

REVISIONAL NOTES ON THE GENERA *DIPLACINA* BRAUER  
AND *HUONIA* FÖRSTER (Odon.)

by

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I. Revision of the section *smaragdina* Selys, of the  
genus *Diplacina* Brauer

With the increase in the number of species of this compact group of *Diplacina*<sup>1)</sup>, one is tempted to suggest that its members are sufficiently distinguished from the genotype *nana* BRAUER and its three immediate allies (all from the Philippine Islands), to erect a new genus for this Papuan cluster of species. Possibly, the same will prove necessary with respect to a third related group, still more deviating from the genotype, which inhabits Celebes and the Banggai Archipelago (Pulu Peleng). This comprises at least three quite distinct species, of which only one, *militaris* RIS, has yet been made known. Until the new forms in our collection are carefully analysed and described, and the advisability for a breaking up of the genus has been demonstrated or refuted, *smaragdina* and its near relatives are best left as an eastern group within the genus. An attempt at the revised definitions of the *nana*, *militaris* and *smaragdina* sections of *Diplacina* will, it is hoped, be given in a following paper.

In the present survey all known species and subspecies of the *smaragdina* group are enumerated or described, with the exception of *D. fulgens* RIS, from the Bismarck Archipelago, which is too imperfectly known to be included. Descriptions and figures are given of 5 new species and 3 new subspecies, and to facilitate their recognition a key has been prepared to identify the males of all known forms, except of *fulgens* and *micans*, sp. n., which had to be omitted owing to the incompleteness of their abdomen. Both, however, are very distinct species.

Reviewing the geographical distribution, we see that the group is restricted to the northern Moluccas as far as the Bismarck Islands, ranging from Halmahera to New Britain. It is a group of closely allied species, but, with their number increasing, sub-groups are already clearly indicated. Two species, viz. *phoebe* and *paula*, which are fundamentally different from each other structurally, show a marked tendency to insular subspeciation.

<sup>1)</sup> Last review of species: M. A. LIEFTINCK (1933), *Nova Guinea* 17, Zool. 1 : 40-58, figs.

## Key to the species (males)

1. Apex of appendix inferior always a little widened, bifid. No median yellow spot or brownish areas immediately posterior to the occipital triangle . . . . . 2
- Apex of appendix inferior narrow, usually rounded or subtruncate, or at most very shallowly emarginate. Lower margin of app. sup. carrying a strong tooth-like postmedian or sub-apical projection . . . 9
2. Appendix superior in profile view straight or nearly so, more or less finger-shaped, destitute of a submedian tubercle or tooth along ventral border and also without clearly visible inferior tooth-like projections or angulations near the apex; in dorsal view more or less forcipate, widely distant, each gently incurved. App. inf. much shorter than superior pair, broad and plate-shaped, strongly longitudinally carinate dorsally, at first sub-parallel, with more or less convex side-margins, its apex subtruncate, shallowly and broadly emarginate, with widely separated and somewhat divaricate tips. Posterior limit of metallic-green band on metepimeron rounded or at most slightly angulate, this band never forked. Lobus anterior of genitalia of large size, hood-shaped. Yellow longitudinal mark attached to basal ring of 7th abd.-segment narrow, incomplete, tapering to a point . . . . . 3
- Appendix superior in profile view with dorsal margin at least slightly convex, not finger-shaped or, if so, then provided with a stout inferior submedian prominence or tooth . . . . . 5
3. Lateral yellow spot in front of frons complete and elongate, reaching upwards as far as the insertion-point of antenna. Labium yellow, with black band on middle approximately parallel-sided. A distinct undulated creamy-white stripe (whether or not interrupted in middle) along humeral suture of thorax (fig. 1). App. sup. acutely pointed, each provided with a distinct though very small intero-ventral prominence situated immediately beyond level of the tips of appendix inferior. Lower margin of app. inf. in side-view only slightly convex. Outer branch of genital hamule comparatively larger and thicker than in the next species. Hab.: New Guinea . . . . . **antigone** LIEFT.
- Lateral yellow spot in front of frons roundish, reaching only half-way upwards along margin of compound eye. Labium either entirely black or with the black median band strongly widened distally. Usually no traces of a yellow stripe along humeral suture of thorax (fig. 1). App. sup. rounded off or bluntly pointed apically, each provided with a minute intero-ventral sub-apical tooth situated well beyond level of the tips of the appendix inferior. Lower margin of app. inf. in side-view strongly convex. Outer branch of genital hamule narrower and a little smaller than in the preceding species . . . . . (**paula**) 4
4. Black band on middle of labium strongly divergent apically, the side-ports creamy-white. Tips of appendix inferior a little longer, more strongly divergent and a little more pointed (fig. 2). Hab.: S. New Guinea . . . . . **paula paula** RIS

- Labium wholly black, or with merest trace of a yellow line on either side bordering the lateral lobe. Tips of appendix inferior shorter, not so strongly divergent and less definitely pointed (fig. 2). Hab.: Misool I. . . . . *paula lethe*, subsp.n.
5. Appendix inferior considerably shorter than superior pair, broad and plate-shaped, with its sides at first sub-parallel and somewhat outbent, then slightly diminishing in width and finally expanded again, with widely divaricate tips. App. sup. in profile view carrying a robust postmedian inferior tooth-like prominence . . . . . 6
- Appendix inferior only little shorter than superior pair and much longer than broad, subtriangular in outline; apex, after a well-marked constriction, expanded and triangularly excised, its tips more or less divaricate. App. sup. in profile view without submedian inferior projection situated near the apex. Lateral spot in front of frons not reaching upwards as far as the insertion-point of antenna. A broad black stripe on the middle of the labium . . . . . 7
6. Lateral spot in front of frons of large size, reaching upwards almost as far as the insertion-point of antenna. Black band on middle of labium much narrower than each of the yellow-coloured lateral portions of same. Mesinterepisternum and a small inferior triangular spot on middle of mesepisternum light green; dorsum of thorax moreover with a pair of large, oval, juxta-humeral greenish-yellow patches confluent ventrally with a band occupying most of the mesinfraepisternite; thoracic sides predominantly pale-coloured, traversed by a metallic-green stripe over the second suture (fig. 3). Abd.-segm. 7 with complete broad greenish-yellow ring occupying basal half of segment. Appendices of small size, superior pair strongly curved in profile view, tips acutely pointed (fig. 4). Hab.: W. New Guinea & Misool I. . . . . *cyrene*, sp.n.
- Lateral spot in front of frons smaller and more tapered upwards, not nearly reaching the insertion-point of antenna. Black band on middle of labium parallel-sided, wider than each of the yellow-coloured lateral portions of same. Dorsum of thorax, including the dorsum of mesinterepisternum, unicolorous metallic-green (the m.i.e. black); thoracic sides with intricate colour-pattern of metallic-green and yellow (fig. 1). Abd.-segm. 7 with narrow pale basal ring which is prolonged backwards half-way the segment's length into a lanceolate spot covering the median carina. Appendices not unusually small, superior pair almost straight in profile view, tips blunt but usually abruptly and very finely pointed at extreme apex. Hab.: New Guinea . . . . . *persephone* LIEFT.
7. Appendix inferior at its base at least two times wider than it is broad at extreme tips; sub-apical constriction not very strongly pronounced, the apex distinctly triangularly excised, but tips not so strongly divaricate. App. sup. in profile view at first rather strongly curved downwards, the apical one-third gently upcurved, the inferior sub-apical prominence obtuse-angulate, carrying 2-3 minute teeth (fig. 7). Lateral yellow spot in front of frons roundish.

- Yellow streaks along humeral suture of thorax vestigial or wholly absent. Second lateral thoracic metallic-green band neither angular nor forked posteriorly, its hind border evenly rounded (fig. 5). Yellow spot attached to basal ring of abd.-segm. 7 narrow, sagittate, acutely pointed posteriorly. Hab.: New Guinea & Misool I. **smaragdina** SELYS
- Appendix inferior at its base less than twice as wide as it is broad at extreme tips; sub-apical constriction well pronounced, the triangular apical notch wider and the tips more strongly divaricate. App. sup. in profile view straighter, evenly and but slightly downcurved, the apex hardly noticeably upturned, the inferior sub-apical prominence acute-angulate. At least rudiments of a yellow stripe along humeral suture of thorax. Second lateral thoracic metallic-green band angulate or forked posteriorly. Yellow spot attached to basal ring of abd.-segm. 7 conspicuous, oval, and usually not pointed posteriorly . . . . . 8
8. Lateral yellow spot in front of frons roundish, subrotundate. A distinct undulated yellow stripe along lower three-fourths of humeral suture. Thorax with complete broad mid-dorsal yellow stripe, slightly diminishing in width upwards, joining the yellow median crest. Metallic-green band covering the second lateral suture definitely forked posteriorly (fig. 5). *Arc* at or only slightly distal to  $Ax_2$ . Subtriangles of fore wing with a cross-vein; costal side of fore wing triangle relatively short, less than half as long as distal side. Basal portion of  $Cu_1$  in fore wing less strongly convex than in *arsinoe*. Pterostigma relatively broad, expanded on middle, colour ochreous. Appendix inferior with sub-apical constriction less pronounced and with the apical notch obtuse-angulate, the tips less strongly divaricate than in the next species. App. sup. in profile view straighter, with upper and lower border more nearly parallel, and with the apex more squarely cut off than in *arsinoe* (fig. 6). Hab.: New Guinea . . . . .
- . . . . . **callirrhoe**, sp.n.
- Lateral yellow spot in front of frons larger. More elongate, somewhat maggot-shaped, reaching at least half-way upwards along margin of compound eye. Yellow stripe along humeral suture of thorax narrower and incomplete on both ends. Thorax with narrow incomplete mid-dorsal yellow stripe, evenly and very finely pointed upwards, joining the median carina, which itself is entirely yellow. Metallic-green band covering the second lateral suture considerably expanded dorsally, but its posterior limit rounded (fig. 5). *Arc* at  $Ax_2$ . Subtriangles of fore wing shorter, uncrossed; costal side of fore wing triangle longer, more than half as long as distal side. Basal portion of  $Cu_1$  in fore wing strongly convex. Pterostigma not expanded on middle and considerably narrower, colour brown. Appendix inferior with strongly pronounced sub-apical constriction, apex with a narrow V-shaped median notch and the lateral expanded portions broadly triangularly excised, tips more widely divaricate. App. sup. in profile view slightly more downcurved with the apical portion more expanded and the tips distinctly more obliquely cut off (fig. 6). Hab.: New Guinea . . . . . **arsinoe**, sp.n.

9. Posterior border of metallic-green band on metepimeron of thorax more or less angulate, but never irregular in shape or forked posteriorly (fig. 3). Occipital triangle wholly black. Baso-dorsal light-coloured spot on 7th abd.-segment narrow and of small size, not reaching half the length of segment. Labium deep black. Lateral yellow spot in front of frons much longer than wide, extending about two-thirds up along margin of compound eye. App. sup. in profile view strongly curved; apex of app. inf. very narrow (fig. 4). Hab.: Misool I. . . . . **erigone**, sp.n.
- Metallic-green spots or bands on metepimeron of thorax either isolated and irregular in shape (x- or z-shaped), or with distinct posterior off-shoot, so as to cut off a roundish or triangular upper spot of yellow. Occipital triangle often spotted with yellow posteriorly. Baso-dorsal light-coloured spot on 7th abd.-segment large and conspicuous, extending caudad at least half-way the length of segment . . . . . 10
10. Thorax very dark and brilliant metallic-green with sharply pronounced bright yellow markings; uppermost meso-metapleural thoracic spots closely approximated, the distance separating them shorter than the diameter of the smallest spot. Labium at least partly deep black in colour. A very distinct yellow spot, variable in shape, behind occipital triangle. Thorax largely black ventrally. (**phoebe**) 12
- Thorax predominantly brilliant metallic-green, but with the ground-colour less vivid, pale glaucous to yellowish-green instead of chrome yellow; uppermost meso-metapleural thoracic spots farther apart, the distance separating them usually wider than the diameter of the largest spot. Labium pale-coloured, either entirely greyish- or greenish-white, or indefinitely marked with brown. Occipital triangle and occiput brown. Thorax pale greyish- to purplish-brown ventrally. 11
11. Labium with distinct, though ill-defined, brownish stripe along inner margin of each of the lateral lobes. Labrum brownish ochreous, fading to dark brown and black distally, anterior border black. Metepimeron with diffuse, inverted Z-shaped, brownish or metallic-green mark, the upper (anterior) division of this spot attached to the upper one-third of the second suture (fig. 3). Basal half or more of 7th abdominal tergite with conspicuous, broad, ochreous dorsal mark, this spot not extending downwards as far as the latero-ventral carina. App. sup. in side-view at first rather straight, thence strongly downwardly bent with convex upper margin, and finally again directed almost straight backwards. Hab.: New Guinea . . . . .
- . . . . . **ismene** LIEFT.
- Labium unicolorous pale greenish-white, inner border of lateral lobes occasionally slightly obscured. Labrum green, at most with a diffuse brownish stripe along anterior border. Metepimeron with well-defined, brown or metallic-green Y-shaped mark, the anterior division of this forked spot running along upper half or two-thirds of the second suture (fig. 3). Basal half or more of 7th abdominal tergite with conspicuous broad ochreous ring, this mark usually covering the entire surface as far down as the latero-ventral carina. App. sup.

- in side-view only slightly downwardly bent, with upper margin nearly straight (fig. 7). Hab.: New Guinea . . . . . **hippolyte** LIEFT.
12. Mouth-parts unicolorous deep black. At least the ventral and dorsal extremities of the mid-dorsal thoracic carina yellow, the impressed portions of the mesepisterna on each side of the carina usually also with a fine yellow stripe, these lines incomplete and rapidly tapering to a point upwards. Two small yellow mesepisternal spots along humeral suture of thorax. Anterior (mesepimeral) off-shoot of yellow mark across first lateral suture of thorax linear, much narrower than the metepisternal division below the spiracle (fig. 9). Wings clear, or with merest traces of yellow at extreme base only. Hab.: Ambon . . . . . **phoebe phryne**, subsp.n.
- Side-lobes of labium at least partly yellow . . . . . 13
13. Mid-dorsal thoracic carina wholly black, the adjoining areas of the mesepisterna unicolorous metallic-green. Labium predominantly black, but each of the side-lobes marked with a sharply defined, elongate chrome-yellow spot placed in the long axis of the body, indented by black interiorly before the middle of its length, this spot occupying about the outer two-fifths of each lateral lobe. A single, comma-shaped, chrome-yellow mesepisternal spot situated above middle along humeral suture. Anterior (mesepimeral) off-shoot of yellow mark across first lateral suture similar to *phryne* (fig. 9). Hab.: Halmahera . . . . . **phoebe amoena**, subsp.n.
- Mid-dorsal thoracic carina and adjoining areas of the mesepisterna, or at least the former, with some yellow colouring. Colour of labium variable, but always yellow marked with black. Yellow stripes or spots along humeral suture of thorax more enlarged . . . . . 14
14. Thoracic pleurae predominantly metallic-green, colour-pattern very similar to *phryne*. Anterior (mesepimeral) off-shoot of yellow mark across first lateral suture of thorax linear, shaped similarly to *amoena* and *phryne*. Labium predominantly yellow, but the median lobe black, as is also a joint stripe bordering the inner margin of the side lobes, this stripe approximately parallel-sided and equal in width to the median lobe. Mid-dorsal thoracic carina very finely and often incompletely lined with yellow, the adjoining impressed portions of the mesepisterna also with some yellow colouring on both ends (resembling *phryne*). Two small yellow mesepisternal spots along humeral suture of thorax, the lowermost spot vestigial or absent. Wings clear, but bases nearly always tinged with golden yellow, as far outwards as  $Ax_2$ , these spots rather conspicuous though ill-defined distalwards. Abd.-segments 4-7 with ochreous basal marks reduced to mere side-spots, the dorsal carinae (except 7) barely coloured. Hab.: Ceram & Buru . . . . . **phoebe phoebe** RIS
- Thoracic pleurae predominantly chrome-yellow or greenish-yellow. Anterior (mesepimeral) off-shoot of yellow mark across first lateral suture of thorax oval, about equal in size and width to the metepisternal division below the spiracle (fig. 9). Labium coloured exactly as described for *amoena*. Mid-dorsal thoracic carina and a joint stripe over the middle of the mesepisterna, greenish-yellow; this stripe

complete, about 1 mm broad ventrally, evenly narrowed upwards and ceasing between the ante-alar triangles, the inner edges of the latter also coloured. A conspicuous, undulated, yellow-green mesepisternal stripe along humeral suture of thorax (fig. 9). Wings hyaline or with minute saffroning at extreme bases. Abd.-segments 4-7 with narrow but complete ochreous basal rings, the dorsal carinae distinctly lined with yellow. Hab.: New Guinea . . . . **phoebe anthaxia** LIEFT.

**Diplacina paula paula** RIS (fig. 1-2).

1933. LIEFTINCK, Nova Guinea 17 Zool. 1 : 43 (key), 44-45 (references, re-description), fig. 26 (♂ genit.). — ♂ holotype S. New Guinea.

Additional material. — New Guinea: 2 ♂ (ad.), S. New Guinea, Digul River territ., Mappi Post, near Ederat, ii.1939, J. M. VAN RAVENSWAAY CLAASEN; 1 ♀ ad. (allotype), S.W. New Guinea, Sungei Arja (east tributary of Umar River), west of Uta, 26.vi.1941, E. LUNDQVIST. 1 ♂ (ad., body compressed, abd.-segm. 4-10 missing), S. New Guinea, LORENTZ Exped., Sabang, 12-24.vi.1907, no. 69/08, unidentified! (Mus. Leiden). Allotype ♀, Sungei Arja, 26.vi.1941, E. LUNDQVIST, in the Leiden Museum.

Male (ad., Mappi Post). — Median lobe of labium black with tiny yellow streaks or a fine line at extreme base; the joint black median band of the lateral lobes not exceeding the width of the median lobe basally, but strongly widened apically, so as to attain almost twice its basal width along distal margin of the lateral lobes. Thorax with a squarish creamy-yellow spot on mesinterepisternum and a pair of short triangular inferior spots immediately adjoining the median carina, which itself is finely yellow on both ends. In one specimen there is a rudiment of a pale mesepisternal spot about half-way up along the humeral suture. Mesometapleural pale markings slightly more reduced than in the type, the mesepimeral band interrupted dorsally so as to cut off a subtriangular spot along upper margin (fig. 1).

Wings similar to the type. *Arc* at  $Ax_2$  on all fore wings, slightly distal to that level on hind wings. Costal side of fore wing triangle fractured distally.  $Cu_1$  on fore wing moderately convex; discoidal field commencing with a single row of cells, only the first cell occasionally divided. Antenodals 10-11 on fore, 8-9 on hind wing; postnodals 6-7.

Segm. 6 and 7 of abdomen with complete orange-yellow basal ring, subequal in width to those on 4 and 5; 6 moreover with a yellow mid-dorsal line extending the basal two-thirds or more of the segment's length; basal ring of 7 prolonged distad along mid-dorsal carina into a narrowly triangular spot, shaped like an arrow-head, which leaves off a little before half-way the length of segment. Remaining segments and anal appendages black, the intersegmental rings brownish-yellow.

Genital organs and anal appendages shaped as shown in fig. 2. Superior appendages in one ♂ a little less pointed apically than in the figured specimen and hence very similar in shape to *paula lethe*. Basal three-fourth of appendix inferior considerably swollen and raised, carry-

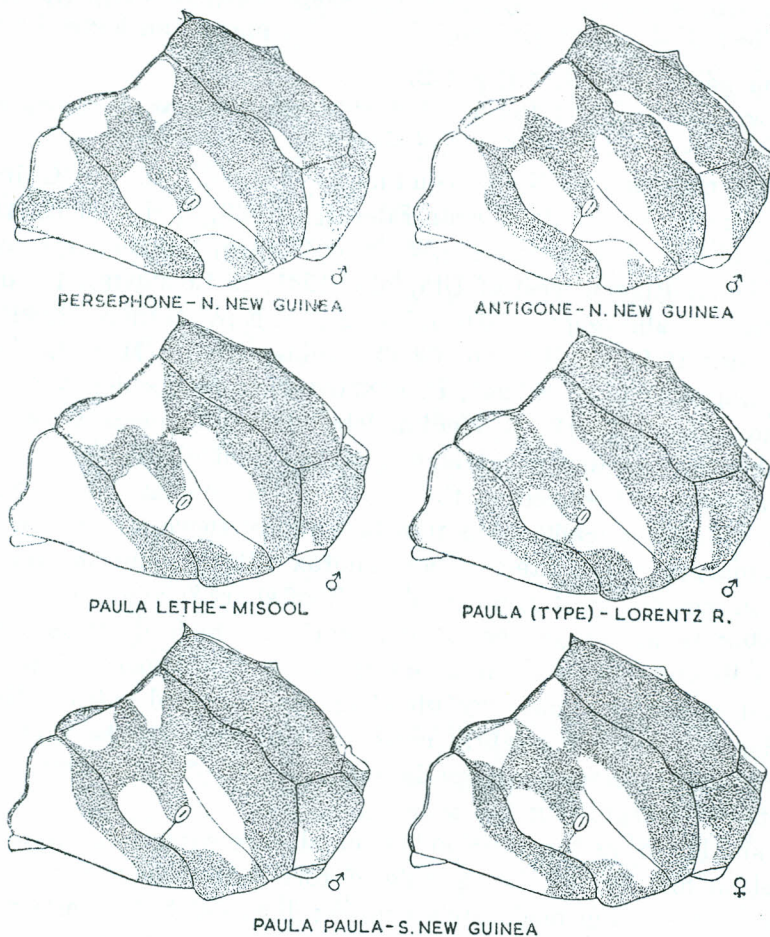


Fig. 1. Colour-pattern of synthorax of *Diplacina persephone* LIEFT. (paratype); *D. antigone* LIEFT. (paratype); *D. paula lethe*, subsp.n., Solal (paratype); *D. paula paula* RIS, S. New Guinea (holotype); the same, ♂ Mappi Post, Digul River; the same, ♀ Arja River (allotype).

ing a distinct — though blunt and smooth — median longitudinal keel, the entire dorsal surface of the appendix very shiny.

