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Expanse, ♂ $3\frac{1}{4}$ to $4\frac{1}{4}$, ♀ $4\frac{1}{4}$ inches.

HABITAT.—Eastern Himalayas, Upper Assam, Cachar, Khasia Hills, Burma.

Our illustration on plate 48, fig. 1, represents a male from Darjiling; fig. 1a is from the Burmese male type of *Irawada*, fig. 1b of a female from Bassein, and the variety of the male, figured on plate 48, fig. 1c, is from Rangoon (taken in October, and now in the collection of Col. C. Swinhoe). On the upperside of the forewings this latter specimen has the usual costal, cell, and discal spots incipiently indicated by a few blue scales only, no submarginal or marginal spots are visible, and the sexual mark is narrower and shorter than in other Burmese specimens of *T. splendens* under examination.

DISTRIBUTION.—According to Mr. L. De Nicéville (Butt. Ind. 61) “it is found, but not very commonly, in Assam, extending through the Eastern Himalayas as far as the valley of the Sardah, which separates Kumaon from Nepal. To the westward of this range it is much rarer than to the eastward. Mr. Wood Mason took both sexes in Cachar from April to June.” Mr. Otto Müller obtained it in Sikkim in June. Mr. L. De Nicéville (J. A. S. Beng. 1881, 55) took “a single male in Sikkim in October.” In Burma it has been taken at Bassein in October. It occurs also in Rangoon and at Tounghoo. Major C. H. E. Adamson (Notes on the Danainæ of Burma, p. 6) says, “I caught two specimens of this insect in March, 1883, on the edge of the Htarony Choung, in Arrakan. In the same year I caught one male and one female soon afterwards near Akyab. During April, in the Arrakan Hill tracts, I found it flying abundantly in certain places. I also caught some specimens at Booseedoung, on the Mayoo river, in April, one male at Akyab on the 15th May, and one on 26th June. The brilliant blue gloss is very apparent when on the wing, and so are the bright yellow caudal appendages of the male. As found in Arrakan this is a very constant species, both in colour and in the number and extent of spots. I have only taken one female.”

ISAMIA MARGARITA (Plate 49, fig. 1, 1a, b, ♂, 1c, d, ♀).

Euplœa margarita, Butler, Proc. Zool. Soc. Lond. 1866, p. 279. Distant, Rhopal. Malayana, p. 31, pl. 4, fig. 3, ♂ (1882).

Salpinx margarita, Butler, Journ. Linn. Soc. Zool. xiv. p. 294 (1878). Moore, Proc. Zool. Soc. 1878, p. 823.

Euplœa (Salpinx) margarita, Marshall and De Nicéville, Butt. of India, i. p. 62 (1882).

Euplœa (Salpinx) Adamsoni, Marshall, Journ. Asiatic Society, Bengal (1880), p. 245, ♂.

IMAGO.—Male. Upperside dark rufescent-brown, in some more of an olivescient tint. *Forewing* darkest and brilliantly glossed with blue from the base to or beyond two-thirds the length, but never extending to the outer margin; with a small pale blue costal spot above end of the cell, a small round spot within lower end of the cell, two lower discal spots between the median veinlets, the lower larger and oval, and

sometimes there are three or four slender upper discal spots indicated by the presence of a few pale blue scales, in others all these spots are obsolescent; submarginal spots more or less indistinct, or obsolete, minute, white, the series never complete, and when present, the two lower and the two between the discoidal veinlets are more or less prominent, and two upper enlarged pale spots are incipiently-indicated before the apex; one or two, sometimes three lower, and one or two upper marginal minute spots are present. *Sexual mark* between the lower median and submedian vein elongated, clothed with widely-separated rather short bidentate and tridentate-tipt scales. *Hindwing* with a large *pale ochreous upper discoidal patch* and a broad cinereous anterior margin; a submarginal and a marginal row of whitish spots, the former row more or less oval towards the anal angle and slightly varying in length in different specimens, sometimes also both rows are composed of smaller and less defined spots or are entirely obsolescent. Underside paler olivescence-brown. *Forewing* with the small pale blue costal, cell, discal, lower submarginal and marginal white spots, as in upperside, the lower discal spot being much enlarged and violet-white; posterior margin broadly cinereous with a broad ochreous upper medial patch. *Hindwing* with both rows of whitish spots as in the upperside, with a small violet-white cell spot, and five or six small slender discal spots. Some white spots at base of wing. Female. Upperside as in male, except in the forewing having the posterior margin straight, and in the absence of the sexual mark. *Forewing* with small costal, cell, discal, and marginal spots present or obsolescent, as in that sex. *Hindwing* with similar marginal rows of spots. Underside as in male. Forewing with the cell spot sometimes lunate, and an elongated narrow streak above the pale posterior margin.

Expanse, ♂ $3\frac{1}{4}$ to $4\frac{1}{4}$, ♀ $4\frac{1}{4}$ inches.

HABITAT.—Lower Burma, Tenasserim; Malay Peninsula.

DISTRIBUTION.—Has been taken at Rangoon in September. “Capt. C. H. E. Adamson took it near Moulmein in June, at Moulmein in the autumn, and at the Mayla Choung in September. It has been taken at Bassein in October. Capt. C. T. Bingham obtained numerous specimens in the Thoungyeen forests, Tenasserim, in December” (Butt. Ind. 62). “Mr. O. Limborg (P. Z. S. 1878, 823) found it at Hatseiga, and at the Hougnduran source in Upper Tenasserim during the cold weather.” Dr. J. Anderson took it somewhat commonly in the Mergui Archipelago in the cold weather from November to March.

In the Malay Peninsula, Mr. Distant (Rhop. Malay. 31) records it from Malacca and Penang.

HABITS, &c.—According to Major C. H. E. Adamson (Notes on the Danainæ of Burma, 1889, p. 7) “numerous specimens taken in June in Salween Park, Moulmein, were flying about after a heavy rain in the bright sunshine. It is not at all a

common insect. On all the specimens taken the blue gloss extends over the basal two-thirds of the anterior wings; the two rows of spots on the margin of the hindwings are invariably distinct, and the inner row in the female is elongate. On the anterior wings the number of the blue discal spots varies, and in one specimen they are entirely absent."

VARIETY. *Isamia Brahma* (Plate 50, fig. 2, ♂).

Isamia Brahma, Moore, Proc. Zool. Soc. Lond. 1883, p. 314, ♂.

Euplea margarita, Distant, Rhop. Malayana, pl. 4, fig. 3, ♂.

Male. *Forewing* shorter than in typical *I. margarita*, not so broad, the exterior margin more oblique; with an intense violet-blue gloss extending to three-fourths of the wing; a very indistinct minute blue dot at end of the cell, one on the costa above it, and a white dot near the posterior angle; sexual mark about half the length of that in typical *margarita*. *Hindwing* with two rows of small prominent white spots.

Expanse, $3\frac{1}{2}$ inches.

HABITAT.—Hatseiga, Moulmein.

This butterfly has much the appearance of *Menama modesta*.

ISAMIA CARPENTERI (Plate 50, fig. 1, 1a, ♀).

IMAGO. Female. Upperside dark fuliginous-brown. *Forewing* with the basal half blackish and glossed with brilliant steel-blue, the blue extending obliquely outward across the wing from end of the cell to one-fourth from the posterior angle (not parallel with the outer margin as in *I. margarita*); a very small white costal spot above end of the cell, and faint traces of three minute discal spots between the medians and submedian vein, the lowest being most prominent; a more or less complete row of very small white submarginal and marginal spots. *Hindwing* with the basal area blackish and brilliantly glossed with steel-blue; a very small brownish-white spot within end of the cell, a discal series of seven very small spots, the lowest being very slender, followed by a submarginal row of narrow oval spots, and a marginal row of smaller somewhat conical spots, of which the three or four last of each row are coalesced. Underside olivaceous-brown, discal area somewhat darker and virescent. *Forewing* with a small violet-white costal spot, one within end of the cell, three discal, of which the upper is slender and the lowest rather large and oval; a lengthened narrow streak between the lower median and submedian and the posterior border broadly violet-white; submarginal and marginal small white spots as on upperside. *Hindwing* with a small violet-white spot within end of the cell, a discal series of seven, a submarginal and marginal row of creamy-white spots, as on upperside; some white dots at base of the wing. *Body* dark brown; head, palpi, thorax in front and beneath black, spotted with white, legs black, fore femora white beneath; abdomen beneath with white segmental bands.

Expanse, ♀ $4\frac{3}{4}$ inches.

HABITAT.—Mergui Archipelago.

Two specimens of the female of this butterfly, in the collection of the British Museum, were recently taken in King's Island Sound, on the 8th February, by Commander A. Carpenter.

INDO-MALAYAN ALLIED SPECIES OF ISAMIA.—*I. superba* (Herbst, Nat. Insekten, vi. p. 14, pl. 119, fig. 3, ♀, 1793). *Habitat.* S. China, Hongkong.—*I. sinica* (Moore, Proc. Zool. Soc. Lond. 1883, p. 312). *Habitat.* S. China.—*I. Midamus* (Linn. Syst. Nat. x. p. 470 (1758); *id.* xii. p. 765 (1767); De Geer, Acta Holmiæ, ix. p. 209, pl. 6, fig. 1, 2, ♀ (1748); Ehret, Plantæ et Papilion. pl. xi. ♂ (1748); Hübner, Samm. Exot. Schmett. i. pl. 24, fig. 3, 4, ♀ (1806). *Habitat.* S. China, Canton.—*I. Alopia* (Godart, Enc. Méth. ix. p. 177, ♂ ♀, 1819). *Habitat.* S. China.—*I. Marseuli* (Moore, P. Z. S. 1883, p. 313). Allied to *I. margarita*. Differs on the forewing in the blue tint being confined more to the base, the marginal spots being quite obsolete, and the sexual mark only half the width, though of the same length. On the hindwing the two marginal rows of spots are very indistinct. Expanse, $3\frac{4}{10}$ inches. *Habitat.* Saigon, Cochin China. In Coll. C. Oberthür.—*I. Grotei* (Felder, Reise Novara, Lep. ii. p. 339, ♂ only, 1867). *Habitat.* Cochin China.—*I. Fabricii* (Moore, P. Z. S. 1883, p. 315). *Habitat.* Cochin China. In Coll. C. Oberthür.—*I. Dejeani* (Distant, Rhop. Malayana, p. 29, pl. 4, fig. 1, ♂, 1882; Moore, P. Z. S. Lond. 1883, p. 314). Near to *I. Chloe*. *Habitat.* Malacca, Sumatra.—*I. Rafflesii* (Moore, P. Z. S. Lond. 1883, p. 314). *Habitat.* Java. In Coll. Godman and Salvin.—*I. Choë* (Guérin, Delessert's Voy. Inde, ii. p. 71, 1843); Distant, Rhop. Malayana, p. 30, pl. 4, fig. 2, ♂. pl. 2, fig. 5, ♀ (1882).—*Syn.* *I. Singapura* (Moore, P. Z. S. 1883, p. 315). *Habitat.* Malay Peninsula, Singapore. *I. Sophia* (Moore, P. Z. S. 1883, p. 315). *Habitat.* Sumatra. In Coll. F. Moore & British Museum.—*I. Ægyptus* (Butler, P. Z. S. Lond. 1866, p. 277). *Habitat.* S. Borneo; Billiton.—*I. Loweii* (Moore, P. Z. S. 1883, p. 316). *Habitat.* Borneo. In Coll. C. Oberthür.—*Isamia Clorinde* (Staudinger). *Habitat.* Island of Palawan.—*I. Dameli* (Moore, P. Z. S. 1883, p. 316). *Habitat.* Shanghai, N. China. In Coll. G. Semper.

MIMICKS OF SPECIES OF ISAMIA.—The male of the Elymniine butterfly, *Elymnius leucocyma*, as well as the Papilionid, *Isamiopsis Telearchus*, are excellent mimicks of the *Isamia splendens*.

Genus TIRUNA.

Tiruna, Moore, Proc. Zool. Soc. Lond. 1883, p. 316.

MALE.—Forewing comparatively shorter than in typical *Isamia*; costa less arched, exterior margin less oblique, somewhat rounded towards the apex, and less convex at the posterior angle; the posterior margin very convex; upper discocellular with a short spur emitted within the cell. *Sexual mark* narrow and strongly impressed. Hindwing shorter and broader, and with a distinct upper discoidal patch.

Type.—T. Roëpstoër fii.

TIRUNA ROËPSTORFFII (Plate 50, fig. 3, ♂).

Tiruna Roëpstorffi, Moore, Proc. Zool. Soc. Lond. 1883, p. 316, pl. 32, fig. 8, ♂.

IMAGO.—Male. Colour and pattern of markings similar to *Karadina Andamanensis*. Upperside pale olive-brown, but darker than in *K. Andamanensis*. Forewing with a similarly-disposed submarginal and marginal row of olivaceous-white spots; the marginal series smaller, conical, and extending to the apex, the two submarginal spots between the median veinlets indented on their outer edge and the lowest spot divided into two; a discal row of much paler spots, and a similar rounded spot within lower end of the cell; sexual mark blackish. Hindwing with the submarginal row of spots narrower than in *K. Andamanensis*, the marginal row smaller and conical; discoidal patch olivaceous-white.

Expanse, $3\frac{1}{2}$ inches.

HABITAT.—Andaman Isles.

This is a very rare species, the only example known to me being the type specimen of the male in the collection of Herr G. Semper, of Altona. In general form, colour, and pattern, it much resembles the *Karadina Andamanensis*, and is a mimick of that species.

INDO-MALAYAN ALLIED SPECIES OF TIRUNA.—*T. Ochsenheimeri* (Lucas, Rev. et Mag. Zool. 1853, 315, ♂); the type specimen of which has been personally examined and a comparative description of it given in my "Monograph of the Euploeinæ," in P. Z. S. 1883, p. 317. Habitat. Java.

Genus NARMADA.

Narmada, Moore, Lepidoptera of Ceylon, i. p. 13 (1880), Proc. Zool. Soc. Lond. 1883, p. 318.

Euplœa (*Stictoplœa part*), Marshall and De Nicéville, Butt. of India, i. p. 90 (1882).

IMAGO.—Male. Forewing elongated, triangular, costa slightly arched, apex somewhat acute, exterior margin oblique, posterior margin slightly convex; upper discocellular with a short spur emitted within the cell. Two sexual marks between the lower median and submedian veins, the upper streak clothed with widely-separated short scales of irregular shape, having broad bluntly bidentate or rounded tips, and the lower streak clothed with widely-separated short tridentate-tipt scales; both these streaks, on the underside of the wing, being clothed with short regularly-disposed round-tipt ribbed scales, interspersed with a few narrow whitish scales and a very few extremely slender clavate white scales. Hindwing triangular.

Type.—N. Coreoides.

This genus differs from typical *Stictoplœa* in the more triangular form of both wings, the forewing being narrower, more acuminate, and the sexual marks shorter. Pattern of markings and coloration similar to typical *Crastia* (*C. Core*).

NARMADA COREOIDES (Plate 51, fig. 1, 1a, ♂ ♀).

Euplœa Coreoides, Moore, Annals of Natural History, 1877, p. 44. Butler, Journ. Linn. Soc. Zool. XIV., p. 301 (1878).

Narmada Coreoides, Moore, Lep. of Ceylon, i. p. 13 (1880); Proc. Zool. Soc. Lond. 1883, p. 318, pl. 29, fig. 10, ♂.

Euplœa (Stictoplœa) Coreoides, Marshall and De Nicéville, Butt. of India, i. p. 90 (1882).

IMAGO.—Male. Upperside dark velvety olive-brown, palest externally. *Forewing* with a prominent submarginal and a marginal row of small whitish spots. *Two elongated silky sexual marks* between the lower median and submedian vein; the upper streak being clothed with widely-separated short scales of irregular shape with broad bluntly-bidentated or rounded tips, and the lower streak clothed with widely-separated short tridentate-tipt scales. Hindwing with broader rows of whitish oval and rounded submarginal spots and smaller rounded marginal spots, anterior margin broadly gicssy-cinereous, clothed with densely-packed broad abruptly taper-pointed striated scales. Underside paler; marginal spots as above. Both wings with a small violet-blue spot at end of the cell and contiguous discal series beyond; *sexual marks* on forewing pale brown, both clothed with short regularly-disposed round-tipt ribbed scales, interspersed with a few narrow whitish scales and a very few extremely slender clavate white scales; the posterior margin glossy cinereous and clothed with round-tipt widely-separated ordinary-shaped scales. *Body* dark brown; head, palpi, thorax in front and beneath black, spotted with white; legs black, fore femora beneath white; abdomen beneath with grey segmental bands. Female paler. Both wings with marginal rows of spots as in the male, the submarginal series above and the discal violet-blue spots on the forewing beneath being larger; two whitish elongated streaks above the submedian; posterior border cinereous.

Expanse, ♂ $3\frac{1}{4}$, ♀ $3\frac{1}{2}$ inches.

HABITAT.—South India.

