

ADDITIONS TO THE ODONATE FAUNA OF THE INDO-AUSTRALIAN
ARCHIPELAGO

by

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Fam. MEGAPODAGRIIDAE

Podolestes harrissoni, sp. n. (fig. 1-2)

1920. LAIDLAW, Proc. Zool. Soc. London : 332 (no descr.). — ♂ ♀ Sarawak (*chrysopus*).
1924. LAIDLAW, J. Mal. Br. R. Asiatic Soc. 2 : 302, pl. 3, fig. 2 (wings, Borneo)
(*chrysopus*).
1930. HINCKS, Sarawak Mus. Journal, 4 : 52. — ♂ Sarawak (*chrysopus*).

Material. — N. W. Borneo: 9 ♂ (3 juv.), 3 ♀ (1 juv.), Sarawak, Kuching, Matang Rd, 3rd mile, 22.ix.1950, and near Batu Kawa, 5.x.1950, M. A. LIEFTINCK. (Also a few old and dilapidated examples identified with "*chrysopus*" in the Sarawak Museum.) Holotype ♂ and allotype ♀ from Matang Road, in the Leiden Museum; paratypes of both sexes in the Sarawak and Bogor Museums.

Male (ad.). — Labium ivory- to light chrome-yellow, tips of the lobes and palpi black. Mandibles chrome-yellow, the narrowed apical three-fifths deep black. Labrum chrome-yellow, with sharply defined deep black line bordering anterior margin. Genae, anteclypeus, and lateral portions of frons also chrome-yellow, the frontal marks tapering and extending upwards along the eye-margin as far as the insertion-point of antennae. Postclypeus (except the side-edges, basally) and all remaining parts of the head mat black with low bronzy reflections; rear slightly pruinulent. Antennae brownish-black, the apex of second joint brown.

Prothorax dull bronzy black, with indistinct yellowish spots on each side of the anterior lobe and upon the median division; posterior lobe trapezoidal, somewhat elevated, with rounded side-edges.

Synthorax greenish bronzy black, almost as far down as the second lateral suture and including the ante-alar triangles. Chrome-yellow are: a vestigial mesepimeral streak along humeral suture near its upper end, and a broad, oblique, wedge-shaped lateral band crossing the spiracle and extending from the metinfraepisternum upwards towards the dorsal margin of the mesepimeron, where it is very narrow; postero-ventrally this band coalesces with the yellow ground-colour of the metepimeron. Metepimeron marked with a large, oblique, oval metallic-green patch on its lower half and a much smaller isolated roundish dot on the middle above it. Ventral surface of thorax pale-coloured, mottled with brown, but usually obscured so much as to become wholly darkened. Thoracic

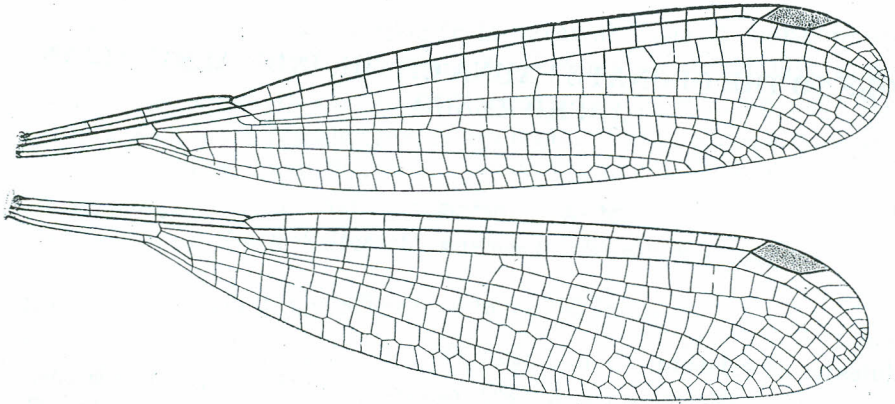


Fig. 1. *Podolestes harrissoni*, sp. n., ♂ Sarawak. Right pair of wings.

sides and ventral surface moreover coarsely pruinose blue in matured examples, so as to conceal the colour-pattern almost completely.

Legs brown and yellowish: coxae and trochanters yellow, the former obscured exteriorly on middle; femora brownish-yellow marked with three more or less sharply defined dark brown rings (including a narrow apical ring); outer surfaces of tibiae pale yellow, the inner surfaces black; tarsi dark brown, the claws toothless.

Wings hyaline, or tinged with brownish-yellow all over the membrane in aged individuals. Neuration as shown in fig. 1. Distance from base of fore wing to Ax_1 less than $1\frac{1}{2}$ times the distance separating Ax_1 from Ax_2 . Nervure Ac situated much nearer Ax_2 than Ax_1 ; nervure Ab complete, meeting Ac at the wing-margin. Quadrilateral short, markedly widened distally, costal and distal sides approximately equal in length on fore wing. Three to four (usually three) postquadrangular antenodal cells, occasionally only two in hind wing. Pterostigma dark reddish-brown. Postnodals 17-19 on fore, 15-17 on hind wing.

Abdomen short, but of slender build; basal and terminal segments moderately inflated in both dimensions, from base of 7 as far as the apex of abdomen gradually a little expanded. Colour mainly dark brown marked with dirty ochreous, the apical rings from 3 onwards black and the whole abdomen gradually more darkened from before backwards. Dorsum of 1 black, the sides largely greenish-yellow; 2 greenish-yellow with broad dark metallic-green dorsal mark, constricted beyond its middle, running from base to apex; 3-7 with dorso-lateral marks similar in principle to that on 2 but greatly expanded laterally so as to leave only a pair of subtriangular spots and elongate subterminal latero-ventral streaks, the pale spots on 6 and 7 often reduced in size and much obscured; 8-10 each with a yellow band along latero-ventral border, those on 9 and 10 often obliterated or absent altogether.

Anal appendages about as long as segm. 9, very slenderly built, brownish-black or black, the bases of both pairs usually with a yellowish lateral spot, shaped as shown in fig. 2.

In aged individuals the yellow ground-colour of the thorax may become considerably reduced, most of the pleurae then being dull black, with the yellow marks restricted to an irregular spot round the spiracle and a triangular dot about mid-way along ventro-lateral border of the metepimeron. Teneral males are peculiar by their conspicuously dark-ringed femora, and also differ from the adult in that only the thoracic

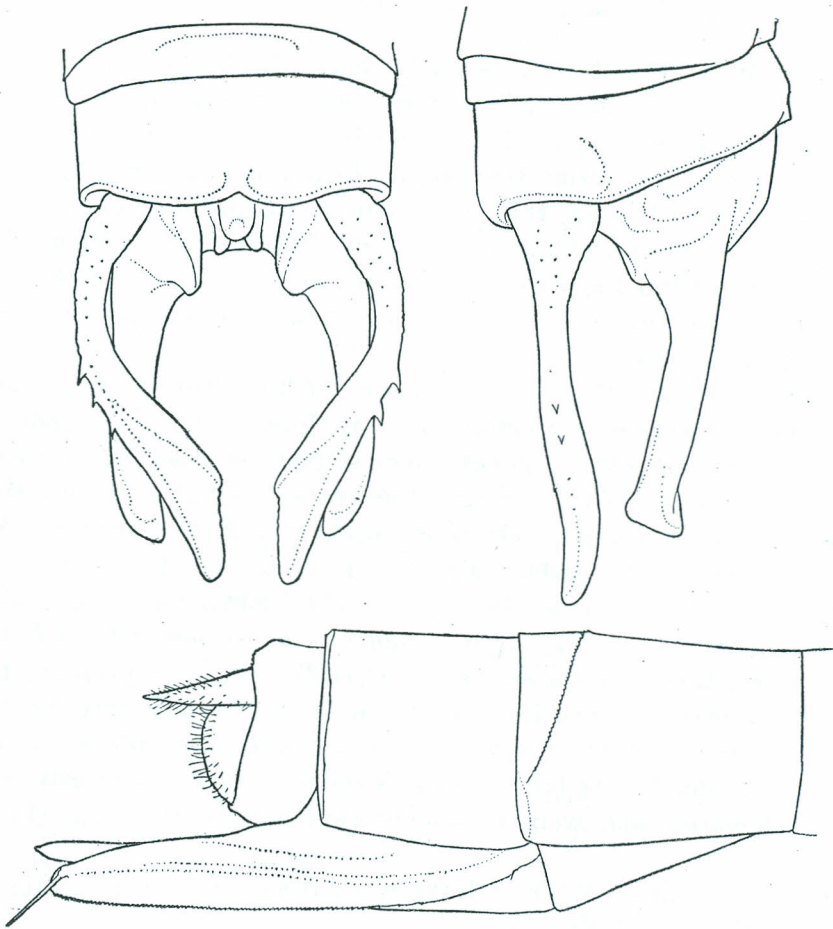


Fig. 2. *Podolestes harrissoni*, sp. n., Sarawak. Anal appendages of ♂, dorsal and right lateral view, and apex of ♀ abdomen, right lateral view.

dorsum, about as far down as the first lateral suture, is dull brown, this colour being interspersed with evenly distributed, extremely minute, yellowish specks, which disappear completely when the insect reaches maturity.

Female (ad.). — Very similar to the semi-adult ♂, except for its more robust build and slightly more restricted dark markings. Prothorax

pale bluish-white or yellow, the anterior and posterior lobes brown. Mesepisterna less densely and not as finely spotted with yellow, the thoracic sides for the greater part dirty yellowish. Legs and abdomen coloured as in the less matured ♂; the very long and almost straight genital valves brownish-yellow, becoming blackish-brown apically (fig. 2).

Measurements: ♂ abd. + app. 32.5-34.0, hw. 26.5-28.0; ♀ 30.0-32.0 (incl. valves), 26.5-28.0 mm.