Female (ad., allotype). — Labium with the median black mark larger and more strongly widened apically than in the ♂, the light-coloured areas



thus restricted to a large, subtriangular, baso-lateral patch of chrome-yellow, placed on either side of the mid-lobe and almost twice the size of the latter.

Prothorax black, the anterior lobe, a triangular mid-dorsal spot on the apical half of the median division, and the whole posterior lobe, bright chrome-yellow. Colour-pattern of synthorax as shown in fig. 1, the inner edges of the ante-alar triangles, the median carina on both ends, and a joint triangular mid-dorsal spot broadly connected ventrally with the squarish spot on mesinterepisternum, upon the lower two-fifths of the mesepisterna, yellow.

Wings hyaline; neuration as in ♂, but discoidal field of fore wing with two rows of cells up to the nodus; *ti* with a cross-vein in left fore wing. 12 antenodals on fore, 9-10 on hind wing; 8-9 postnodals.

Abdomen deep black, all markings on segm. 2-7 bright chrome-yellow, quite similar in principle to those of the ♂ but rather considerably enlarged, yellow mid-dorsal carinae also more conspicuous than in the ♂. The basal rings of 5-7 prolonged caudad along the latero-ventral carinae, this backward prolongation on 5-6 linear and extending half the segment's length, that on 7 shorter and higher than on the preceding segments and also shorter than the finely pointed projection extending along the median carina of the same segment.

Valvula vulvae not developed, distal portion of 8th sternite bluntly longitudinally carinate, its apical border straight cut off and only slightly swollen. Anal appendages short and blunt, slightly conical.

♂ abd. + app. 19.0-19.5, hw. 22.0-22.7, pt. fw. 1.8, pt. hw. 2.0; ♀ 19.0, 23.5, 2.0, 2.2 mm.

***Diplacina paula lethe*, subsp. n. (fig. 1-2).**

Material. — Misool I. : 7 ♂ (ad.), N. Misool, Solal, source of Gu River, ca 50 m, 15.x.1948, M. A. LIEFTINCK. Holotype ♂ in the Leiden Museum.

Closely resembling *paula* in the structure of the ♂ genitalia and anal appendages, but immediately distinguished therefrom by the shiny black labium and the slightly more extensive light ground-colour of the thorax and abdomen, the basic pattern of the latter being indeed very much alike in the two races. The general 'facies' resemblance coupled with the very similar wing venation and the extremely slight structural differences between examples from S.W. New Guinea and Misool, have led me to consider the latter a geographical race of *paula* rather than giving it full specific rank.

Ground-colour of body light greenish-yellow, head markings creamy yellow. Median carina of thorax finely lined, its middle portion occasionally obscured; mesepisternal triangular spot on either side of the median carina sharply delimited, restricted to the lower one-third on mid-

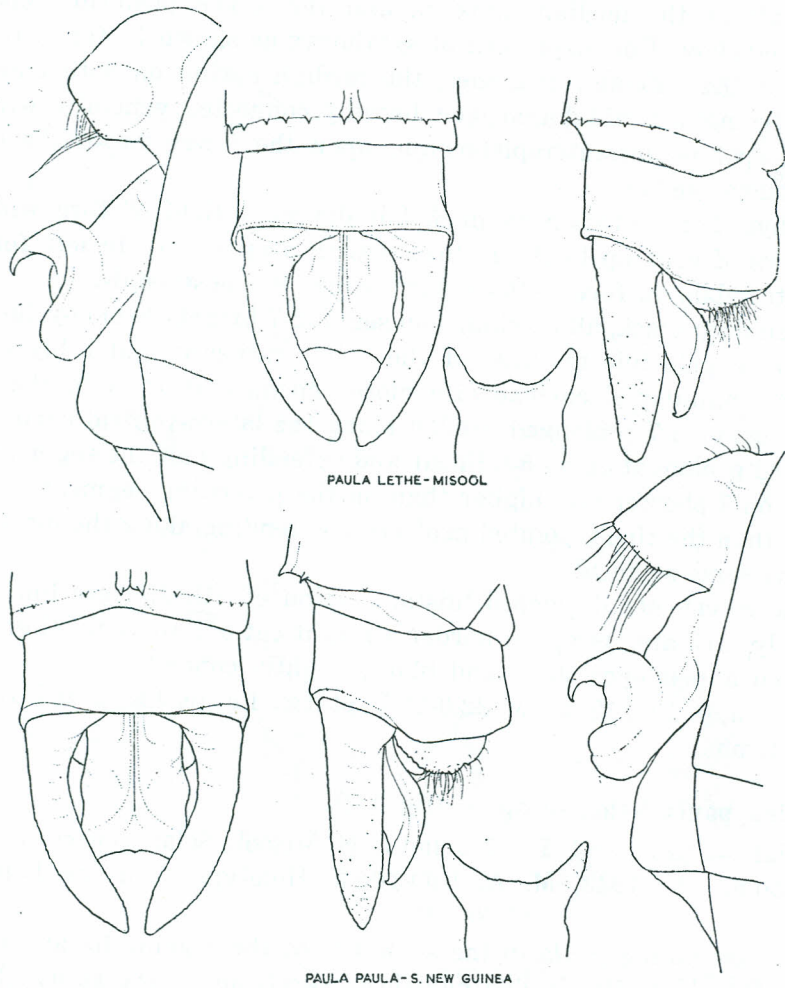


Fig. 2. Male genitalia, left side-view, and anal appendages, dorsal view and right side, of *Diplacina paula lethe*, subsp.n., Solal (holotype), and of *D. paula paula* RIS, Mappi Post, Digul River. The apex of the appendix inferior of both subspecies is shown in ventral aspect.

dorsum; a fine yellow line between the ante-alar triangles on either side of the median carina. All specimens agree in having the upper divisions of the two lateral thoracic pale bands broadly and transversely fused,

whereas in typical *paula* the spots are disconnected. In 3 out of 8 specimens the mesepimeral band is more or less broadly interrupted above the middle (as in fig. 1), in the others it is continuous and similar in shape to *paula* (type, fig. 1).

Wings hyaline, neuration as in the typical subspecies. Fore wing with 10-12 antenodals. Arculus occasionally somewhat distal to  $Ax_2$ .

Greenish-yellow markings on 3rd abd.-segment slightly more enlarged, less sharply delimited than in *paula*, at times more or less confluent latero-ventrally across the jugal suture. Yellow lines covering the mid-dorsal carinae of segm. 4-6 very distinct, but all incomplete posteriorly, narrow sagittate dorsal mark on segm. 7 abruptly emerging from the basal ring, extending half-way the length of segment (similar to *paula*, but more finely pointed).

The differences in the shape of the genital hamule and the lobus anterior are probably partly due to slight distortions of these parts in drying, although the more elongate and less rounded outline of the external branch of the hamule in *lethe* (not the less convex outline of the end-hook of the internal branch!) would seem to be a constant character.

Anal appendages very similar to the typical race, the inferior one a trifle shorter, with the branches less widely divaricate (fig. 2).

Abd. + app. 18.5-19.5, hw. 22.0-23.0 mm; pterostigma as in *paula*.

Female unknown.

Distinguished from *paula* by the entirely black labium, which character may serve to its immediate recognition. On account of slight differences found in the genitalia and appendages of the ♂, *lethe* was first considered specifically distinct from *paula*, but on studying these organs more closely I am of opinion that the differences noticed are of not more than subspecific value, the 'facies' of the insects being exactly alike.

During my stay on the island Misool I have met with this remarkable species only on a single occasion. This was on an excursion from the coastal village Solal into the interior, in an attempt to reach the source of a small forest brook, known as the Gu. On following its capricious course for a few miles upstream, carefully avoiding the many 'dolines', we arrived at about 10 a.m. at a point where the stream passed through a ravine and then broadened out into a rock pool with crystal clear water, forming a small open space in the dense jungle. Here the subterranean course of this stream ended, a large body of icy cold water suddenly emerging from a cave in the precipice. Standing high above the rocky bed, the first *Diplacina* were spotted from beneath with field-glasses, as

they fluttered in the sunshine round the tree tops, probably in the pursuit of their prey. With the rising sun the insects descended, settling on leaves, until finally they came within striking distance, one by one, and could be captured with a long-handled insect net.

I have described this peculiar habitat in some detail since nothing is yet known of the life-history of *Diplacina*, the larva of the species belonging to the Papuan section of the genus being still unknown. I was struck by the absence of vegetation and debris in the upper reaches of the Gu, so presumably the larva of *lethe* lives among stones or coarse sand on the bottom of the pool. No other dragonflies were noticed here.

Distribution: Misool I.

***Diplacina persephone* LIEFT. (fig. 1).**

1933. LIEFTINCK, Nova Guinea 17 Zool. 1 : 42 (key), 47-49, fig. 28 (♂ genit. & apps.).  
— ♂♀ N. New Guinea.

No additional material. The colour-pattern of the thorax, after a paratype ♂, is shown in fig. 1.

Distribution: N. New Guinea.

***Diplacina antigone* LIEFT. (fig. 1).**

1909. MARTIN, Bull. Soc. ent. Ital. 60 : 197. — E. New Guinea (*smaragdina*).  
1933. LIEFTINCK, Nova Guinea 17 Zool. 1 : 42 (key), 45-47, fig. 27 (♂ genit. & apps.).  
— ♂♀ N. New Guinea.  
1948. LIEFTINCK, Treubia 18 : 458 (note on distrib., sub *smaragdina*).

No additional material. The drawing of the colour-pattern of the thorax is from a ♂ of the type series.

Distribution: N. and E. New Guinea.

***Diplacina cyrene*, sp. n. (fig. 3-4).**

Material. — W. New Guinea: 1 ♂ (ad.), 1 ♂ (juv.), Vogelkop, Klamono oilfields, 19. & 20.viii.1948, M. A. LIEFTINCK. Misool I: 1 ♂ (juv.), 1 ♀, W. Misool, Fakal, 23 & 30.ix.1948, M. A. LIEFTINCK. Holotype ♂, Klamono, 20.viii.1948; allotype ♀, Misool, 23.ix.1948; both in the Leiden Museum.

Male (ad., holotype). — Labium pale creamy-yellow, with a minute brownish spot on the middle of the median lobe and a joint brownish-black mark, campanuliform in shape, upon the middle of the lateral lobes, this spot only about two-thirds as wide as each of the yellow lateral patches, much narrower basally than the median lobe of the labium, but widened on middle and after a slight sub-apical constriction again rather

suddenly expanded sideways so as to form a crescentic black apical border. Mandibles dark brown, with a vestigial yellow spot at base. Labrum shiny black, marked with a pair of small, transverse yellow dots on either side of the middle near base. Clypeus creamy-yellow, except a narrow brown

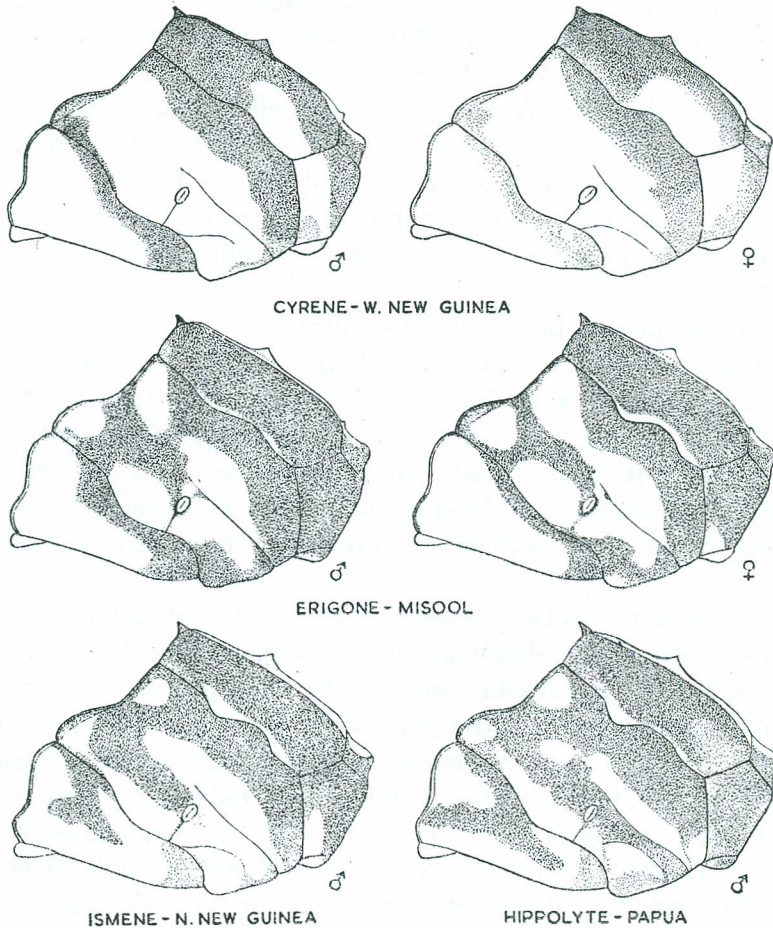


Fig. 3. Colour-pattern of synthorax of *Diplacina cyrene*, sp.n., Klamono (holotype) and Misool I. (♀ allotype); *D. erigone*, sp.n., Misool (holotype and allotype); *D. ismene* LIEFT. (paratype); *D. hippolyte* LIEFT., Mafulu.

median area along fronto-clypeal suture which forms the lower border of the squarish metallic-blue patch occupying most of the frons. Frons with a vertical band of creamy-yellow on either side bordering the margin of compound eye and reaching upwards almost as far as the insertion-point of antenna. Frons, vertex and occipital triangle brilliant metallic-blue;

rear of the head black, behind the eyes a broad creamy-yellow lateral stripe, widest dorsally, where it is cut off obliquely.

Prothorax dark rufous, the anterior lobe, a transverse dorsal mark on the median division, and the posterior lobe, bright greenish-ochreous.

Synthorax predominantly pale greenish-ochreous marked with brilliant metallic-green as shown in fig. 3. Mesepisterna with a short triangular green median spot immediately above the green mesinterepisternite; median carina otherwise black, as are also the ante-alar triangles. Lower portion of the mesinfraepisternal, mesepimeral and metepimeral bands bronzy-brown with low metallic lustre. Ventral surface of thorax light green about the sutures, otherwise dull greyish-brown.

Coxae and basal part of trochanters grey-green; legs black, basal three-fourths of the anterior femora with a conspicuous creamy-yellow stripe.

Wings comparatively broad, slightly more expanded between arculus and nodus than in the allied species, with the apices also more rounded off than usual. Membrane hyaline. Arculus distinctly distal to  $Ax_2$  on all wings. Costal side of fore wing triangle noticeably fractured; all  $ti$  free.  $Cu_1$  on fore wing moderately convex. Discoidal field of fore wing with a single row of cells up to level of the bridge. 11 antenodals on fore, 9-10 on hind wing; 7-8 postnodals. Pterostigma relatively short, dark brown.

Abdomen slender, basal segments normally expanded, but 7-8 distinctly higher, more strongly arched and laterally compressed than usual, the apical two segments considerably smaller than the preceding ones, 10th segment and anal appendages comparatively very small. Ground-colour pale glaucous green on basal segments, more greenish-ochreous distally; segm. 1-2 green, distal one-third of 2 indistinctly reddish-brown dorsally, this mark bluntly triangular above, the sides of the segment with very diffuse apical ring of the same colour. Genital organs dull brownish. Segm. 3 dark brown, the succeeding segments black, 3-6 carrying complete light green basal rings, that on 3 very broad, extending laterally beyond the jugal suture, that on 4 reaching as far as that level, and those on 5-6 again a little narrower; basal half of 7 entirely green, this conspicuous mark forming a very broad ring that is complete and straight cut off behind; remaining segments and appendages black.

Genitalia and anal appendages shaped as shown in fig. 4; dorsal surface of appendix inferior with strongly pronounced, blunt and shiny, longitudinal keel.

Female (semiad., allotype). — Resembling the ♂ closely in facies and wing-venation. Dark body-markings less extensive, the ground-colour generally paler.

Labium cream-coloured, only the tip of the median lobe and the inner margin of the lateral lobes brownish-black; the joint median band thus formed similar in principle to that of the ♂ but distinctly narrower, barely one-half as wide as each of the pale lateral areas. Labrum black, dark brown at base, and carrying a pair of widely distant yellow basal spots. Clypeus and frons as in ♂, the metallic-green frontal patch purplish-brown anteriorly.

Colour-pattern of pro- and synthorax similar to the ♂, but the metallic colour of the mesepisterna ill-defined ventrally; lateral bands narrower, the stripe along second suture very diffuse, pale brown in colour. Venter of thorax throughout pale greenish-yellow (fig. 3).

Wings broad, with rounded apices; posterior wing distinctly widened, broadest about mid-way between arculus and nodus. *Arc* mid-way between  $Ax_2$  and  $Ax_3$ . Neuration close; fore wing triangles of small size, costal margin markedly fractured, *ti* irregular in shape, once traversed; discoidal field commencing with one divided cell, then with 2-3 single cells, and from a level half-way between *t* and nodus again with two cell-rows. 12-13 antenodals on fore, 10 on hind wings; 9-11 postnodals. Pterostigma dark red-brown.

Abdomen cylindrical, basal segments hardly inflated, segm. 9-10 distinctly smaller in size than the preceding ones. Colour-pattern similar in principle to the ♂, but all pale marks enlarged, light yellowish-green in colour. Segm. 1 and basal two-thirds to three-fourths of 2 pale; 1 unmarked, but 2 with a diffuse brown apical ring, widest dorsally, the intersegmental membrane also brown. Segm. 3 with very conspicuous irregular green mark, similar to the ♂ but larger, occupying about the basal two-thirds of the sides; this mark somewhat constricted at jugal suture and rounded posteriorly, extending upwards along base so as to form a rather narrow anastomosis connecting the lateral spots upwards across the dorsal crest. Segm. 4-6 each with sharply defined green basal annule, about one-fifth to one-sixth as long as the segments themselves and widest laterally; 7 with the basal four-seventh entirely green, 8 with a green spot on either side near base, 9-10 and appendages black.

Valvula vulvae not developed, slightly arched, apical border of 8th sternite almost straight. Anal appendages very small, widely distant, sub-cylindrical, abruptly, very finely and acutely pointed.

♂ abd. + app. 19.0, hw. 21.5, pt. 2.0; ♀ 19.5, 24.8, 2.0 mm.