This species has much the general appearance of *Crastia Core*, found also commonly in the same localities, but can easily be distinguished from it by the presence of *two* sexual marks in the male, the female showing on the underside of the forewing two pale corresponding streaks, instead of one, as in *C. Core*.

DISTRIBUTION.—This species appears to be confined to South India. Mr. L. De Nicéville (Butt. of India, 91) says it “is not common.” Mr. W. C. Taylor, in his List of Orissa Butterflies, enumerates it as being “rare at Khorda,” but his identification of the species is probably erroneous, and requires confirmation. It occurs at Bangalore in Mysore, North Canara, Malabar, and the Wynaad. Mr. G. F. Hampson (J. A. S. Beng. 1888, 348) “found it with *C. Core*, not uncommonly in the spring and autumn, at all elevations on the Nilgiris.” It also has been taken at Trevandrum in Travancore in May, by Mr. H. S. Fergusson.

NARMADA MONTANA (Plate 51, fig. 2, 2a, ♂ ♀).

Euplœa montana, Felder, Reise Novara, Lep. ii. p. 330 (1867), ♂ ♀.

Narmada montana, Moore, Lepidoptera of Ceylon, i. p. 13, pl. 6, fig. 1, ♂ (1880); Proc. Zool. Soc. Lond. 1883, p. 318.

Euplœa (Stictoplœa) montana, Marshall and De Nicéville, Butt. of India, i. p. 91 (1882).

Euplœa Lankana, Moore, Annals and Mag. of Nat. Hist. 1877, p. 44, ♂.

Stictoplœa Lankana, Butler, Journ. Linn. Soc. Zool. XIV. p. 302 (1878).

IMAGO.—Male. Upperside dark velvety olive-brown, paler externally. *Forewing* with a submarginal and a marginal row of very small indistinct ochreous-white spots, which are obsolescent anteriorly. *Two elongated silky sexual marks* between the lower median and submedian vein. *Hindwing* with a submarginal and a marginal row of brownish-white spots, the former row oval from the anal angle and duplex anteriorly, the latter row smaller and round; anterior border broadly glossy-cinereous. Underside paler; marginal white spots as above, those on the forewing more prominent. *Forewing* with a small violet-white costal spot above end of the cell, one at lower end of the cell, and a contiguous discal series beyond; *sexual marks* pale brown and longer than on upperside; posterior margin cinereous. *Hindwing* with a small violet-white cell spot, and seven discal spots; some white spots at base of the wing. *Body* dark brown; head, palpi, thorax above and beneath black, spotted with white; legs black, fore femora white beneath; abdomen beneath with grey bands. Female. Upperside as in the male, except the sexual marks, and in the posterior margin of the forewing being straight. Underside also as in the male; two elongated whitish streaks above the submedian.

Expanse, 3 to 3 $\frac{3}{4}$ inches.

HABITAT.—Ceylon.

This species is similar in colour and pattern to the Ceylonese *Crastia Asela* and to *Pademna Sinhala*, but may be distinguished from them in the male possessing two sexual marks on the forewing, and in the female also having two elongated streaks on the underside above the submedian vein.

DISTRIBUTION.—It has been captured at Galle, Rambodde, and Kandy, and by Mr. F. M. Mackwood in the Navalpittia country.

ALLIED INDO-MALAYAN SPECIES OF NARMADA.—The only other known species of this genus is *N. consimilis* (Felder, Reise Novara, Lep. ii. p. 329, 1867), a female of which is in the collection of Messrs. Godman and Salvin. *Habitat.* Java and Sumatra.

The following allied genera and species also occur within the Indo-Malayan area, namely :—*Nacamsa simillima* (Moore, P. Z. S. 1883, p. 310; Semper, Reisen Archipel. Philippen. Lep. p. 32, pl. 4, fig. 1, 2, 3, ♂ ♀ (1886). *Habitat.* Luzon, Philippines.—*N. Meldola* (Moore, P. Z. S. 1883, p. 310; Semper, Reisen Archipel.

Philippen. Lep. p. 32, pl. 4, fig. 4, 5, 6, ♂ ♀ (1886). *Habitat.* Mindanao, Philippines.
Anadara Gamelia (Hübner, Samm. Exot. Schmett. ii. pl. 10, fig. 1, 2 (1806-27) ;
Syn. E. Fàber, Zinken-Sommer, Nova Acta Akad. N. C. 1831, p. 186, pl. 16, fig.
 18, 19, ♂ ♀; E. Lorraini, Chapman, Etom. Mo. Mag. 1873, 263, ♀. *Habitat.* Java.

Genus STICTOPLÆA.

Stictoplæa, Butler, Journ. Linn. Soc. Zool. xiv. p. 301 (1878). Moore, Proc. Zool. Soc. Lond. 1883,
 p. 319.

Euplæa (sect. *E.*), Distant, Rhop. Malayana, p. 36 (1882).

Euplæa (*Stictoplæa*, sect. *C*, part), Marshall and De Nicéville, Butt. of India, i. p. 90 (1882).

IMAGO.—Male. Wings broad. *Forewing* lengthened-triangular, costal margin slightly arched, apex somewhat rounded; exterior margin oblique and slightly convex, posterior margin slightly convex; upper discocellular with a very short spur emitted within the cell. *Two broad lengthened sexual marks* between the lower median and submedian vein, each mark on the upperside, when first examined under the 'binocular,' having the illusive reticulated appearance, both marks being clothed with widely-separated short oval bluntly-bidentate or tridentate-tipt scales, and on the underside both marks are clothed with regularly-disposed short round-tipt ribbed scales, with a few intervening very narrow white scales and here and there a very slender white projecting scale. *Hindwing* broad, with the costal margin much arched in the middle, exterior margin convex, waved.

Type.—*S. gloriosa*.

STICTOPLÆA HARRISI (Plate 52, fig. 1, 1a, ♂ ♀).

Euplæa Harrisii, Felder, Reise Novara, Lep. ii. p. 328 (1867), ♂.

Stictoplæa Harrisii, Moore, Proc. Zool. Soc. Lond. 1883, p. 320, pl. 30, fig. 6, ♂.

Euplæa Grotei (♀ only), * Felder, Reise Novara, Lep. ii. p. 339, pl. 41, fig. 7, ♀.

Stictoplæa Grotei, Butler, Journ. Linn. Soc. Zool. xiv. p. 302 (1878). Moore, Proc. Zool. Soc. Lond. 1878, p. 824.

Euplæa (*Stictoplæa*) *Grotei*, Marshall and De Nicéville, Butt. of India, i. p. 91 (1882).

Euplæa Grotei, Distant, Rhopal. Malayana, p. 36, pl. 3, fig. 3, ♂ (1882).

IMAGO.—Male. Upperside. *Forewing* dark velvety blue-black, brilliantly glossed throughout with steel blue; a submarginal row of generally clearly-defined pale violet-blue small round spots, and a lower marginal row of minute spots. *Two elongated broad silky-black sexual marks* between the lower median and submedian vein, both clothed with widely-separated short oval bluntly-bidentate or tridentate-tipt scales. *Hindwing* dark violaceous-brown, costal border glossy cinereous, clothed with widely-disposed broad spear-pointed scales; a prominent submarginal

* The butterfly described by Dr. Felder, *l. c.*, as the male of his *Euplæa Grotei*, is a species of the genus *Isamia*. See I. Grotei, p. 132, *ante*.

row of small slightly ovate spots, and a marginal row of smaller rounded white spots. Underside dark violaceous-brown. *Forewing* with a small pale violet-blue costal spot, one at lower end of the cell, a discal spot between the upper and middle median veinlets, and sometimes two smaller upper discal spots, a larger paler lower discal spot between the middle and lower medians, and a submarginal and marginal row of minute white spots, which are generally obsolete anteriorly. *Sexual marks* pale brown, both clothed with regularly-disposed short round-tipt ribbed scales, with a few intervening very narrow white scales and here and there a very slender white projecting scale; posterior margin glossy-cinereous. *Hindwing* with both marginal rows of spots as above, and also a small violet-blue spot at end of the cell, and a discal series of six small spots. Some white spots at the base of the wing. Body dark brown; head, palpi, thorax above and beneath black, spotted with white; legs black, fore femora white beneath; abdomen beneath with grey bands. Female. Upperside as in the male, excepting that the forewing is straight along the posterior margin, and in the absence of the sexual marks. On the underside the forewing has an elongated pale streak above the pearly-grey posterior margin.

Expanse, ♂ $3\frac{1}{4}$ to $3\frac{3}{4}$, ♀ 4 to $4\frac{1}{2}$ inches.

HABITAT.—Tenasserim, Lower Burma.

Dr. Rogenhofer, the Custodian of the Vienna Museum of Zoology, has kindly favoured us with a coloured drawing of the type specimen of Felder's *E. Harrisi*, of which the illustration on our plate 52, fig. 1, is a copy. Specimens of this species had previously been identified as representing *E. Grotei* of Felder, an erroneous identification which arose from Felder having erroneously figured the female of our present species (*Harrisi*) as representing that sex of the *E. Grotei*. The male of the latter named species (*Grotei*) is described as possessing only *one sexual mark* on the forewing.

DISTRIBUTION.—This species has been taken in Moulmein in June. Mr. Otto Limborg (P. Z. S. 1878, 824) took it in Upper Tenasserim, at Ahsown, above Ahsown, and from Hatseiga to Hougnduran. "Capt. C. T. Bingham obtained numerous specimens in the autumn in the Thoungyeen forests" (Butt. Ind. 92). It has been taken in the Mepley Valley in October. Major C. H. E. Adamson (Notes on the Danainæ of Burma (1889), p. 14) records the capture of one male at Mepley in February, one male in June at Moulmein, and four males and two females in July at Hpa An, all in Tenasserim. These are the only specimens taken of this rare insect, and it does not appear to extend further north than the Tenasserim district. Its caudal appendages are light brown. Messrs. Elwes and de Nicéville (J. A. S. Beng. 1887, 416) notice the capture of several specimens at Tavoy and Sinbyoodine. Dr. J. Anderson (J. Linn. Soc. Zool. 1886, 31) records its capture in the Mergui Archipelago in "December and January."

Felder's type specimen is recorded as from Cochin-China, and Mr. Distant (Rhop. Malay. 36) describes it from specimens captured at Malacca.

STICTOPLÆA CROWLEYI (Plate 52, fig. 2, ♂).

IMAGO. — Male. Upperside. *Forewing* brilliantly blue-glossed and with submarginal and marginal pale blue spots as in *S. Harrisi*, except that the former series are a little larger. *Hindwing* with three very small upper submarginal white spots, as in *S. binotata*. Underside. *Forewing* with a small violet-white costal, cell, upper discal, and two lower discal spots, and very minute submarginal and marginal spots. *Hindwing* with a very small violet-white cell spot, five discal spots, a submarginal and a marginal row of very small spots.

Expanse, ♂ $3\frac{3}{4}$ inches.

HABITAT.—Tenasserim.

This is an intermediate form between *S. Harrisi* and the Sumatran *S. tyrianthina*, the latter differing on the upperside of the forewing in being deep violet-brown without the blue gloss, in the submarginal spots increasing in size towards the apex, and in the total absence of marginal spots. The type specimen is in the collection of Mr. Philip Crowley.

STICTOPLÆA HOPEI (Plate 53, fig. 1, 1a, ♂ ♀).

Euplœa Hopei, Felder, Reise Novara, Lep. ii. p. 328 (1867), ♂.

Stictoplœa Hopei, Butler, Journ. Linn. Soc. Zool. xiv. p. 302 (1878). Moore, Proc. Zool. Soc. Lond. 1883, p. 319.

Male. Comparatively smaller and with narrower forewings than in typical specimens of *S. binotata*. *Forewing* with the spots similar but somewhat smaller. *Hindwing* with a complete row of prominent white submarginal spots, the marginal spots nearly obsolete, except three very minute dots in the middle. Female. Upperside. *Forewing* marked as in the male, except in the absence of the sexual marks and the posterior margin being straight. *Hindwing* with a submarginal and marginal row of white spots.

Expanse, ♂ $3\frac{1}{2}$, ♀ 4 inches.

HABITAT.—Silhet, Khasia Hills, Naga Hills.

STICTOPLÆA BINOTATA (Plate 53, fig. 2, 2a, ♂ ♀).

Stictoplœa binotata, Butler, Journ. Linn. Soc. Zool. xiv. p. 302 (1878). Moore, Proc. Zool. Soc. Lond. 1883, p. 319, pl. 30, fig. 4, ♂.

Euplœa (Stictoplœa) Hopei, Marshall and de Nicéville, Butt. of India, i. p. 92, pl. 9, fig. 18, ♂ ♀ (1882).

IMAGO.—Male. Upperside. *Forewing* dark velvety blue-black, brilliantly glossed with steel-blue; a small pale violet-blue costal spot, one within lower end of the cell, a discal series of five spots which are more or less dentated, the three upper

with the point inward, the two lower with the point outward, the lowest sometimes ill-defined; a submarginal row of large pale-blue spots, the lower being broadly quadrate or pyriform, the upper more rounded, and a marginal row of very small spots. *Two silky long sexual marks* between the lower median and submedian vein. *Hindwing* dark rufescent-brown, the costal border broadly glossy cinereous-white; with generally three, sometimes only two, very small prominent white upper submarginal spots. Underside paler rufescent-brown. *Forewing* with the costal, cell, discal, and marginal rows of spots as in upperside, all prominent violet-white, the upper discals being smaller and slender, the lower discal larger and oval, the submarginals reduced nearly to the size of the marginals; sexual marks brown, posterior border brownish-cinereous. *Hindwing* with a small violet-white cell spot, six small discal spots, three or four small upper submarginal spots, and a nearly complete marginal row of very small white spots. Some white spots at base of the wing. *Body* dark brown; head, palpi, thorax above and beneath black, spotted with white; legs black, fore femora white beneath; abdomen beneath with greyish segmental bands. Female. Upperside. *Forewing* with the posterior margin straight; the pale blue markings as in male, but generally larger, the discal row sometimes lobular and with a lower streak above the submedian. *Hindwing* as in the male; in some specimens two small bluish-white discal spots are present. Underside marked as in the male. *Forewing* with two elongated violaceous-white streaks above the submedian vein; posterior margin cinereous.

Expanse, ♂ $3\frac{1}{2}$ to $4\frac{1}{4}$, ♀ $3\frac{3}{4}$ to $4\frac{1}{4}$ inches.

HABITAT.—N. E. India, Sikkim.

DISTRIBUTION.—This is probably the northern form of the preceding. Mr. L. de Nicéville (J. A. S. Bengal, 1881, 55), obtained it in Sikkim in October, it being by no means a common butterfly. Mr. H. J. Elwes (Trans. Ent. Soc. 1888, 302) says it is “found not uncommonly in Sikkim up to about 3000 feet elevation from April to October.”

All the specimens of both *S. Hopei* and *S. binotata* that we have examined are from the localities cited. It is recorded by Major C. H. E. Adamson, in his Notes on the Danainæ of Burma (1889), p. 14, that, what he considers to be *S. Hopei* “is common in the North of Burma. I have caught it close to Akyab town, on the coast, in March, and it flies commonly in April in the Arrakan Hill tracts as high as 2000 feet, and probably higher. In the hills about Bhamo it is also found rarely, and I have one caught in Rangoon in March. The caudal appendages of the male are of a light brown colour.”

STICTOPLÆA PYGMÆA (Plate 52, fig. 3, 3a, ♂ ♀).

Stictoplaea pygmaea, Moore, Proc. Zool. Soc. Lond. 1883, p. 320.

Allied to *S. microsticta*. Smaller in size: *forewing* in both sexes with smaller

discal spots and larger submarginal spots, the latter series triangular in form in the male and somewhat confluent with the lower discal series in the female, the marginal dots being more distinct: the cell spot is also larger. *Hindwing* in male with three upper submarginal minute white spots only, the female, besides these submarginal spots also showing indistinct marginal spots.

Expanse, ♂ 3, ♀ 3½ inches.

HABITAT.—Cachar.

This is probably only a variety of *S. Hopei*. The allied *S. microsticta* is a broader winged insect in both the fore and hind wings.

STICTOPLÆA REGINA (Plate 53, fig. 3, ♂).

Stictoplæa regina, Moore, Proc. Zool. Soc. Lond. 1883, p. 319, ♂.

IMAGO.—Male. Comparatively smaller than typical *S. binotata*; *forewing* of a violet-blue with less gloss; submarginal spots half the size of those in that species, the discal spots reduced to the two between the radial and middle median, and a very minute spot at lower end of the cell. *Hindwing* deep rufous-brown, immaculate.

Expanse, ♂ 2½ inches.

HABITAT.—Cachar.

This also is probably only a variety of *S. Hopei*.

MIMICK OF INDIAN SPECIES OF STICTOPLÆA.—The male of the Elymniine butterfly *Dyctis Patna*, and the male of the Papilionid *Isamiopsis Telearchus* are excellent mimicks of *Stictoplæa binotata*.