Runs out in my key (*Zool. Meded.*, Leiden, 1950, 31 : 39-41) to near *chrysopus* SELYS, but immediately distinguished from that species by the yellow labrum and face-marks, these parts in *chrysopus* being all black. *P. harrissoni* also differs from that species in the dull colour of the legs and the black-ringed femora, the denser wing-venation, the very oblique distal side of the pterostigma, and in many details of coloration. The anal appendages of the ♂ and the shape of the genital valves of the ♀ are rather similar in the two species, but in every detail *harrissoni* is the more stoutly built of the two.

On September 22, 1950, small colonies of this insect were found among dense vegetation bordering the tiny brooks which meandered through an old rubber garden on both sides of Matang Road. These shady and damp situations yielded several other rare dragonfly species that same day, e.g. *Prodasineura interrupta* (SELYS) and the very slender *Amphicnemis madelenae* LAIDL.; also three species of *Archibasis*, viz. *melanocyana* (SELYS), *tenella* LIEFT. and *viola* LIEFT., the latter being moderately common, as was also *Aciagrion borneense* RIS. Of the Libellulidae, all three known species of *Orchithemis* were present; but the most noteworthy discoveries were a female of the very rare *Nannophyopsis chalcosoma* LIEFT., and two males of *Pseudagrionoptera diotima* RIS. The two small Libellulines, *Brachygonia oculata* (BRAUER) and *Tyriobapta laidlawi* RIS, were extremely abundant in this remarkably rich locality.

Named in honour of Mr TOM HARRISSON, D.S.O., the able curator of the Sarawak Museum at Kuching.

Fam. PLATYCNEMIDIDAE

Coelliccia resecta, sp. n. (fig. 3)

Material. — S. E. Borneo: 2 ♂ (ad.), Kutai, Balikpapan, Sungai Mentawir, sea-level, 6.x.1950, A. M. R. WEGNER. Holotype in the Leiden Museum, paratype in M.Z.B.

Belongs to LAIDLAW's group 3, of *C. membranipes* (RAMB.).

Male (ad.). — Labium buff-yellow, palpus black. Head above deep velvet black with a pair of large green lateral spots in front of frons bordering the eyes, situated at level of clypeus and just below the fronto-clypeal suture, the upper border of these spots straight and each of them prolonged inwards for a short distance as a fine line along the fronto-clypeal suture. Labrum, clypeus, mandibles and cheeks (the true genae) deep glossy black, but the lower margin of the mandibles finely yellow. Vertex with a pair of minute yellowish dots, one on either side of the lateral ocellus, and rear of the head marked with rather large, elongate-oval, transverse postocular spots, which are only partly visible when viewed from above. Antennae black, apex of first joint light yellow and distal one-third of second joint brown. Head beneath glossy black with a very large patch of green on each side bordering the eye-margin.

Prothorax with entire dorsum mat black, the sides largely buff-yellow; posterior lobe broad, its margin entire and slightly upturned, side-edges obtuse-angulate.

Synthorax deep black marked with sky-blue as shown in fig. 3, the metepimeron and metinfraepisternites buff-yellow, this colour turning paler on the ventral surface, which is unmarked.

Legs buff-yellow; coxae unmarked, trochanters with a black exterior dot; femora striped with black exteriorly and with a black apical ring; tibiae light yellow, apices obscured and inner surfaces black; last tarsal joint also black apically; claws reddish. Bristles dark brown.

Wings hyaline, neuration black. *Ac* situated about mid-way between *Ax*₁ and *Ax*₂. *Ab* meeting *Ac* in one point at the wing-margin. *Arc* slightly distal to *Ax*₂. Costal side of quadrangle of fore wing about $\frac{3}{5}$ length of anal side, of hind wing about $\frac{5}{7}$. *M*₃ arises at the subnodus, *Rs* well distal to it. Three postquadrangular antenodal cells. 16-17 postnodals on fore, 15-16 on hind wing. Pterostigma of large size, distinctly broader than the underlying cell, moderately oblique, about $\frac{1}{3}$ longer than wide, anal border distinctly convex, proximal and distal sides parallel, colour brownish-black with very fine pale framing.

Abdomen long and slender, shaped as in such species like *macrostigma* and *nigrohamata*. Segm. 1 with narrow X-shaped black mid-dorsal spot from base to apex, for the rest bluish-white, only the ventro-lateral suture with a blackish dot; 2-7 dark brown dorsally, becoming progressively darker from before backwards, the band on 2 rather broadened apically and the intersegmental ring between 1 and 2 marked with a black latero-ventral dot; pale colour of the sides of 3-5 or 3-6 extending dorsalwards at extreme base (but intersected by brown) and before the apex of each segment to form a pair of minute baso-dorsal lunules and indistinct pale latero-ventral sub-apical marks. Sides of 7 with a continuous ochreous stripe along tergal margin, this stripe widening and acquiring a blue tint towards the apex of segment; lower two-thirds of sides of 8 entirely sky-blue, the dorsum being deep black; 9 and 10 unicolorous sky-blue, except a black line at base of 9, restricted to the dorsum and prolonged backwards mesially for a short distance to form a tiny spear; posterior margin of 10 also finely black.

Anal appendages shaped as shown in fig. 3, the superior pair blue tipped with bright ochreous and obscured interiorly; inferior pair ochreous, their bases and apices also somewhat obscured.

Abd. + app. 34.0-34.5, hw. 20.4-21.0 mm.

Female unknown.

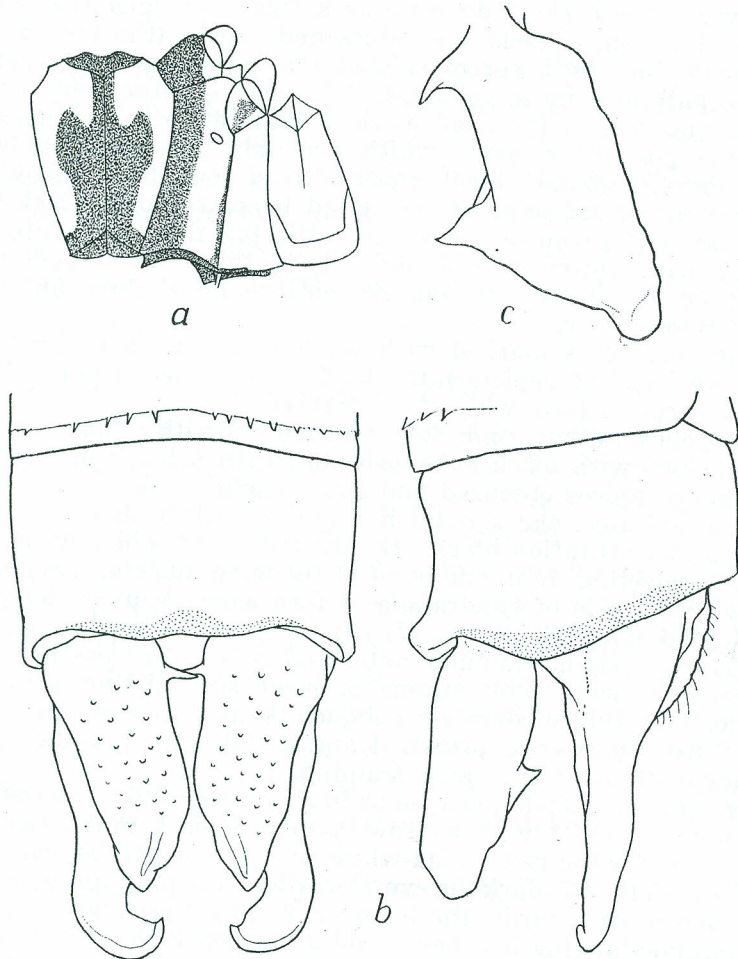


Fig. 3. *Coelliccia resecta*, sp. n., ♂ colour-pattern diagram of thorax (a), anal appendages, dorsal and right lateral view (b), and oblique interior view of right superior appendage (c).

Allied to *nigrohamata* LAIDLAW, but differs in that the black colour on the dorsum and sides of the thorax is more extensive, reaching down as far as two-thirds the distance between humeral suture and level of spiracle, the dorsal margin of the metepisterna and metepimera being

also bordered with black and only the lower one-fourth of the mesinfraepisternite remains yellow. In *nigrohamata*, moreover, the pterostigma is not expanded, the quadrilateral is longer, the veins *Ab* and *Ac* are not coincident at the wing-margin, and the superior anal appendages of the ♂, besides being shaped differently from *resecta*, are black instead of blue.

Penis differing from LAIDLAW's description of the same organ in *membranipes* and *nigrohamata* in that there is no terminal lobe, the tip of the third segment considerably expanded just before the origin of the two apical filaments and provided on either side with a large rounded lamella; filamentous apical processes gently curved and directed caudad, tips in lateral view projecting a little beyond dorsal margin of second penile segment.

Fam. COENAGRIIDAE

Palaiargia tanysiptera, sp. n. (fig. 4)

Material. — Halmahera I. (N. Moluccas): 5 ♂ (ad.), 1 ♂ (juv.), C. Halmahera, Mts Sembilan, 600 m, & Siu, 600-700 m, 27.ix.-6.x.1951 (5 ♂), and Tolewang, 50 m, 10-25.x.1951 (1 ♂), Sundanese collectors MANIS & AMSARI. Holotype ♂: Mt Sembilan, 600 m, 4.x.1951, in the Leiden Museum; paratypes in M.Z.B.

Male (ad.). — Facies of *melidora* and *optata*: head relatively of small size, thorax large and stout, abdomen of slender build. Labium deep brownish-black or black, except the median lobe which is bright yellow. Labrum, genae and clypeus glossy black; mandible-bases also black but occasionally carrying a yellowish spot. A broad, transverse, cerulean-blue band in front of frons connecting the eyes, extending upwards as far as the sulcus between frons and vertex and laterally as far as the antennal sockets; first antennal joint also blue, the remaining joints black. Head otherwise deep black, vertex in one ♂ with a pair of minute blue points, one on either side of the median ocellus, and postocular lobes in this specimen also with vestiges of round blue postocular spots.