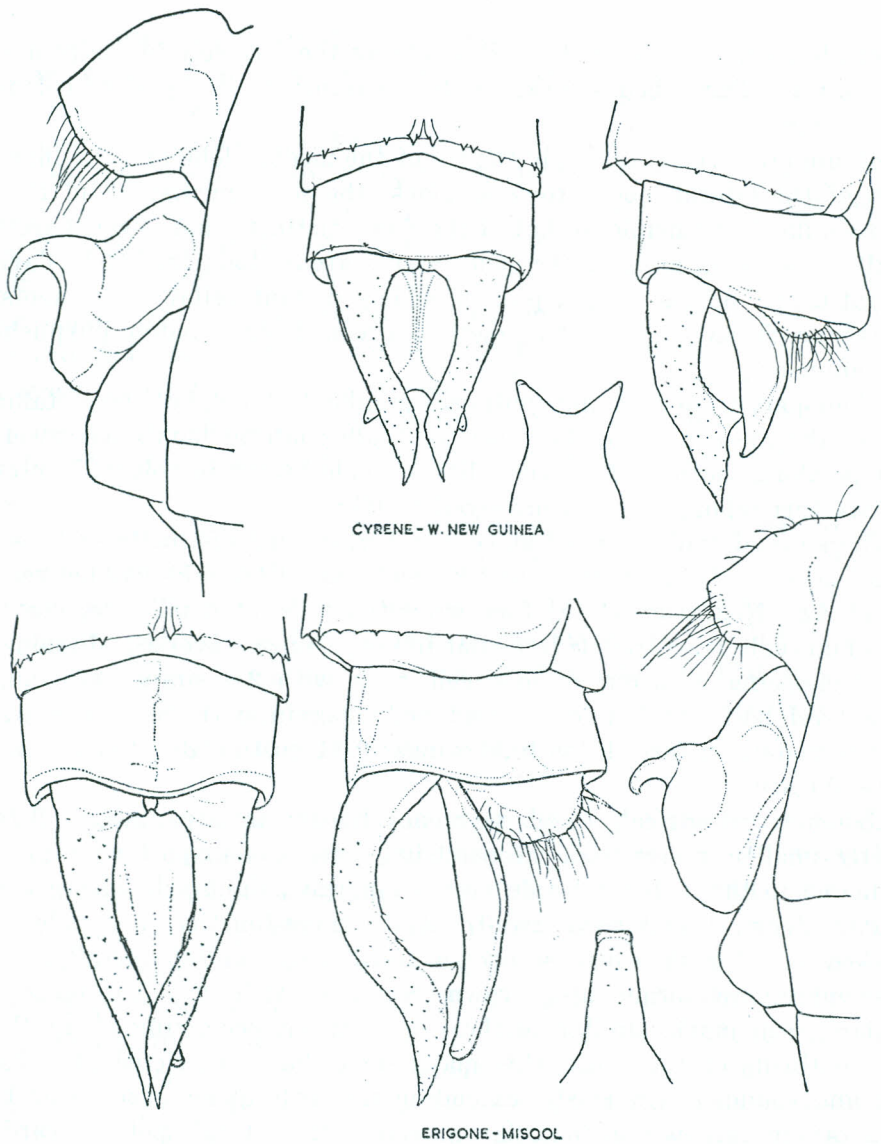


Fig. 4. Male genitalia, left side view, and anal appendages, dorsal view and right side, of *Diplacina cyrene*, sp.n., Klamono (holotype), and of *D. erigone*, sp.n., Misool (holotype). The apex of the appendix inferior of both species is shown in ventral aspect. Hairs on apps. omitted.

The two other males (one from Klamono and the other from Misool I.), though very immature, are practically indistinguishable from one another, resembling the types also very closely in venation, colour-pattern and structural details.



This remarkable and easily recognized species takes an isolated position, but comes closest to *paula* and its near allies *antigone* and *persephone*.

Evidently a very rare species. Settles on leaves in sunlit openings beside small jungle streams.

Distribution: W. New Guinea and Misool I.

***Diplacina callirrhoe*, sp. n. (fig. 5-6).**

Material. — N. W. New Guinea: 1 ♂ (ad.), Vogelkop, Karoon, "N. Guinée, LAGLAIZE", and "*Diplacina smaragdina* S. ♂" (purple labels in SELYS's hand), with additional pin-labels "*D. smaragdina*" (in RIS's hand) and Museum identifications sub nom. *smaragdina smaragdina* SELYS, type, etc. Holotype in the Brussels Museum.

Male (ad., holotype). — Labium bright creamy-yellow with a broad, almost parallel-sided, deep black median band, which includes the median lobe and does not exceed the latter in width; distally, this band expands sideways for a short distance along the border of the rounded angles of the lateral lobes, the creamy side-spots thus surrounded evenly convex distally. Malar area yellowish, mandibles brown. Labrum black. Clypeus entirely bright greenish-yellow. Frons brilliant metallic-green, except a narrow anterior stripe bordering the clypeal suture, which is brown; lateral yellow-green spots along margin of compound eye short, sub-quadrangular. Vertex brilliant metallic-green. Occipital triangle metallic blue-black. Rear of the head black; a greenish-yellow band, widest dorsally, on each side along the eye margin.

Prothorax dull bronzy-black, the anterior lobe yellow, the posterior lobe green.

Synthorax, ground-colour greenish-yellow, marked with brilliant metallic blue-green as shown in fig 5. Mesinterepisternum black, carrying a transverse green median spot, which is less wide than the joint mesepisternal band bordering the mid-dorsal carina along its full length; this mid-dorsal stripe broadest ventrally (width almost 1 mm), gradually diminishing in width and extending upwards to between the ante-alar triangles, which themselves are black. Humeral mesepisternal stripe distinct. Ventral surface of thorax predominantly yellow-green, the metepimeral areas partly metallic greenish-black and the posterior division of the metasternum obscurely brown.

Coxae for the greater part green, legs otherwise black, except the inner surfaces of trochanters and femora of the anterior pair, which are green.

Wings hyaline; neuration dense. *Arc* slightly distal to  $Ax_2$  on fore wing, at  $Ax_2$  on hind wing. Triangle of fore wing narrow and uncrossed, with the costal side not fractured and very short, barely half as long as the proximal side; *ti* much larger, with a cross-vein in both fore wings. Discoidal field commencing with two or three divided cells followed by only one or two single cells.  $Cu_1$  moderately convex. 14 antenodals on fore, 11 on hind wing; 9-10 postnodals. Pterostigma relatively of large size, light ochreous-brown between black nervures.

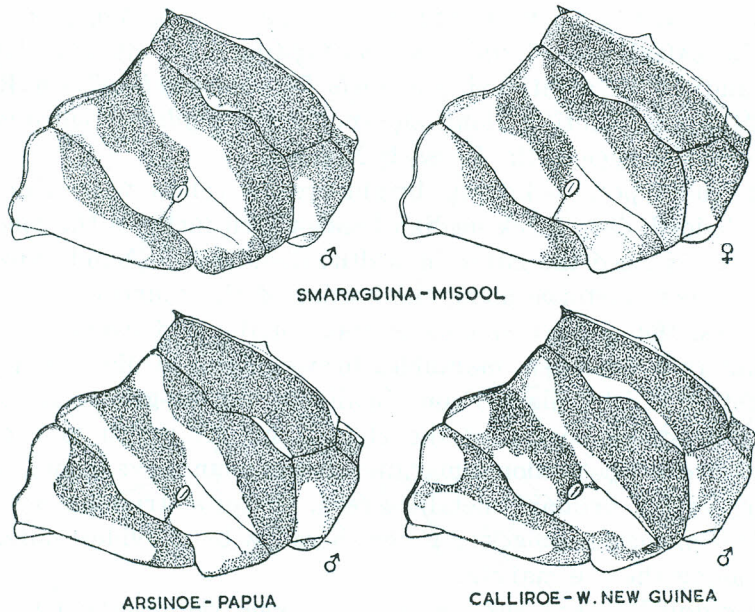


Fig. 5. Colour-pattern of synthorax of *Diptacina smaragdina* SELYS, Misool; *D. arsinoe*, sp.n. Kokoda (holotype); *D. callirrhoe*, sp.n. Karoon (holotype).

Abdomen very slender, rather strongly spindle-shaped; basal segments distinctly inflated in both dimensions, apical segments widest on middle of segm. 8. Black, marked with green, as follows. Segm. 1 with transverse dorsal spot and a slightly larger spot filling out most of the sides; 2 with longitudinal diamond-shaped dorsal spot extending from base almost as far as the apex of segment, a sub-rectangular dot upon the middle of the sides, narrowly separated by the dark jugal suture, and an elongate spot situated along lower margin. Lobus anterior of genitalia green, bordered with black; hamuli blackish; posterior lobe and vesicle greenish. Segm. 3 with vivid yellow-green stripe, widest basally,

bordering the mid-dorsal crest almost along its full length, and with two lateral dots, one large subtriangular dot broadly attached to the base of segment, and one much smaller spot just posterior to the jugal suture. Basal three-fourths of the mid-dorsal carina of segm. 4-6 with yellow line, and each of these segments in addition with a small baso-lateral spot, which on 6 forms an incomplete narrow ring. Segm. 7 with narrow basal ring to which, after a fine constriction, is attached an oval mid-dorsal greenish spot, restricted to the dorsum and extending almost the basal half of the segment's length. Remainder of abdomen black.

Genitalia and anal appendages shaped as shown in fig. 6.

♂ abd. + app. 22.5, hw. 26.5, pt. 2.5 mm.

Female unknown.

Distribution: N. W. New Guinea.

***Diplacina arsinoe*, sp. n. (fig. 5-6).**

Material. — Central E. New Guinea: 1 ♂ (ad.), Papua, Kokoda, 1200 ft, viii.1933, L. E. CHEESMAN, B.M. 1933-427. Holotype in the British Museum.

Male (ad., holotype). — Labium mainly pale ochreous; median lobe with a black spot, shaped like an isosceles triangle pointing basad, occupying exactly its middle one-third; lateral lobes also with black marks, forming together a joint median stripe, broadly attached basally to the triangle on the mid-lobe, but gradually diminishing in width forwards until slightly before distal margin, where it expands sideways for a short distance, the intero-apical margin of the lobes thus also finely bordered with black. Mandibles blackish-brown; malar area with a yellow point. Labrum black. Clypeus pale greenish-yellow, except the middle of the postclypeus, which is brownish. Frons and vertex brilliant metallic-green, the anterior one-third of the vertical portion of the frons brown; lateral spots bordering the eye-margin conspicuous, almost twice higher than wide, reaching slightly more than half-way up towards the antennal base, the dorsal extremity of the spot suddenly narrowed, appendiculate. Occipital triangle and rear of the head black; a broad yellow band, widest near its dorsal end, on each side along the eye-margin.

Prothorax brownish-black, only the anterior and posterior lobes greenish-yellow.

Synthorax, ground-colour a delicate green, marked with brilliant metallic-green as is shown in fig. 5, the sides with distinct coppery reflections. Mesinterepisternum black with trapezoidal median yellow-green spot. Mid-dorsal carina yellow, joined on either side by a narrow

yellow stripe, triangularly widened ventrally (here together broader than the interepisternal spot), reaching upwards about three-fourths the whole length of the carina; ante-alar triangles black. Lateral markings sharply

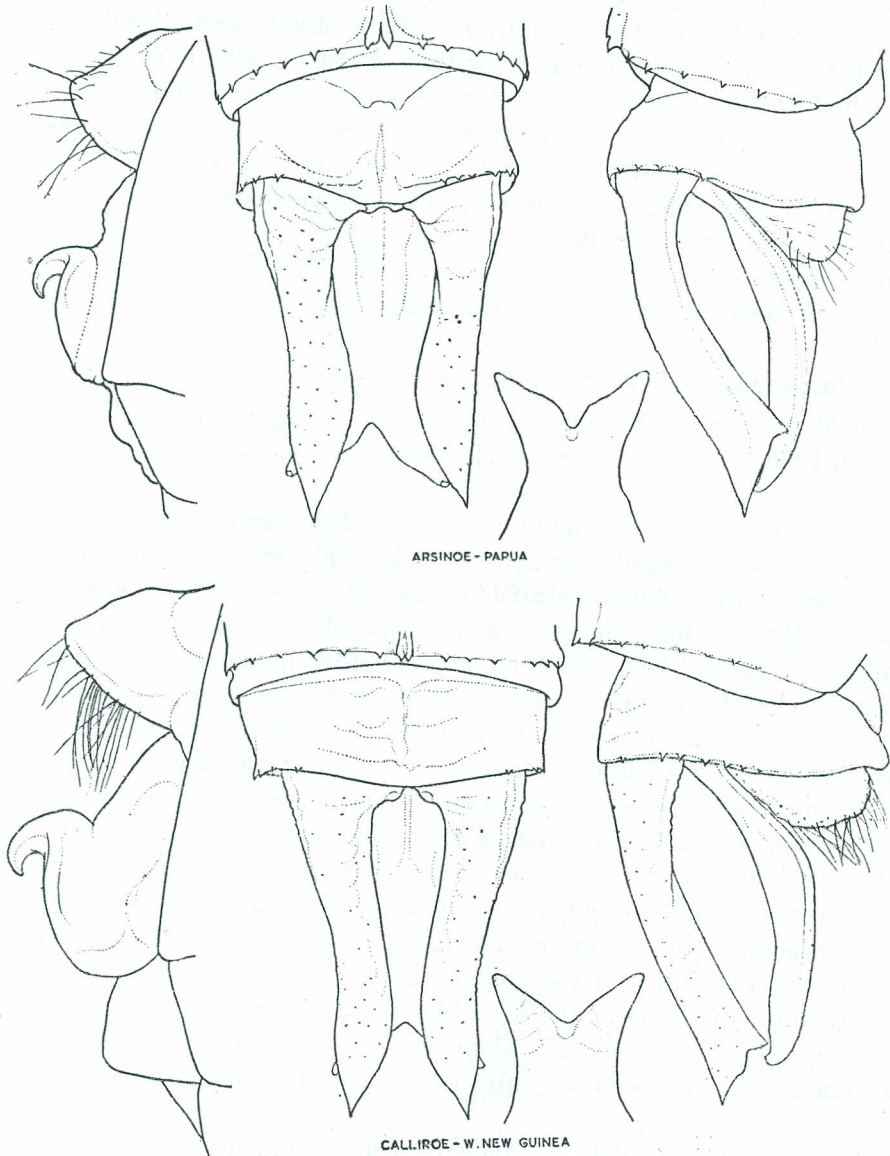


Fig. 6. Male genitalia, left side view, and anal appendages, dorsal view and right side of *Diptacina arsinoc*, sp.n., Kokoda (holotype), and of *D. callirhoe*, sp.n., Karoon (holotype). The apex of the appendix inferior of both species is shown in ventral aspect. Hairs on apps. omitted.

delimited, the metepimeral bronzy-black band strongly widened and angulate posteriorly. Ventral surface dull black with bronzy reflections, the sutures greyish-green.

Legs black, but all coxae with a green posterior mark and the whole inner surface of the trochanters and femora of anterior legs yellow-green.

Wings hyaline, membrane slightly enfumed; neuration more open than in *callirrhoe*. Arc at  $Ax_2$  in all wings. Triangle of fore wing uncrossed, with the proximal side less than twice as long as the costal side, the latter slightly fractured distally; *ti* wider, also without cross-nerve. Discoidal field of fore wing commencing with one divided cell followed by four single cells to beyond half-way between *t* and the nodus.  $Cu_1$  strongly convex basally. 10-11 antenodals on fore, 9-10 on hind wing; 7 postnodals. Pterostigma narrow, dark reddish-brown.

Abdomen of the same slender build as *callirrhoe*, but the terminal segments slightly less spindle-shaped, 8th segment widest, parallel-sided. Black, marked with green similarly to *callirrhoe*, but for the following differences. Lateral mark of segm. 2 smaller and latero-ventral spot vestigial; lateral spot behind jugal suture of 3 also smaller; basal marks of 4-6 annular instead of being broken up into finely pointed dorsal triangles and roundish side-spots; basal annule and dorsal mark on 7 very similar to *callirrhoe*, the latter, however, abruptly tapering to a short point.

Genitalia and anal appendages black, shaped as shown in fig. 6.

♂ abd. + app. 22.5, hw. 25.0, pt. fw. 2.3, pt. hw. 2.5 mm.

Female unknown.

Though closely related to *callirrhoe*, this new species can easily be distinguished therefrom by the characters given in the key.

Distribution: E. New Guinea.

### *Diplacina smaragdina* SELYS (fig. 5 and 7).

1878. SELYS, Mitt. Mus. Dresden 3 : 294, 320 (partim!). — ♂♀ Karoons, Laglaize, N.W. New Guinea (*Diplacina*?)
1879. SELYS, Ann. Mus. civ. Genova 14 : 306-307 (partim!). — Same specimens (*Diplacina*?)
1933. LIEFTINCK, Nova Guinea 17 Zool. 1 : 43 (key), 52-55 (incl. references), fig. 30 (♂ genit., apps.). — ♂♀ Humboldt Bay area, N. New Guinea.
1942. LIEFTINCK, Treubia 18 : 458 (references, remarks). — N. & E. New Guinea.

Additional material. — N. W. New Guinea: 1 ♂, 1 ♀ (ad.), Vogelkop, Karoon, "N. Guinée, Laglaize", "*Diplacina smaragdina* S" (purple labels in SELYS's hand), and with additional type designations by F. RIS

and the Brussels Museum curators. Holotype ♂ and allotype ♀ in the Brussels Museum. — Misool I: 17 ♂, 9 ♀ (ad.), W. Misool, surroundings of Fakal, ca 150 m, 20.ix.-2.x.1948, M. A. LIEFTINCK.

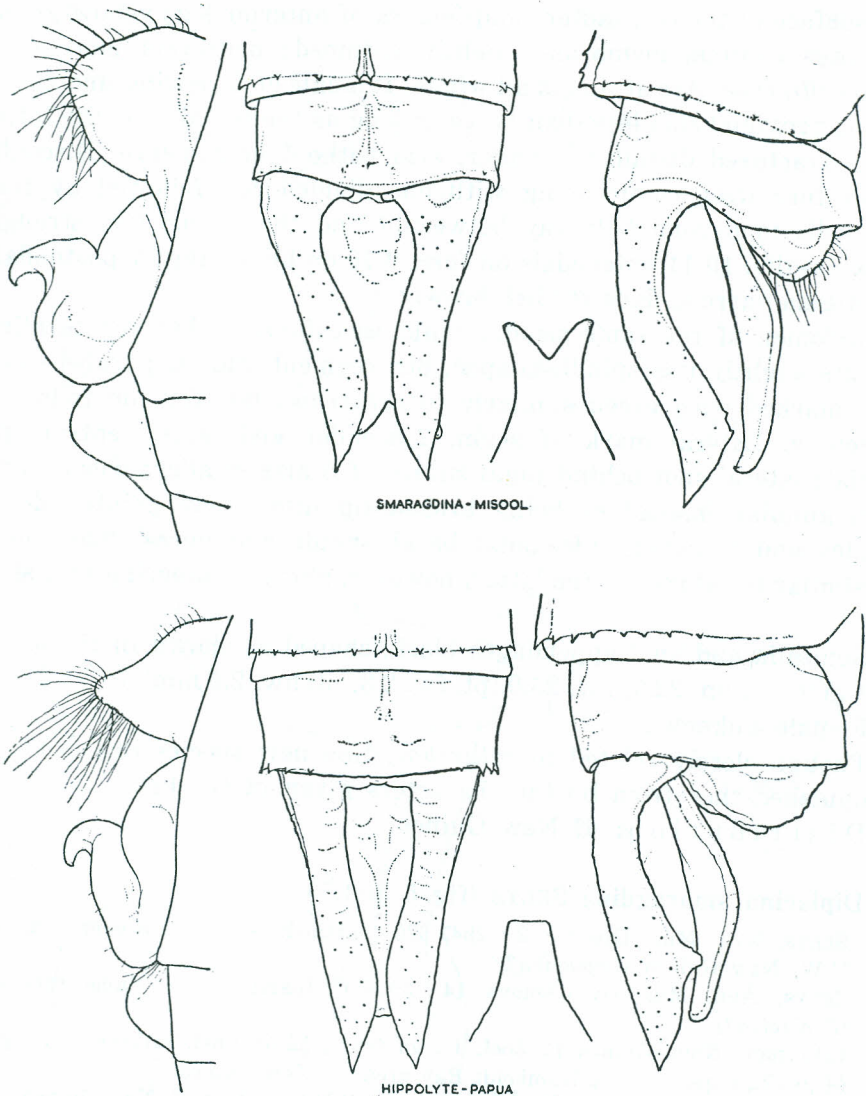


Fig. 7. Male genitalia, left side view, and anal appendages, dorsal view and right side, of *Diplacina smaragdina* SELYS, Misool, and of *D. hippolyte* LIEFT., Mafulu. The apex of the appendix inferior of both species is shown in ventral aspect. Hairs on apps. omitted.

When in March, 1947, I had the opportunity of studying SELYS's types of *smaragdina* in the Brussels Museum, it was found that LAGLAIZE's two males belong to two different species, whilst the only specimen of the female sex is conspecific with the true *smaragdina*. The original description is a composite one, applying to both *smaragdina* and *callirrhoe*, sp.n., a re-characterization of the latter being given in this paper. SELYS's description of the superior anal appendages corresponds well with the shape of these organs in this second specimen. RIS did not notice the differences between these two species either; the wing-photograph in the monograph is of the type *smaragdina*, whereas the genital organs at the 2nd abdominal segment of the ♂ have probably been drawn from the second specimen, as this individual is marked with an additional red pin-label. These organs are indeed very much alike in the two species.

*D. smaragdina* is easily held apart from *callirrhoe* by its smaller size, different venation, much narrower median thoracic band, and other details of coloration; also by the less deeply excised appendix inferior.

On Misool this species was found on several of the larger forest streams, the males resting on leaves of shrubs and trees overhanging the water. Also often seen in company with *Huonia thais*, sp.n., on the gravel banks of the Wartama and Kasiem rivers. Both are very inconspicuous insects when settled on leaves or stones.