INDO-MALAYAN ALLIED SPECIES OF STICTOPLÆA.—*S. microsticta* (Butler, Journ. Linn. Soc. Zool. xiv. p. 302 ♂ (1878). *Habitat.* —? The locality of this species is unknown. We have seen only the type specimen, which is described as having the ‘upperside of the forewing like *S. Hopei*, except that it is larger, all the spots are considerably smaller, and the purple shot is less livid. Hindwing with only the three first of the discal series of white spots.’ Type in coll. British Museum.—*S. picina* (Butler, P. Z. S. 1866, p. 280, pl. 30, fig. 1, ♂). *Habitat.* Sumatra.—*S. inconspicua* (Butler, Journ. Linn. Soc. Zool. xiv. p. 302, ♂). *Habitat.* Sumatra. In coll. British Museum.—*S. Lacordairei* (Moore, P. Z. S. 1883, p. 321, ♂). *Habitat.* Java. In coll. Hewitson, British Museum.—*S. latifica* (Butler, P. Z. S. 1866, p. 292, pl. 29, fig. 3, ♀). *Habitat.* Philippines.—*S. Dufresneyi* (Godart, Enc. Méth. ix. p. 815 (1816); Semper, Reisen Archipel. Philippen Lep. p. 23, pl. 6, fig. 6, 7, 8, ♂ ♀ (1886). *Habitat.* Philippines.—*S. Swinhoei* (Wallace, P. Z. S. 1866, p. 358). *Habitat.* Formosa.

Subfamily II.—SATYRINÆ.

- Satyrinæ*, Bates, Journ. Ent. 1861, p. 220; Trans. Linn. Soc. Zool. 1862, p. 515; Journ. Ent. 1864, p. 176. Butler, Catal. Fabrician Lep. B. M. p. 8 (1869). Kirby, Syn. Catal. D. Lep. p. 36 (1871). Moore, Lep. Ceylon, i. p. 13 (1880). Distant, Rhopalocera Malay. p. 37 (1882). De Nicéville, Butt. India, etc. i. p. 95 (1883). Semper, Reisen Archipel. Philippen, i. p. 34 (1886). Scudder, Butt. E. U. States, i. p. 115 (1888).
- Satyri*, Fabricius, Ent. Syst. 111, i. p. 214 (1793). Latreille, Gen. Crust. et Ins. xiv. p. 97 (1805).
- Satyridæ*, Swainson, Cabinet Cycl. pp. 86, 93 (1840). Doubleday and Westw. Gen. D. Lep. p. 352 (1851). Wallace, Trans. Ent. Soc. 1853, p. 261. Trimen, Rhop. Africa Austr. p. 184 (1866). Butler, Catal. Satyr. B. M. p. 1 (1868). Staudinger, Catal. Lep. Eur. p. 22 (1871). Kirby, Eur. Butt. p. 27 (1882).
- Satyrides*, Boisduval, Spec. Gén. Lep. p. 166 (1836). Ind. Méth. Eur. Lep. p. 25 (1840). Rambur, Faune Ent. Andal. Lep. p. 292 (1839). Duponchel, Catal. Méth. Lep. Eur. p. 11 (1844).
- Satyrites*, Blanchard, Hist. Nat. des Ins. ii. p. 456 (1840).
- Satyridi*, Stephens, Catal. Brit. Lep. B. M. p. 6 (1850). Stainton, Manual Brit. Butt. i. pp. 21, 25 (1857).
- Satyroidæ*, Lederer, Verh. Zool. Bot. Ver. Wien (1852), pp. 16, 23. Wallengren, Lep. Scandinaviæ, p. 6 (1853). Guenée, Lep. d'Eure-et-Loire, p. 25 (1867-75).
- Satyritæ*, Lucas, Chenu's Encycl. Hist. Nat. Papillons, p. 176 (1853).
- Satyriden*, Schaatz, Exot. Schmett. p. 26 (1885).
- Satyrina*, H. Schäffer, Lep. Exot. p. 55 (1858); Prod. Syst. Lep. p. 12 (1864). Plötz, Syst. der Schmett. Mitth. Vorpomm. xvii. p. 6 (1886).
- Hipparchiides*, Westwood, Butt. of G. Brit. 2nd Edit. p. 39 (1855). Kirby, Manual Europ. Butt. p. 45 (1862).
- Orcades*, Borkhausen, Natur. der Eur. Schmett. i. p. 63 (1788). Hübner, Tentamen, i. p. 1 (1806). Verz. bek. Schmett. p. 52 (1816). Scudder, Syst. Rev. Amer. Butt. p. 4 (1872).
- Prætores et Dictatores*, Herbst, Nat. Syst. Ins. viii. p. 7 (1796), ix. p. 159 (1798).
- Thysanuriform Stirps* (pars) Horsfield, Catal. Lep. E. I. C. p. 48 (1828-9).
- Lymaciiformes* (pars) Newman, British Butt. p. 19 (1871).
- Furcula*, Guenée, Lep. d'Eure-et-Loir, p. 25 (1867-75).
- Ragadina*, H. Schäffer, Prod. Syst. Lep. p. 15 (1864).

CHARACTERS OF THE SATYRINÆ.

IMAGO.—“Of medium size. *Body* generally small and weak. *Head* of moderate size, front tumid, protuberant below. *Antennæ* inserted in a common, transverse hollow, separating the front from the vertex, very slender, scaled, straight, as long or longer than the abdomen, the limits of the club ill-defined, occupying from one-fourth to one-half of the apex in a gradually enlarging area. *Palpi* slender, the clothing nearly all in a vertical plane, giving it the appearance of considerable compression. *Thorax* moderately slender, compressed. *Forewing* produced somewhat at the apex to a well-rounded angle, generally slightly full at the border which is seldom angulated or even wavy; costal vein greatly swollen at the base; first and generally also the second subcostal veinlets arising just before the apex of the

cell, the other two at some distance beyond; the inferior branches are much as in the Nymphalinæ; discoidal cell usually at least half the length of the wing, closed by distinct veins; median vein often swollen at the base, the branches equidistant, the first arising at the middle of the cell, the last at its tip, which curves towards the subcostal veinlets; submedian vein sometimes swollen at the base; internal veinlet absent. A very anomalous distribution of the veins of the forewing, both at the costal and inner margins, is shown by Mr. Wood-Mason to occur in the genus *Parantirrhæa*. *Hindwings* not generally smaller than the forewings, broadly rounded, generally without tails, angles, or more than slight crenulations; inner border forming a gutter for the reception of the abdomen; costal vein terminating at about the middle of the outer half of the anterior border; subcostal vein taking its rise apparently as a dependent of the costal vein, its lower branch curving strongly at base toward the median; cell closed by a slender vein, connecting the lower subcostal veinlet just beyond its initial curve to the last branch of the median at its curve, directed outward from the subcostal toward the median veinlet; the branches of the median vein arise further from the base of the wing than the corresponding ones of the subcostal vein, the terminal one curving to receive the [discocellular] vein closing the cell; submedian vein terminating at the anal angle; internal vein terminating at about the middle of the inner border. *Forelegs* very small, variable in division and armature; the male tarsi consist of a single joint sometimes divided by sutures into from three to five unarmed articulations; in the female they are divided into four or five joints, sometimes unarmed, sometimes with apical spurs, and sometimes with scattered spines only. *Male abdominal appendages*:—Upper organ provided with a hook as long as or longer than the centrum and generally as long as or longer than the clasps; also, with a pair of slender, tapering, backward-directed appendages on the sides; clasps pretty long and slender, at least four times as long as broad, tapering on the apical half, and generally becoming very slender.” (Scudder, Butt. E. U. S. i. 115, 1888.)

EGG.—“Subspherical, flattened at the base, and rounded, though usually slightly flattened at the summit; the sides full and broadest below the middle, usually in the middle of the lower half; covered either with very inconspicuous cells or with very numerous, delicate, longitudinal ribs; surface minutely granulose; micropyle composed of minute angular cells; increasing a little in size outwardly and separated by delicate raised lines” (Scudder). Mr. W. Doherty, who is the only entomologist who has paid attention to the study of the eggs of Indian butterflies, characterizes those of the Satyrinæ (Journ. Asiat. Soc. Bengal, 1886, 109) as follows:—“Egg about as high as wide, a little more or a little less, rather small, hard, typically translucent, and smooth or with obscure polygonal facets, sometimes subradiate, or even (*Aulocera*) with distinct, broadly-scalloped, anastomosing ribs, somewhat as in

Hesperia. In some species it is covered with calcareous (?) accretions which do not appear till after some days' exposure to the atmosphere."

CATERPILLAR AT BIRTH.—"Abdomen tapering very slightly and regularly from in front backward, the last segment often showing little or no sign of its subsequent bifurcation; body furnished above, on either side, either with two rows, or with a double row of clubbed appendages, one placed anteriorly and one posteriorly on each segment; the sides with another row, formed of a single appendage, placed centrally above the spiracles of each segment, and, beneath another double row, its members not quite in a line—all seated on papillæ."

ADULT CATERPILLAR.—"Head well rounded, smaller than the largest part of the abdomen, although not always of a less size than the first thoracic segment, with no protuberances, excepting on the summit, which sometimes bears on either side a long, straight, conical horn. Body nearly or quite cylindrical, largest at or in advance of the middle, tapering more or less toward each end, the terminal segment longitudinally forked, each fork extending backward as a conical projection, often of considerable length. Surface of the body profusely studded with papillæ, each giving rise to a very short hair; ornamented with longitudinal coloured bands, some of which are frequently composed of oblique dashes, one to a segment; the segments are cut by transverse incisions, usually into six sections, the front one the largest, the last incision frequently obscure; legs and prolegs short but not very stout.

CHRYSALIS.—"Head scarcely at all or but little produced in front; the anterior curve of the thorax very high; ocellar prominences often not at all pronounced; abdomen broadly rounded, not deeply separated from the thorax, the lower surface of the body nearly straight, slightly and broadly curved; the whole body well rounded, with a few or no tubercles excepting the slight projections at base of the wings; edges of the wings very slightly raised above the level of the body and not at all thickened at the border, but generally carinate from the wing tubercle backward." (Scudder, l. c. p. 115.)

GENERAL CHARACTERISTICS AND HABITS.—"Among the Nymphalidæ, the butterflies of this subfamily present a very distinctive appearance. Their sombre hues, almost always inclining to dark brown; their markings, mostly confined to round ocellated spots upon the underside and to some extent upon the upperside, near and parallel to the outer margin—oftenest occurring in the lower subcostal and lower median interspaces; together with the delicate texture of the membrane of the wings, the suppleness of the veins, which are usually inflated at the base (a character, however, not found in some genera and shared by some genera in neighbouring subfamilies); and the excessive atrophy of the forelegs in the males—all combine to separate these insects from those of any other large group. There is no doubt that in many cases

the sombre markings in this group are instances of protective resemblance, the underside of the hindwings being marbled or mottled with darker and lighter colours, in such a way as to render the insect very difficult to see when alighted, for instance, upon a gray rock. That this is its purpose, is indicated, not only by the invariable habit of insects of this subfamily to alight with closed wings, showing only their under surface, but their very common trick of immediately dropping the front wings into concealment between the hinder pair, and also of tipping over to one side and resting in a half reclining posture, the gray wing against the gray rock.

“The caterpillars may be readily recognized by the peculiar bifurcation of the terminal segment of the body; they are almost invariably clothed only with a short but coarse pubescence arising from papillæ so numerous as to give a shagreened appearance to the skin, and longitudinally striped with continuous or broken bands of colour. Mr. Distant rightly considers this a form of protective colouring, and even looks upon the forked tail as in some measure protective, and on type of larva as a ‘very primitive form.’ He remarks (*Rhopalocera Malayana*, p. 37) that ‘they are almost all feeders on various grasses, to which their green coloration and markings assimilate them, thus affording a good example of “protective coloration.”’ In an evolutionary sense there are also ample grounds for considering them as exhibiting a very primitive form. Dr. Weissmann (*‘Studies in the Theory of Descent,’* Engl. edit.) has made the most profound and philosophical study of larval characters, principally as found in the *Sphingidæ*, a family which strongly exhibits more or less specialized larval markings. He considers the oldest *Sphinx* larvæ as being without markings and probably protected only by adaptive coloration and a large caudal horn, &c. It is at least probable that the bifid tails of the *Satyrinæ* fulfil an analogous protective function with this caudal horn in the *Sphingidæ*, or with the forked horn at the tails of the larvæ of some genera of moths. With the next stage of Sphingid evolution, where the larvæ have become longitudinally striped, we may almost apply Dr. Weissmann’s very words to the *Satyrinæ*:—‘The caterpillars thus marked must have been best hidden on those plants in which an arrangement of parallel linear parts predominated; and we may venture to suppose that at this period most of the larvæ of the *Sphingidæ* lived on or among such plants (grasses).’

“The caterpillars eat slowly and are very long in attaining maturity; and as the egg and chrysalis states are usually longer than common, the species of this group are almost without exception single brooded,* and, in the genus *Cœneis*, some species are supposed to take two years to complete the cycle of growth. So far as is known, the larvæ feed only on grasses and sedges (the only exception known to me is the European *Cœnonympha tiphon*, the caterpillar of which is said by Merrin to feed on *Rhynchospora*, one of the *Cyperaceæ*). It is probable that the larvæ of

* See subsequent remarks on “Seasonal Dimorphism” in this subfamily.

nearly all the species hibernate. M. Marloy, who seems to have been more successful in finding the larvæ of the European species than any one else, obtained them all in the months of March, April, and May (Ann. Soc. Ent. France, vii. pp. 263-7 (1838). Prittwitz also states (Stett. Ent. Zeit. xxii.) that all European species, except two, probably or certainly winter in the larval stage, and these exceptional insects, curiously enough, are almost the only ones which are double-brooded." (Scudder, l. c. p. 115.) According to Mr. L. de Nicéville (Butt. India, i. 95 (1883) "the larvæ feed only during the night."

"In this subfamily are found some curious and instructive exceptions to the general rule of pupation among the Nymphalidæ, a family which, as is well known, suspend themselves by the hinder extremity during the chrysalis state. In certain European species, whose transformations were first studied by M. Marloy, the caterpillar goes beneath the ground to pupate, and forming a large oval cocoon or cell, composed of grains of earth connected by a little silk, undergoes its transformations therein without suspending or attaching itself in any form whatever. In one of our [N. American] species of *Ceneis* we have an even more extreme case. In another European species, *Melanargia galathea*, Mr. Bates informs us, Messrs. Hellins and Buckler have found the chrysalis lying on the ground between stems of grass, the shrivelled skin of the larva remaining attached to the hinder extremity of the chrysalis. Both Dr. Boisduval and Mons. Duponchel give a similar account of it, but Hübner represents it as suspended. Mr. Edwards has recently bred the species in this country [N. America] from specimens sent over, and had an experience similar to that of Messrs. Hellins and Buckler. But besides this insect, we know of at least eight European species, mostly referred to *Satyrus*, but some to *Epinephele* and *Pararge* as well, the chrysalids of which are not suspended; and so far as yet appears these all belong to the species of Satyrinæ which have vertically ribbed eggs. Most of the species, however, whose transformations are known, suspend themselves after the manner of other Nymphalidæ.

"The butterflies of this subfamily may be further distinguished by their peculiar flight, which is of a feeble, wavering, dancing character and not long sustained; neither do the insects rise far above the ground. Mr. R. Trimen (Rhopal. Africae Austr. p. 185) says he has 'noticed that those species which do not possess the basal inflation of the veins of the forewings possess greater powers of flight and a more robust structure generally.' Mr. A. R. Wallace, in writing of the species found on the Amazons, says (Trans. Ent. Soc. Lond. (2) ii. p. 261) he 'does not remember to have ever seen any species rise four feet from the earth, while the greater number of them do not exceed as many inches.' They are shade-loving insects. 'They chiefly affect the glades and lanes of the woods, being not often seen in the clearing; sometimes, however, they come into our gardens of a morning, but then they fly

along close to the ground, beneath the shrubs and in the shelter of the fence, as if shade were more congenial than sunshine. Perhaps as there is a correspondence and a harmony in all the divine works, there may be a reference to these retiring habits in the dull tints common to the tribe and the want of those glowing colours so general among butterflies' (Gosse, *Alab.* 55, 56). Dr. Thwaites also (*Moore, Lep. Ceylon*, i. p. 13), speaking of the subtropical Satyrinæ, says that 'their movements are more lively in the early morning and evening during their amatory gambols,' and Mr. de Nicéville remarks (*Butt. of India*, i. p. 104) that the hundred or more species of *Mycalesis* 'seldom take flight unless disturbed, except toward evening.'

"In certain features the Satyrinæ show some curious resemblance to the Hesperidæ. The eggs of the ribbed species closely resemble those of the Hesperidi in general appearance; the caterpillar at birth has a similarly large and striking head, and occasionally the terminal segments of the body are armed with much longer cuticular appendages than elsewhere, a common feature among the Pamphilidi; the mature caterpillar is sluggish in motion, with a somewhat flattened belly and short prolegs, giving a limaciform body, which is clothed with pile only; the chrysalis is unusually rounded and occasionally is not suspended, and the imago often has an oblique patch of raised hairs or scales on the upper surface of the forewings concealing the androconia, which remind one strongly of the similar stigma one often finds in the Pamphilidi. That these peculiarities have some phyletic meaning it is impossible to doubt, but they should not be allowed to overshadow or in any way to conceal the great body of characteristics by which this group forms a part of the great and varied family Nymphalidæ.