Prothorax cerulean-blue, marked on mid-dorsum with a conspicuous X-shaped black band, the anterior lobe and the side-edges of the posterior lobe remaining blue; propleuron with a comma-shaped black basal streak half-way down the sides and a narrow stripe along latero-ventral border.

Synthorax deep velvet-black marked with a pair of complete cerulean-blue antehumeral bands, which cover about the outer one-third of each of the mesepisterna; these bands run parallel to the humeral suture but are separated from it by a narrow black stripe; dorsally, they diminish a little in width until near the upper end, which is again somewhat expanded and rather knob-like, leaving off a short distance before reaching the ante-alar triangles, which are black. Mesepimera and mesinfraepisternites deep black. Sides blue, this colour divided into two subequal portions by a broad deep black band covering the second suture, this band being

equal in width or even a little broader than the blue metepisternal band. Metinfraepisternum black and metepimeron bordered with black along dorsal (posterior) and latero-ventral margins. Thorax deep black ventrally, the swollen anterior portion of the poststernum carrying a tuft of backwardly directed ferruginous hairs, behind this the sternal plate being also ferruginous in colour.

Legs black, the coxae and trochanters largely blue on the outside; basal half of all femora striped with pale blue or ochreous interiorly. Tarsal claws ferruginous.

Wings broad, posterior margin strongly convex, tips bluntly pointed, but not as abruptly narrowed apically as in *melidora*. Membrane strongly enfumed brownish-yellow. Venation similar to that species, but basal prolongation of *Ab* only about $1\frac{1}{2}$ times longer than *Ac* in both pairs of wings. Costal side of *q* somewhat longer than proximal side in fore wing, almost or fully two times longer than proximal side and a little longer than distal side in hind wing. *Cu₁* in hind wing entering the wing-margin at level of 3-5 cells proximal to *pt*, *Cu₂* a few marginal cells before that level. Four postquadrangular antenodal cells in fore, three in hind wing. 17 postnodals on fore, 16 on hind wing. Pterostigma removed distad, though less markedly so than in *melidora*; no divided cross-veins between *C* and *R₁* posterior to *pt*, or occasionally only the first cell following *pt* crossed. Pterostigma very oblique but proximal and distal sides almost parallel, the costal and distal sides subequal in length and a little longer than the anal; colour brownish-black or black.

Abdomen slender, the basal segments a little more inflated than the terminal ones. Deep black, marked with cerulean-blue, as follows. Segm. 1 with a pair of very large, transverse, dorso-lateral spots occupying the distal four-fifths or more of the sides; 2 with broad, sub-rectangular spot, occupying about half of the dorsum and placed slightly in advance of the middle of segment; 3-6 each with conspicuous mid-dorsal longitudinal bands of blue, very similar in shape and size to those described for *melidora* but slightly less abruptly rounded posteriorly, those on 4 and 5 being bluntly pointed apicad, the sides of all segments deep black; segm. 7 wholly black, whilst 8, 9 and 10 (including the intersegmental rings) are entirely blue dorsally and on most of the sides, the lower portion of the sides and under surfaces being black.

Anal appendages of slender form, though shorter than 9th segment, the inferiors distinctly longer than superior pair, shaped as shown in fig. 4; colour black.

♂ abd + app. 31.2-33.7, hw. 22.0-23.5 mm.

Female unknown.

This striking new species approaches *melidora* in the extent of the blue dorsal abdominal bands, which on segments 3-6 are very similar in the two species. The deep black ground-colour of the body of *tanysiptera*, the black face and absence of blue postocular spots, as well as the much narrower antehumeral bands and very different anal appendages, are all characters that may serve to its easy recognition.

Palaiargia melidora, sp. n. (fig. 4)

Material. — Waigeu I. (off N. W. New Guinea) : 1 ♂ (ad.), 8 ♀ (ad., most specimens broken and damaged), Camp Nok, 2500 ft, iii-iv. 1938, L. E. CHEESMAN. Holotype ♂ and allotype ♀ in the British Museum; 2 parallotypes in M.Z.B. Type ♂ with collector's note: "lateral stripe of thorax pale gr(reen), dorsally blue, mac(ulae) of abdomen blue".

Male (ad., holotype). — Head relatively small, thorax very robust, abdomen slender. Labium yellowish-brown (apparently discoloured), cleft of median lobe short and narrow. Labrum, mandibles and apparently also the genae, blue-green or blue, unmarked, except the tips of the mandibles, which are brown. The whole anterior surface of the head, with the exception of the blackish anteclypeus, but including the first antennal joint, bright sky blue, the transverse upper border-line of the coloured area perfectly straight and situated slightly above the middle of the distance between fronto-clypeal suture and median ocellus. Rest of the head mat black save a pair of triangular-oval blue postocular spots of moderate size, which are pointed inwards and separated from one another by a distance only little wider than their own breadth. Occipital ridge and rear of the head black.

Prothorax almost wholly blue, only the margin of the anterior lobe finely, the impressed postero-median portion of the median division, and the lateral portions of the posterior lobe, rusty-brown.

Synthorax, dorsum deep black, with a pair of complete, very broad, sky-blue antehumeral bands, which cover approximately the outer half of each of the mesepisterna; dorsalwards, these bands diminish a little in width, curving very slightly inwards away from the humeral suture and leaving off abruptly a short distance before reaching the ante-alar triangles, which are black. Mesepimera, a narrowly triangular (mesepisternal) area on either side of the antehumeral bands joining the upper portion of the humeral suture, as well as the mesinfraepisternites, warm Prout's brown. Sides blue-green, this colour divided into two portions by a broad ochraceous-tawny band over the second suture, this band being only little narrower than the green bands on both sides of it, except at its upper end, where it is rather abruptly narrowed. Thorax light green ventrally, the poststernum more or less ferruginous.

Legs black, the coxae and trochanters blue-green exteriorly; basal half of anterior femora with a blue interior stripe, the middle and posterior femora also with some basal colouring on the inside.

Wings broad with strongly convex posterior margin and bluntly pointed tips, shaped much as in *charmosyna* and allied species. Membrane enfumed brownish-yellow. Venation very similar to *charmosyna*. Basal prolongation of *Ab* about 2½ times longer than *Ac* in fore wing, twice as long in hind wing. Costal side of *q* only little longer than proximal side in fore wing, 1½ times as long as proximal side and subequal in length to distal side in hind wing. *Cu*₁ in hind wing entering the wing-margin at level of about 3-4 cells proximal to *pt*, *Cu*₂ a few marginal cells before that level. Origin of *M*₃ and *Rs* normal, base of *M*₃ short and strongly

arched. 15 postnodals on fore, 14 on hind wing. Three postquadrangular antenodal cells. Apex of wing abruptly narrowed, the pterostigma distinctly more removed distad than in *charmosyna*, rather similar to that of *halcyon*. No divided cross-veins between *C* and *R*₁ posterior to *pt*.

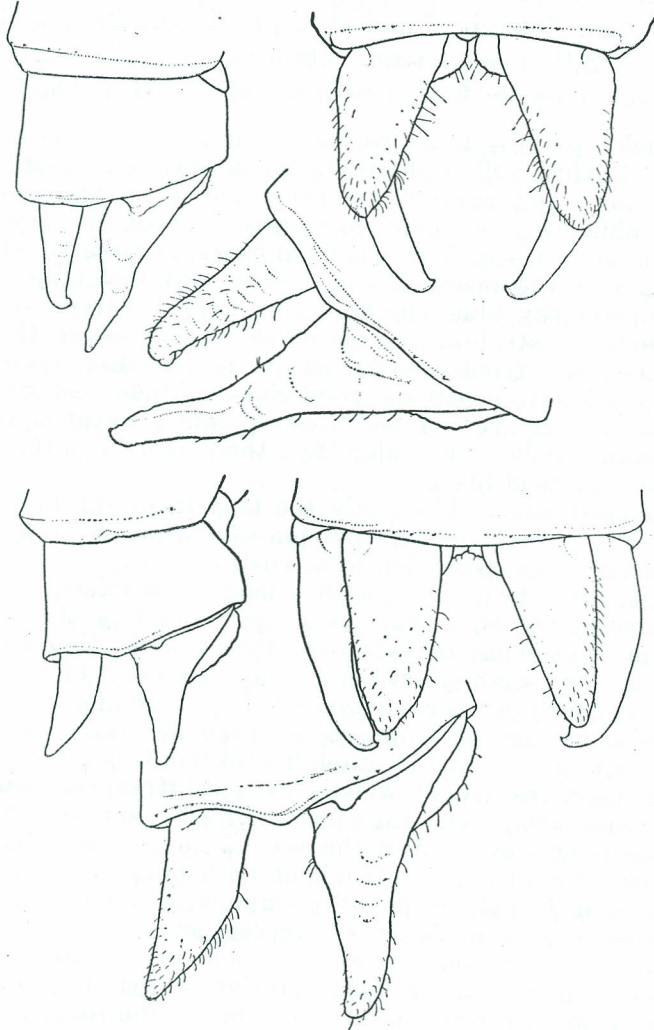


Fig. 4. Three upper figures: *Palaiargia tanysiptera* sp.n., Halmahera (paratype), ♂ apex of abdomen and anal apps., dorsal and right lateral view. Three lower figures: *Palaiargia melidora*, sp.n., Waigeu I. (holotype), ♂ apex of abdomen and anal apps., dorsal and right lateral view.

Pterostigma very oblique, the costal side a trifle longer than distal side but much longer than anal side; colour deep black.

Abdomen shaped similarly to *charmosyna* and allies; black, marked with blue, as follows. Segm. 1 blue with narrow X-shaped mid-dorsal spot;

basal two-thirds of 2 with very broad dorso-lateral mark and a broad blue stripe along lateral margin of tergite; 3-6 each with conspicuous mid-dorsal longitudinal bands of blue, slightly diminishing in width from before backwards and rounded off posteriorly before reaching the apex of segment, extending the basal $\frac{7}{8}$ on 3, $\frac{8}{9}$ on 4, $\frac{4}{5}$ on 5, and $\frac{2}{5}$ on 6, so as to leave broad apical black spots, the sides being also black; segm. 7 wholly black, whilst 8, 9 and 10 are entirely blue above, 8 only carrying a narrow black basal annule, the sides and under surfaces of these segments being black.