Distribution: New Guinea (universal?); Misool I.

#### ***Diplacina micans*, sp. n. (fig. 8-9).**

Material. — Waigeu I., 1 ♂ (ad., segm. 6-10 of abdomen missing), printed label "BERNSTEIN, Waigeu", "*Diplacina smaragdina* SELYS" in SELYS's handwriting. Holotype in the Leiden Museum.

Male (ad., holotype). — Labium with the median lobe dark brown except a narrow diffuse yellow line along base; lateral lobes bright ochreous, but approximately the inner halves of each deep black, the joint median band thus formed rather trapezoidal in shape, gradually expanded distally and almost twice as wide apically than the diameter of the mid-lobe. Mandibles very dark brown. Malar area yellowish. Labrum black. Clypeus greenish-yellow, except the middle of the post-clypeus, which bears a brown streak against fronto-clypeal suture. Frons mainly brilliant dark metallic-green, the anterior declivous part in front of a distinct transverse carina, brown; lateral green spots along margin of compound eye broad and rather short, reaching about half-way up-

wards towards the antenna. Vertex metallic-green. Occipital triangle blackish-brown, rear of the head black; on each side behind the eyes a chrome-yellow stripe, widest dorsally and leaving off abruptly.

Prothorax blackish-brown, the anterior and posterior lobes green.

Synthorax brilliant metallic-green marked with yellowish-green as shown in fig. 9. Median one-third of mesinterepisternum, the dorsal carina on both ends, and a fine line joining the latter on either side, yellowish; these lines together form a narrow joint stripe, tapering upwards to a point about one-fourth the whole length of mesepisternum. Ventral surface of thorax dark metallic-green, the sutural stripes brownish.

Legs black; inner surfaces of coxae, trochanters and basal four-fifths of anterior femora, pale greenish.

Wings hyaline; neuration open. *Arc* mid-way between  $Ax_2$  and  $Ax_3$  on all wings. Triangle of fore wing small, uncrossed, its costal side only one-fifth shorter than proximal side, not fractured; *ti* also without cross-vein. Discoidal field of fore wing with a single row of cells as far as about mid-way between *t* and the nodus.  $Cu_1$  very weakly convex. 12 antenodals on fore, 9-10 on hind wing; 7-8 postnodals. Pterostigma long and rather narrow, dark brown.

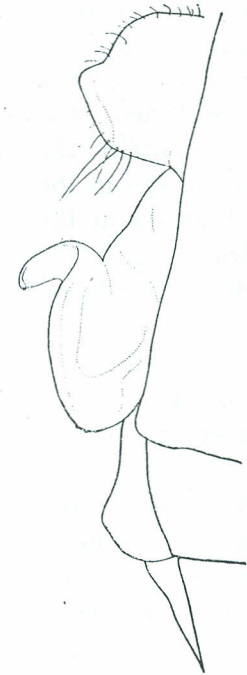


Fig. 8. Genitalia, left side view, of *Diplacina micans*, sp.n., Waigeu I. (holotype).

Abdomen (incomplete) of the usual slender build. Colour black, marked with green, as follows. Segm. 1-2 and basal half of 3 with almost continuous broad lateral band, which is finely interrupted by the black intersegmental ring between 2 and 3; a much smaller spot is placed alongside 3 beyond the transverse suture; dorsum of 1 partly green, and of 2 with additional triangular basal spot; 3 also with short triangular dorsal spot, pointing backwards. Segm. 4 and 5 each with a narrow green basal ring, produced backwards on 4 into a short triangle, the mid-dorsal carinae remaining black. Remainder of abdomen wanting.

Genital organs brownish-black, except the vesicle, which is green. Hamulus shaped similarly to *hippolyte* and *arsinoe*, apex of inner branch strongly curved and finely pointed, but, owing to its twisted appearance in full profile view, seemingly much broader than in the other species (fig. 8).



♂ abd. (segm. 1-5) 13.5, hw. 29.5, pt. fw. 2.5, pt. hw. 2.7 mm.  
Female unknown.

This new species, by its large size, peculiar wing-venation and restricted green body-markings, should be easily distinguished from all other regional species. Possibly allied to *smaragdina*.

Distribution: Waigeu I.

**Diplacina erigone**, sp. n. (fig. 3 and 4).

Material. — Misool I.: 1 ♂, 2 ♀ (ad.), W. Misool, Fakal, ca 150 m, 4.x.1948, M. A. LIEFTINCK. Holotype ♂ and allotype ♀ in the Leiden Museum. Living colours: "Eyes blackish-brown. Labium black. Vestigial yellow spots on abdominal segments 5-7".

Male (ad., holotype). — Labium deep black, surface shiny. Mandibles black, dark brown apically. Labrum black. Anteclypeus and postclypeus bright greenish-yellow, the latter with narrow brown median area along fronto-clypeal suture which forms the lower border of the metallic-blue patch occupying most of the frons. Lower one-third of the vertical surface of frons dull black, not metallic; lateral greenish-yellow spots along margin of compound eye conspicuous, elongate and slightly curved, tapered upwards, not entirely reaching the base of antenna. Vertex metallic-blue. Occipital triangle blue-black. Rear of the head black; a narrow yellow band, widest dorsally, on each side along the eye-margin.

Prothorax deep black, only the anterior and posterior lobes bright greenish-yellow.

Synthorax, ground-colour ochreous with a green shade, marked with brilliant metallic-green as shown in fig. 3, mesepisterna slightly more blue-green. Mesinterepisternum black with small median green spot. Mid-dorsal carina yellow, joined on either side along its full length by an equally narrow yellow line, widest ventrally and reaching upwards as far as the ante-alar triangles, which themselves are black. Lateral greenish-yellow spots sharply delimited but rather dusky, as is also a greyish cloud on the middle of the widest part of the metepimeron (not shown in the figure). Ventral surface of thorax metallic blue-black, the sutural stripes obscurely yellowish.

Legs wholly black; inner surfaces of coxae, trochanters and basal two-thirds of anterior femora, yellow-green.

Wings hyaline. *Arc* mid-way between  $Ax_2$  and  $Ax_3$  on fore wing, slightly more proximal to that level on hind wing. Triangle of fore wing of small size, uncrossed, its costal side not fractured; *ti* also without

cross-nerve. Discoidal field of fore wing commencing with one divided cell followed by three single cells to a little beyond half-way between *t* and the nodus. *Cu*<sub>1</sub> moderately convex. 12 antenodals on fore, 9 on hind wing; 8-9 postnodals. Pterostigma rather short, dark brown.

Abdomen very slender, slightly spindle-shaped; basal segments rather inflated in both dimensions, the apical segments only little expanded. Black, marked with greenish-yellow, as follows. Segm. 1 with transverse band occupying distal half of dorsum; 2 with subtriangular mid-dorsal spot, pointing backwards, restricted to the basal half of segment, and a much larger, isolated, roundish spot upon the middle of the side, this mark finely traversed by the jugal suture. Genital organs wholly black. Basal two-thirds of segm. 3 with elongate mid-dorsal spot, almost interrupted by the jugal suture, its anterior division widest and subtriangular in outline, the posterior portion smaller, lanceolate; sides with a pair of similar, though slightly larger spots, which are more distinctly interrupted by the transverse suture. Segm. 4 with very small triangular dorsal spot and an equally small transverse spot on either side of it, these three spots situated at extreme base; 5-7 only with minute baso-dorsal subtriangular spots and the basal two-thirds of the dorsal carinae also finely lined with yellow; spot on 7 only little larger, though more elongate, than the preceding ones; 8-10 and appendages black.

Genitalia and anal appendages shaped as shown in fig. 4. Basal half of appendix inferior very broad and trapezoidal, the apical portion slender, abruptly and considerably narrowed; dorsal surface slightly concave, basal two-thirds carrying two low but distinct longitudinal ridges, one on each side of the middle.

Female (ad., allotype). — Resembles the ♂ closely, but differs as follows. A minute pale spot at the mandible-bases. Lateral marks on vertical surface of frons a little broader. Joint mid-dorsal longitudinal stripe on mesepisterna also broader than in ♂, widest ventrally a short distance away from the spot on mesinterepisternum, gradually diminishing in width and continued upwards between the ante-alar triangles as far as the posterior border of the latter, the inner margin of the triangles also finely edged with yellow. Ground-colour of pro- and synthorax bright greenish-yellow, lateral thoracic markings sharply delimited but narrower, throughout brilliant metallic-green (fig. 3).

Abdomen broader, with cylindrical segments, more broadly marked with green than in the ♂; lateral spot on segm. 2 occupying most of the surface, and the paired spot on either side of 3 either narrowly interrupted by black (parallotype) or broadly contiguous (allotype) across the jugal

suture. Basal ring on 4 prolonged caudad along dorsal carina into a fine line extending three-fourths its whole length; lateral spot isolated, sub-triangular, placed low down exactly mid-way the length of segment. Segm. 5 and 6 each with similar, though still narrower, clear green basal rings, 5 in addition with a green point placed mid-way immediately above the latero-ventral carina. Segm. 7 with extremely narrow basal ring, and with the baso-dorsal spot attached to it short and slender, narrowly triangular, barely reaching the middle of segment. Remaining segments and appendages black. Valvulae vulvae not developed, posterior border somewhat swollen, weakly trituberculate, the lateral tubercles vestigial. Anal appendages widely distant, conical, pointed.

In the paratype the metepisternal yellow-green band is complete and approximately equal in width to the band on mesepimeron, the abdominal marks in this specimen being also a little more extensive than in the allotype.

♂ abd. + app. 20.7, hw. 24.5, pt. fw. 1.8, pt. hw. 2.0; ♀ 20.5-21.0, 27.5, 2.3-2.5 mm.

Very rare. Superficially resembling *smaragdina*, but at once distinguished from that species by the black labium and the restricted yellow body-markings. Probably breeds in small tributary brooks of shady forest streams; settles on leaves in sunny spots.

Distribution: Misool I.

#### *Diplacina ismene* LIEFTINCK (fig. 3).

1933. LIEFTINCK, Nova Guinea 17, Zool. 1: 44 (key), 55-57, fig. 31a (thor. ♂), 32 (genit. & apps. ♂). — ♂♀ N. New Guinea.  
1948. LIEFTINCK, Treubia 18: 457-458. — ♂♀ Central & E. New Guinea.

No new material. Fig. 3 of the thorax of *ismene* is copied from my 1933 paper.

Distribution: N. and N. E. New Guinea.

#### *Diplacina hippolyte* LIEFTINCK (fig. 3 and 7).

1933. LIEFTINCK, Nova Guinea 17, Zool. 1: 44 (key), 57-58, fig. 31b (thor. ♂), 33 (genit. & apps. ♂). — ♂♀ N. New Guinea.  
1948. LIEFTINCK, Treubia 19: 458. — ♂ Central N. New Guinea.

Additional material. — E. New Guinea: 1 ♂ (ad.), Papua, Mafulu, 4000 ft, i.1934, L. E. CHEESMAN, B.M. 1934-321. In the British Museum.

The present example differs from typical *hippolyte* only in that the broad ochreous mark covering most of the 7th abdominal tergite does not extend downwards as far as the ventro-lateral carina but ends a little above that level, thus approaching the condition found in *ismene*. Otherwise the specimen is quite typical; the colour-scheme of its thorax is shown in fig. 3.

Distribution: New Guinea (mountains).

**Diplacina phoebe amoena**, subsp. n. (fig. 9).

Material. — N. Moluccas: Halmahera I., 28 ♂, 5 ♀ (ad.), N. Halmahera, Tobelo, v.1931-iv.1933, M. J. VAN DIEJEN; 32 ♂, 9 ♀ (ad.), C. Halmahera, Atjengo, 50-100 m, 9-12.ix.1951 (1 ♀), Tuguaer-Tasoa, 100-150 m, 20-24.ix.1951 (16 ♂, 4 ♀), Mumar River, 2-300 m, 25-26.ix.1951 (3 ♂), Mts Sembilan & Siu, 600-700 m, 27.ix.-6.x.1951 (10 ♂, 1 ♀); Biaur, 600 m, 7-12.x.1951 (1 ♂, 3 ♀), Tolewang, 50 m, 12-25.x.1951 (2 ♂), native coll. AMSARI & MANIS. Holotype ♂ and allotype ♀: Tasoa, 150 m, 23.ix.1951, in the Leiden Museum.

Male. — This new subspecies is chiefly characterized by the reduction of the yellow colouring on the thoracic dorsum and along the humeral suture. The meso-metapleural spots are somewhat variable in size, the elongate spot along the first lateral suture being at times reduced in size and barely as long as the distance separating it from the triangular upper spot (thus smaller than in fig. 9).

The triangles of the wings are always free, but *ti* on fore wing is often traversed once.

Female. — Agreeing with the ♂ in most respects, but all yellow markings a little more extensive; dorsal carina of thorax often with a very fine, though usually obliterated, yellow line; mesinterepisternum on middle, and mesepisterna immediately above it, each occasionally with vestigial yellow marks, the ante-alar triangles posteriorly also bordered with yellow near their meeting point. Abdomen with the lateral yellow marks enlarged, shaped as in typical *phoebe*.

Size variable. ♂ abd. + app. 20.5-23.5, hw. 23.5-27.5, pt. 2.3-2.5; ♀ 22.0-23.5, 27.0-29.0, 2.5 mm.

Distribution: Halmahera.

**Diplacina phoebe phoebe** RIS.

1919. RIS, Nova Guinea 13 Zool. 2 : 114 (diagn., key, pars!). — ♂ ♀ Ceram (*phoebe*).  
 1919. RIS, Cat. Coll. SELYS, Lib. 16<sup>2</sup> : 1058 (key), 1060-1061. — ♂ ♀ Ceram (*phoebe*).  
 1926. LIEFTINCK, Treubia 7 : 286. — ♂ ♀ Buru (*phoebe*).

Material. — S. Moluccas: C e r a m I., 1 ♂, S. Ceram, Amahai/Liang, Elpaputih Estate, xii.1937-i.1938, F. K. A. CLARINGBOULD; 2 ♂ (ad.), N. Ceram, Wahai, 21.xi.1941, J. J. VAN DER STARRE.

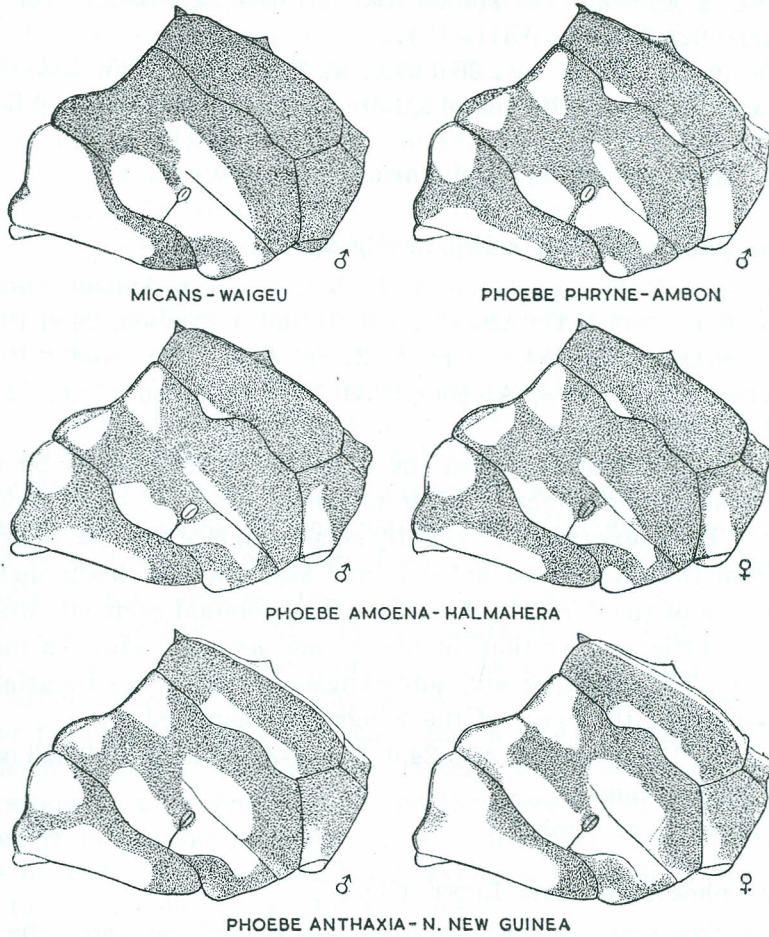


Fig. 9. Colour-pattern of synthorax of *Diplacina micans*, sp.n., Waigeu (holotype); *D. phoebe phryne*, subsp.n., Ambon (holotype); *D. phoebe amoena*, subsp.n., Halmahera (holotype and allotype); *D. phoebe anthaxia* LIEFT., Hollandia (paratypes).

Both sexes of the typical race of *phoebe* have been described in great detail by RIS in the Selysian monograph. The series from Buru, discussed by the present writer, are not now available for comparison, but they did agree in all essential characters with specimens from Ceram. Examples from South New Guinea, reported also by RIS and referred by

him to *ph. phoebe*, have later been transferred to *ph. anthaxia* LIEFT. (*postea*).

The supposed larva of *D. phoebe*, described and figured by the present writer, and referred to this species with considerable doubt, has turned out later to be of *Agrionoptera similis* (SELYS). (See LIEFTINCK, *Treubia*, 7 Suppl., 1930 : 323-326, pls. VIII - IX).

♂ abd. + app. 23.0-23.5, hw. 26.0-27.0, pt. 2.0; ♀ 22.5-23.5, 28.0-29.0, 2.5 mm (Ceram); ♂ 20.0-23.0, 24.0-26.0, 2.0; ♀ 20.5-21.5, 25.5-27.5, 2.1-2.4 mm (Buru).

Distribution: Ceram and Buru.

**Diplacina phoebe phryne**, subsp. n. (fig. 9).

Material. — S. Moluccas: Ambon I., 5 ♂, 2 ♀ (ad.), Ambon, Sungei Waitumu, ca 30 m, 23.iv.1941, AMSARI; 1 ♂, 1 ♀ (ad.), Ambon, 26.xi.1941, J. J. VAN DER STARRE; 4 ♂ (ad.), Ambon, 27.vii. & 5.xi.1948 and x.1949, M. A. LIEFTINCK. Holotype ♂, Ambon, 27.vii.1948; allotype ♀, id., 23.iv.1941; in the Leiden Museum.

Immediately distinguished from the other known subspecies by the black labium, and by a slightly different combination of other colour characteristics. Both sexes average slightly smaller in size than *ph. phoebe*, and apart from the differences noted in the key, may be distinguished also by the shape of the dorsal spot on the 7th abdominal segment, which besides being a little smaller than in *phoebe* and *amoena*, shows a more rounded outline. The triangles and subtriangles of the wings invariably lack a cross-vein and the bases of the wings are unspotted.

♂ abd. + app. 19.5-20.5, hw. 23.5-24.0, pt. 1.8-2.0; ♀ 21.0, 25.0, 2.3 mm. Shady forest streams.

Distribution: Ambon.

**Diplacina phoebe anthaxia** LIEFT. (fig. 9).

1933. LIEFTINCK, Nova Guinea 17 Zool. 1 : 43 (key), 49-52 (incl. references), fig. 29 (genit. & apps. ♂). — ♂♀ New Guinea.

1949. LIEFTINCK, Ibid. n.s. 5 : 261 (cat., as species).

No fresh material. Remarkably enough, this race, though clearly belonging to the same polytypic species, was not encountered by me in the extreme western portion of New Guinea, nor on Misool. The types are from the Humboldt Bay area in the north, but it occurs also in the lowlands of southern New Guinea. Structurally identical with typical *phoebe*.

Distribution: North & South New Guinea.

## II. Revision of the genus *Huonia* Förster, with a description of the larva of *H. thais*, sp. n.

The genus *Huonia* FÖRSTER<sup>1)</sup>, which formerly included only two species, has now grown to one of the largest and dominant in the Libellulid fauna of the New Guinea region. I have dealt with its members in parts III (1935) and VI (1942) of "The dragonflies of New Guinea" (*loc. cit.*, *postea*), 7 species being known at that time from New Guinea, and 1 from the Moluccan island Halmahera. Two collecting expeditions, — one undertaken by Dr STEN BERGMAN and the writer to Misool and western New Guinea in 1948, and a second organized by the Botanic Gardens to Halmahera in 1951 — yielded 4 additional new species, so that the total number now amounts to 12.

With the descriptions and figures of the new species I here offer also outline drawings and colour-pattern diagrams of several already known forms; and to make this revision as complete as possible I have, where necessary, added amended descriptions of little known species.

Distribution. — The discovery on Halmahera of no less than three species of *Huonia* comes as a great surprise, since only a single species was hitherto known outside the mainland of New Guinea. Recently, I have described several other new dragonflies from this island which belong to typically Papuan species groups, or even genera (e.g. *Selysioneura*, *Macromia* and *Synthemis*), and there remain many others, either unrecorded or undescribed, which bring the fauna of Halmahera in yet closer relationship to that of the Papuan. With few exceptions these species are either found also in New Guinea — but absent from Celebes and the southern Moluccas! — or are very closely related to species occurring in the western part of New Guinea, and therefore would appear to have originated from the mother continent at a not very remote date. It is my hope to deal with the Halmaheran fauna as a whole in a separate memoir, to be published on a later occasion.