"Allusion has just been made to the androconia or male scales occurring sometimes in this subfamily; with the exception of the Euploëinæ and the Argynnidi this is the only group of Nymphalidæ in which they are frequently present; and so far as known they possess here the uniform character of exceedingly attenuated scales with a tasselled tip. They by no means occur in all genera, and sometimes show no external sign of their presence; they are generally found upon the upper surface of the front wings, and often in the form of an oblique stigma. In some Asiatic species, according to Dr. Thwaites (*Moore, Lep. of Ceylon*, i. p. 13) they are found as 'a pair of curious pencils of hair which each lie within a fold of the upper wing, and which are capable of being spread out radiately during the insect's flight.' I am not aware that any odour has been detected in any of them; I have been able to detect none in our two [N. American] species of *Ceneis*. About half our [N. American] species possess no androconia." (*Scudder*, l. c. p. 115.)

"The SATYRINÆ are connected on the one hand with *Euploëa* through *Zethera* [*Euploëamima*], a very aberrant form; and on the other hand with *Elymnia*

through *Melanitis* and *Parantirrhæa*. The genera are structurally very closely related to each other; but in addition to the structural distinctions, each genus exhibits a distinctive style of coloration and markings, which though sometimes difficult to define, is generally unmistakable to the experienced eye; thus, in *Mycalesis*, the underside almost invariably has a straight transverse band across the middle of both wings, with a more or less prominent series of ocellated spots beyond it; in *Lethe*, the basal area on the underside is usually either irregularly or not at all variegated; while in *Zophoessa* it is usually ornamented with straighter transverse lines; in *Hipparchia* [Eumenis] and the allied groups the upper surface is usually brown, variegated with yellowish brown; in *Aulocera* the upper surface is black with a white transverse common stripe; in *Erebia* [Paralasa] the upper side is dark brown, sometimes with ferruginous patches and an ocellus at the apex of the forewing; in *Ypthima* the upper surface is more uniform lighter brown, and the ocellus at the apex in it and in *Callerebia* is always bipupilled. Many of the genera comprise but a single species, such as *Anadebis*, *Orinoma*, *Cyllogenes*, and *Parantirrhæa*; others again have only one representative within Indian limits, such as *Zethera* [Euploeamima], *Pararge* [Lasiommata], *Erites*, *Æneis* [Parœneis], and *Ragadia*, or only two or three, such as *Cœlites*, *Neorina*, *Rhaphicera*, and *Zipætis*; the genera which contain the greatest number of species, such as *Mycalesis*, *Lethe*, and *Melanitis*, have been recently divided off into several groups, some of which depend, as in the case of the divisions of [the old genera] *Danais* and *Euploea*, on the presence and position of scent-pouches and tufts of hair on the wings of the male insect." (de Nicéville, Butt. Ind. i. 95.)

SEASONAL DIMORPHISM:—Mr. de Nicéville in Proc. Asiatic Society of Bengal, December, 1884, writes, "During the last nine years I have collected butterflies in Calcutta, and have always noted the months in which I met with the different species. In this way I became aware that certain closely allied species [of *Mycalesis*, *Melanitis*, *Ypthima*, and *Junonia*] occurred at particular seasons only, and when these species were grouped together according to the time of the year they were met with, it became apparent that those which occur in the rains were strongly ocellated forms, whilst those occurring at other seasons had the ocelli reduced to mere rudiments, or were absent altogether. Why the wet season should beget a generation of 'eyed' butterflies, and the dry season a generation of 'eyeless' forms, I am quite unable to offer a conjecture. In addition to the absence or presence of ocelli, some of these species present other seasonal differences. In *Mycalesis perseus* and *M. mineus*, on the underside in the rains generation the discal white line is very prominent, it is obsolete in the dry season generation; and on the latter form of *M. mineus*, the forewing is much more produced at the apex, making the outer margin straighter. In the dry season form of *Melanitis Leda* the forewing is more falcate, and the underside is not striated."

In the Journ. Asiat. Soc. Bengal, 1885, p. 39, Mr. de Nicéville further says, "The constancy of this phenomenon is such that I cannot help thinking there must be some physical reason for it,—can it be a protective one? The difference in the garb of the surrounding vegetation makes it little remarkable that a change should be found in the coloration of the butterflies of the two seasons, but it is difficult to see why this change should show itself in the obliteration or development of ocelli. The only hypothesis which I can suggest is, that during the rains the density of the vegetation is such that the butterflies can easily hide their conspicuous ocelli, while in the cold and dry seasons the ocelli, easily seen through the scantily-clothed jungle, would render the butterflies an easy prey to their inveterate enemies the birds, lizards, and insectivorous insects; so that the ocellation being a cause of danger would have a worse chance of survival, and consequently would be gradually wiped out by a process of a survival of the fittest, the fittest in this case being the least gaudily-marked individuals. Were this the case, however, the non-marked forms would certainly survive during the rains, for their homeliness of coloration, though no longer absolutely essential, would still give them an advantage over their ocellated brethren, unless indeed the ocelli are preserved by sexual selection at this time when the struggle for bare existence is not so keen as at other seasons."

In a subsequent paper (Journ. Asiat. Soc. Bengal, 1886, p. 229), Mr. de Nicéville gives the life history of certain species of Calcutta Satyrinæ, of the genera *Mycalesis*, *Ypthima*, and *Melanitis*, and states that he has "been able to prove by breeding direct from the egg, that the extraordinary seasonal dimorphism which he had previously suspected to occur does actually exist," and gives the details of the rearing of the species therein described, which, up to that date, he had succeeded in obtaining for breeding. The life history of these dimorphic species will be found described under the genera above referred to.

Later on Mr. de Nicéville writes (Journ. Asiat. Soc. Bengal, 1888, 273), "With regard to many of the Indian Satyrinæ, they are divided into two strongly-marked well-defined groups, which I have designated dry and wet-season forms respectively. These forms *prevail* during their respective seasons, but are by no means strictly confined to them. For instance, it is a common occurrence in India to have what is called a 'break in the rains,' when for many successive days the weather is somewhat similar to that obtaining in the dry season. It may be noted that the Calcutta year is roughly divisible into a cold season, extending from the middle of October to end of March; a hot season, extending from April to middle of June; and a wet season or rains, from the middle of June to the middle of October. Any larvæ turning to pupæ during a 'break' would almost certainly, though they would emerge perhaps a week afterwards in a deluge of rain, be of the dry season form. Similarly, during the dry season, dry season forms prevail, but, should a

rainy day or two come, pupæ formed during the wet interval would probably produce the wet season form of butterfly. Again, as it takes butterflies some little time to lay their eggs (after having completed this operation they die immediately) it must frequently happen that the two forms overlap:—a dry season female not having laid her eggs during the dry season would do so at the beginning of the rains, and though caught in the rainy season, would still be a dry-season butterfly, its worn appearance, if nothing else, proclaiming the fact; and *vice versâ* with a wet season butterfly, not having completed her laying during the rains, and caught in the dry season.”

On the subject of seasonal dimorphism in Indian butterflies of this subfamily, Mr. W. Doherty (Journ. Asiatic Society of Bengal, 1886, p. 105) gives us the result of his more extended observations, and says, “So far as my four years’ experience goes, there are four broods of Indian tropical and subtropical butterflies; two in the wet season—in May or June and in August or early September, and two in the dry season—in October or late in September and in the first warm weather of March, respectively. These periods vary in different localities, the amount of rainfall being the chief cause of change. In Kumaon, where I spent less than six months, I cannot be sure how many broods of butterflies occur there or in what months they appear; the second wet season brood, a numerous one, appeared from the middle to the end of August, and the first dry season brood, less important, especially in the drier valleys, came out in the last week of September, my first specimen of *Mycalesis visala* having been taken September 22nd. In Travancore, there was a small brood of dry-season forms early in March, and a very large one in the second week of May. In Orissa and Ganjam, the first wet-season brood did not appear till the end of July (the monsoon coming late that year), and was poor in numbers. In the Chittagong Hill tracts, the last dry-season brood, including a vast number of species and of specimens, appeared in the middle of March, while the first wet-season brood, both there and in Arakan, came out at the end of May, and was a very small one. At Bassein, Burma, the first dry-season brood, which, as I have said, appeared in Kumaon near the end of September, was delayed till the middle of November. All butterflies do not have four broods. A few seem to keep coming out at short intervals throughout the year; many are found only in the wet season, and some perhaps only in the dry season. It is said that still others are found in but one month of the year, and so have only one brood instead of four. Nevertheless, I think I may generalize my experience into the brief statement that there are four broods, two of the wet, two of the dry season, each of them simultaneous with or preceding by a month the beginning and the end of the season after which I have named them.

“Between the two broods of dry-season butterflies (October and March), and

between the two broods of wet-season butterflies (May—June and August—September), I have never observed any difference. But between specimens of the wet and dry-season broods there are in many genera very perceptible differences. There is a difference in size, the wet-season specimens being generally smaller, and there are minor differences in the angulation of the wings and in the tone and purity of the colouring below. But the most remarkable difference is in the presence of large eye-like spots on the underside of the wet-season forms, either absent or greatly reduced in those of the dry season. To give an example, the Sarju Valley was on September 20th full of ragged specimens of a strong-ocellated butterfly (*Mycalesis mineus* proper), which a week later was succeeded by swarms of a larger, more angulate, non-ocellate insect (*Myc. visala*), precisely similar in its structure, and especially in those very complex organs, the prehensores, which in general mark by strong differences the slightest specific variations. In the same way *Melanitis Leda* was succeeded by the non-ocellate *Mel. Ismene*, and *Junonia Asterie* by the non-ocellate *J. Alman*a. Such facts are best studied in countries where the wet and dry seasons are well marked, and there is none better than Travancore, where in 1882-3 I first observed these curious metamorphoses. Hitherto I have only found them to exist in *Junonia*, *Ypthima*, *Melanitis*, and in the following groups of *Mycalesis*—*Calysime*, *Orsotriena*, *Telinga*, *Gareris*, *Virapa*, and *Samanta*. Many genera of the Satyridæ seem to produce only the two wet-season broods, and so fail to show what variations the weather would produce in their markings. Again, some dry countries produce only the dry forms, and some wet countries only the wet forms. For instance, I believe that Sindh produces only the dry-weather form *Junonia Alman*a, while the wet climate of Ceylon and Singapore produces only *J. Asterie*. In dry Orissa, the wet and dry forms of *Orsotriena Medus* and *O. Runeka* are tolerably distinct, and the latter is the commoner of the two. But on the damp Malabar Coast, of the representative forms *Orsotriena mandata* and *O. mandosa*, the latter, the dry-weather one, is scarce and imperfectly differentiated. The cause of this seasonal dimorphism would be a curious subject of study, but I have no suggestions to offer myself. Mr. de Nicéville has recently observed to me that perhaps, owing to the rank vegetation of the rainy season, the butterflies are better concealed, and have therefore been free to assume these handsome spots, under the influence, perhaps, of sexual selection. This view is, I think, somewhat strengthened by certain facts. The dry season forms are all more or less leaf-like in shape and colouring, while in the wet-season ones there is no such mimicry. This argues greater exposure to danger in the dry season. Remembering, however, the remarks of Darwin and Wallace on the protective nature of the ocelli of birds, borne out by the testimony of all sportsmen, and observed by me in the case of the common wild Peacock, I am inclined to think that the ocelli are a direct protection to the insect during the rains. Certainly that is likely to be the

case in the Himalayas, insectivorous birds being especially numerous there during the south-west monsoon, when the ocellate type of butterfly prevails.”

Mr. Doherty (J. A. S. Bengal, 1889, 118) gives us some subsequent observations which he made on the Upper Assam frontier between August and December, and in other parts of the East, stating that “The season was a very poor one, the cold weather commencing earlier than usual. The dry-season, non-ocellate brood of *Mycalesis*, *Melanitis*, *Junonia*, &c., appeared about the end of September, and none but rubbed and ragged individuals of the wet-season brood were seen flying after that date. My theory of the effect of drought and humidity (somewhat like that of heat and cold on certain European species) on the shape and ocellation of these butterflies has now received confirmation from various sources. In Eastern Java and the neighbouring islands of Sumba, Sambawa, and Timor, the seasons are the reverse of those in India, the winter months—December, January and February—being the rainy ones. I found the broods of the Satyridæ similarly reversed there, the wet-season form coming out late in the autumn, and the dry-season one in the spring. This is of course only indirect evidence, but direct evidence has not been wanting. Mr. de Nicéville, who early adopted my views on this subject, some time ago reared *Mycalesis mineus* from the eggs of *M. visala*, and has lately bred both forms of *Melanitis Leda* under natural conditions from the eggs of the ocellate one. This, however, took place at the time of the change of monsoon. At any other time it must be very unusual for both forms to come from the same parent. Two years ago, in the early part of the dry season in the island of Sambawa, I succeeded in obtaining both *Melanitis Leda* and *ismene* from the eggs of *Leda* by keeping a wet sponge in the box in which the former species was reared. I particularly recommend this experiment to naturalists living in the East, as *Melanitis* lays its eggs with unusual facility in captivity, and the larva feeds on young growing rice, which is always obtainable. . . . It was perhaps the general destruction of forests in the long-settled parts of the East—India, China, Java—whether by the agency of nature or by that of prehistoric man, that gave rise to seasonal dimorphism in the Satyridæ. In the wet, dark woodland, their ocelli served them as a protection. Then came the change; the country was partly deforested, and, instead of the former uniformly damp climate, there was a long dry season in which the rank vegetation withered, the sunlight entered everywhere, and the ocellate butterflies were rendered conspicuous. Some species disappeared from the regions thus affected, while others lost their ocelli and assumed the angular shape and dull neutral colouring of dry leaves, and so survived. In the less variable climate of the equatorial regions, this has rarely taken place, and generally only the ocellate broods are found there. And in desert regions, instances may perhaps occur where the ocellate form has altogether disappeared.”

On this interesting subject Mr. G. F. Hampson, in his "Notes and List of the Butterflies of the Nilgiris" (Journ. Asiat. Soc. Bengal, 1888, 347) states that "most of the species have four broods, two in the dry season and two in the wet season; but some species have only the two wet-season broods. Seasonal dimorphism is rather difficult to study on the Nilgiris, owing to the fact that the Western and North-western Slopes get heavy rains during the South-west monsoon and hardly any during the North-east; while the Eastern and South-eastern Slopes have their wet season during the North-east monsoon and get little of the South-west; and, consequently, the wet and dry-season broods are some three months later in appearing on the Southern and Eastern Slopes than on the Western and Northern, and the two forms get much mingled in the intermediate districts, which partially get both monsoons."

GEOGRAPHICAL DISTRIBUTION.—"This subfamily is more widely spread over the globe than any other similar group of butterflies, being universally present wherever butterflies occur. Its members extend to the polar colds and alpine summits, and embrace several genera peculiar to such regions. Yet, wherever they occur, the Satyrinæ can be recognized by their peculiar facies, and have nowhere lost their characteristic flight and habits." (Scudder, l. c. p. 121.) Of the genera occurring within our limits "some few are purely Indian; others are Asiatic and Malayan; and again, others belong only to the Palæarctic region, and occur within our limits only in the mountains on the North and West." (de Nicéville, Butt. Ind. i. 97.)

Key to the Indian Genera of SATYRINÆ.