Anal appendages black, the inferiors subequal in length to superior pair, shaped as shown in fig. 4.

Female (ad.). — Resembling the σ in many respects. Mouth-parts grey-blue or greenish-blue, the frontal band ochraceous-buff to yellow ochre and changing gradually into greenish-brown upwards behind the antennae. Postocular spots a little smaller than in the σ and less sharply defined. Ground-colour on middle of head various shades of reddish- to dark brown.

Pro- and synthorax marked similarly to the σ but ground-colour rather more russet or ochraceous-tawny, the mid-dorsal band never deep black and the pale-coloured antehumeral and lateral thoracic stripes narrower, less clearly defined and greenish-yellow instead of blue.

Legs black, femora lighter on the inside and posterior femora (except apically) brown instead of black. Wings hyaline; neurulation as in the σ , but the quadrangle generally longer in both pairs of wings. Pterostigma greyish brown.

Abdomen very dark reddish-brown, with restricted blue dorsal marks, arranged similarly in principle to the σ , but considerably smaller; blue mark on 2 completely divided up into two oval spots situated a trifle proximal to the middle of the segment, the lateral blue stripe as in σ ; 3-6 each with rather small, baso-dorsal light blue spots, that on 3 narrow and annular, widest mid-dorsally, those on 4-6 triangular in shape, bluntly pointed apically, and reaching basal one-sixth to one-seventh of the segment's length; no distinct pale-coloured lateral tergal stripes. Segm. 7 unmarked, but dorsum of 8 and 9 each with broad blue dorso-lateral mark, occupying about the apical two-fifths to one-half of the length of segment, the intersegmental rings being also light blue; 10 blackish-brown, as are also the genital valves and anal appendages. Valves normal, barely surpassing apex of abdomen, lower margin finely and deeply serrated. Appendages about half as long as segm. 10, somewhat depressed, the apices a little upturned when viewed from aside.

σ abd. + app. 32.0, hw. 21.5; η 28.5-29.0, 22.0-23.0 mm.

This new species, by a combination of colour characters (absence of red body-marks, presence of postocular spots, conspicuous and extensive blue colouring on head and abdomen), can easily be held apart from its congeners. The σ resembles *tanyisiptera* somewhat in the rich blue abdominal marks, but the latter has the face largely black and differs widely in its anal appendages.

The ♀ of *melidora* corresponds closely to the description of *flavovittata* (SELYS), from Karoon (N.W. New Guinea), the type of which I have re-described in 1949 (*Nova Guinea*, new ser., 5 : 126-127). Unfortunately, the ♂ of this species is still unknown, but the ♀ is of smaller size, measuring only 25.5 mm for the abdomen and 20.5 for the posterior wing; its body-marks are very sharply delimited and the thorax is pruinescent white. Until the ♂ of *flavovittata* can be compared with that of *melidora*, I prefer to keep both species apart, since the females of *Palaiargia* are often very similar and difficult to identify. However, the close relationship between *flavovittata* and *melidora* is beyond dispute.

Teinobasis suavis, sp. n. (fig. 5)

Material. — S. E. Borneo: 1 ♂ (semiad.), 5 ♀ (ad.), Kandangan distr., Ampah & Ranamun, 0-20 m, 3, 11 & 21.v.1948, LIEM SWIE LIONG. Holotype ♂ and allotype ♀ in the Leiden Museum; paratypes in M.Z.B.

Male (semiad.). — Head small, face porrect. Mouth-parts pale yellow-orange, the labrum xanthine orange on middle. The whole anterior surface of the head, as far upwards as a line drawn between the eyes across the vertex immediately in front of the posterior ocelli and including the antennae, light orange-yellow; flagellar joints of antennae obscured. Frontal ridge distinct, obtuse-angulate. Vertex and rest of the head brilliant metallic-green, unmarked, except a small transverse yellowish spot low down posterior to the occipital ridge. Rear of the head black with low metallic-green lustre, the anterior parts on either side of the labium pale creamy-yellow ventrally.

Pro- and synthorax throughout ochraceous-buff, growing paler laterally; prothorax with a fine mid-dorsal longitudinal black line and with a tiny black spot on either end of it at the base of the anterior and posterior lobes, the latter short and evenly rounded posteriorly. Dorsum of thorax with vestiges of dark points on mesoprescutum, a blackish point on each side in front of the ante-alar triangles, which themselves are filled out on middle with a brilliant metallic-green spot. Sides with a tiny blackish streak at upper end of humeral and second lateral suture, and a black point under the base of each wing. Ventral surface creamy-yellow.

Legs light orange-yellow, the spines brownish-yellow; claws toothless. Posterior femur with 5 short spines.

Wings hyaline, neuration brown. Petiolation ceases at level of Ac , which is placed much nearer Ax_2 than Ax_1 . Vein Ab entering the wing-margin distal to Ac for a distance about twice (or a little less) the length of Ac itself. Arc situated slightly but distinctly distal to Ax_2 . Quadrilateral of fore wing with costal side about half as long as anal side and almost as long as distal side, that of hind wing much longer: almost three-fourths that of anal side. Medio-anal link slightly broken on both fore wings, entire on hind wings. M_1 zig-zagged apically, ending 2-3 cells before level of pt ; Cu_1 also very short, entering the wing-margin at level of Px_4 in all wings (in left fore wing between Px_3 and Px_4). Vein Cu_2 excessively short,

entering the wing-margin at the second postquadrangular antenodal cross-vein, i.e. one cell before the prolongation of *Arc* in fore wing and at that level in hind wing. Three postquadrangular antenodal cells on fore, and only two on hind wing. *Rs* rises at the subnodus, *M*₂ slightly but distinctly proximal to it. 9-10 postnodals on fore, 8-10 on hind wing (9 and 8, respectively, of second series). Pterostigma slightly oblique, parallel-sided, about 1½ times longer than wide, its colour greyish surrounded by a yellow line.

Abdomen very slender, apical segments more or less truncated. Ground-colour pale yellow. Segm. 1 unmarked, but 2-7 each with narrow dorsal bands of a brilliant metallic-green colour, progressively a little broader from before backwards, running from near the base to the apex of the segment so as to save tiny, but very conspicuous, baso-dorsal spots of a bright yellowish-white tint; band on 2 almost parallel-sided, those on succeeding segments a little broadened before the apex, forming narrow dark sub-apical rings, the intersegmental rings also obscured. Segm. 8 and 9 greenish-orange with sharply defined broad bronze-green dorsal marks, abruptly widened posteriorly and forming thick black apical rings (similar to fig. 5 for the ♀); 10 blackish above, yellowish aside.

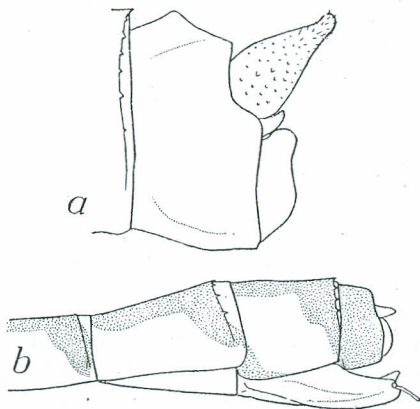


Fig. 5. *Teinobasis suavis*, sp.n., ♂ anal apps. (a), and apex of ♀ abdomen (b), left lateral view.

Anal appendages (rather compressed) with the conical and slightly incurved upper branches of the superior pair yellow tipped with black, the much shorter lower branch as well as the inferior appendages appearing light green in colour (fig. 5).

Female (ad.). — Resembling the ♂ in most respects, but abdomen much more stoutly built. Orange colour of face and frons deeper in tint, the vertical portion of frons intermingled with pale green. Prothorax with narrow metallic-green mark restricted to the median portion; posterior lobe extremely short, somewhat raised posteriorly, margin straight mesially with rounded side-angles.

Synthorax coloured as in the ♂, but marked above with a complete, rather broad, brilliant metallic-green band over the middle of the dorsum and including the median crest; this band on each side reaching exactly half-way down between median carina and humeral suture, running parallel to the latter. Ante-alar triangles yellow, each marked with a metallic-green median spot. Thorax otherwise as in the ♂, the sides slightly intermingled with pale green.

Wings clear, neurulation resembling that of the ♂. Pterostigma greyish-ochreous, centred with grey-brown.

Abdomen of slender build, segments cylindrical, the apical ones rather inflated, shaped as shown in fig. 5. Ground-colour light orange-yellow,

intermingled with pale green alongside of segm. 1-3 or 1-4. Bronze-green dorsal marks sharply defined, progressively more distinctly broadened apically from before backwards, and very conspicuous on the apical segments; ground-colour of 9th segment deep xanthine-orange instead of pale yellow. Valves short, normal. Anal appendages and tuberculum yellowish, the former extremely short, bluntly conical (fig. 5).

♂ abd. + app. 27.0, hw. 16.2; ♀ 26.5-28.0, 17.5-18.5 mm.

This diminutive species has no near allies. It is immediately distinguished from other regional *Teinobasis* by its small size and pale colouring. The extreme reduction of the vein Cu_2 is a unique character, and the strongly contrasting colour-pattern of the terminal abdominal segments is also a characteristic feature shared alike in both sexes.

Amphicnemis platystyla, sp. n. (fig. 6 a-b)

Material. — S.E. Borneo: 1 ♂ (ad.), Kandangan distr., Ampah, 0-20 m, 29.iv.1948, LIEM SWIE LIONG. Holotype in the Leiden Museum.

Male (ad.). — Labium, maxillae and mandibles pale yellow, maxillary palpi and apex of mandibles ferruginous. Labrum light orange, its basal half rather sharply defined brown, the pit-like median impression black. Genae and anteclypeus pale greenish-yellow; postclypeus dark brown with a diffuse reddish-brown median spot. Transverse carina of frons distinct, rectangulate, its declivous anterior division blackish in colour but carrying a pair of transverse pale spots, one on each side of the middle. Head otherwise brilliant metallic-green, except a stripe along the margin of compound eyes, which is dull black. Antennae pale yellow anteriorly, metallic greenish-black posteriorly, the flagellar joints brownish. Rear of the head black, almost lustreless.