Taxonomy. — In some venational characters a number of species show a departure from the characterization of the genus *Huonia* as given by RIS in the Selysian monograph. Some of them are subject to individual variation, whilst others do not equally apply to all the species at present known. The differences noted above render a modification of the generic diagnosis necessary, and therefore it seems best to enumerate the discrepancies as follows:

<sup>1)</sup> FÖRSTER (1903), *Ann. Mus. Nat. Hung.* 1 : 514-520, figs. (Genotype: *H. epinephela* FÖRST.

- (1) Discoidal field of fore wing hardly noticeably expanded towards the posterior margin (*ferentina*, *thisbe*, and some *rheophila*), sometimes containing only a single row of cells for a short distance (*silvicola*);
- (2)  $Cu_1$  of fore wing only slightly convex (*daphne*);
- (3) *Arc* occasionally coincident with  $Ax_2$  (nearly all species);
- (4) Often 2 *Cux* in hind wing (*daphne*);
- (5) Costal side of fore wing triangle often slightly fractured (*daphne*, *thisbe*, *silvicola*), and distal side occasionally angulate (*daphne*, *thisbe*);
- (6) Proximal side of hind wing triangle coincident with *Arc* (*daphne*, *ferentina*, *thais*);
- (7) *ti* of fore wing occasionally made up of three instead of only two cells (*thisbe*);
- (8) Anal loop of hind wing usually less strongly noded than would appear from RIS's description and photograph of the wings of *epinephela*, the veins  $A_1$  and  $A_2$  frequently obtuse-angulate; moreover, the outer angle of the loop often extends beyond the level of the triangle for only one or two cells (nearly all species).

The penis of *Huonia* was described and figured by FÖRSTER in 1903. His sketches of the organ are very crude, but he was the first to point out the remarkable general resemblance of the genitalia between the members of his "Gruppe der *Libellulidae papuaninae*". A review of the penes in the species now available for study does not leave the subject beyond the need of further treatment, because it was found that there is considerable diversity in its structure. The most striking point to be noted in its morphology is the peculiar modification of the third segment, or the distal portion, of the penis. In all species examined, the assortment of weakly chitinised lobes at the apex lies eintad of a prominent "hood" which completely covers the various soft lobes. The shape of this huge outgrowth, which is very hard and heavily sclerotized, is characteristic for each species and divides the genus in three fairly distinct groups:—

(A). *H. epinephela*, *hylophila*, *silvicola*, and probably also *aruana*. — Hood broad, its surface rather flattened dorsally, apex truncate, tridentate, median tooth compressed, crested and curved inwards, lateral teeth depressed, rounded (fig. 10 A);

(B). *H. daphne* and *thisbe*. — Hood very narrow apically, strongly compressed, crested and hook-shaped, with short lateral prominences which are removed basad (fig. 10 B);



(C). *H. arborophila*, *ferentina*, *rheophila*, *thais*, and probably also *thalassophila*. (*Oreophila* not studied.) — Hood similar in principle to (A), but with the apex narrower, more strongly convex dorsally, and deeply incised, so as to form three clearly differentiated lanceolate lobes (fig. 10 C).

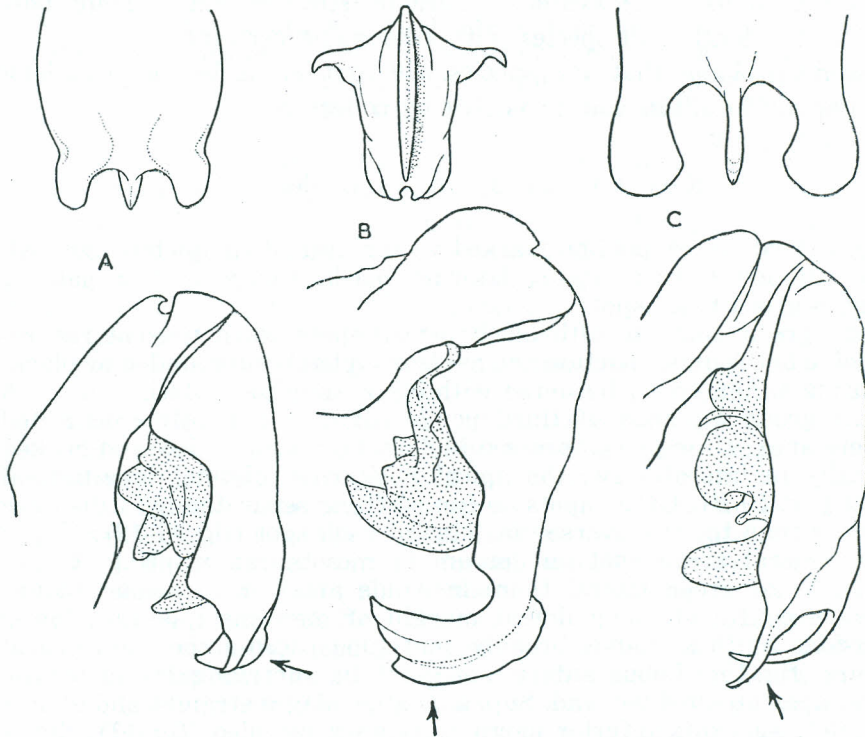


Fig. 10. Penis structure of *Huonia hylophila* LIEFT. (A), *H. daphne*, sp.n. (B), and *H. thais*, sp.n. (C). Upper row: apex of chitinous "hood" covering third penile segment, caudal aspect. Lower row: third (apical) segment and part of second segment of penis, showing structures, lateral view. Weakly chitinized parts are dotted. The arrow-heads indicate the angle of view from where the figures in the upper row were drawn. Fig. B and C drawn on the same scale, both considerably more highly magnified than A.

Contrary to what has been found by KENNEDY for the genus *Libellula*<sup>1)</sup>, the penis characters that divide the genus *Huonia* into groups are neither consistent with colour or venational characters, nor do they appear to parallel the geographical distribution of the species. It must be admitted that the two slightly aberrant members of penis-group B (*daphne* from Halmahera, and *thisbe* from Misool), also differ somewhat from the others in venational characters; but, whereas they are remark-

<sup>1)</sup> C. H. KENNEDY (1922), *Ent. News*, Philad., 33 : 33-40, 65-71, 105-111, 3 pls.



3. Sup. anal apps. about as long as segm. 9-10 of abdomen taken together, of slender build and evenly pointed apicad; upper margin in profile view undulated, with two slight convexities, lower margin smooth and rounded, carrying a row of 5-6 minute black tubercles. Inf. app. narrowly triangular in ventral view, lateral borders at first somewhat convex, then slightly concave, apex a little notched, in side view evenly and but slightly upcurved. Genital hamule with strong hook-like anterior branch. First lateral (mesepimeral) thoracic green band nearly always complete. Posterior femur nearly straight. Only one *Cux* in all wings. Costal side of fore wing *t* generally fractured distally. Abdomen moderately spindle-shaped. Hab.: W. & N. New Guinea . . . . . **epinephela** FÖRST.
- Sup. anal apps. shorter than segm. 9-10 taken together, shaped otherwise. Posterior femur distinctly curved . . . . . 4
4. Distal portion of 10th abdominal tergite strongly longitudinally carinate. Sup. anal apps. orange-yellow, almost for their basal half black, slightly outcurved beyond middle, outer border at first convex, then concave, and finally again convex in dorsal aspect; basal three-fourths stout and parallel-sided in profile view, downcurved, tips abruptly and very finely pointed; lower margin carinate, with distinct acute or obtuse-angulate projection beyond the middle of its length and carrying a row of 4-7 robust black teeth. Inf. app. blackish, more or less spotted with yellow, very broad at base, apex truncated, distinctly notched, strongly and abruptly upcurved in side view. Genital hamule with small (sometimes strongly incurved) hook-like anterior branch (fig. 14). 1 *Cux* in hind wing. Costal side of fore wing *t* entire. First lateral (mesepimeral) thoracic green band obliterated (♂) or entire (♀). Abdomen very strongly spindle-shaped. Hab.: W. & central N. New Guinea . . . . . **hylophila** LIEFT.
- No conspicuous longitudinal crest on dorsum of 10th abdominal segment. Sup. anal apps. orange or yellow, only the bases and tips black; lower margin in profile view at most with an obtuse-angulate projection beyond the middle of its length. Inf. app. light-coloured, tipped with black; triangular in shape, but not very noticeably broadened basally. Abdomen moderately spindle-shaped . . . . . 5
5. Basal half of sup. anal apps. in profile view distinctly sub-basally constricted; lower margin of each smooth and rounded, but obtuse-angulate beyond the middle of its length, and with a row of 6-7 minute black tubercles; in dorsal view at first distinctly constricted, then inflated beyond middle, and finally tapering to a point, the outer border of each appendage convex. Inf. app. rather abruptly upcurved in side view, apex slightly notched. Genital hamule with a short, hook-like anterior branch. 2 *Cux* in hind wing. Costal side of fore wing *t* entire. Lateral thoracic green marks resembling *epinephela*, the first lateral (mesepimeral) band complete. Hab.: Aru Is. . . . . **aruana** LIEFT.
- Basal half of sup. anal apps. in profile view more definitely curved, with upper and lower margin parallel to one another, lacking an obtuse-angulate projection beyond the middle of its length, slightly

carinate ventrally, with a row of 4-5 minute, though acute, black denticles; in dorsal view almost straight, with outer and inner border sub-parallel from base almost to apex, which is finely pointed. Inf. app. gradually upcurved in side view, apex more deeply notched. Genital hamule with a fine, very slender, sickle-shaped anterior branch, which appears vermiform in lateral aspect (fig. 14). 1 *Cux* in hind wing. Costal side of fore wing *t* fractured near apex. First lateral (mesepimeral) thoracic green stripe obliterated, its lower division linear. Postero-ventral green spot on metepimeron unusually short, more or less oval (fig. 13). Hab.: W. New Guinea & Misool

- . . . . . *silvicola* LIEFT.
6. Labrum wholly black. Upper divisions of green lateral thoracic bands anterior to second suture, broadly confluent along dorsal margin of meso-metapleurae . . . . . 7
- Labrum ochreous or green, with black marginal stripe . . . . . 8
7. Penis group B; hood of third penile segment shaped similarly to *daphne*, but apical hook-like portion still more strongly curved and pinched, but lacking a well-differentiated crest. Frons green with a large, more or less squarish, black patch on the middle at base, which does not extend forwards as far as the fronto-clypeal suture (fig. 19). Lower divisions of green mesepimeral and metepisternal bands (three large spots) coalescent across the interpleural suture and behind the spiracle. Black metepimeral band along second lateral suture with short rectangular posterior projection (fig. 20). Sup. anal apps. in dorsal view slightly forcipate, at first divergent, then gradually curved inwards, the tips meeting and tapering to a point; dorsal margin in profile view at first slightly convex, the pointed tips distinctly upturned. App. inf. shorter than superior pair (fig. 16). Small species, with slightly longer wings and more open venation. Hab.: Misool . . . . . *thisbe*, sp.n.
- Penis group C; hood of third penile segment shaped similarly to *thais* and allied species (fig. 10 C). Frons black with a small squarish green central spot along anterior border and with two vertical stripes, one on either side, running from the base towards the antero-lateral edge of frons; these stripes slightly divergent and angularly widened anteriorly. Lower divisions of green mesepimeral and metepisternal bands (three large spots) completely isolated and surrounded by black. Black metepimeral band along second lateral suture with prominent posterior off-shoot (fig. 15). Sup. anal apps. in dorsal view almost straight, parallel-sided and sub-parallel to one another, gradually tapering to a point; dorsal margin in profile view nearly straight. App. inf. sub-equal in length to superior pair. Small, short-winged species, with dense venation. Hab.: Halmahera . . . . . *rheophila* LIEFT.
8. Black patch at base of frons large, more or less trapezoidal, completely intersected on either side by an upward extension of the green ground-colour, shaped like a slender vertical bar which reaches base of frons, the thick black stripe along the eye-margin thus of great length and very conspicuous (fig. 18). Green mesepimeral thoracic

- band complete, its upper division strongly curved, lower division narrow and widely separated from the two green spots on the metapleurae (fig. 18). Sup. anal apps. slender, sub-parallel, apices somewhat swollen, obliquely truncated when viewed laterally, with strong angular inferior sub-apical projection; tips upturned, acutely pointed (fig. 17). Penis group C. Hab.: Halmahera . . . . **ferentina**, sp.n.
- Black patch at base of frons not shaped as above and not so deeply invaded by green on each side, or if so, then the thoracic sides not marked as described for *ferentina*. Sup. anal apps. not as above . . . 9
9. Upper antehumeral thoracic spot of large size; first lateral (mesepimeral) green stripe complete; lower divisions of green mesepimeral and metepisternal stripes not or only rarely confluent with one another. Green bands on metepimeron sub-parallel, the black stripe separating them nearly straight and occasionally obliterated (fig. 15). Ventral surface of thorax black, unmarked. Black median patch at base of frons restricted to upper half, somewhat indented on either side by the ground-colour. Sup. anal apps. bright orange, hardly obscured basally, each slightly bent basally, thence almost straight and parallel-sided, the tips abruptly and inconspicuously pointed; apices with 3-5 acute black teeth along lower margin, but lacking a distinct sub-apical projection. Species of moderate size: ♂ abd. + app. 28.0-30.5, hw. 31.0-33.0 mm. Penis not studied. Hab.: N. New Guinea . . . . . **oreophila** LIEFT.
- Upper antehumeral thoracic spot relatively smaller. Colour-pattern of head and thorax variable, usually not as above, and green bands on metepimeron usually not completely intersected by black, or if so, then the spots are less straight and not nearly so parallel to one another. Ventral surface of thorax at least with some pale colouring. Sup. anal apps. of smaller size and neither so conspicuously orange-coloured nor shaped as described above. Species of smaller size: ♂ abd. + app. 22.0-27.0, hw. 24.5-30.5 mm. Penis group C (*thalassophila* not studied) <sup>1)</sup> . . . . . 10
10. Sup. anal apps. not noticeably sub-basally constricted; sub-apical inferior projection barely indicated, at most slightly obtuse-angulate in profile view, the apices only little upturned and less acutely pointed. Appendix inferior only slightly shorter than superior pair (fig. 21). Body-colouring very similar to *arborophila* (for differences see specific description.) Hab.: Misool & W. New Guinea . . . . . **thais**, sp.n.
- Sup. anal apps. slightly but distinctly sub-basally constricted, provided with a strongly pronounced, submedian (or more definitely postmedian) inferior projection, the apices strongly upcurved, very finely pointed. Appendix inferior very markedly shorter than superior pair . . . . . 11
11. Inferior tooth along margin of sup. anal apps. rectangulate, situated about half-way their length; basal portion of appendages more curved in profile view. Appendix inferior considerably shorter than superior

<sup>1)</sup> Judging from FÖRSTER's remarks in the original "description", this organ is shaped similarly to *arborophila* and allies.

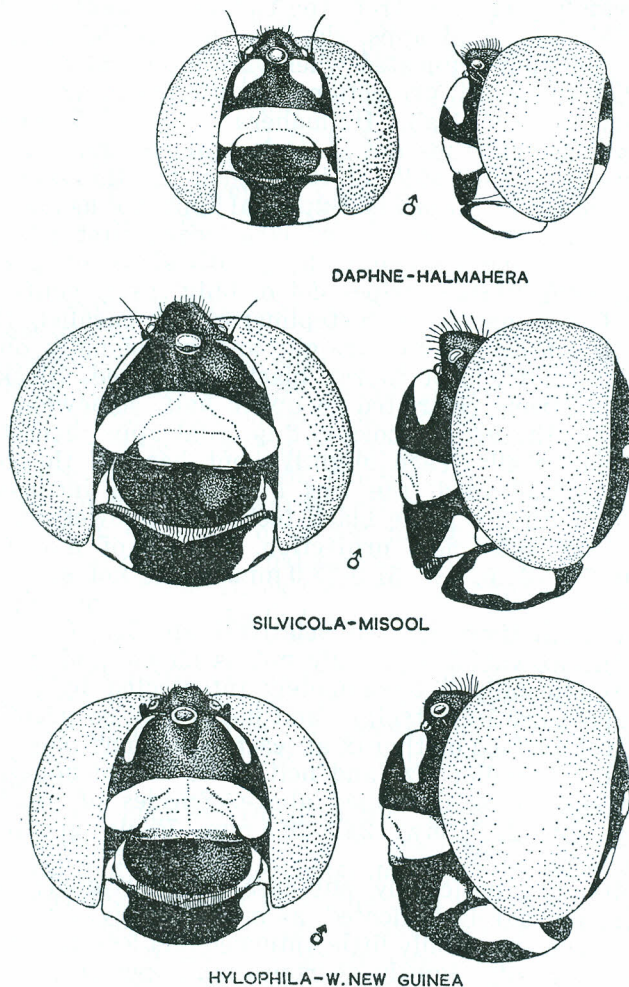


Fig. 11. Frontal and left lateral view of head of *Huonia daphne*, sp.n., Mumar River (holotype); of *H. silvicola* LIEFT., Fakal; and of *H. hylophila* LIEFT., Taminabuan.

- pair. Upper portion of green mesepimeral band confluent posteriorly with the upper spot on metepisternum, so as to form a T-shaped mark.  
 Hab.: E. New Guinea . . . . . *thalassophila* FÖRST.
- Inferior tooth along margin of sup. anal apps. acute-angulate, situated much beyond half-way their length; basal portion of appendages straighter in profile view. Appendix inferior relatively longer.

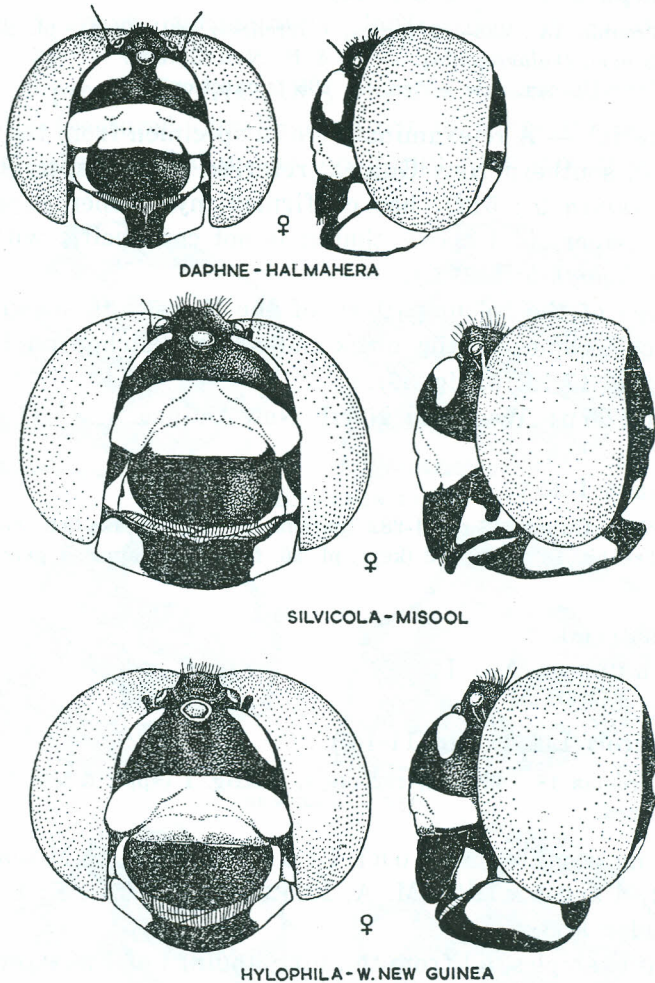


Fig. 12. Frontal and left lateral view of head of *Huonia daphne*, sp.n., Mt Sembilan (allotype); of *H. silvicola* LIEFT., Fakal (allotype); and of *H. hylophila* LIEFT., Taminabuan (incomplete, first described ♀).

Upper portion of green mesepimeral band not or only very rarely confluent posteriorly with the upper spot on metepisternum (fig. 20). (Posterior femur relatively shorter and less markedly curved. Neuration closer. Abdomen less spindle-shaped. Genital lobe relatively shorter and less slenderly pointed. Light ground-colour of body generally less extensive.) Hab.: New Guinea (universal) . . . . .  
 . . . . . **arborophila** LIEFT.

**Huonia epinephela** FÖRSTER (fig. 13).

1942. LIEFTINCK, Treubia 18 : 488-489 (notes, references), 491 (key), pl. 25 fig. 35 (genit. ♂, sub nom. *thalassophila*). — W. & N. New Guinea.  
 1949. LIEFTINCK, Nova Guinea, new series, 5 : 235 (correction).