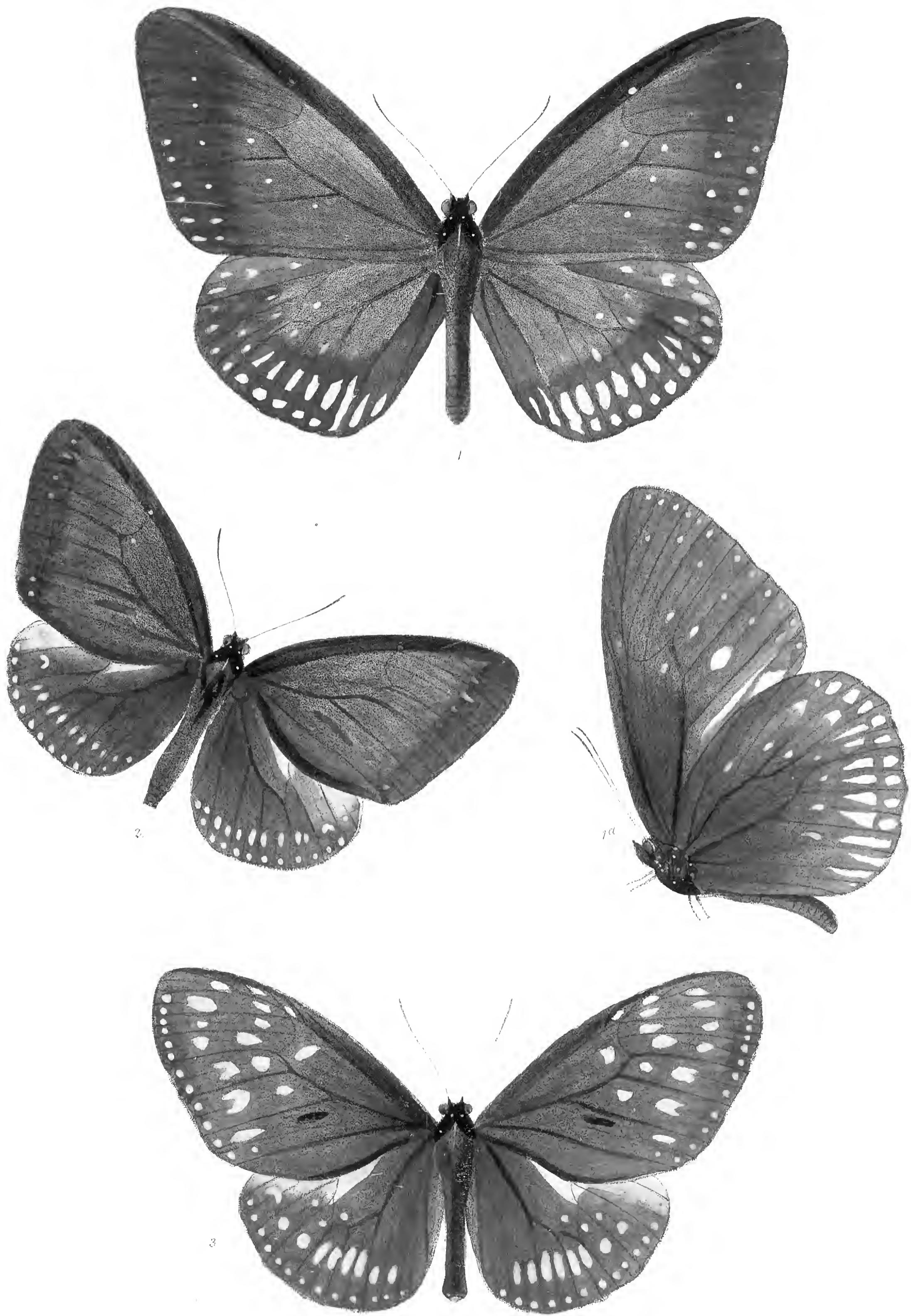
- I. Hindwing with the apex of the cell at, or close to, the origin of the middle median veinlet, usually appearing as if the latter were a continuation of the lower discocellular veinlet.
 - A. Palpi clothed in front with short dense *appressed* hairs.
 1. Forewing with the costal vein only scarcely perceptibly swollen at the base; the eyes naked.
 - a. Hindwing short, rounded, without ocellated spots EUPLCEAMIMA.
 - b. Hindwing rather elongate, rounded, with ocellated spots on upper and underside ANADEBIS.
 - B. Palpi clothed in front with moderate or rather short *porrect* hairs.
 2. Forewing with the median and submedian vein usually much swollen at the base in addition to the swollen costal vein, but variable. The *eyes hairy*, except in *Orsotriæna*, where they are naked. [In the type of the genus *Mycalesis* (*M. Evadne*)—an African species—the eyes are also naked.] Males with one or more scent-pouches, or androconial patches, on the upperside of the wings. [Mycalesis, Auctorum.]
 - 1A. Males with an *androconial patch and tuft of hairs* on upperside of both the *fore* and *hindwings*.
 - a. Males with the *androconial patch and tuft on hindwing* near to the subcostal vein, and overlapped by the forewing; the costal, median, and submedian veins of *forewing* much swollen at the base. The *eyes hairy*.

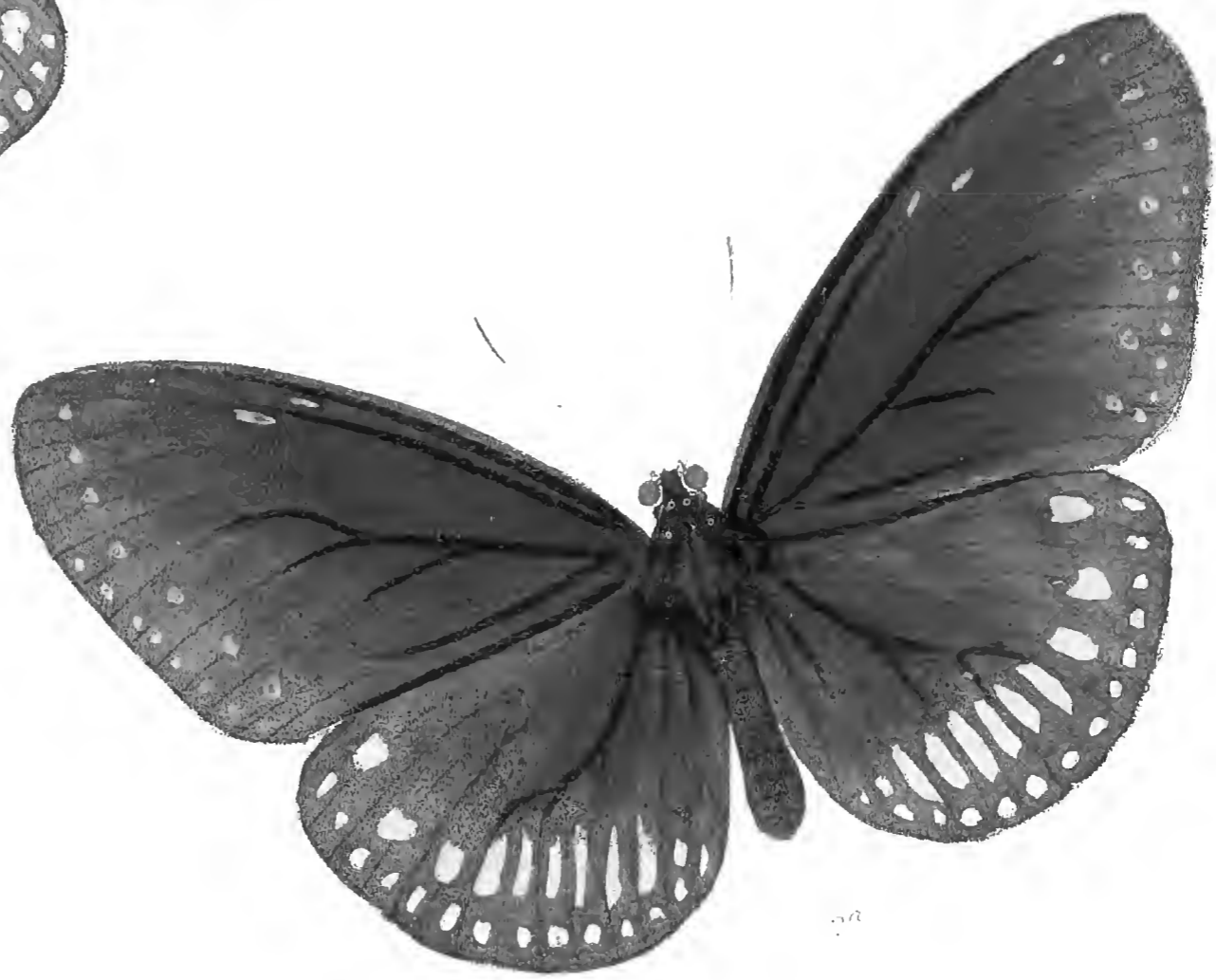
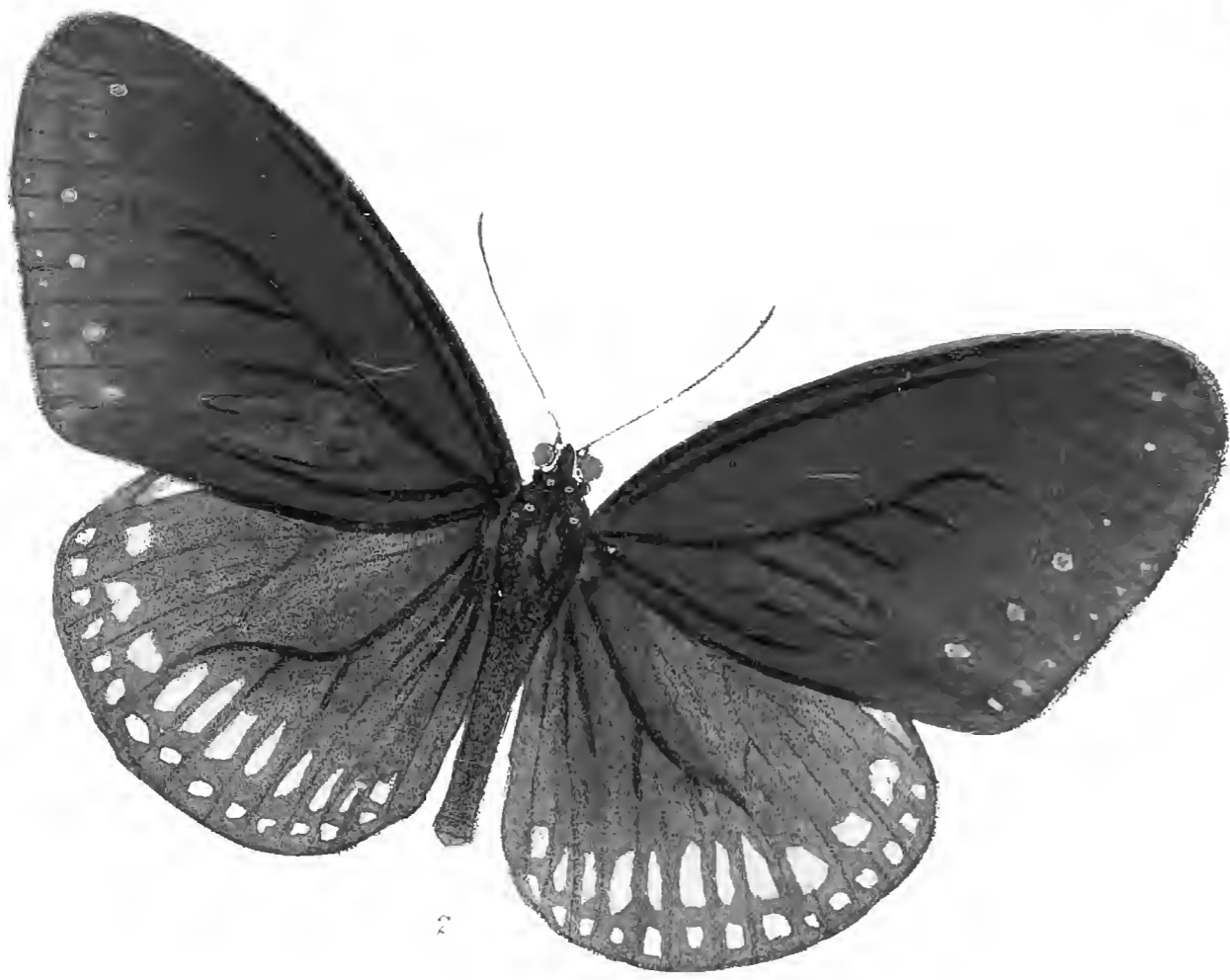
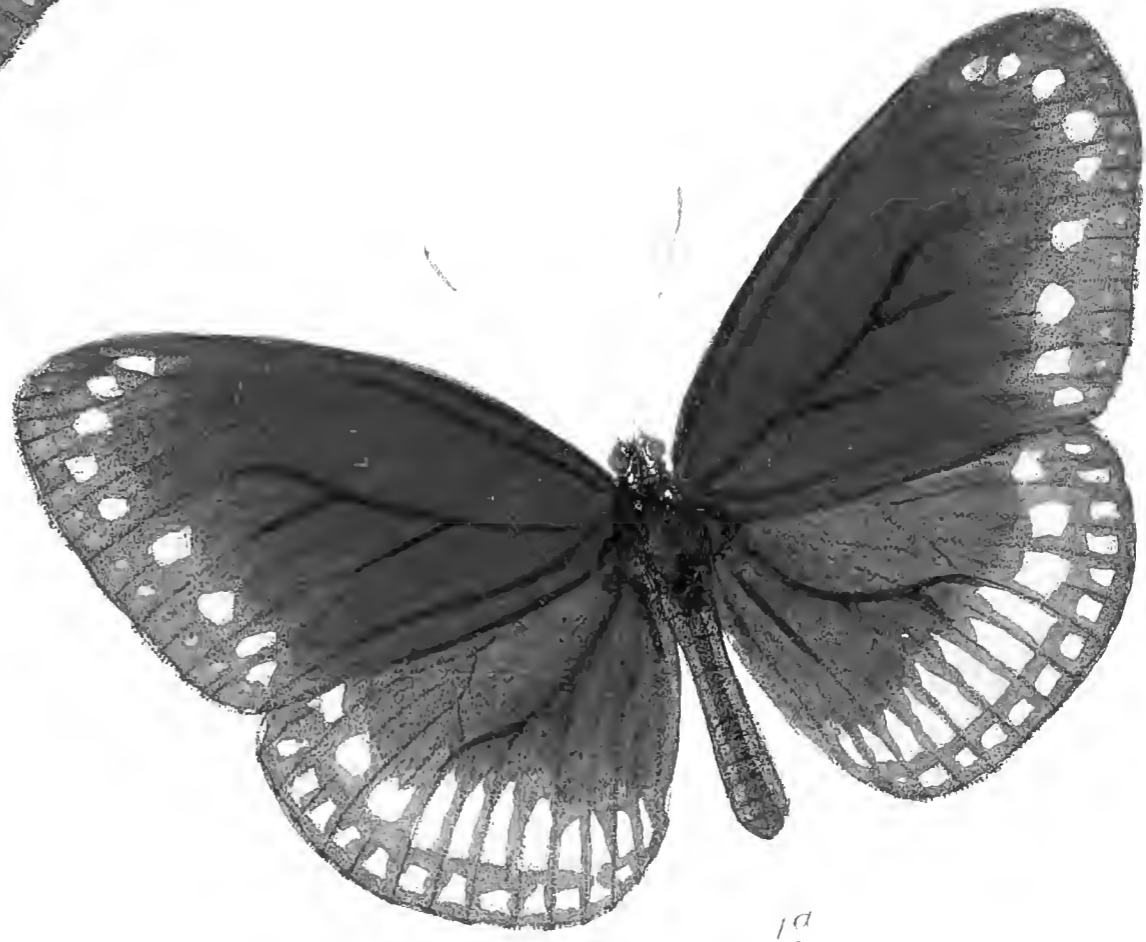


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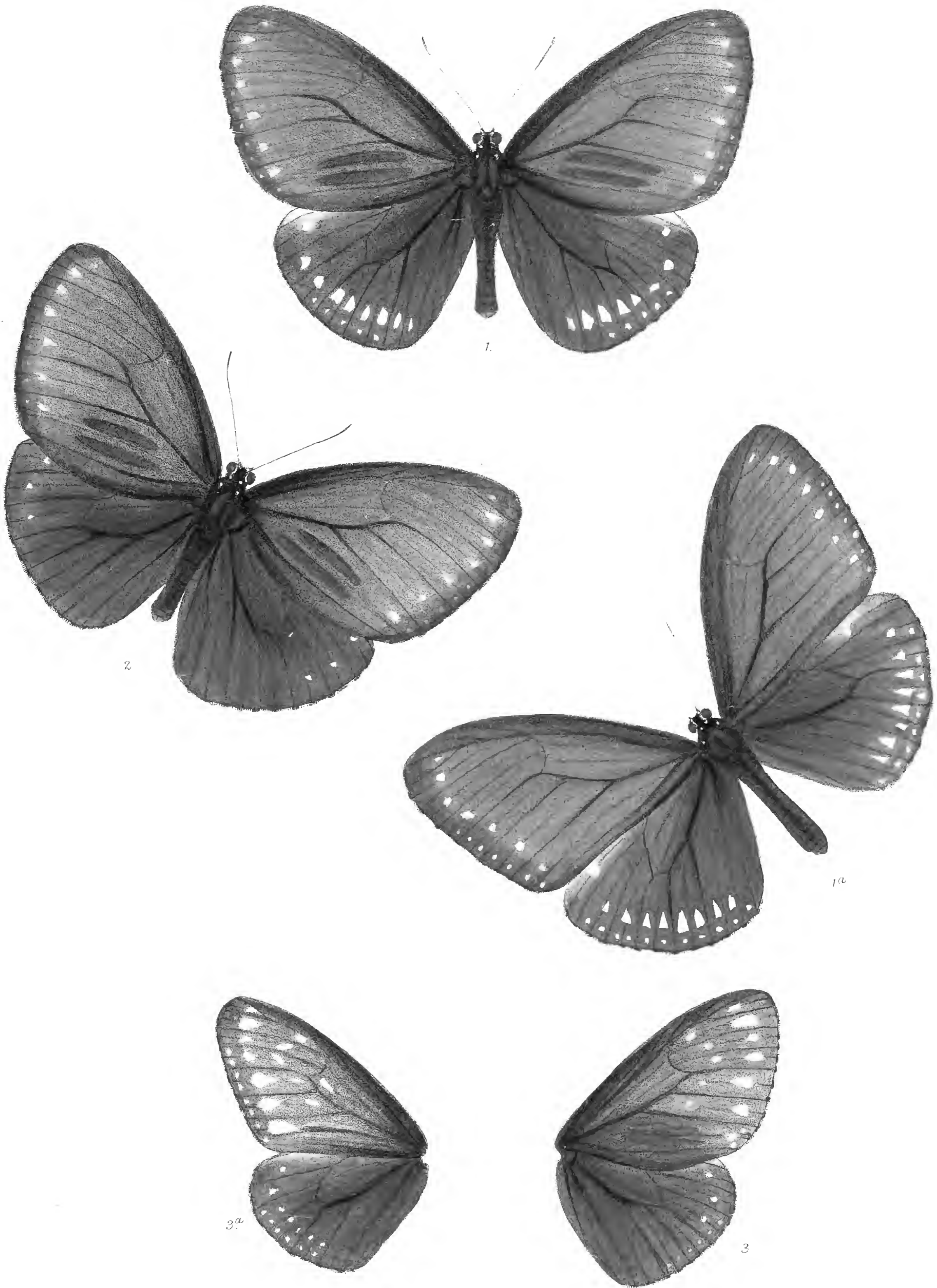




