convinced, they are drawn from the dry season form of ssp. *coruscans* i.e. f. *langii* Moore.

REFERENCES

1865. Hewitson, *Ill. Diurn. Lep.* p. 57.
1865. Moore *Proc. Zool. Soc. London*, p. 773.
1882. Moore, *Proc. Zool. Soc. London*, p. 248.
1886. Doherty, *J. As. Soc. Bengal*, p. 130.
1908. Fruhstorfer, *Ent. Zs.*, vol. xxii, p. 49.
1911. Swinhoe, Moore's *Lepidoptera Indica*, vol. viii, p. 100 *et seq.*
1912. Evans, *J. Bombay N. H. Soc.*, vol. xxi, p. 989.
1912. Fruhstorfer, *Berl. Ent. Zs.*, vol. lvi, p. 253.
1918. Fruhstorfer, *Tijds. v. Ent.*, vol. lxi, pp. 44-53.
1925. Draesecke, *Iris*, vol. xxxix, p. 223.
1925. Evans, *J. Bombay N. Hist. Soc.*, vol. xxx, p. 617.
1927. Evans, *The Identification of Indian Butterflies.*



1929. "Revisional notes on the genus *Heliophorus* (Lycaenidae) with descriptions of new forms." *The journal of the Bombay Natural History Society* 33, 384–402.

View This Item Online: <https://www.biodiversitylibrary.org/item/185225>

Permalink: <https://www.biodiversitylibrary.org/partpdf/151928>

Holding Institution

Smithsonian Libraries and Archives

Sponsored by

Biodiversity Heritage Library

Copyright & Reuse

Copyright Status: In Copyright. Digitized with the permission of the rights holder

License: <http://creativecommons.org/licenses/by-nc/3.0/>

Rights: <https://www.biodiversitylibrary.org/permissions/>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.