Prothorax brilliant metallic-green above and on upper half of the sides, the remainder orange-yellow; posterior lobe evenly rounded, lateral angles not developed, hind margin somewhat elevated.

Synthorax, as far down as the first lateral suture and the spiracle, very brilliant metallic-green, this colour including the upper three-fifths of the mesinfraepisternites and the postero-dorsal one-seventh of the metepisterna. Sides and under surface deep chrome.

Legs, including the spines, light orange-yellow; all femora with very narrow but sharply defined blackish apical ring; basal one-fourth of anterior tibia, and extreme bases of intermediate and posterior tibiae, also obscured; tarsi pale.

Wings hyaline; M_1 arises at the subnodus or very little distal to it, R_s slightly beyond that level. Ac situated very near Ax_2 , and Ab entering the wing-margin distal to Ac at a distance of about $1\frac{1}{2}$ times the length of Ac itself. Two postquadrangular antenodal cells in all wings. 11-12 postnodals on fore, 10 on hind wing. Pterostigma hardly noticeably oblique, almost square (even a trifle higher than long), exactly similar in shape on fore and hind wing, its borders a little convex, colour bright

orange-yellow framed in brown, each with a conspicuous brown "eye-spot" filling out approximately the inner two-thirds of the area.

Abdomen very slim and slender; ground-colour pale yellow, growing darker backwards. Segm. 1 and 2 metallic-green above, these markings widening apically and forming distinct brown rings; succeeding segments dark metallic-brown, 3-7 each with narrow pale yellow basal rings, interrupted mid-dorsally. Terminal segments distinctly expanded; 8 and 9 brilliant metallic-blue, with the intersegmental rings finely yellowish; 10 and anal appendages entirely wax-yellow, as are also the lower tergal margins of 8 and the sternal plates of 9. Median process along posterior margin of 10th tergite short, vermiform.

Anal appendages shaped as shown in fig. 6 a-b; upper branches of superior pair flattened distalwards, the basal three-fourths of the lower branches rather swollen when viewed from below; inferior appendages short, subtruncate and a little divergent.

Abd. + app. 31.0, hw. 17.6 mm.

Female unknown.

By the characteristic square form of the pterostigma, this distinctive species is easily recognized and can only be confounded with *A. martini* RIS, the ♂ of which also lacks a prothoracic spine. It differs from *martini* in that the pterostigmata of the fore and hind wings are exactly similar in shape and colour, whereas in *martini* this cell on the fore wing is blackish whilst that of the hind wing is unicolorous orange. The two species are most easily held apart by the structure of their anal appendages, which are very different in shape: the superiors in *platystyla* are considerably wider and more flattened dorso-ventrally, the inferior pair being also broader and longer. (In *martini* they are only half as long as the superiors.)

***Amphicnemis erminea*, sp. n. (fig. 6 c-e)**

Material. — S. E. Borneo: 2 ♂ (sub-ad.), 3 ♀ (ad.), 1 ♀ (semiad.), 2 ♀ (juv.), Kandangan distr., Ampah, 0-20 m, iv.-v.1948, LIEM SWIE LIONG. Holotype ♂ and allotype ♀ (ad., blue colour-phase) in the Leiden Museum; paratypes in M.Z.B.

Male (sub-ad.). — Labium and maxillae pale yellow, the latter tipped with brown. Labrum deep glossy black, broadly bordered with yellowish. Genae, mandibles and anteclypeus pale yellow, the mandibles marked basally with a deep black dot, the apical teeth being blackish-brown; anteclypeus slightly obscured on both sides. Postclypeus glossy black. Frons with a pair of transverse yellow spots on each side of the middle of the vertical surface; its transverse ridge distinct, rectangulate. Head otherwise dark metallic blue-green, except a stripe along the margin of compound eyes, which is dull black. Antennae blackish, apex of first joint whitish, and second joint striped with yellow anteriorly. Rear of the head bronzy black.

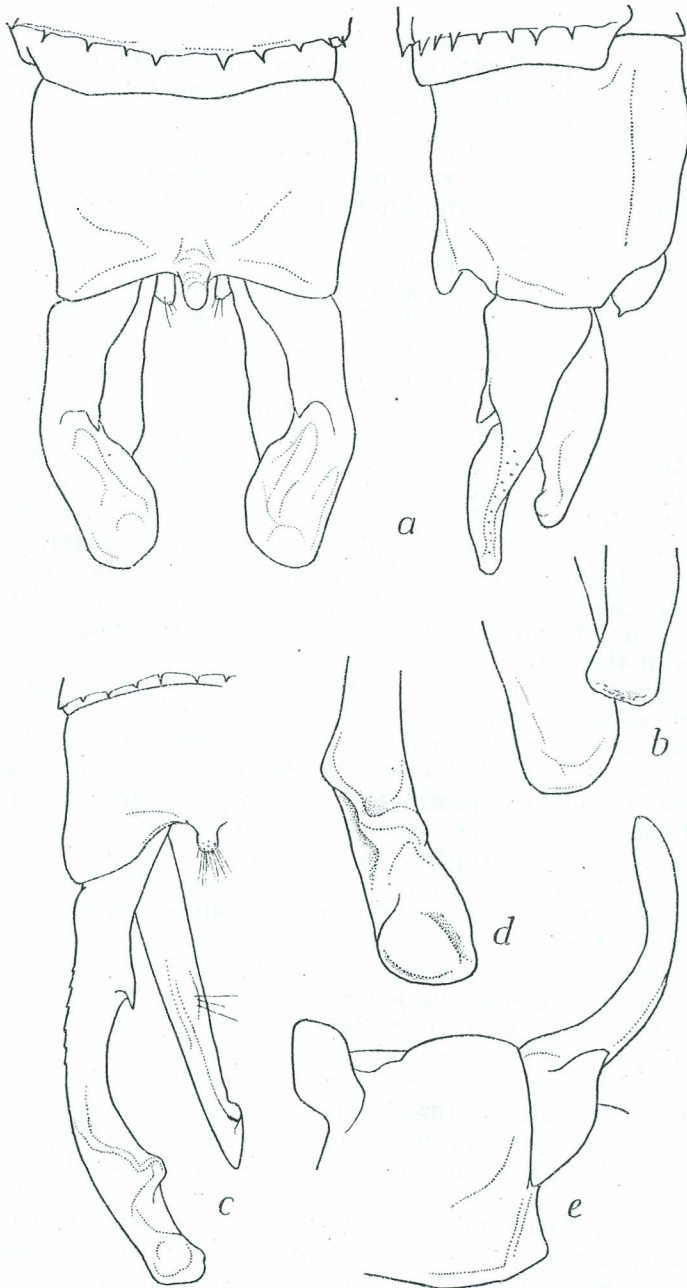


Fig. 6. *Amphicnemis platystyla*, sp.n., ♂ anal apps., dorsal and right lateral view (a), and apical portion of upper and lower branch of right sup. app., oblique ventral view, more highly magnified (b). *Amphicnemis erminea*, sp.n., left portion of ♂ anal apps., dorsal view (c), interior view of apex of upper branch of left sup. app. more highly magnified (d), and left lateral view of ♀ prothorax (e).

Prothorax brilliant metallic-green above and on upper half of the sides, the remainder light yellow; posterior lobe somewhat projecting on middle, forming a tiny, slightly upturned, blunt median tubercle, its side angles very short and rounded.

Synthorax, as far down as the first lateral suture and the spiracle, brilliant metallic-green, this colour including the upper two-third of the mesinfraepisternites and the postero-dorsal edges of the metepisterna. Sides and under surface light yellow.

Legs light yellow, the spines brownish-black or black; apical half of all femora with diffuse, greyish-brown exterior stripe (probably quite distinct in full-coloured males), the knees sharply defined black; anterior tibiae with black stripe along outer one-third of their length, middle and posterior tibiae with vestiges only of a dark extero-basal stripe; claws orangish.

Wings hyaline; M_1 arises well beyond the subnodus, R_s one cell further distad, about half-way between nodus and Px_1 . Ac situated very near Ax_2 , but Ab entering the wing-margin well away from Ac by a distance of at least three times the length of Ac itself. Three post-quadrangular ante-subnodal cells in all wings. 13 postnodals on fore, 11-12 on hind wings. Pterostigma slightly oblique, approximately similar in shape in fore and hind wing, the rather oblique proximal side about equal in length to the costal side, and distinctly shorter than the anal side; distal side shortest and slightly convex exteriorly; colour dark grey surrounded by a distinct whitish line.

Abdomen very slim and slender, the terminal segments distinctly inflated; ground-colour pale yellow, growing darker backwards. Segm. 1-2 metallic-green above, these marks widening apically and forming distinct brown rings; succeeding segments brown without distinct basal rings but all marks broadened apically to form complete dark brown apical rings. Terminal segments darker, especially 8 and 9 dark metallic blue-green above. Segm. 10 less deeply pigmented than the preceding ones, indistinctly yellowish ventro-laterally and underneath. Posterior border provided with a short vermiform median protuberance carrying a bundle of fine pencil-hairs at apex.

Anal appendages, superior pair long and ribbon-like, deeply divided into upper and lower branches, the lower branch distinctly shorter than the upper one, shaped as in fig. 6 *c* and *d*; inferior appendages much higher than long, very short, placed almost vertical, not visible in dorsal aspect. Colour of superiors palest yellow, of inferiors dirty yellow-green.

Female (ad.). — Resembles the ♂, differs as follows. Pale transverse marks anterior to the antennae on the declivous part of frons broader and confluent mesially, so as to form a fairly broad band above the postclypeus.