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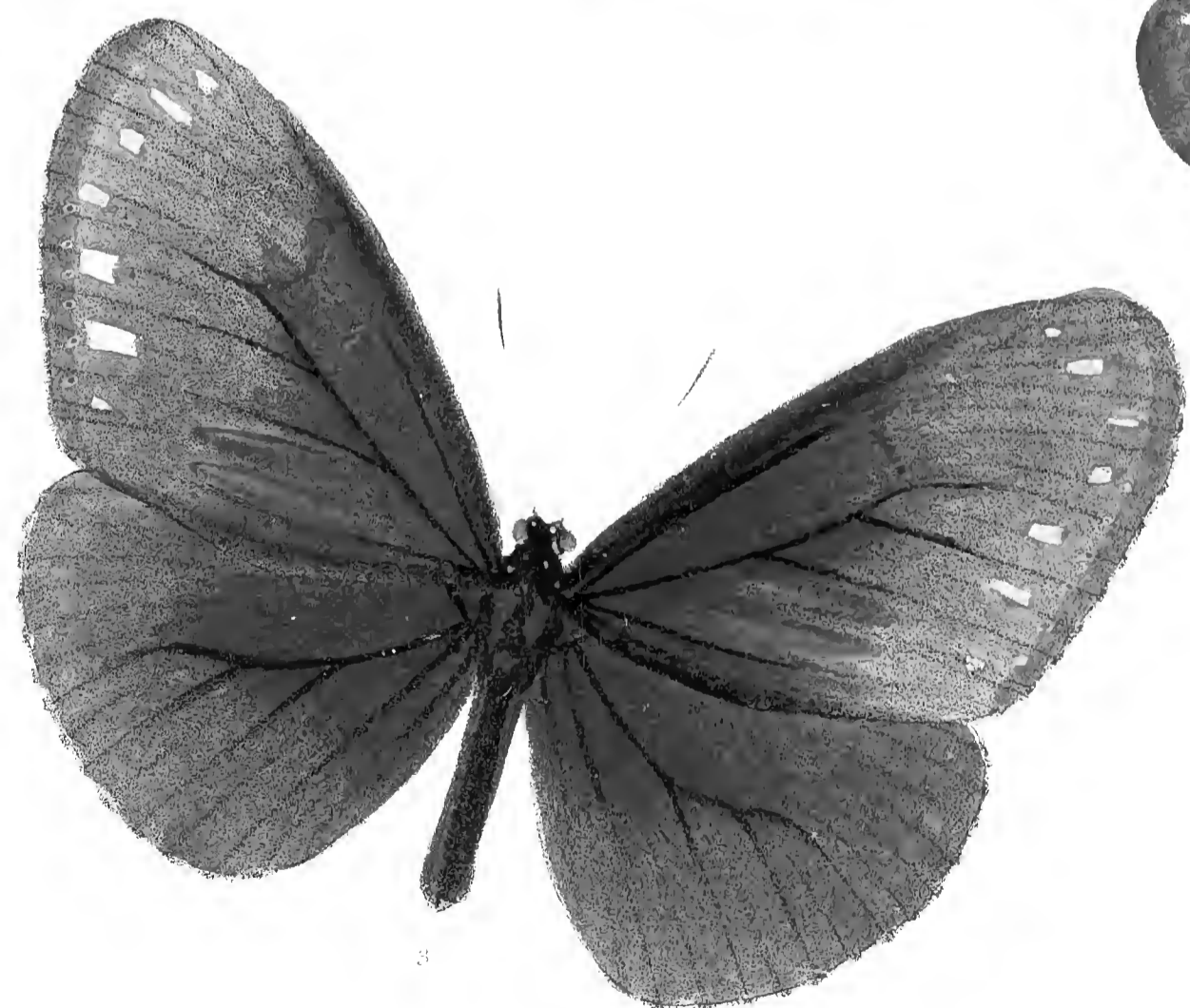
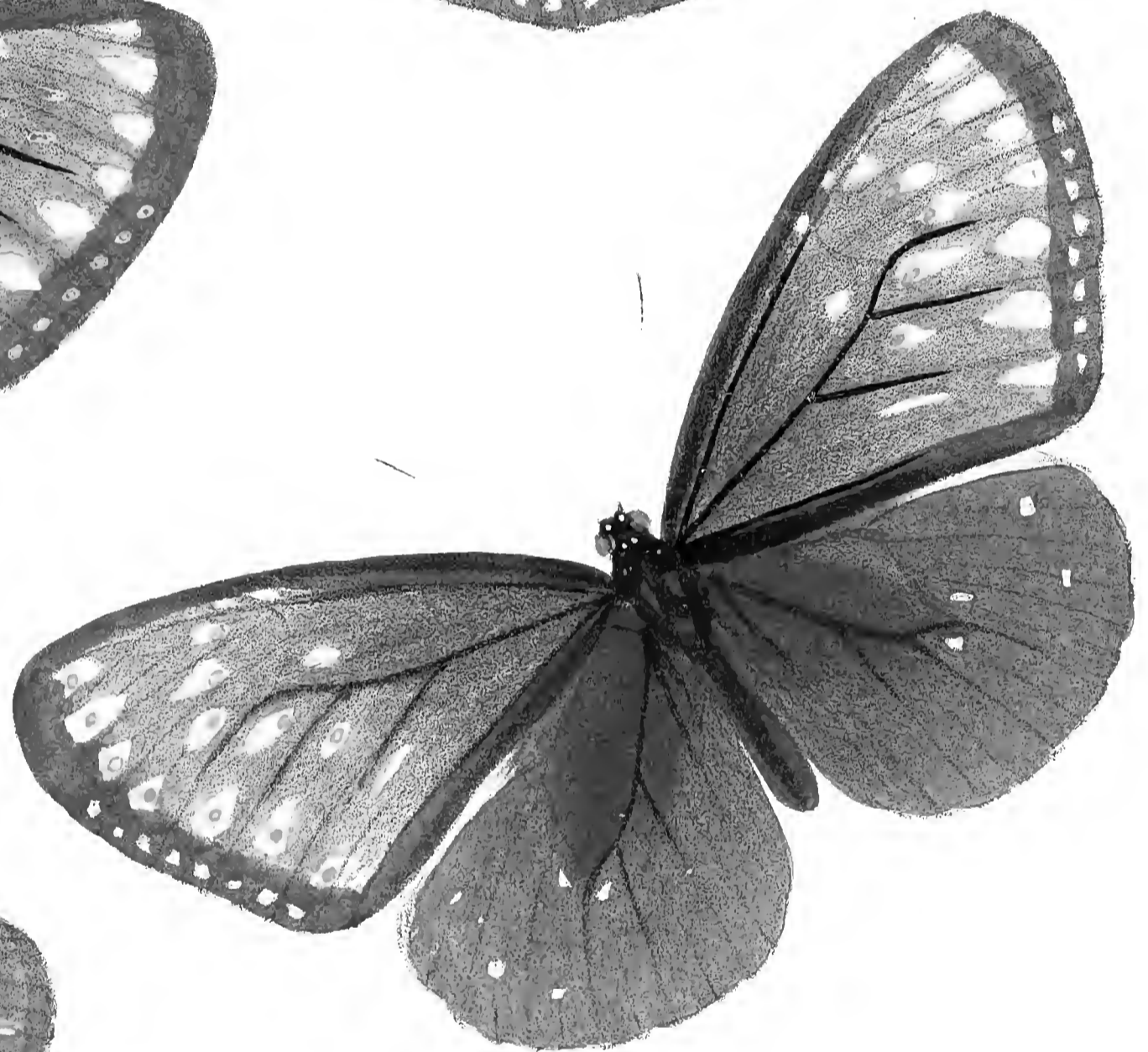
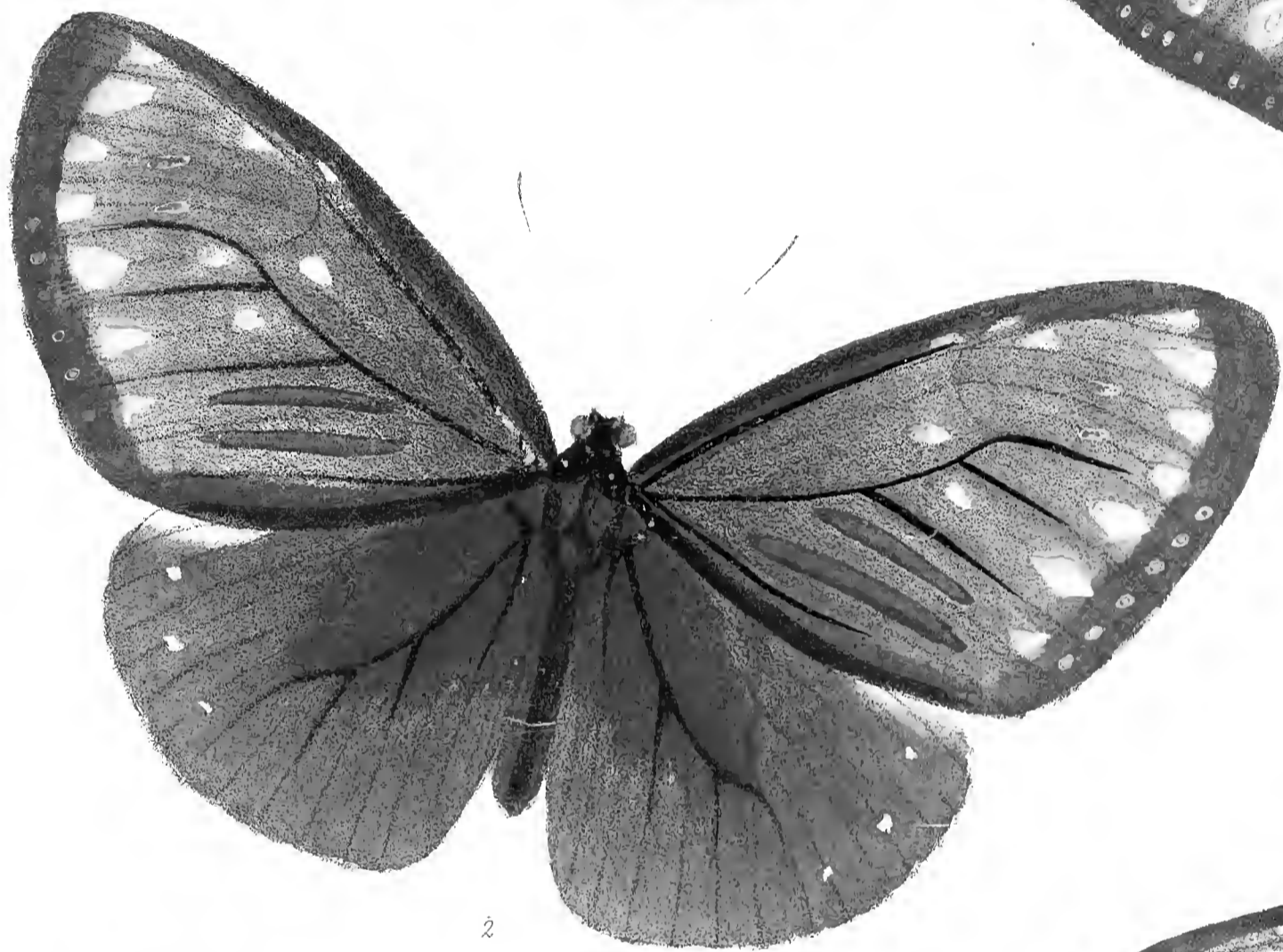
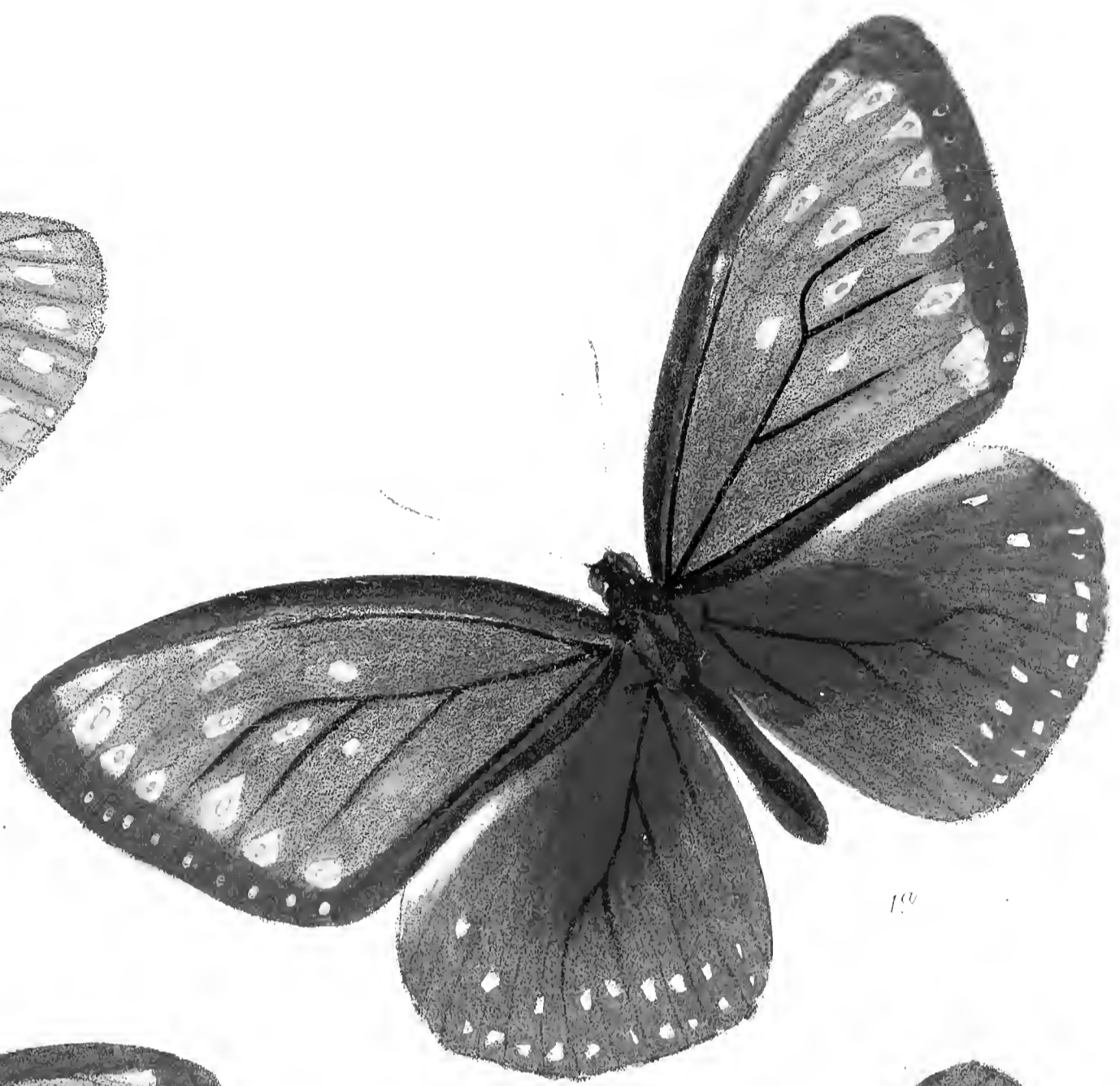
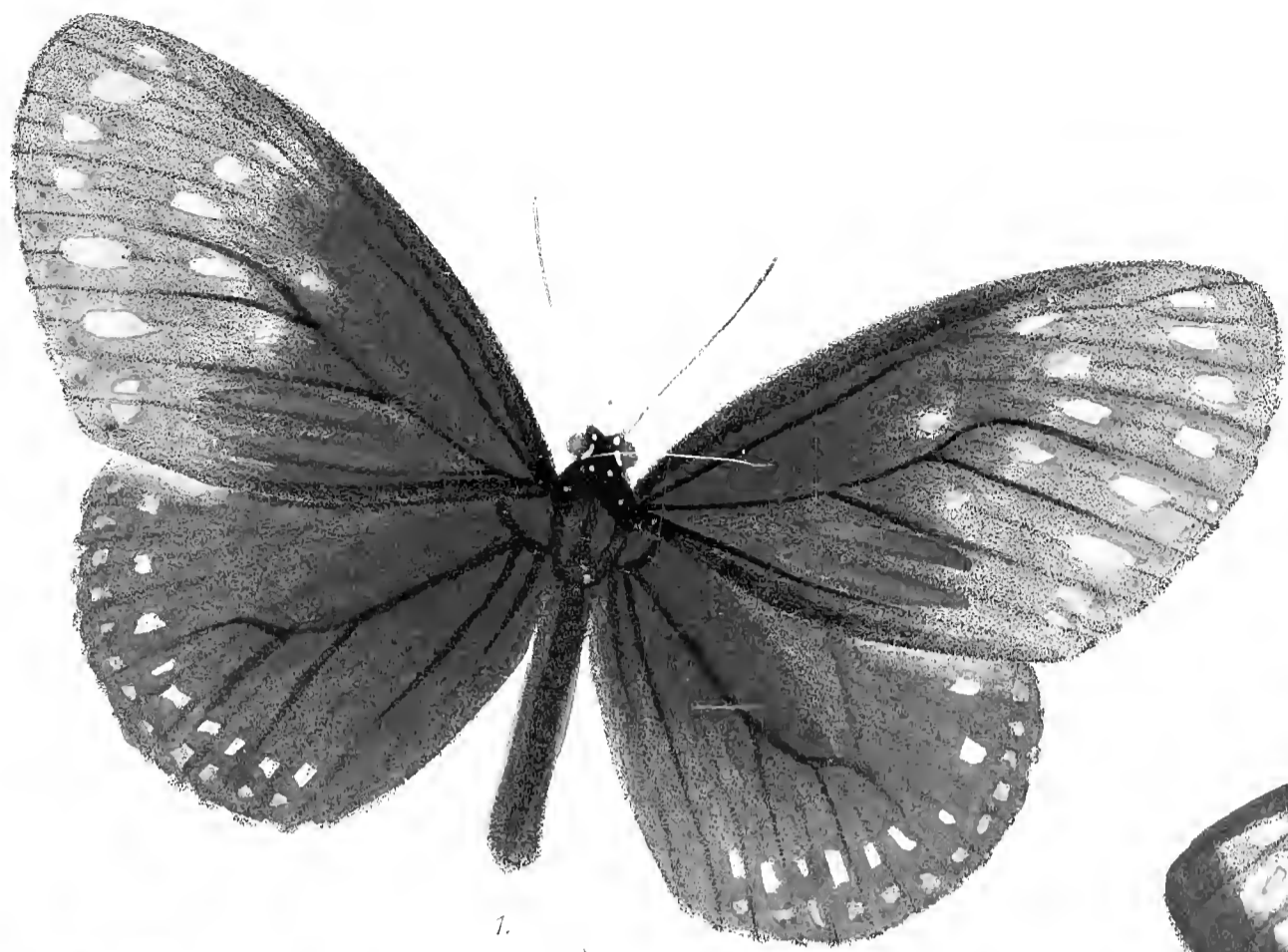
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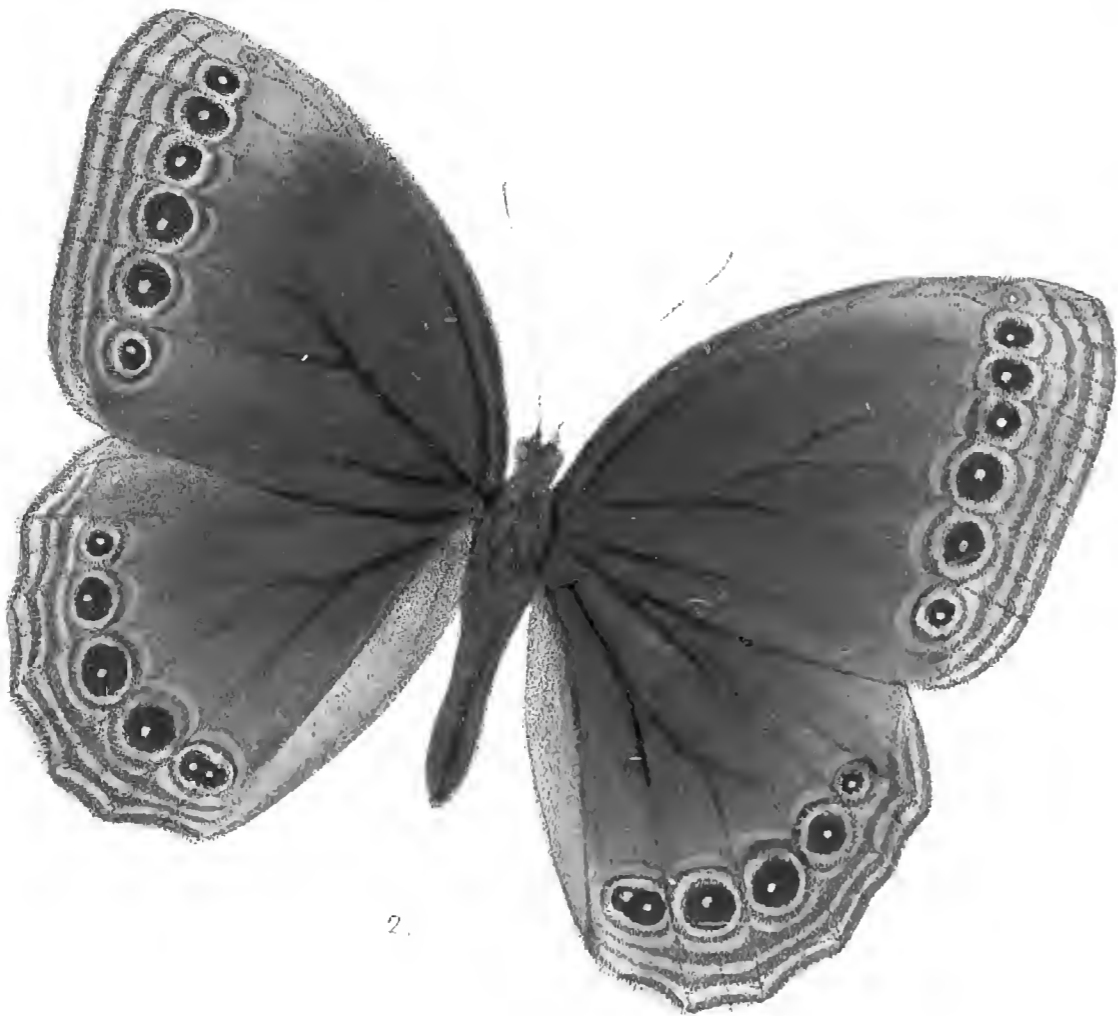
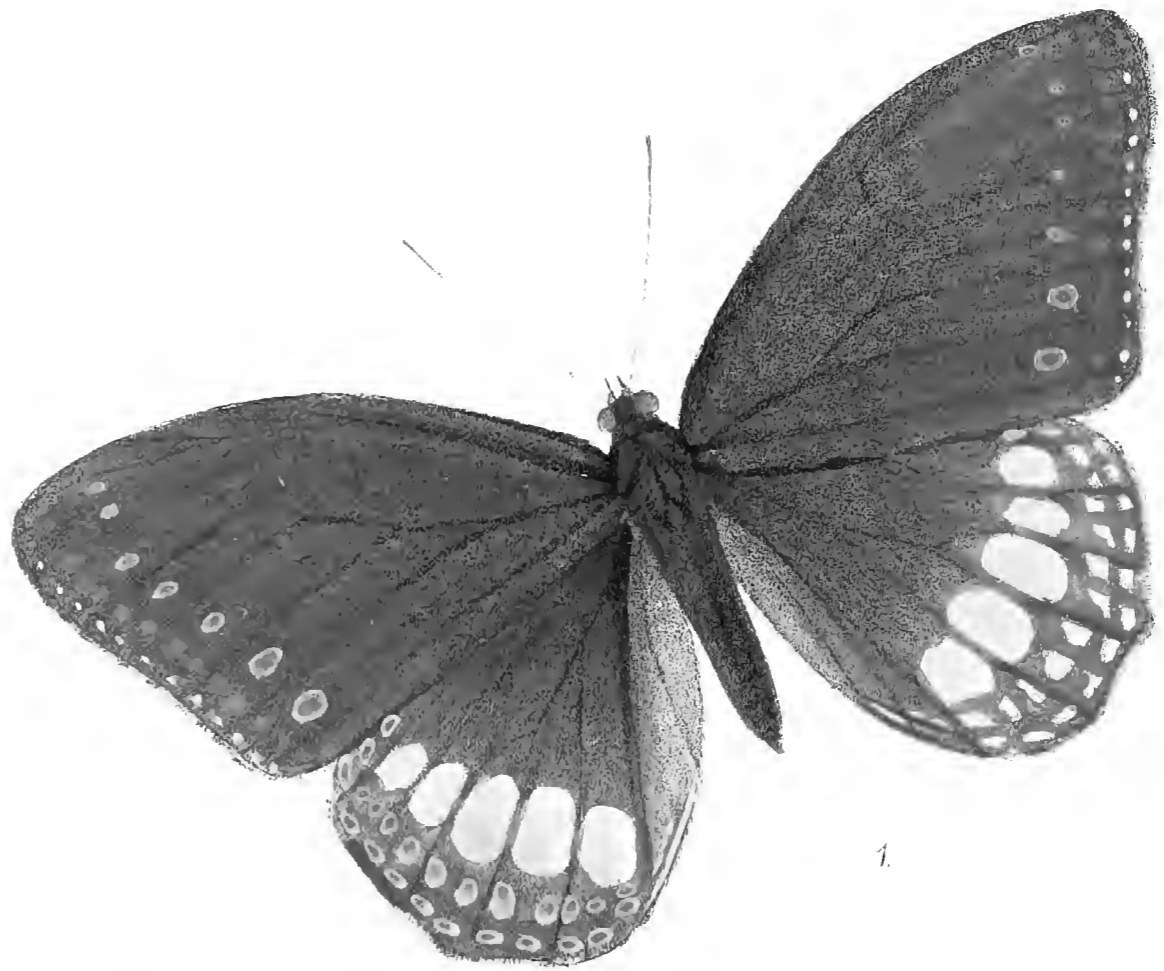