No new material. — A re-examination of a specimen from the Lorentz River territory in southern New Guinea, referred to this species by RIS in 1913 (*Nova Guinea* 9 : 512), has confirmed my former supposition, expressed in the paper cited above, that it is not conspecific with *epinephela* (see under *hylophila* LIEFT.).

The drawings of the colour-pattern of the thorax, as shown in fig. 13, are small scale copies of the black-and-white sketches published in 1935 (*Nova Guinea*, 17 : 275, fig. 36).

Distribution: West and North New Guinea.

**Huonia aruana** LIEFT.

1935. LIEFTINCK, Nova Guinea 17 : 281-282 (partim). — ♂ Aru Is. (s.n. *epinephela*).  
 1942. LIEFTINCK, Treubia 18 : 491, 492 (key), pl. 26, fig. 38-39 (apps. & genit. ♂). — ♂ Aru Is.

No fresh material.

Distribution: Aru Is.

**Huonia silvicola** LIEFT. (fig. 11-14).

1942. LIEFTINCK, Treubia 18 : 489-491, 492 (key), textfig. 1 (apps. & genit. ♂). — ♂ W. New Guinea.

Additional material. — Misool I.: 5 ♂, 1 ♀ (ad.), C. Misool, Fakal, ca 150 m alt., 1, 4 and 5.x.1948, M. A. LIEFTINCK. Allotype ♀: Fakal, 5.x.1948, in the Leiden Museum.

The present examples, all from the surroundings of Fakal, agree very closely with the type from the Anakasi river, on the mainland of western New Guinea. The following additional colour notes may serve to its easy recognition.

Male (ad.). — Broad black band on middle of labium slightly expanded distalwards, the chrome-yellow lateral patches more or less semicircular or oval in outline, occupying a little less than one-half of the surface of each lateral lobe. Mandible-bases green. A pair of small greenish spots behind the occipital triangle. Thorax with upper mesepimeral green spot roundish or triangular (usually a little larger than the corresponding spot on mesepisterna), the lower portion always narrow, streak-like or linear. Metepimeron with two green spots, the lowermost





"hood" of the third segment not tongue-shaped and convex exteriorly, but narrow, rather pinched and longitudinally carinate, almost pointed apically.

Anal appendages shaped exactly as described and figured for the type, either clear yellow or slightly orangish in colour.

Female (ad., allotype). — Resembles the ♂ very closely. Head-markings as in fig. 12. Occipital triangle shiny black; rearwards, its posterior prolongation is conspicuously swollen so as to form two closely approximated nipple-shaped tubercles, which are yellow in colour and separated from one another longitudinally by a narrow V-shaped sulcus.

Colour-pattern of synthorax as in fig. 13. Wings hyaline, the bases not spotted with yellow. Neuration as in the ♂, *ti* of fore wing with a single cross-vein. 10½ - 11½ antenodals on fore, 9 on hind wing; 7 post-nodals. Pterostigma dark brown.

Abdomen much broader and stouter than in the ♂, very slightly spindle-shaped, with the yellow markings all a little more extensive; segm. 4 and 5 each with a pair of transverse, crescent-shaped, baso-dorsal spots and a yellow point upon the middle of the sides; 6 only with very conspicuous dorso-lateral orange-yellow patch, which is divided longitudinally by a fine black line over the median carina. Remaining segments black. Vulvar lamina not developed: posterior border of 8th sternite straight, the margin very slightly swollen, forming an almost acute carina, which is very shallowly and hardly noticeably notched in the middle. Anal appendages yellow, prickle-shaped, at first a little incurved, the finely pointed apices slightly outbent, the extreme tips black.

Differs from the ♀ of *epinephela* by having the tubercles behind the occipital triangle distinctly more raised and smaller, the yellow spots on top of these tubercles being also much smaller than in that species. The thoracic colour-pattern is also different in the two species (cf. fig. 13), while the yellow mid-lateral streaks of segments 4 and 5 of the abdomen in *epinephela* are linear instead of rounded; lastly, the anal appendages of ♀ *epinephela* are decidedly longer and almost straight.

♂ abd. + app. 29.0-30.5, hw. 33.5-35.5, pt. 3.0-3.2; ♀ 30.0, 36.0, 3.2 mm.

Unlike the much smaller *H. thais*, sp.n., which inhabits open sunny streams and small rivers with shallows and gravel bars, this fine insect is apparently restricted to more shady surroundings. On Misool it was decidedly rare, only half a dozen examples being taken, and all were found singly along small brooks and rivulets in dense forest. The males

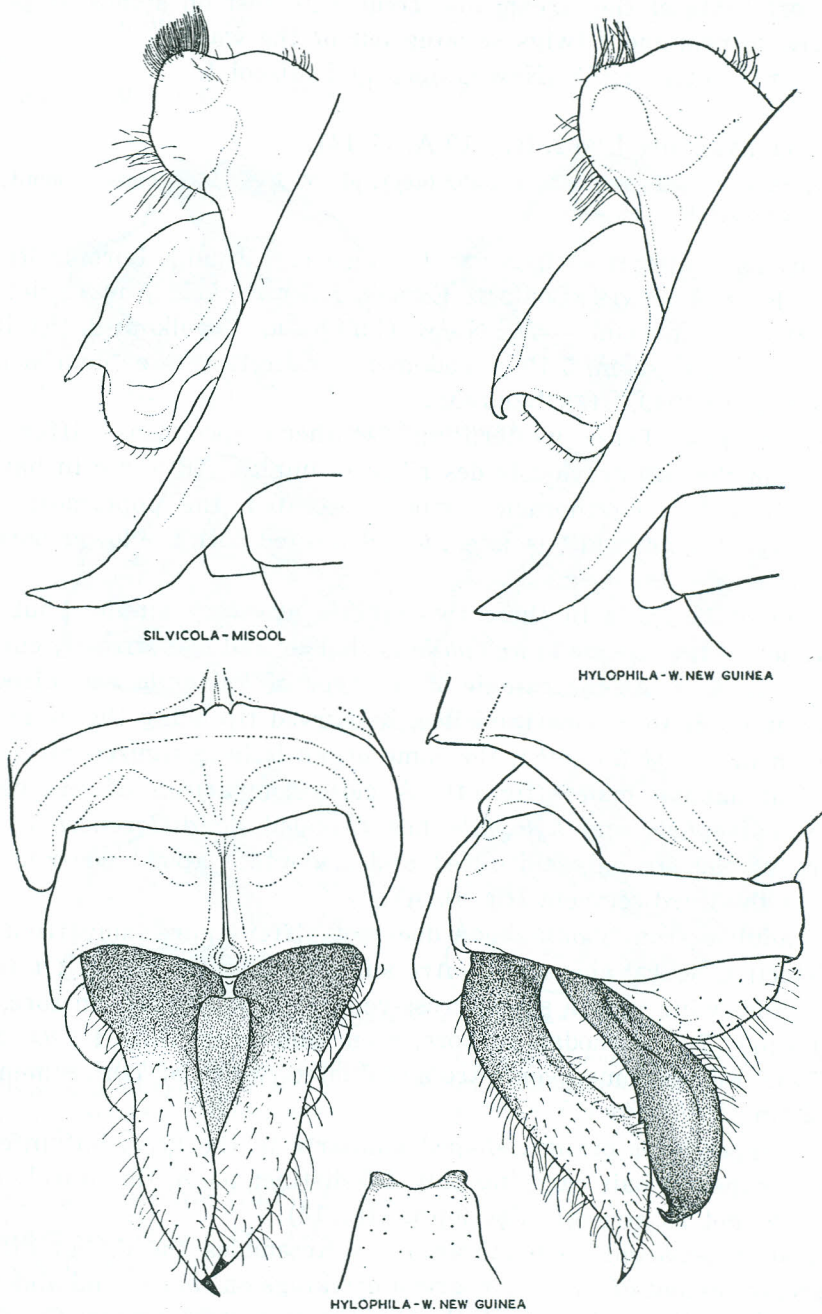


Fig. 14. Male genitalia, left side view, of *Huonia silvicola* LIEFT., Misool; the same and anal appendages, dorsal view and right side, of *H. hylophila* LIEFT., Taminabuan. Apex of appendix inferior drawn in ventral aspect. Hairs on appendages and genital organs partly omitted.

patrol short beats of the stream and frequently rest on stones or perch themselves on prominent twigs sticking out of the water.

Distribution: W. New Guinea and Misool I.

**Huonia hylophila** LIEFT. (fig. 10 A, 11-14).

1942. LIEFTINCK, Treubia 18 : 489, 491-492 (key), pl. 26, fig. 36-37 (apps. & genit. ♂).  
— ♂ Central N. New Guinea.

Additional material. — S. New Guinea: 1 ♂ (ad.), Lorentz River, 9.xi.1909, H. A. LORENTZ (LORENTZ Exped., *H. epinephela* FÖRST., det. F. RIS), in Mus. Amsterdam. — W. New Guinea, Vogelkop: 2 ♂ (1 juv., defective), 1 ♀ (ad., segm. 5-10 of abdomen missing), Taminabuan, south-west-coast, 16.iii.1949, STEN BERGMAN.

Male (ad.). — These western and southern specimens differ but slightly from the two previously described examples. All agree in having the mesepimeral green thoracic stripe obliterated, the uppermost spot being of large size and quite isolated, not connected with the lower portion as is the case in *epinephela*.

The genital organs in these two species are very similar, but the outer branch of the hamule in *hylophila* is shorter and less strongly curved than in *epinephela*. As the hamule of the type of *hylophila* was directed too much inwards to be clearly visible, its curved tip being therefore not well shown in fig. 37 (*loc. cit.*), the same organ is here figured after one of the Taminabuan males (fig. 14). A close comparison of the penile organ of *epinephela* and *hylophila* has revealed no differences in the armature of the strongly chitinized and tridentate apical covering, or "hood", of the third segment (fig. 10 A).

The adult ♂ from Taminabuan does not differ appreciably from the type. Principal neural characters: *Arc* slightly proximal to  $Ax_2$ ; *t* regular; *ti* of fore wing with a single cross-vein.  $11\frac{1}{2}$  antenodals on fore, 8-9 on hind wing; 7-8 postnodals on fore, 8 on hind wing. Only 1 *Cux*. Segments 7 and 8 of abdomen very strongly dilated, width of 7th segment at apex 3.2 mm.

Anal appendages orange, shaped similarly to the type, but inferior margin of superior pair carrying only 4-5 distinct teeth, the apical tooth of this row not so strongly developed (fig. 14).

Female (abd.-segm. 5-10 missing). — Resembles the ♂, but differs in the greater extent of the yellow-green markings on thorax and abdomen (fig. 13). Wing-bases saffronated, the membrane greyish-brown.  $9\frac{1}{2}$  -  $10\frac{1}{2}$  antenodals on fore, 7-8 on hind wing; 7 postnodals.

Abd. + app. 30.0, hw. 34.5, pt. 3.0; ♀ abd. (incomplete), hw. 37.0, pt. 3.3 mm.

Distribution: West and central North New Guinea.

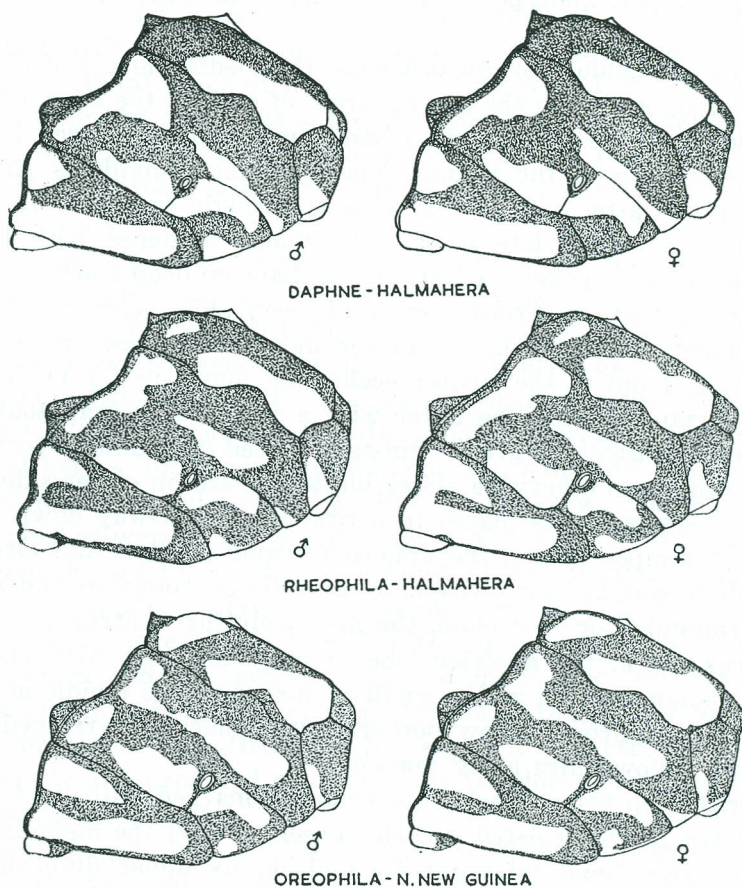


Fig. 15. Colour-pattern of synthorax of *Huonia daphne*, sp.n., Halmahera (type and allotype); of *H. rheophila* LIEFT., Halmahera (♂ Mumar River and ♀ allotype, Tobelo); and of *H. oreophila* LIEFT., Cycloop Mts (paratypes).

***Huonia oreophila* LIEFT. (fig. 15)**

1942. LIEFTINCK, Treubia 18 : 492-493 (addit. notes, references). — ♂♀ Central N. New Guinea.

No fresh material.

The figures 15 are small-scale copies of those accompanying the original description.

**Huonia daphne**, sp. n. (fig. 10 B, 11, 12, 15 and 17).

Material. — H a l m a h e r a I.: 9 ♂, 1 ♀ (ad.), C. Halmahera, Mumar River, 200-300 m, 25.ix.1951 (1 ♂), and Mts Siu, 600-700 m & Sembilan, 600 m, 27.ix.-6.x.1951, Sundanese collectors MANIS & AMSARI. Holotype ♂: Mumar R., 25.ix.1951, allotype ♀: Mt Sembilan, 8.x.1951, in the Leiden Museum.

Male (ad.). — Labium bright ochreous, the median lobe and a joint longitudinal band, bordering the inner margin of each of the lateral lobes, upon the middle of the labrum; this band approximately parallel-sided and equal in breadth to the median lobe, in some individuals slightly narrower than the latter but in all specimens strongly expanded apically, the distal margin of the lateral lobes thus also bordered with black. Mandible-bases chrome-yellow or light green. Labrum deep black. Clypeus entirely vivid light green. Frons deep black, very shiny, carrying a pair of large, isolated, subtriangular or rather more oval, grass-green spots on either side in front of the median ocellus, as shown in fig. 11. Vertex and occipital triangle black, the latter with a conspicuous trapezoidal or diamond-shaped ochreous or green twin-spot, placed immediately posterior to it; rear of the head otherwise glossy black, marked on either side with three bright ochreous spots placed in a row about half-way down along the margin of compound eye, the uppermost spot smallest and circular, the intermediate spot at least twice as large and also roundish, the lowermost spot triangular or lanceolate, the apex pointing ventrad.

Prothorax black, the anterior lobe broadly bordered with chrome-yellow, the median division with a small twin-spot on the middle at apex, the posterior lobe chrome-yellow bordered with black and fringed with long brownish-yellow hairs along margin.

Synthorax deep velvet-black, conspicuously marked with light green as shown in fig. 15. No isolated superior green spot on the mesepisterna. Mesepimeral green band interrupted by black, its upper division very large and always coalescent with the upper division of the metepisternal band. Green marks on metepimeron completely divided up into two by a pointed posterior off-shoot of the black band along second lateral suture. Ventral surface of thorax black, marked with two pairs of green spots, one on the metepimera and one on middle of poststernum.

Legs black, the posterior portion of all coxae green, as is also a small inferior spot on the trochanters; besides, there is a thick green stripe almost along full length of the interior surface of the anterior pair of femora. Distal two-thirds of posterior femora with a row of 12-15 small, backwardly directed black spines.

Wings hyaline, membrane slightly tinged with greyish-yellow in aged individuals. Neuration close. *Arc* at *Ax*<sub>2</sub>. Triangle on hind wing with its proximal side slightly distal to *Arc. ti* of fore wing with a single cross-vein. Fore wing triangle regular, or with its costal side very slightly fractured distally and with the distal side sometimes slightly angular mid-way its length. Discoidal field of fore wing commencing with two rows of cells. Cubital space of hind wing either with 1 or with 2 cross-veins (often in one of the wings only), the proportion being exactly alike. 9½ - 11½ antenodals on fore, 7-9 on hind wing; 6-7 postnodals. Pterostigma short and broad, with anal border slightly convex; colour deep black.

Abdomen of the same slender build as *rheophila*, the terminal segments strongly spindle-shaped, widest at the apex of the 8th segment. Colour deep black, marked with bright orange-yellow as follows. Segm. 1 marked with three transverse streaks along posterior margin, the dorsal one linear but with a knob-like median protuberance, the lateral ones broader and somewhat curved; 2 with a pair of transverse, band-like dorso-lateral marks, interrupted on mid-dorsum, and with isolated basal spot placed low down above the genitalia; a narrow, complete, inter-segmental ring between 2 and 3, interrupted mid-dorsally; 3 with a pair of transverse dorso-lateral streaks in front of the jugal suture, and a much narrower annule, interrupted in the median line, placed immediately behind the jugal suture; 4 and 5 each with a pair of narrow transverse baso-dorsal spots and a somewhat larger roundish spot mid-way along ventral margin; 6 with conspicuous postmedian orange ring, occupying somewhat more than two-fifths of the segment's length, indented by black anteriorly and produced posteriorly at the dorsal crest. Remaining segments black, unmarked.

Genitalia shaped as shown in fig. 17. Structure of penile organ as described in the key and as appears from fig. 10 B, the armature of the third segment widely different from that of the other known species, excepted *thisbe*, from Misool.

Anal appendages wax-yellow, bases of superiors very slightly obscured, shaped as in fig. 17; apices of superior appendages sometimes a little upturned.

Female (ad., allotype). — Similar to the ♂ in all essential characters. Joint black band on labial lobes parallel-sided, not broader than the median lobe. Head markings as in fig. 12. Prothorax as in the ♂, the median division with an additional yellow point along side-margin, the posterior lobe chrome-yellow with a black stripe along margin and fringed with long,

soft, golden-brown pencil hairs. Colour-pattern of thorax as in fig. 15. Wings hyaline. Proximal side of hind wing triangle distinctly distal to *Arc*; fore wing triangle with costal side slightly fractured distally and with its distal side also angulate. Left hind wing with 2 *Cux*.  $11\frac{1}{2}$  antenodals on fore, 9 on hind wing; 7 postnodals. Pterostigma conspicuous, anal side a little convex, deep black.

Abdomen cylindrical; black, marked with greenish-ochreous much as in the ♂. Segm. 1 with triangular mid-dorsal spot and with a slightly curved transverse band alongside. A pair of transverse bands, interrupted on mid-dorsum and rather clubbed laterally, just posterior to the jugal suture of 2; lower portion of sides filled out with an angular mark placed in the long axis of the body, and extending from base to apex, the posterior prolongation considerably narrowed. Segm. 3-6 marked as in the ♂, but all spots a little larger, the ring on 6 constricted mid-laterally.

Valvula vulvae not developed, but posterior margin of 8th sternite with broad U-shaped emargination, the side-portions being distinctly swollen.

Anal appendages clear yellow, long and narrowly cylindrical, only slightly shorter than 9th segment and acutely pointed, straight in lateral view but distinctly outcurved with strongly concave outer margin when viewed from above.

♂ abd. + app. 24.0-25.5, hw. 25.0-28.0, pt. 2.2; ♀ 25.0, 28.7, 2.3 mm.

Immediately distinguished from all other species by the isolated spot in front of frons, combined with the absence of a superior antehumeral spot on the thoracic dorsum. The first character links it with the *epinephela* cluster, while the anal appendages and the fused spots under the wing-bases suggest affinities with both *thisbe* and *rheophila*. However, the shape of the genital organs — more especially the curious structure of the hood of the penis — strongly supports the view that *daphne* is most closely related to *thisbe*, which also has a complete pale ring encircling the 6th abdominal segment.

Distribution: Halmahera.

**Huonia thisbe**, sp. n. (fig. 16, 19 and 20).

Material. — Misool I.: 1 ♂ (ad.), C. Misool, Fakal, ca 150 m, 23.ix. 1948, M. A. LIEFTINCK. Holotype in the Leiden Museum.