Ground-colour of pro- and synthorax deep greenish-glaucous, the dorsum dull bronzy black, only the ante-alar triangles brilliant metallic-green. Posterior lobe of prothorax longer and higher than in the ♂, directed upwards, its side-edges rounded but in the form of ear-like lobes; median division depressed on both sides of the middle, which is prolonged into an enormous, upwardly directed and strongly curved, finger-like process, the apex of which is directed obliquely anterad (fig. 6*e*).

Legs pale greenish-yellow, the black stripe along outer surface of femora complete and sharply defined, knees deep black; otherwise as in the ♂.

Abdomen with dorso-lateral bronzy brown bands similar to those of the ♂, those on basal segments less metallic. Interrupted pale basal spots better defined than in the ♂. Intersegmental rings of segm. 8 and 9 yellowish; 9th tergite dull brown, distal half marked with a pair of roundish yellow dorsal spots, one on each side of the middle; segm. 10 yellow-white, obscured ventrally. Genital valves slightly surpassing the tuberculum, but not projecting beyond tips of anal appendages; colour of all terminal appendages yellow.

Female (ad.). — Colour of pro- and synthorax throughout coral red, only the anterior and posterior alar processes and the ante-alar triangles brilliant metallic-green. Legs light coral red, femora not striped with black exteriorly, but knees finely obscured. Apex of prothoracic spine dark brown, almost black. Abdomen as in the adult ♀, ground-colour slightly intermingled with pink.

♂ Abd. + app. 37.7-38.0, hw. 21.0; ♀ 36.2-38.5, 22.2-22.6 mm.

This new species is easily distinguished from its congeners. Runs out in my key to near *gracilis* and *mariae*, but the ♂ differs from both by the slender apex of the upper branch of the superior appendage, and the ♀ by its enormous posterior prothoracic spine.

The anal appendages of *erminea* resemble most closely those of *billitonis* LIEFT. and *kuiperi* LIEFT. (both from Billiton I.), but the upper branches of the superiors in *erminea* are much straighter, narrower and less expanded apically. It differs from *kuiperi*, which also lacks a prothoracic spine, by having the posterior lobe of the prothorax produced behind in a triangular median tubercle; also in being of larger size, by having the femora striped with black exteriorly, and in other details of body-colour.

Attention should be drawn to the fact that the superior anal appendages of ♂ *Amphicnemis* and *Pericnemis*, in all known species, are deeply divided and consist of two well-developed branches, as in *Teinobasis*¹⁾ and allied genera. What has formerly been called the inferior appendage in these genera, is in reality the lower branch of the superior appendage, even in the remarkable zygopteron *Pericnemis stictica* SELYS, in which the slender lower branch is almost as strongly developed as the pincer-like upper one.

Lastly, advantage may be taken of the present opportunity to correct three slight errors in my last revision of the genus (*Treubia*, 1940, 7 : 361-

1) See LIEFTINCK, *Nova Guinea*, 1932, Zool. 15 : 582, where the correct interpretation of homologies as given by RIS and CAMPION was adopted, contrary to NEEDHAM's statement (*Philipp. J. Sci.*, 1939, 70 : 299-300).

377, figs). On page 366, line 5 from bottom, read "Mentawai Is." instead of "Billiton"; on page 376, line 3 from bottom, the prothoracic spine of the ♀ of *madelenae* is said to be amply half as long as in the ♂; this spine is probably partly broken off in the allotype, for in specimens captured by myself in Sarawak, the spine is at least as long as it is in the ♂. On page 377, line 12 from above, read "which differs ... in", instead of "from which it differs ... by".

Fam. GOMPHIDAE

Burmagomphus arthuri, sp. n. (fig. 7)

Material. — S. E. Borneo: 1 ♀ (ad.), Kutai, Balikpapan, Sungai Mentawir, sea-level, 6.x.1950, A. M. R. WEGNER. Holotype in the Leiden Museum.

Female (ad.). — Head 5.4 mm wide, distance between eyes above at closest point 1.0 mm. Labium chamois, head otherwise tawny-olive throughout, without any dark markings, rear isabella-coloured. Vertex and occiput shaped as shown in fig. 7a. Antennae brown.

Prothorax, dorsum mikado brown, swollen rim of the anterior lobe pale green and the hind margin of the posterior lobe finely brown; sides gradually turning a little paler downwards, isabella-coloured.

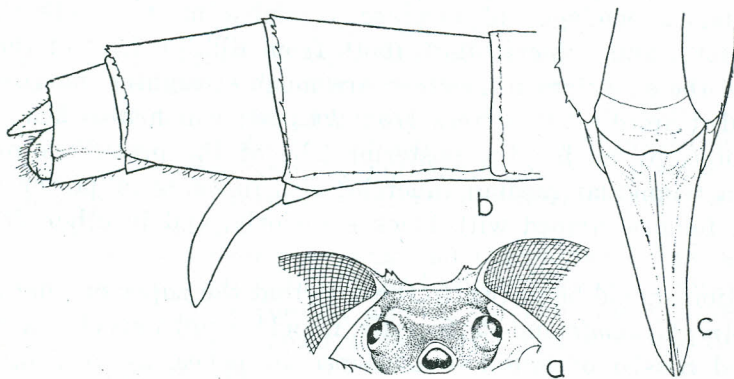


Fig. 7. *Burmagomphus arthuri*, sp. n., S.E. Borneo, ♀ holotype. Fronto-dorsal view of occipital region (a), right lateral (b) and ventral (c) view of apical abdominal segments.

Synthorax warm purplish-brown (bister) above and laterally, as far down as a point about half-way between humeral and first lateral suture at which level the colour gradually acquires an ecru-olive tint, as is also the whole ventral surface of the thorax. Dorsum with a pair of ill-defined, oblique, pale glaucous antehumeral bands, which are widest ventrally and extend upwards from the angle where the humeral and upper mesinfra-episternal sutures meet, ceasing at a point about 0.7 mm below the ante-

alar triangles; thorax otherwise unmarked; no light-coloured mesothoracic half-collar.

Legs very short, posterior femur only 4.3 mm long (parallotype *vermicularis* from Tonkin, and *javicus* ♀ from Java: 5.2-5.3 mm); armature as for genus. Isabella-coloured throughout, the inner surface of the anterior femora and trochanters more ecru-olive; apices of tibiae brownish-olive; tarsi dark brown, the apical joints almost black.

Wings hyaline; neuration dark brown, the costa isabella-coloured at its base. Wings somewhat intermediate in shape between *vermicularis* and *javicus*: slightly less drawn out than in the former, but less expanded basally than in the latter. Anal area of hind wing narrower than in both these species: the veins very irregular and showing no indication of being more or less arranged in transverse rows, as in *vermicularis* (and to a less extent also in *javicus*). Fore wing with 2, hind wing with only 1 prefurcal cross-vein between sectors of arculus. A_1 and A_2 weakly developed; only three cells between cubital space and posterior margin of hind wing at level of *ti* and *t*. Anal area of fore wing with a single row of cells, without divided cells. Only one row of cells between M_1 and M_{1a} at level of distal end of pterostigma, but distal to that level the area contains two rows and 3-4 marginal cells. Cu_2 ending at level of the nodus in both pairs of wings (as also in most *vermicularis* and *javicus*). Fore wing with 12 antenodals of first series, hind wing with 9; postnodals 10 (11 on left wing). Pterostigma braced, shorter than in the two species mentioned; colour cinnamon-buff.

Abdomen very long, slender and of the usual shape, the basal segments only moderately inflated. Colour of first four segments uniform light greenish-brown with no indication of light or dark spots, all carinae finely dark brown; succeeding segments more obscurely brown, 5 to 7 each with faint indication of greenish-yellow basal rings extending as far distad as the transverse carinae and appearing narrowly indented posteriorly by the brown ground-colour at the mid-dorsal crests; dorsal surface of segm. 9 and 10 raw umber. Vulvar scale (ninth sternite) enormously developed into a strongly downcurved, gutter-shaped ovipositor-like organ, 1.3 mm in length, shaped as shown in fig. 7 *b* and *c*. Anal appendages brownish-yellow, short, somewhat depressed and downbent, bluntly conical.

Abd. + app. 27.4, hind wing 23.0, pt. fw. 2.0 mm.

Male unknown.

This new species has no near allies. It differs from all its Malaysian congeners, including the only known Bornean species, *B. insularis* LAIDL., in having no black body-markings, whilst the great length of the genital valve is a unique character not shown by any other known regional Gomphid. The ♂ of *arthuri* should be an easily recognised insect. I venture to believe that *B. inscriptus* (SELYS), from Java, will prove to be its nearest relative.

Named in honour of its discoverer, Mr ARTHUR M. R. WEGNER, zoologist of the Museum Zoologicum at Bogor.

Fam. AESHNIDAE

Oligoaeschna sumatrana, sp. n. (fig. 8)

Material. — W. Sumatra: 1 ♂ (ad.), Mt Kerintji (Peak of Indrapura), Kaju Aro, 1600 m, 30.x.1952, R. STRAATMAN. Holotype in the Leiden Museum.

Allied to *mutata* LIEFT.

Male (ad., holotype). — Labium bister-coloured, maxillae cinnamon. Mandible bases and labrum cinnamon-brown, the side-edges of the labrum orange-cinnamon and the apex of the mandibles glossy black. Clypeus and frons cinnamon-brown intermingled with olive, rather obscured along the frontal crest; vertical surface of frons irregularly and coarsely wrinkled, the dorsal surface smooth, Prout's brown with a pair of large and fairly distinct olive-green lateral spots whose diameter is less than the dark ground-colour on middle of frons. Vertex black, occipital triangle brownish-black; rear of the head dark cinnamon-brown.