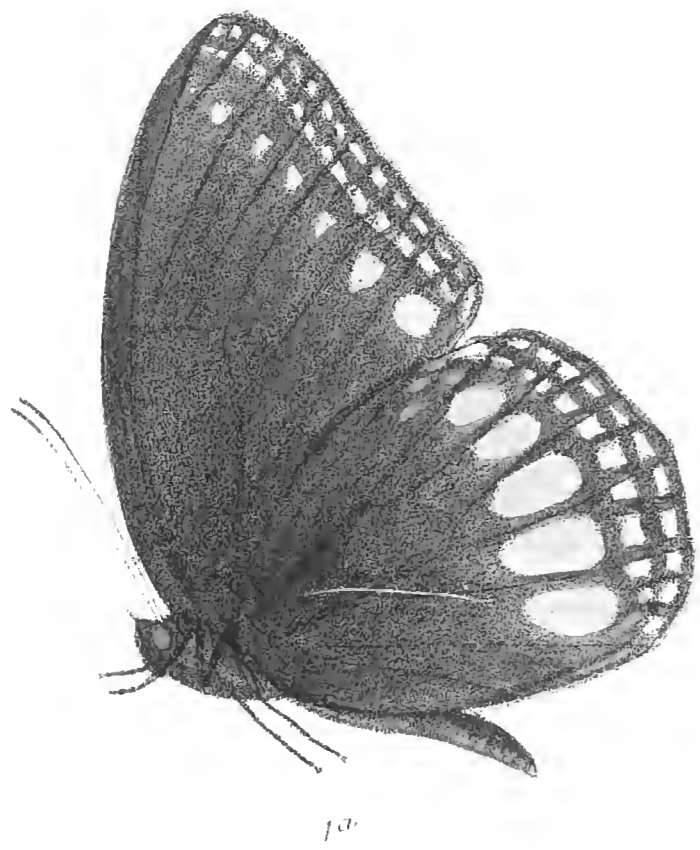
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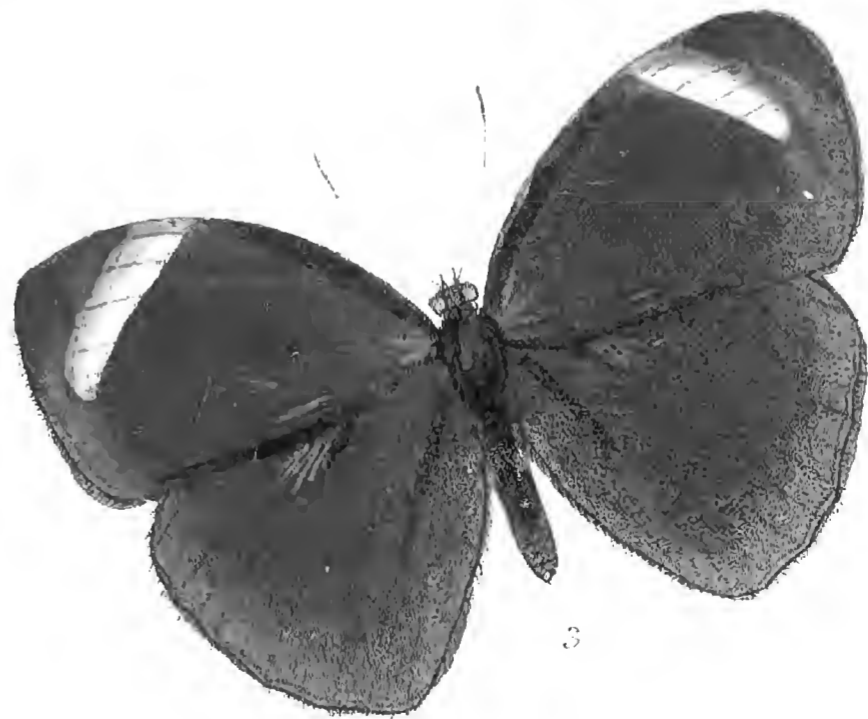
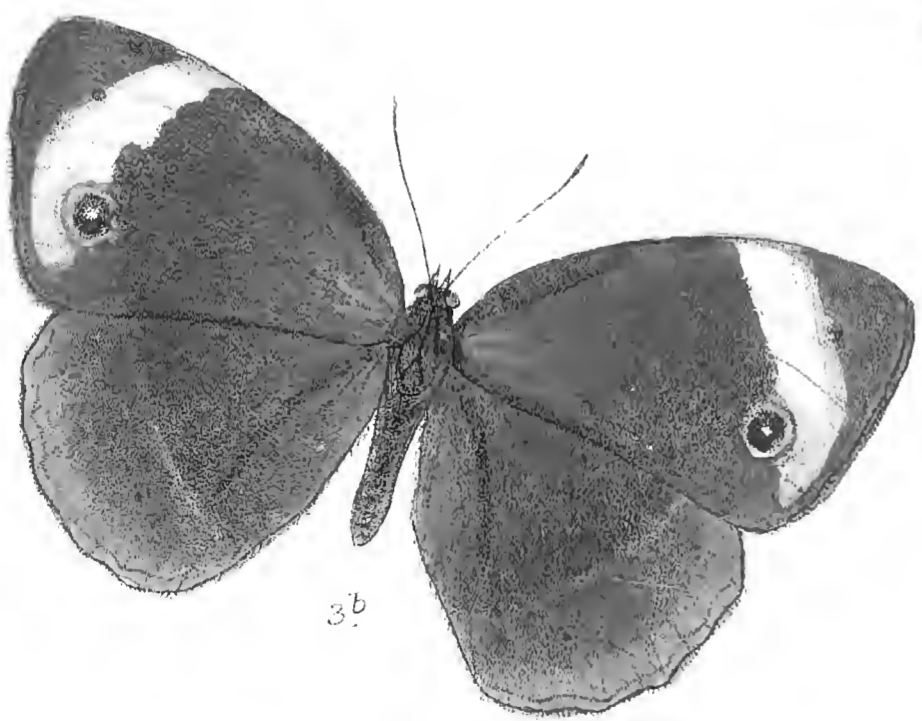
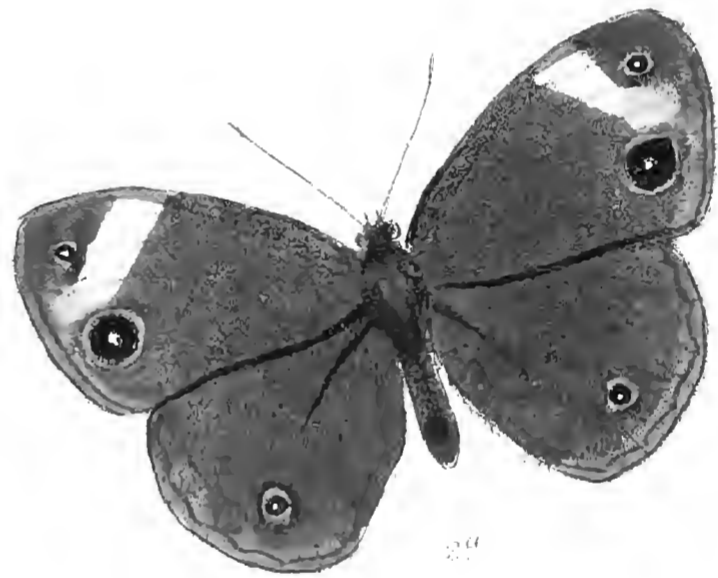
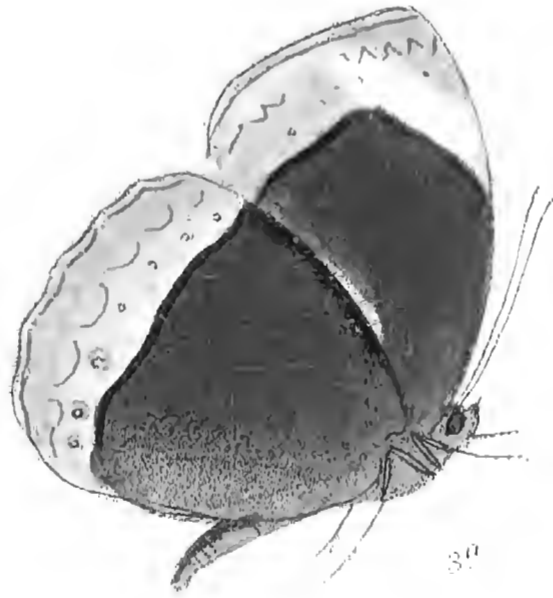
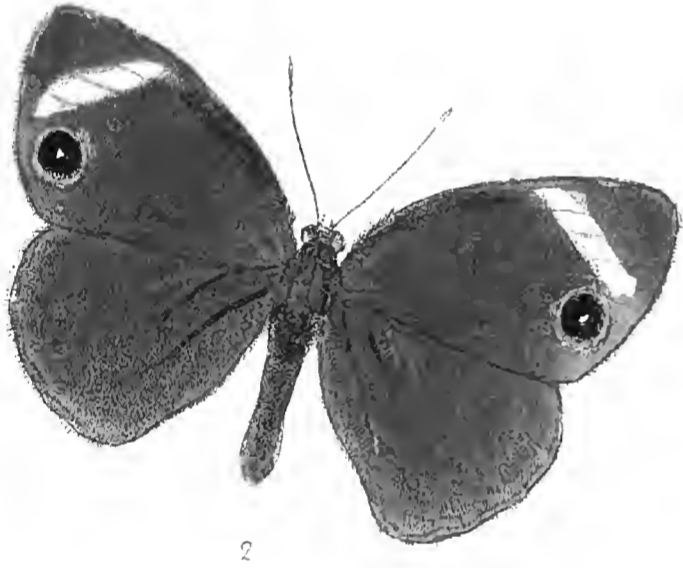
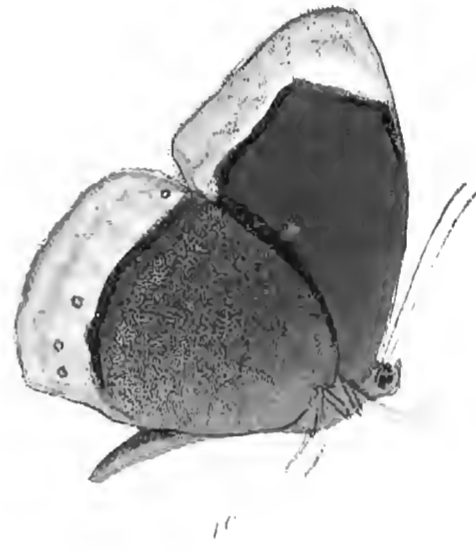
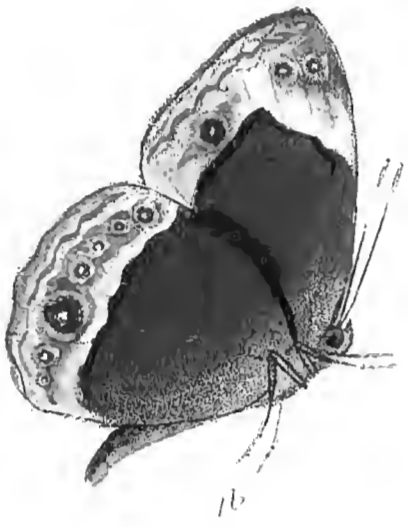
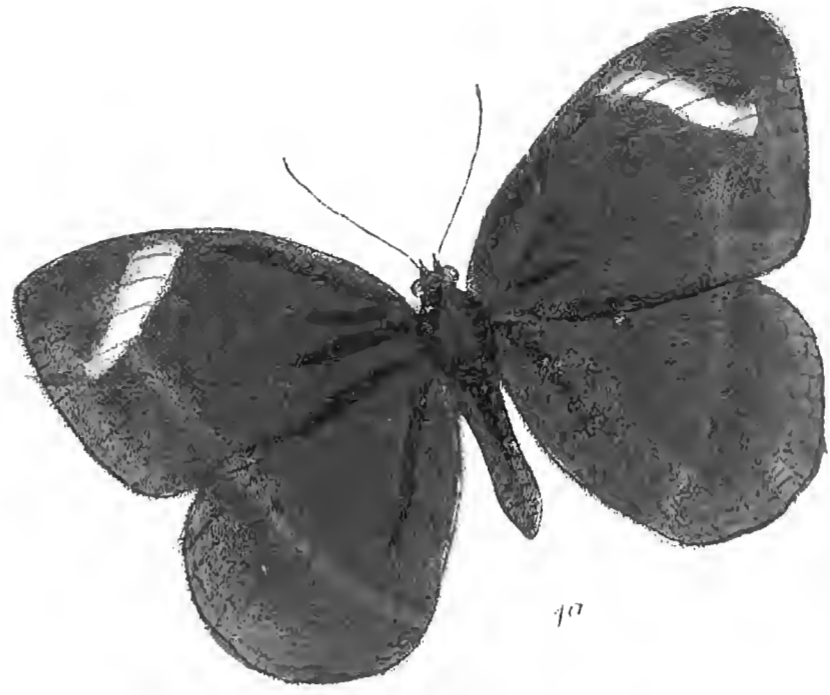