Male (ad., holotype). — Labium bright lemon yellow, the median lobe black, as is also a joint band upon the middle of the labium, bordering the inner one-third of each of the lateral lobes; this band at first parallel-



sided and equal in width to the median lobe, thence rather strongly broadened, bordering the intero-apical angles of the lobes. Mandible-bases lemon yellow. Labrum deep black. Clypeus and lateral portions of frons vivid lemon yellow, this colour on the latter changing to light green upwards. Black frontal spot more or less squarish, glossy black (fig. 19). Vertex and occipital triangle black, the latter very shiny. Rear of the head glossy black, with a large, transverse bright yellow twin-spot placed immediately posterior to the occipital triangle; this spot shaped like a double triangle whose bases nearly meet in the median line, the apices being directed sideways; there are also three conspicuous yellow spots placed in a row, about half-way down along the margin of each of the compound eyes: the uppermost spot very small, the middle spot quadrangular, the lowermost spot narrowly triangular, the apex of the triangle pointing ventrad.

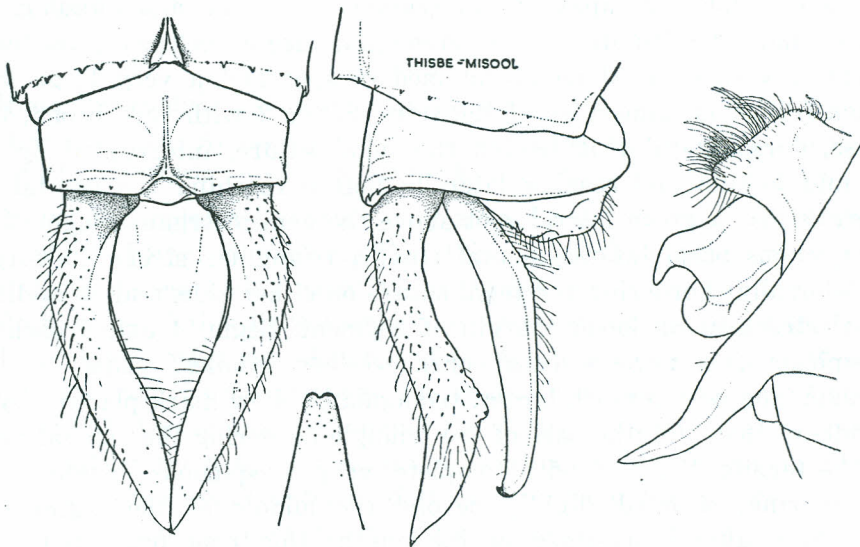


Fig. 16. *Huonia thisbe*, sp.n., from Fakal (holotype). Anal appendages, dorsal view and right side, and genitalia, left side view. The apex of the appendix inferior is drawn in ventral aspect. Hairs on appendages and genital organs partly omitted.

Prothorax black; anterior lobe broadly bordered with chrome-yellow, the median division with minute yellow lateral spot; posterior lobe brownish-black with three yellowish marginal dots, its hind margin fringed with very long golden-yellow hairs.

Colour-pattern of synthorax deep velvet-black and brilliant light grass-green, as shown in fig. 29; ventral surface black, thinly pruinose,

the metepimera with a pair of oval pale green bands, divergent posteriorly, and poststernum with a pair of much smaller ill-defined yellowish dots.

Legs black; the coxae of all legs brownish, pruinose and somewhat paler posteriorly; the trochanters almost entirely green, as are also the basal five-sixths of the inner surfaces of the first pair of femora. Distal four-sevenths of posterior femora with a row of 13-14 small backwardly directed curved teeth.

Wings hyaline. *Arc* at or very slightly proximal to *Ax*<sub>2</sub>; costal side of fore wing triangle fractured distally, the distal side also slightly angulated mid-way its length; hind wing triangle distinctly distal to *Arc*; *ti* of fore wing with a single cross-vein, or three-celled. Only one *Cux* in all wings. 9½ antenodals on fore, 8 on hind wing; 6 postnodals (7 in one hind wing). Pterostigma brownish-black.

Abdomen slender, spindle-shaped, the basal segments not as strongly inflated as in *ferentina*, 4-6 narrow and cylindrical, the terminal segments expanded, widest at apex of 7th segment, 10 small and annular. Deep black, marked with light grass-green and bright ochreous, as follows. Segm. 1 with small dorso-apical median spot and a very large lateral patch filling out almost all of the sides. Segm. 2 with very broad, transverse, dorso-lateral ring behind the jugal suture, interrupted by black on mid-dorsum and ceasing laterally before reaching the genital lobe; there is also a green lateral spot above the genital organs. Segm. 3 with conspicuous basal intersegmental ring, a triangular streak (interrupted mid-dorsally) bordering the jugal suture on either side, and an additional basal streak along lower margin of segment. Segm. 4 and 5 each with conspicuous, transverse basal orange-yellow lunules, widest on mid-dorsum, and with a much larger, triangular, yellow mark placed upon the middle of the sides, the base of the triangle bordering the ventral margin of the tergite. Segm. 6 with complete, very conspicuous, bright orange-yellow ring, situated slightly beyond the middle of the segment and occupying almost one-third of its length; this ring prolonged caudad along the dorsal crest into a pointed triangle, and also along the ventral margin of the tergite. Remaining segments black.

Genital organs black, the hamuli greenish-brown interiorly (fig. 16). Penis shaped similarly in principle to *daphne*, with the "hood" of the third segment strongly narrowed and hook-shaped apically, lacking a definite crest.

Anal appendages wax-yellow, bases slightly obscured and only the extreme apices black, shaped as shown in fig. 16.

♂ abd. + app. 23.5, hw. 26.7, pt. 2.2 mm.

Female unknown.

This very handsome little species was discovered on a cold spring-fed brook on the bottom of a steep gully intersecting part of a wide savanna, at some distance from the forest around Fakal. The tiny brook was entirely overgrown with ferns, Pandanus, and a tangle of dry bush. The insect was first observed hovering in a sunlit opening between two ledges of rock, but it soon perched on a stick jutting out from a small clear runnel of water that trickled over a gravelly bottom. It was captured and recognized at once as a unknown species of *Huonia*. The brilliant chrome-yellow and light green body-markings of the insect were very conspicuous, much more so in fact than the dark green of *H. thais*, which it otherwise resembled fairly closely. *H. thisbe* was the only anisoptera noticed in these surroundings, and in spite of a careful search the present specimen was the only one seen.

Distribution: Misool I.

***Huonia rheophila* LIEFTINCK (fig. 15 and 17).**

1935. LIEFTINCK, Nova Guinea 17 : 271-272 (key), 272-274, fig. 34, 35 (not 33!), 36A (head and thoracic markings ♂ ♀, genit. & apps. ♂). — ♂ ♀ N. Halmahera.

Additional material. — H a l m a h e r a I.: 3 ♂, 1 ♀ (ad.), C. Halmahera, Mumar River, 200-300 m, 25.ix.1951 (3 ♂), Tolewang, 50 m, 13.x. 1951 (♀), Sundanese collectors MANIS & AMSARI.

Both sexes of this little species have been described and figured in detail, but I here offer new sketches of the thoracic colour-pattern of both sexes, taken from fresh examples; the genitalia of the ♂ are also figured anew (fig. 17). Unfortunately enough, the figures 33 and 35, of *oreophila* and *rheophila* in the original description, were transposed; moreover, since the labrum in paragraph 1<sup>1</sup> of the key on page 271 was erroneously stated to be "yellow, bordered with black" instead of "black", this species cannot properly be identified; this error is corrected in the original description on p. 272-274, which therefore should be consulted first. The penis of *rheophila* is figured in the same paper on p. 273, fig. 34.

The present examples apply perfectly to the description. The joint black band on the middle of the labium is approximately parallel-sided and as broad as the median lobe. Labrum wholly black. The markings on frons are of a very characteristic shape and practically alike in all specimens. The uppermost green spot on the mesepisterna of the thorax is of very small size, much smaller in fact than in such species like *thais*

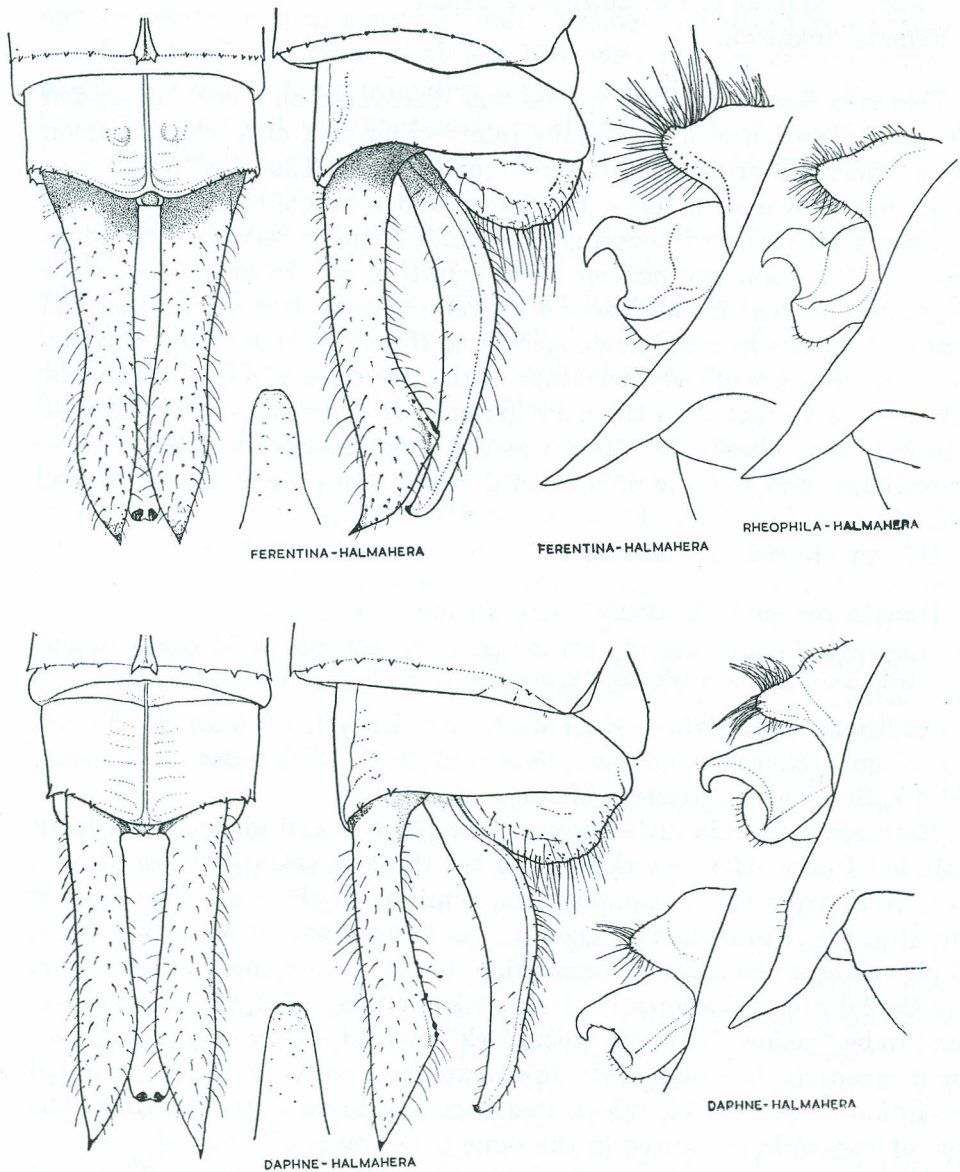


Fig. 17. Upper row: anal appendages, dorsal view and right side, and genitalia, left side, of *Huonia ferentina*, sp.n., Mt Sembilan (♂ holotype); genitalia, left side, of *H. rheophila* LIEFT., Mumar River. Lower row: anal appendages, dorsal view and right side, Mumar River (♂ holotype), and genitalia (type and paratype), left side, of *H. daphne*, sp.n. Apex of appendix inferior drawn in ventral aspect. Hairs on appendages and genital organs partly omitted.

and *arborophila*, while the uppermost divisions of the two lateral (mesepimeral and metepisternal) bands are both detached from the main portions and confluent with one another, forming a transverse band along the dorsal margin of the pleurae (fig. 15).

Female with valvula vulvae not developed, posterior margin of 8th abdominal sternite very shallowly excised, so as to form an obtuse-angulate and very wide emargination, the margin on both sides being somewhat swollen.

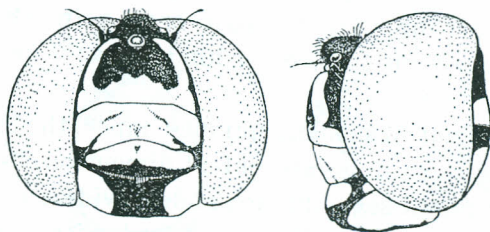
♂ abd. + app. 24.0, hw. 24.0-24.5, pt. 2.6; ♀ 25.5, 27.0, 3.0 mm.

Distribution: Halmahera.

***Huonia ferentina*, sp. n. (fig. 17 and 18).**

Material. — Halmahera I.: 1 ♂ (ad.), C. Halmahera, Mt Sembilan, 600 m, 14.x.1951, Sundanese collector AMSARI. Holotype in the Leiden Museum.

Male (ad., holotype). — Labium chrome-yellow, the median lobe black, as is also a joint parallel-sided band of exactly the same width as the median lobe, upon the middle of the labium and bordering the inner one-third of each of the lateral lobes; near the apex this band suddenly expands sideways, the distal margin of the lobes thus being also narrowly bordered with black. Mandible-bases and labrum chrome-yellow, the latter with a greenish tinge and bordered with black, as shown in fig. 18. Traces of brownish streaks laterally, filling out the labro-clypeal edges and a pair of ill-defined transverse lines on each



FERENTINA - HALMAHERA

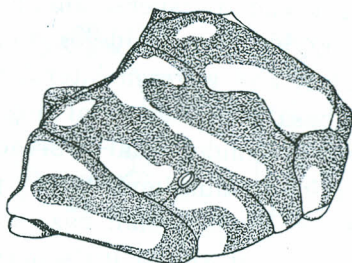


Fig. 18. *Huonia ferentina*, sp.n., Mt Sembilan (♂ holotype). Frontal and left lateral view of head and colour-pattern of synthorax.

side of the middle on postclypeus. Clypeus and frons glaucous-green, frons marked with shiny deep black, as shown in fig. 18. Vertex and occipital triangle black, the latter very shiny. Rear of the head glossy black, with a large, roundish, median yellow twin-spot, placed immediately posterior to the occipital triangle, and with three yellow dots placed in a row half-way down along the margin of each of the compound eyes.

Prothorax black; anterior lobe broadly bordered with chrome-yellow, median division with small bright green twin-spot on its middle and with minute green lateral dot; posterior lobe black, its hind margin fringed with very long pale brownish-yellow hairs.

Colour-pattern of synthorax deep velvet-black and green, as shown in fig. 18; ventral surface black, thinly pruinescent blue, the metepimera with a pair of lanceolate light green streaks, which are strongly divergent posteriorly.

Legs black, except the coxae, which are striped with green posteriorly, the trochanters and the basal two-thirds of the first pair of femora being also striped with green interiorly. Distal four-sevenths of posterior femora with a row of 11 small backwardly directed curved teeth.

Wings hyaline. *Arc* at  $Ax_2$ ; sides of fore wing triangle not fractured; hind wing triangle with its proximal side almost in line with *Arc*; *ti* of fore wing with a single cross-vein. Only one *Cux* in all wings.  $9\frac{1}{2}$  antenodals on fore, 8 on hind wing; 7 postnodals. Pterostigma narrow, dark brown.

Abdomen slender, spindle-shaped, the basal segments strongly inflated, especially so in dorso-ventral dimension, 4-6 very narrow and cylindrical, the terminal segments expanded, widest at apex of 7th segment, 10 small and very narrow. Black, marked with green, as follows. Segm. 1 with minute dorso-apical median spot and a much larger, elongate, lateral patch. Segm. 2 with broad transverse annule slightly beyond middle and widely interrupted by black on mid-dorsum, stopping short about two-thirds down the sides; and a green lateral point above the genitalia. Segm. 3 with narrow basal intersegmental ring, interrupted mid-dorsally, and with broad transverse annule, equal in breadth to that on 2 and also interrupted by black on mid-dorsum, immediately posterior to the jugal suture. Segm. 4 and 5 each with very small baso-dorsal ochreous spots, and a slightly larger spot on either side a little beyond half-way the segment's length, placed along lower margin. Segm. 6 only with merest trace of baso-dorsal paired spots, but with a pair of conspicuous, oval, ochreous dorso-lateral marks, separated by the black median carina, placed slightly beyond the middle of the segment and occupying about one-fourth of its entire length. Remaining segments black.

Genital organs black, the hamuli greenish interiorly (fig. 17). Penis shaped similarly in principle to *arborophila*, *thais* (fig. 10 C) and *rheophila*, the slight differences in the terminal appendages of the "hood" being negligible.

Anal appendages orange-yellow, bases and apices of superior pair narrowly black, shaped as shown in fig. 17.

♂ abd. + app. 26.6, hw. 28.0, pt. 2.5 mm.

Female unknown.

Distribution: Halmahera.

***Huonia thalassophila* FÖRSTER.**

1903. FÖRSTER, Ann. Mus. Nat. Hung. 1 : 520. — ♂ ♀ Huon Gulf.

1913. RIS, Cat. Coll. SELYS, Lib. 14 : 745 (partim). — ♀ Huon Gulf.

1942. LIEFTINCK, Treubia 18 : 485-487 (paratypes re-described), pl. 25, fig. 34 (apps. ♂).  
— ♂ ♀ Huon Gulf.

No fresh material.

Distinguished from *arborophila* and allied species by paler colouring and different appendages.

Distribution: E. New Guinea.

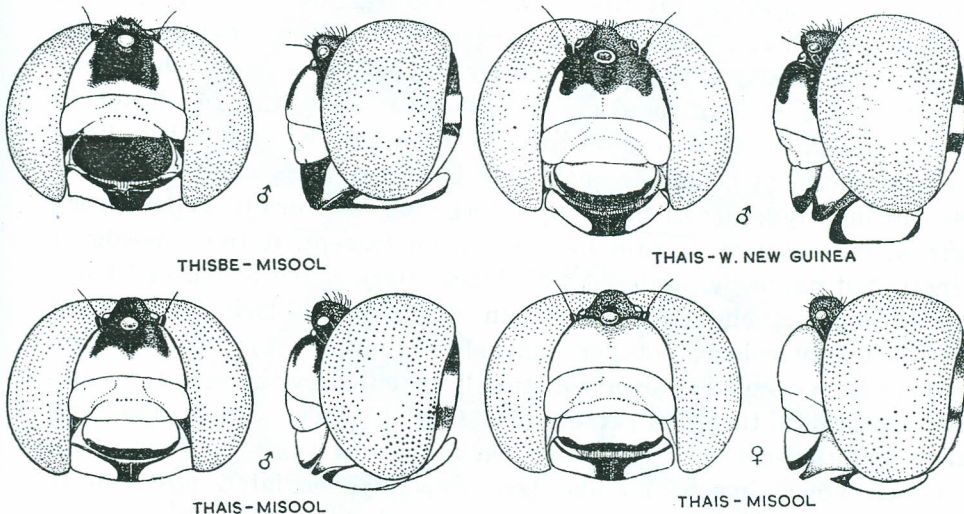


Fig. 19. Frontal and left lateral view of head of *Huonia thisbe*, sp.n., Fakal (holotype); and of *H. thais*, sp.n., ♂ Taminabuan (atypical) and from Fakal (♂ and ♀, typical series).

***Huonia arborophila* LIEFT. (fig. 20).**

1942. LIEFTINCK, Treubia 18 : 487-488 (synonymy, full references). — New Guinea.

Additional material. — N. E. New Guinea: Markham River Valley, Nadzab, 20 miles from Lae, 9.vii.1944, K. V. KROMBEIN (U.S. Nat. Mus. and author's coll.).

The present drawings of the colour-pattern of the synthorax (fig. 20) are small-scale copies of the figures in my 1935 paper. These specimens

from southern New Guinea could not be re-examined on this occasion, but they are very probably conspecific.

Distribution: New Guinea (universal).

**Huonia thais**, sp. n. (fig. 10 C, 19-23).

Material. — Misool I.: 74 ♂, 15 ♀ (ad.), C. Misool, Fakal and surroundings, 100-150 m alt., Kasim, Fagé & Wartama Rivers, 15.ix.-8.x. 1948, M. A. LIEFTINCK. With collector's note: "Eyes emerald green". W. New Guinea, Vogelkop, 3 ♂ (ad., one defective), Taminabuan, southwest coast, 16.iii.1949, STEN BERGMAN. Holotype ♂ and allotype ♀: Misool, Kasim River, 12 & 17.ix.1948, in the Leiden Museum.

Closely allied to *arborophila* LIEFT.