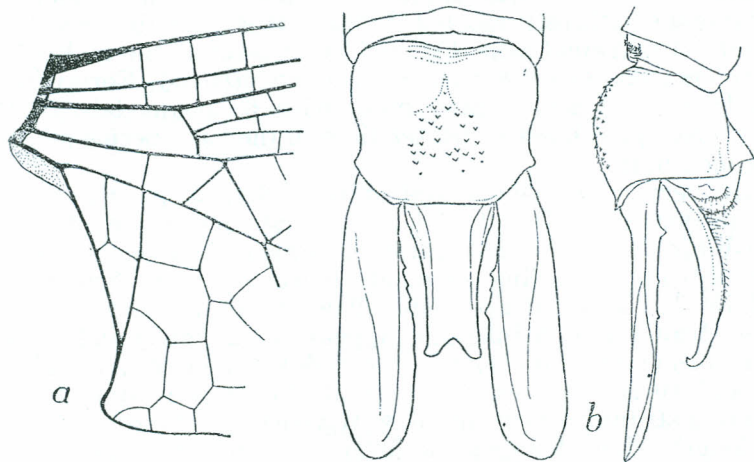


Fig. 8. *Oligoaeschna sumatrana*, sp. n., basal portion of right hind wing (a), and dorsal and right lateral view of anal appendages of ♂ holotype (b).

Synthorax velvet Prout's brown; dorsum with a pair of oblique, elongate-oval, olive-green antehumeral bands, incomplete above, and with a pair of transverse, elongate-oval bands of the same colour on each side of the crest immediately in front of the ante-alar triangles, which themselves are dark brown. On the sides are two broad, rather diffuse, olive-green bands, one mesepimeral and one metepimeral band. Anterior band occupying most of the mesepimeron, extending upwards as far as the dorsal margin of that space where it is straight cut off; upper one-fourth slightly narrowed, its posterior border shallowly emarginate by the invading dark ground-colour. Posterior band rather broader and rounded off on both ends, covering most of the metepimeron. Between these bands, near the dorsal margin of the metepisternum, lies a third,

more or less triangular, green spot of much smaller size than the others. Meso- and metinfraepisternites ochraceous tawny, the former more or less intermingled with olive-green.

Legs russet, the apices of all femora obscured; tarsi blackish.

Wing-membrane smoky yellowish, only the basal area as far out as the arculus subhyaline; no yellow basal spots except for a mere saffron streak at extreme base. Only one row of cells between *Rs-Rspl* and *M₁-Mspl* in all wings. Triangles three-celled, each containing two transverse cross-nerve; supratrangles with two cross-nerve in all wings; *ti* regular, cubital spaces with a single additional cross-nerve. Anal triangle and membranula of posterior wing shaped as shown in fig. 8a, membranula light grey. Nodal index $\frac{7.15.15.6}{8.11.9.9}$. Pterostigma braced, 2.5 mm long, ochraceous-tawny.

Abdomen slender, with the basal segments moderately inflated in both dimensions, 4.8 mm wide across the auricles, segm. 3 7.4 mm long, 2.3 mm wide at base, then slightly constricted (1.4 mm), and 2.0 mm wide at apex; succeeding segments only very little expanded, widest at middle of 6 (3.0 mm), from the end of this segment as far as the end the abdomen being almost parallel-sided (width across apex of 9th segment 2.7 mm). Colour brownish-black, the basal segments lighter; markings olive-green, obscured. Segm. 1 light brown with a pair of very large dorso-lateral green spots and with the distal portion of the mid-dorsum also green. Segm. 2 with small basal mid-dorsal spot, a pair of diffuse, transverse dorso-lateral spots on each side of the middle just behind the jugal suture, and with a pair of similar, though more approximated, transverse oval dorsal spots bordering posterior margin; sides light greenish-brown marked with an oblique, blackish, longitudinal streak on posterior half. Segm. 3-8 each with a conspicuous, crescent-shaped, transverse dorso-apical streak, almost broken up in the median line by the blackish longitudinal carina and tapering to a point laterally; 3-6 moreover with a pair of somewhat smaller, triangular green spots, narrowly interrupted in the middle line and placed immediately posterior to the jugal suture. Segm. 9-10 brownish-black, 9 only with traces of two dorsal streaks along posterior margin. Dorsum of 10th segment somewhat convex, its surface throughout very closely, microscopically, transversely striate, the median area covered with numerous widely spaced rasp-like warts, which are evenly distributed over the median third of the tergal surface.

Auricles small but prominent, triangular, posterior border straight and transverse, carrying 5-6 minute black denticles; colour greenish.

Anal appendages blackish-brown, the inferior appendage russet, shaped as shown in fig. 8b; distal three-fourths of superiors strongly, though not acutely, longitudinally carinate; pubescence very short and scanty.

Abd. + app. 52.5, hind wing 41.0, pt. 2.5 mm.

Female unknown.

This new species comes nearest to *O. mutata* LIEFT., from E. Borneo, the body-markings (especially the enlarged abdominal spots) being rather

similar in the two species. Structurally, *sumatrana* and *mutata* also agree fairly closely in the texture of the dorsal surface of the 10th abdominal segment; yet, *sumatrana* is easily distinguished from *mutata* by the shape of the superior anal appendages, which are straighter and much less expanded distalwards. *O. sumatrana* is also a good deal larger in size than *mutata*, the latter species measuring only 42.5 mm for the abdomen and 34.0 mm for the hind wing.

O. sumatrana is the second species of the genus to be reported from Sumatra, only *modiglianii* being so far known from the island. However, apart from a male and three females of *modiglianii* taken by him in May and August 1948 and in April 1949 near Laut Tador in N. E. Sumatra, Mr STRAATMAN also succeeded in capturing, in March 1949, a typical male of the rare Bornean species *bühri* FÖRST., at the same locality as the former. This brings the number of Sumatran species up to three, and it is not unlikely that new forms will be discovered. *O. sumatrana* is the first known species from the mountain zone in Malaysia, all others being found in the marshy forests of the plains.

Heliaeschna uninervulata MARTIN (fig. 9)

1909. MARTIN, Cat. Coll. SELYS, 20, Aeschn. 3 : 163-164, fig. 164 (♀ wings, W. Borneo), fig. 165 (♂ apps., Borneo). — ♂ ♀ Borneo; ♂ Engano.
 1911. MARTIN, in WYTSMAN, Gen. Insect. 115, Aeschn.: 27, pl. 6, fig. 9a-b (♂ apps., Borneo).
 1934. LIEFTINCK, Treubia, 14 : 444 (Sumatra, Java, Borneo, notes).
 1935. LIEFTINCK, Misc. Zool. Sum., Medan, 92-93 : 22 (♂ N.E. Sumatra).
 1948. LIEFTINCK, Treubia, 19 : 286, 304 (♂ Engano).

Material. — S u m a t r a : 1 ♂ (ad.), N.E. Sumatra, Deli, L. P. DE BUSSY; 1 ♂ (ad.), id., Deli, Laut Tador, 90 m, 29.iv.1949, R. STRAATMAN; 1 ♀ (ad., intact), E. Sumatra, Inderagiri, Rengat, 15.v.1939, P. BUWALDA; 1 ♀ (ad.), S. Sumatra, Lampongs, Terbanggi-hilir near Menggala, 16.viii.1936, M. BARTELS. — E n g a n o I.: 1 ♂ (yellow label, Mus. Paris). — J a v a : 1 ♀ (ad., intact), N. Java, Mts Muria, alt.? v.1940, M. E. WALSH; 3 ♂, 1 ♀, Mid-central Java, Ambarawa, LUDEKING, and 1 ♂ (ad.), Malang, HILLEBRAND, det. R. MARTIN (Mus. Leiden). — B o r n e o : 1 ♂, N. Borneo, Darvel Bay, Pagel D.V., det. E. SCHMIDT (Mus. Berlin); 2 ♂, 1 ♀ (ad.), W. Borneo, Singkawang & Bakuan, 18.ii.1932, 12.vi.1933 & 9.iv.1934, L. COOMANS DE RUITER; 1 ♂ (ad.), E. Borneo, West Kutai, Melak, 15.iv.1938, B. M. HOEKS; 1 ♀, S. E. Borneo, Ulu Sungai, Tandjung, F. SUCK, ded. 13.vi.1903 (Mus. Hamburg); 1 ♂, 1 ♀ (ad.), S. E. Borneo, Kandangan distr., Ampah and Ranamun 0-20 m, 7 & 21.v.1948, LIEM SWIE LIONG.