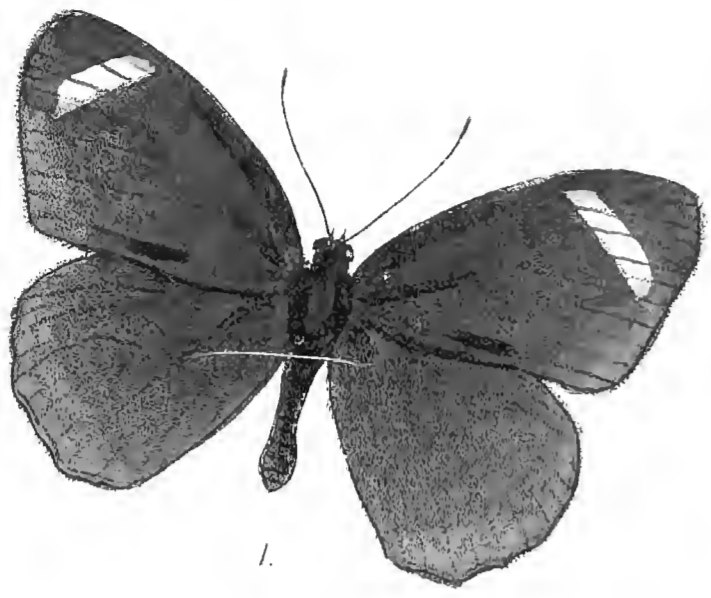
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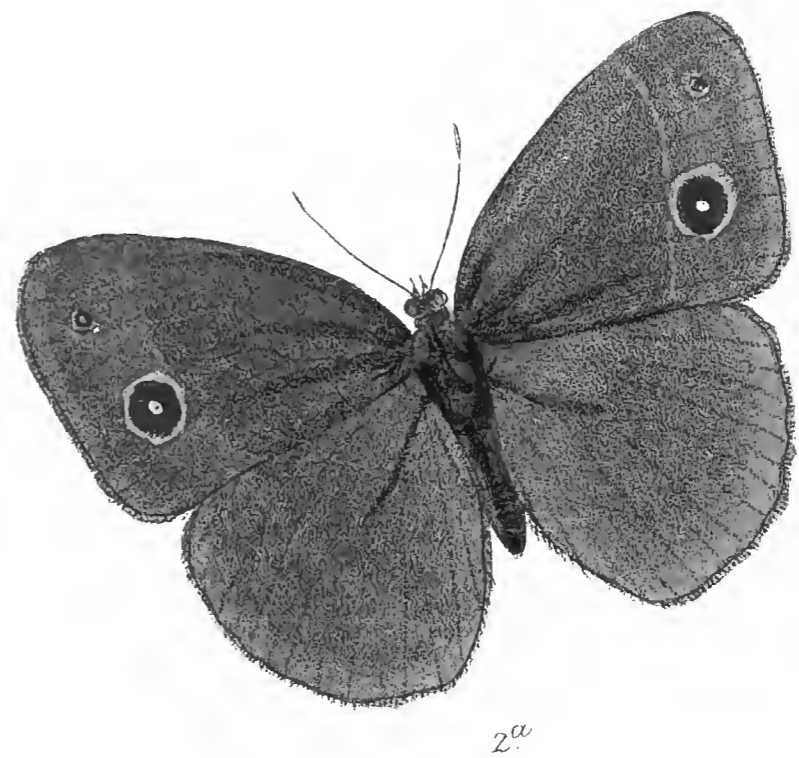
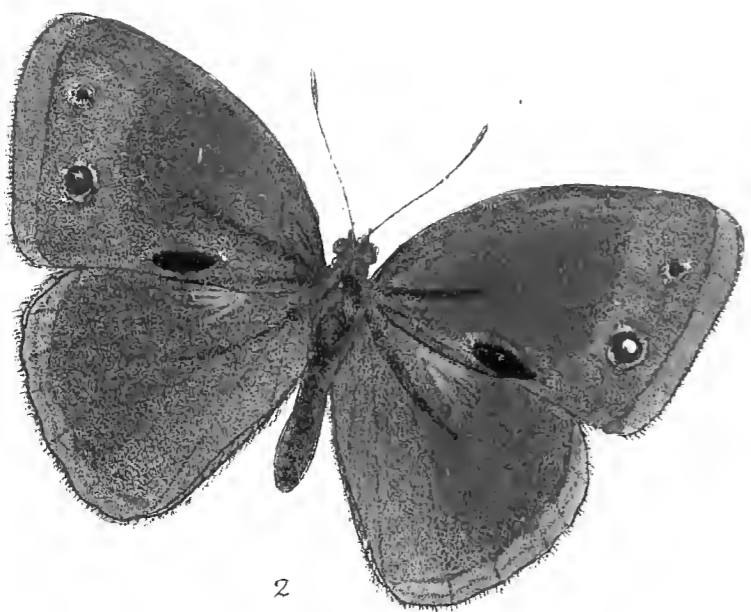
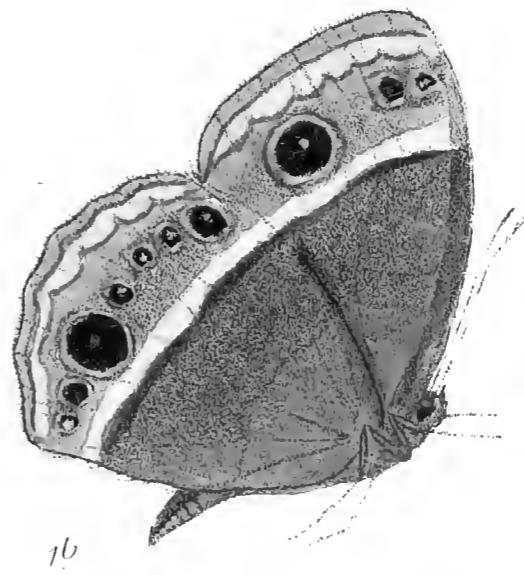
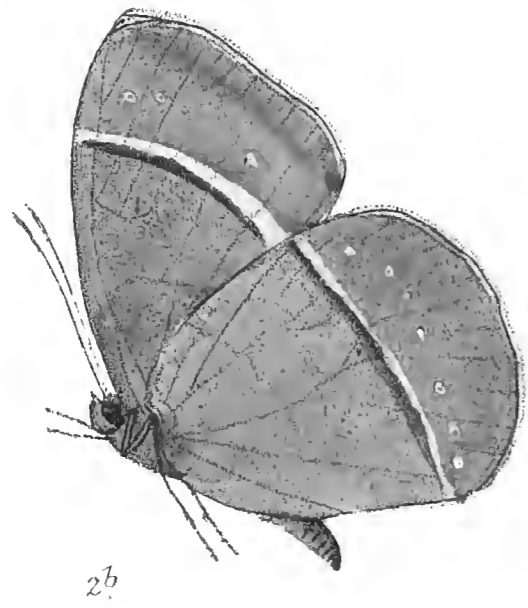
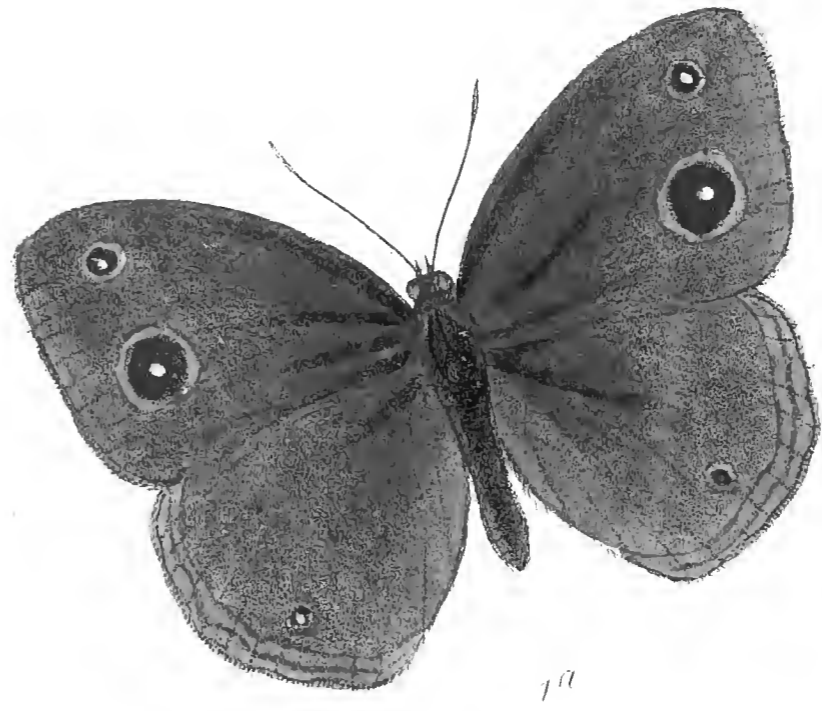
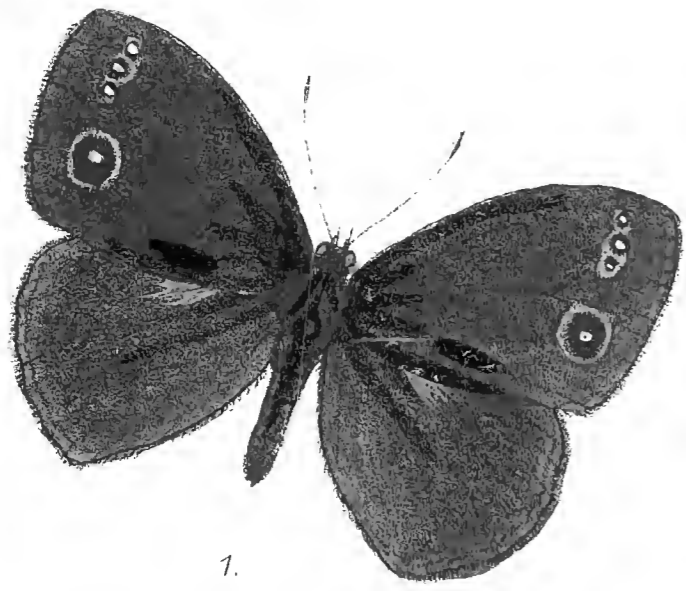
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