Male (ad., Misool). — Labium chrome-yellow to pale green, with reduced black markings: median lobe with a cloudy dark brown spot of variable size, usually confined to its median one-third but often more extensive so as to leave only the lateral border yellow; lateral lobes with a joint, campanulate, median spot bordering the inner margin of the lobes, this spot nearly always very shortly stalked, or even detached from the spot on the median lobe, and never much exceeding the latter in breadth; apically it is strongly expanded sideways, wing-like, the distal margin of the lobes being also narrowly bordered with black. Mandible-bases, labrum, clypeus, and the frons anteriorly and laterally, yellow-green or green, the anterior margin of the labrum (except at the side-edges) distinctly but narrowly bordered with black. Dark patch at base of frons sub-quadrangular, slightly wider than deep, dark blackish-brown or reddish-black in colour, not very sharply delimited; this spot on both sides near the eye-margin always distinctly indented by the green ground-colour, the frontal tubercles rather shiny (fig. 19). Vertex black. Occipital triangle chestnut-coloured to almost black. Rear of the head black, with two closely approximated, circular, green spots immediately posterior to the occipital triangle; there are also three yellow-green spots on either side along the margin of compound eyes, the uppermost spot vestigial, the middle spot roundish and the lowermost spot triangular and largest of all.

Prothorax black, the anterior lobe bordered with light chrome, the median division with a pair of very small mid-dorsal spots and a point alongside; posterior lobe unmarked, its free margin fringed with long golden-brown or yellowish hairs.

Synthorax grass-green and deep black, as in *arborophila* and most other species, the ground-colour on the sides slightly predominant, the



arrangement of the green marks very similar to *arborophila* and variable to the same extent (cf. fig. 20). The green mesepimeral band is more often interrupted above its middle than complete (proportion about 3 : 2); the upper division of this band averages smaller in size than it is in *arborophila* and it is decidedly more triangular in shape; rarely it is prolonged

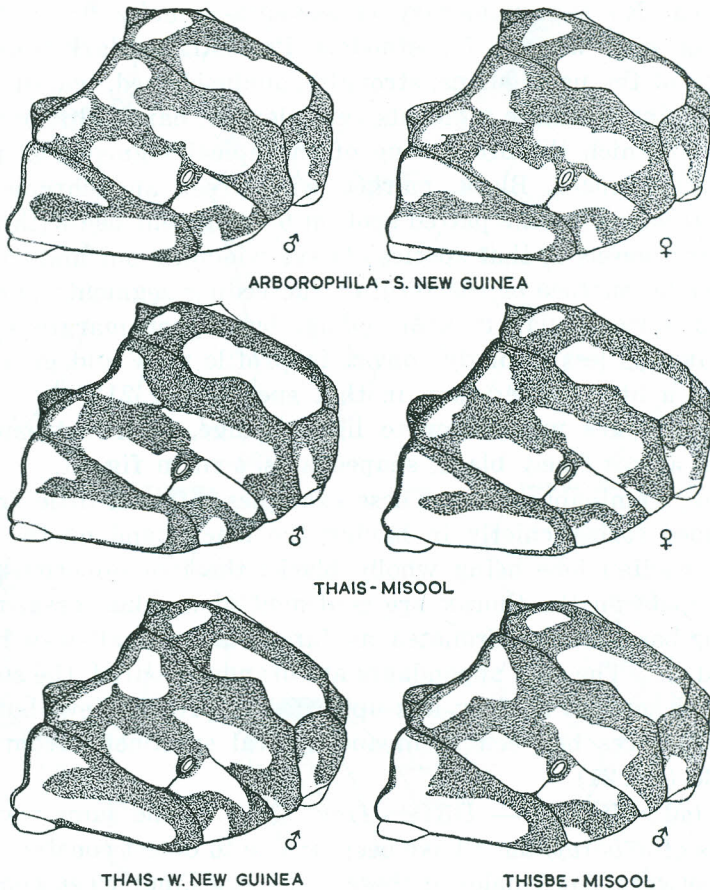


Fig. 20. Colour-pattern of synthorax of *Huonia arborophila* LIEFT., Lorentz River; of *H. thais* sp.n., Misool (♂ and ♀) and Taminabuan (♂); and of *H. thisbe*, sp.n., Fakal (holotype).

caudad to become confluent with the small superior spot on the metepisternum; lastly, the black posterior off-shoot of the band on metepimeron is generally shorter and more pointed than in *arborophila*. Ventral surface of thorax green, but all sutural lines broadly and confluent striped with black.

Legs black, coxae and anterior femora marked with green as in *arborophila*; armature of femora as in that species (9-12 teeth on posterior pair).

Wings hyaline; neuration not different from *arborophila*. *Arc* usually at  $Ax_2$ ; hind wing triangle with its proximal side either in line with *Arc* or distinctly distal to it. Fore wing triangle nearly always regular; *ti* once traversed. No supernumerary cross-veins. Usually  $9\frac{1}{2}$  antenodals on fore, 7-8 on hind wing; 6-7 postnodals. Pterostigma dark brown.

Abdomen of the usual shape, strongly spindle-shaped, widest at apex of segm. 7, the intermediate segments very slender, hardly different from *arborophila*, in which the broadening of the apical segments is perhaps a little less pronounced. Black, marked with green and chrome yellow similarly to *arborophila*, the paired spot on 6th segment below the latero-ventral constriction as in that species always widening out and continued on to the ventral surface of the tergite; succeeding segments unmarked.

Genitalia very similar to *arborophila*, but upper margin of inner branch of hamulus less strongly convex in profile view and genital lobe slenderer and a little longer than in that species (fig. 21).

Anal appendages wax-yellow to light orange, their extreme bases obscured and apices finely black, shaped as shown in fig. 21.

Male (ad., Taminabuan). — These examples differ a little from the above described series, chiefly in having the black band on the labium broader, the median lobe being wholly black; the two uppermost meso-metapleural spots on the thorax are confluent along the dorsal margin, and the wing-bases are saffronated as far distad as half-way between the bases and  $Ax_1$ . The anal appendages are orange-coloured, the superiors are a trifle thicker and slightly less upturned in profile view, but otherwise the differences between them and typical specimens from Misool are negligible (fig. 21).

Female (ad., Misool). — Differs from the ♂ in the same way as do the two sexes of *arborophila*. I have been unable to detect constant colour-differences between the females of these two species, but when comparing series of both, they can be held apart on the slightly different form of the anal appendages, those of *thais* being shorter. The only reliable means of distinction, however, is found in the structure of the valvula vulvae. In *arborophila* the swollen posterior margin of the 8th sternite has a distinct, though shallow, V-shaped median incision, forming two thick, shiny black laminae, which are crescent-shaped, evenly rounded posteriorly and directed slightly ventrad; in *thais* the posterior margin is also a little swollen, but the median incision is barely indicated and the two

"lobes" on either side of it are extremely short and almost straight-bordered ridges, which do not at all project caudad or ventrad.

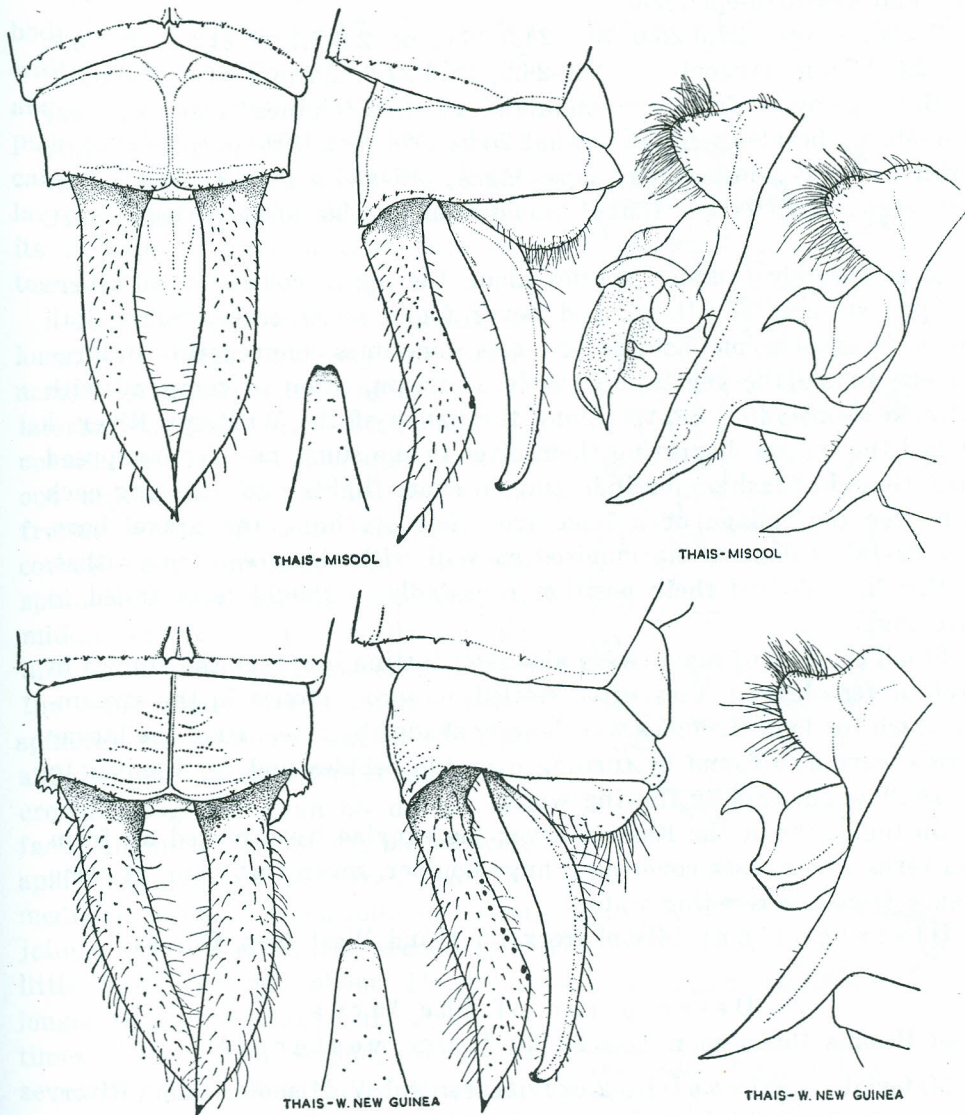


Fig. 21. *Huonia thais*, sp.n., from Misool (upper row, typical series), and from Tamina-buan (lower row, atypical example). Anal appendages, dorsal view and right side, and genitalia, left side, showing penis behind twisted hamulus (upper left). Apex of appendix inferior drawn in ventral aspect. Hairs on appendages and genital organs partly omitted.

In one ♀ the green mark on the mesepimeron of the thorax is not only complete but rather unusually widened, the upper meso-metapleural spots being also fused, so as to form an irregular band, which is continued downwards across the first lateral suture with the fused spots on the meta- and metinfra-episterna.

♂ abd. + app. 22.0-23.0, hw. 24.5-26.0, pt. 2.6-2.7; ♀ 21.5-24.0, 26.0-28.0, 2.6-2.7 mm (Misool); ♂ 25.0-26.0, 26.5-27.0, 2.7 mm (Taminabuan).

Our examples from the mainland of New Guinea, collected near Taminabuan, besides being somewhat larger, differ a little in their slightly shorter and less pointed anal appendages; otherwise they are so similar to the series from Misool that it would seem unwise to keep them apart.

A moderately common species along the upper course of all rivers and open streams of Misool, and never found away from water. Both sexes have arboricolous habits, the males sometimes congregating in large numbers among the vegetation beside a stream, often in company with *Diplacina smaragdina* SELYS. Along the banks of the Wartama River, I watched the insects disporting themselves in the sunshine with outspread wings, Gomphid fashion, or indulging in short flights and pursuing each other over the foliage of a huge tree that overhung the gravel bars. Their cryptic colouring harmonised so well with the green leaves that, had they not shifted their position repeatedly, I should have failed to notice them.

Small colonies of males were also seen flitting low over the ripples in search of females, but they often settled on sunny stones in the stream-bed, which for long stretches was densely shaded by trees. Here the larvae of *thais* were also found by turning over the pebbles and dead leaves in very shallow but rapidly flowing water.

On the banks of the Kasiem River the exuviae were picked up from small ferns and mosses covering a huge boulder, seven feet high, at some distance from the receding water.

Distribution: Misool (terr. typ.) and West New Guinea.

Description of the larva  
of *Huonia thais*, sp. n. (fig. 22-23) from western Misool.

Material. — Misool I.: 2 exuviae, central W. Misool, Kasiem River, ca 100 m, 9.x.1948, "Attached to moss and ferns growing on huge boulder, 2 metres above water-mark; imagoes taken in transformation"; and several larvae, various instars, from other streams in western Misool, 100-150 m, 1-6.x.1948, M. A. LIEFTINCK.

A smooth, rather flat, compactly built larva, with a broad head, strong and wide thoracic segments and comparatively short, strong legs (fig. 22).

Measurements (approximative, taken from exuviae). — Length of body 17.6, of abdomen 10.3, of posterior femur 3.7, of antennae 1.2 mm; width of head across the eyes 4.5, of abdomen across end of segm. 6 (sternal plate flattened out) 6.0 mm. (The camera lucida drawing fig. 22 of the larva is from a 'restored' exuvia, with its abdomen slightly inflated and extended).

Head almost twice as broad as long; eyes large, not very prominent across the middle of the length of head; lateral margins very little oblique, curving into the posterior margin without any indication of an angle; no frontal ridge. Surface hairless, but covered with microscopical wart-like spinules, except small bare patches on middle of frons, the ocellar region and six areas in a transverse row on the epicranial and occipital lobes; spinules on posterior angles of head and behind the eyes longer and more crowded together than on dorsal surface. Antennae very short, placed wide apart and slightly in advance of the median ocellus, seven-jointed; first joint shortest and widest, second joint little narrower but about  $1\frac{1}{2}$  times longer than first, third joint about  $1\frac{1}{2}$  times longer than second, fourth to seventh joints sub-equal in length to second and all of about the same length.

Mentum of labium broad, very short and rather flattened, reaching backwards between the anterior legs as far as the base of the second pair of coxae; its base strongly cupped and more or less triangular when

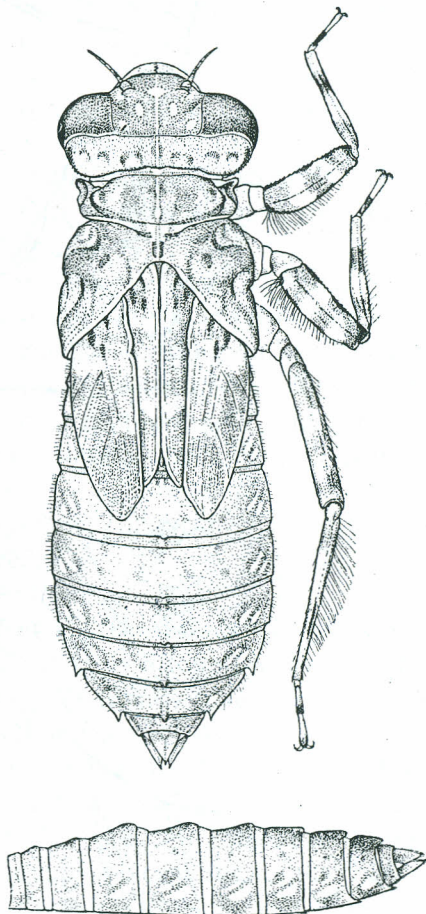


Fig. 22. *Huonia thais* sp.n. Ultimate larval instar, Misool I. Body slightly distended. About five times enlarged.

viewed from beneath *in situ*, its distal portion only moderately convex. Mental setae placed transversely almost in a straight row, 2 + 4 or 3 + 3 (rarely 3 + 4) on either side of the middle; mid-lobe moderately pro-

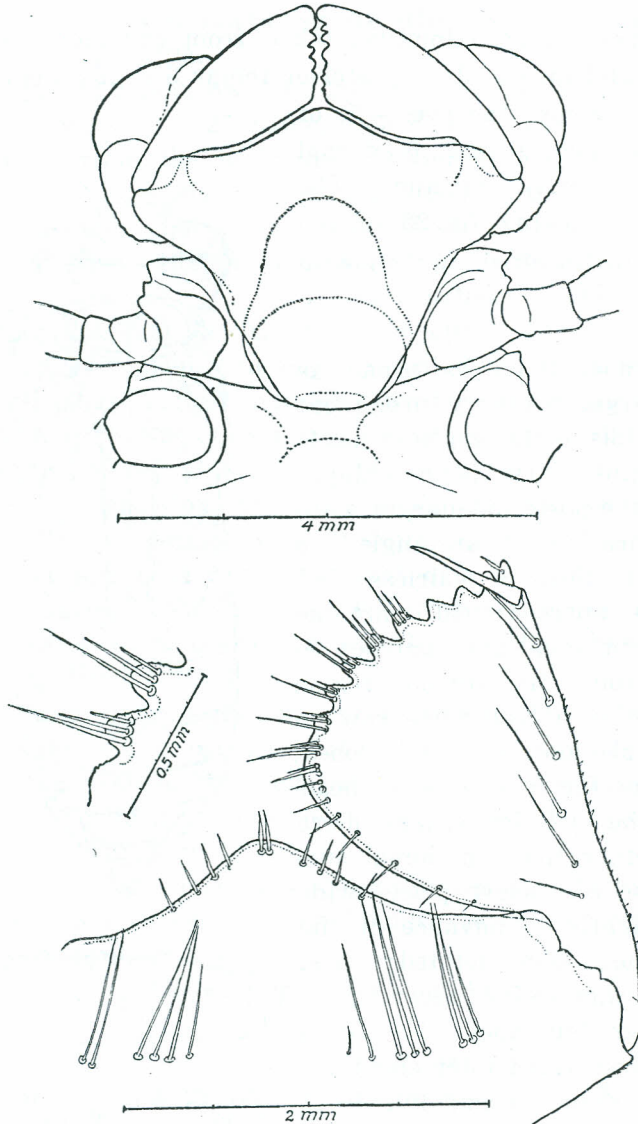


Fig. 23. *Huonia thais*, sp.n. Ultimate larval instar, Misool. Ventral aspect of head and prothorax (*in situ*) and interior view of labium (flattened out), with crenulations on inner margin of lateral lobe, more highly magnified.

tuberant, marginal setae distinct, one pair at apex and four on either side. Lateral lobes very strongly hollowed out, their inner margins with a

proximal row of strong marginal setae, the distal portion deeply crenulated, as shown in fig. 23, there being 7 (8) V-shaped indentations and 8 (9) rounded projections, the last projection deeply divided, and all of them carrying 3 long bristles; movable hook slender and relatively very short; lateral setae 5-6.

Prothorax very wide, only slightly convex dorsally; lateral propleural process strongly protuberant, more or less thumb-shaped in dorsal view, lacking tufts of hair. Thorax robust, surface for the greater part covered with microscopical warts. Wing-cases parallel, reaching back as far as the end of segm. 5 or a little beyond it (in exuviae to the middle of that segment).

Legs short and strong, all femora and tibiae distinctly flattened; posterior carinae fringed with longish hair, otherwise bare, the anterior keels of femora microscopically serrulate.

Abdomen broad, thick-set, widest at apex of segm. 5, dorsal surface moderately arched, ventral surface flattened. Lateral spines of small size, present only on segments 8 and 9; dorsal hooks still smaller, tubercular and rounded, vestigial on 5 but increasingly (though only slightly) more conspicuous posteriorly, those on 8 and 9 nipple-shaped and prolonged backwards into slightly elevated blunt longitudinal ridges. Appendix dorsalis weakly longitudinally carinate.

Body colour uniform brownish-yellow, indistinctly mottled with brown; femora and tibiae faintly ringed.

This peculiar larva, so suggestive of the Corduliidae in the form of the large teeth on the opposed edges of the lateral labial lobes, is entirely unlike anything known in the subfamily Trithemistinae<sup>1)</sup>. As a matter of fact, there exists a close general resemblance between it and the larvae of *Nannophlebia*, *Microtrigonia* and *Lanthanusa*, of which only the former has yet been described (see LIEFTINCK, 1930, *Treubia* 7 Suppl.: 320-323, pl. VII, fig. 1-10:—larval structures of *Nannophlebia ? buruensis* LIEFT.). Besides some striking similarities in the morphology of the imagines (e.g. structure of the penis and armature of the legs), the 'facies' of the larvae of these genera is also more or less alike; all of them agree in having a rather stocky appearance, a compactly built body and a smooth texture. In the writer's opinion a closer examination of these larvae will probably prove that the Papuan genera *Microtrigonia*, *Huonia* and *Lanthanusa*

<sup>1)</sup> I have followed COWLEY's suggestion as to the emendation of the names of all higher categories based on generic names ending in *-themis*. (See J. COWLEY, 1942, *Proc. R. Ent. Soc. London* (B) 11 : 63).

are better removed from the *Trithemis* series of genera and linked on more naturally to the primitive Tetrathemistine genera *Nannophlebia* and *Bironides*, with which they have many characters in common.

The stream-lined body of some of these larvae is somewhat reminiscent of certain Gomphid larvae, and although they are not capable of burrowing in sand or mud, — the legs are entirely different and unfit to this purpose — they are well protected, lying buried under stones and pebbles, usually in shallow water.

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