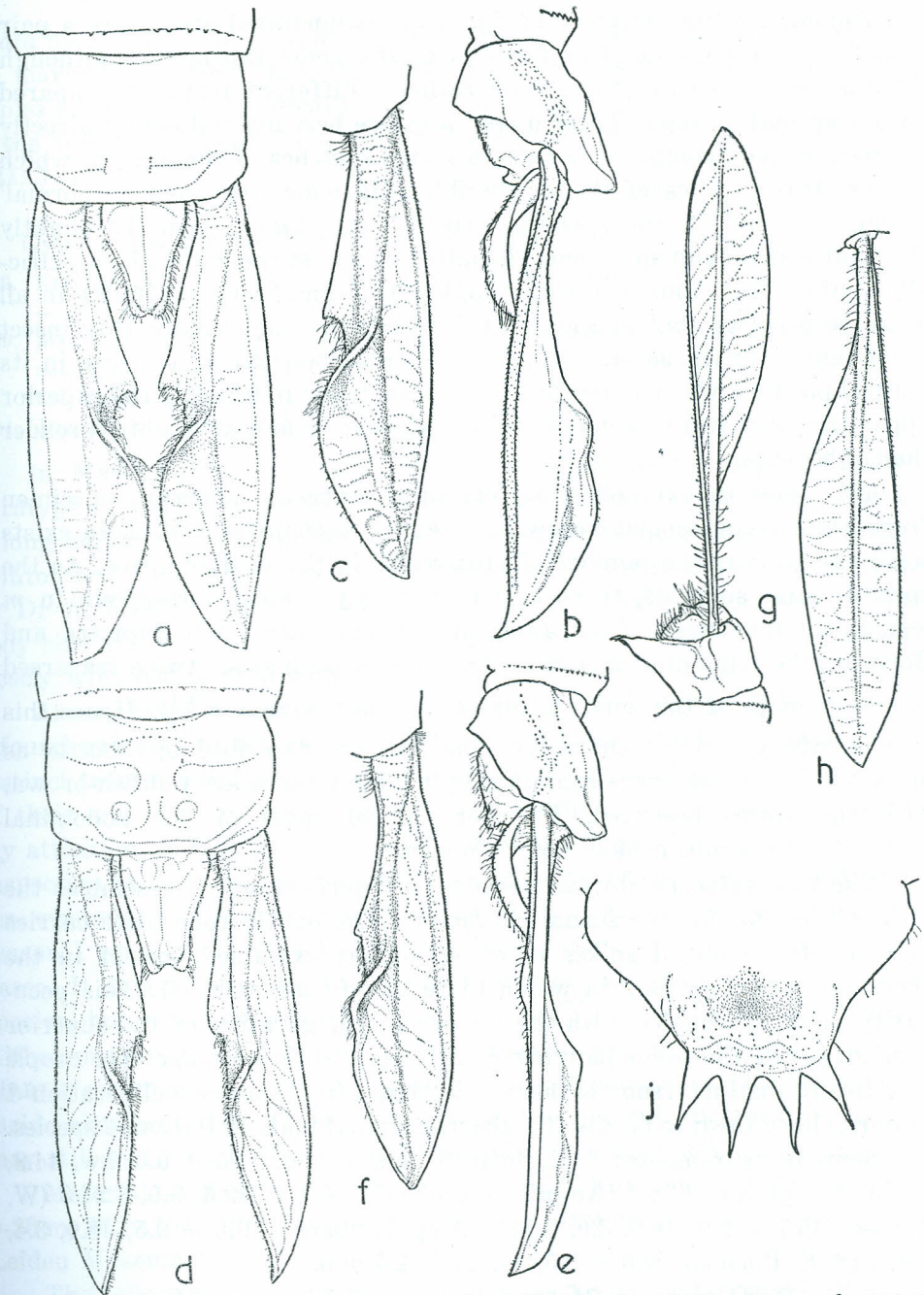


Fig. 9. *Heliaeschna uninervulata* MARTIN, from Borneo, ♂ and ♀ anal appendages; a-c typical ♂ from E. Borneo (Kutai); d-f atypical ♂ from S. E. Borneo (Ampah); g-j apex of ♀ abdomen, right lateral view (g), appendix of same, horizontal view (h), and dentigerous plate of 9th sternite of same, caudal view (after specimen from Ampah).

Among the fine series of 12 ♂ and 7 ♀, enumerated above, are a pair from S. E. Borneo, which I prefer to place also under this species, although the anal appendages of the ♂ have rather a different form as compared with a normal example. These differences are best understood by directly comparing the accompanying camera lucida sketches of the organs, which I have drawn as carefully as possible. Fig. 9 *a-c* are from a 'normal' example, from E. Borneo, whereas fig. 9 *d-f* are taken from the slightly aberrant Kandangan specimen. The latter was first thought to be specifically distinct from *uninervulata*, though both ♂ and ♀ are so similar in all other respects to that species that I refrained from giving this insect a new name. In fig. 9 *a* and *d* the apex of the abdomen is rendered in its natural position, viewed directly from above, while in 9 *c* and *f* the superior appendage is shown in a horizontal plane, so as to appear slightly broader than otherwise.

All males in our collection, except the present aberrant specimen from Ampah, correspond closely to MARTIN's description, but there exists some variation in the number of cross-veins in the median space. As the specific name suggests, there is normally only a single cross-vein in *m* (e.g. in all four males from Java, and in one each from Sumatra and Borneo); the remaining specimens have the median space twice traversed in one or more of the wings (Ampah ♂ $\frac{2.2}{2.1}$, but Ampah ♀ $\frac{1.1}{1.1}$). Hence this is evidently a variable character. The legs are described by MARTIN as black, but in all specimens examined by me the femora are reddish-brown, with the apices obscured. The dorso-apical spots of the abdominal segments are cerulean blue, not yellowish.

The ♀ of *uninervulata* has never been described, but it resembles the ♂ closely, except for the sexual characters. The dentigerous plate carries three strong apical spikes in all specimens examined, except in the aberrant ♀ from Ampah, in which there are four (fig. 9 *j*). This peculiarity of the ♀, coupled with the different configuration of the superior appendages of the accompanying ♂, led me first to consider this couple specifically distinct from *uninervulata*, but after mature deliberation I rather believe them to be slightly aberrant individuals of the same species.

Some measurements: ♂ (E. Borneo) abd. + app. 47.5 + 6.0, hw. 44.8, pt. fw. 3.0, pt. hw. 2.2; ♂ (Ampah, aberr.) 47.0 + 6.0, 42.5, 3.0, 3.2; ♀ (W. Borneo) 46.7 + 9.0, 46.0, 3.0, 2.5; ♀ (Ampah, aberr.) 49.0 + 9.5, 48.0, 3.4, 2.8; ♀ (S. E. Borneo) 49.0 + 9.5, 47.0, 3.0, 2.7 mm.

In the Paris Museum (MARTIN's collection) I have seen two pairs, one from Tonkin, the other labelled Cambodge, both identified with *uniner-*

vulata by MARTIN. The ♀ from Cambodia possesses anal appendages which are markedly broader than they are in typical *uninervulata*. These examples are possibly specifically or racially distinct and might be the same as the insect described from Burma by FRASER as *Heliaeschna beesoni* (FRAS.)¹).

***Gynacantha dohrni* KRÜGER (fig. 10, left)**

1899. KRÜGER, Stett. ent. Ztg. 59 : 277-278, 281, 283, 285-287, fig. p. 280 (♂ apps) — ♂ N.E. Sumatra; ♂ Java, ♂ ♀ Borneo.
 1909. MARTIN, Cat. Coll. SELYS, 20, Aeschn. 3 : 193, fig. 197 (♂ apps, Bukau, N. Borneo, sub *basiguttata*), and 199-200, fig. 204 (♂ apps, N. Borneo, leg. WATERSTRADT, sub *dohrni*).
 1911. RIS, Ann. Soc. ent. Belg. 55 : 245 (key), fig. 11 (♂ apps, S. E. Borneo).

In March, 1938, I have been able to compare the type and one paratype of *dohrni* (from N. E. Sumatra and Borneo, respectively), with a long series of that species in our collection from Sumatra, Borneo, Billiton and Java; the types having been kindly sent to me for inspection by Dr A. KÄSTNER of the Stettin Museum. Although some variation in body size and wing colour was noticed, all these specimens corresponded closely with KRÜGER's insects and his description of *dohrni*.

Among many *dohrni*, collected recently by Mr LIONG in S. E. Borneo, I found one pair of a *Gynacantha* that were first considered specifically distinct from *dohrni*, both on account of the different shape and neuration of their wings as of their superior size, while the ♀ at once attracted my attention by having the auricles somewhat larger than usual. A close inspection of the anal appendages of the ♂, however, revealed no differences whatever as compared with those of typical *dohrni*, and for that reason I am not disposed to describe these insects under a new specific name. It is just possible that they represent the two sexes of a new species, but more material is needed to settle the status of this insect. Although two good figures of the anal appendages of the ♂ are found in MARTIN's monograph, a third existing in RIS's paper (*loc. cit.*), a camera lucida sketch of these organs taken from the present aberrant specimen, may still be found useful for the sake of comparison with allied species.

Material. — S. E. B o r n e o : 1 ♂, 1 ♀ (ad.), Kandangan distr., Ampah, 0-20 m, 26.iv.1948 (probably taken *in cop.*), LIEM SWIE LIONG; both in the Leiden Museum.

The following comparative notes may serve to their recognition.

1) *J. Bombay Nat. Hist. Soc.*, 1922, 28: 901-902.

Male (ad.). — Labium bright ochraceous-orange, the distal edges of the lateral lobes ochraceous-tawny, as are also the maxillae, the mandibles, and the labrum; tips of mandibles black. Clypeus and vertical portion of frons tawny-olive, the dorsal surface of frons tawny; distal one-third of the frons dark brown, so as to suggest a T-spot lacking its stem, of which there is not the merest trace. Vertex dark brown. Occipital triangle citron yellow, occiput black with a thick black stripe extending laterally along the margin of compound eyes for about 3 mm on either side of the median line; rear of the head chamois (greenish-yellow). Head measuring 9.3 mm across the eyes.

Thorax throughout olive-green (buffy citrine; probably olive-lake during life), the lower parts of the thorax, including the infraepisternites and coxae of legs, tawny-olive.

Legs orange-cinnamon, the apical one-fourth of the anterior pair of femora brown; posterior femur 7.7 mm long.

Wings longer and more drawn out than in typical *dohrni*, with the posterior border of the hind wing less markedly convex; reticulation closer and pterostigma relatively longer. Nodal index $\frac{26.32.31.29}{30.24.23.30}$. Anal angle of hind wing slightly obtuse-angulate (approximately rectangulate in typical *dohrni*). Fore wing with 5-6, hind wing with 7 cell-rows between *Ms-Mspl* where most widely separated and with 9 and 12 cell-rows, respectively, between *Rs-Rspl* (typical *dohrni* 4-5, 4-5 and 5-6, 5-6). Position of *Rs*-fork similar: in fore wing at level of proximal side of *pt*, in hind wing slightly proximal, but in both pairs more strongly expanded towards the wing-margin, attaining finally about twice its width under the middle of *pt*. Anal loop more than twice as deep as it is wide (less narrow in the great majority of typical series). Venation otherwise without peculiarities. Membrane sub-hyaline; extreme bases very slightly and diffusely tinged with yellow (much less conspicuously coloured than in typical *dohrni*). Membranula linear, pale greyish.

Abdomen not different from normal specimens, auricles provided posteriorly with 8 marginal denticles. Greatest width of abdomen across the auricles, 6.3 mm; width of segm. 3 at the constriction 0.6 mm, at apex of segment 2.0 mm. Coloration blue and brownish-black, the ground-colour of basal segments lighter, not differing from typical *dohrni*. Accessory genitalia and anal appendages exactly identical. The appendages are shown in fig. 10.

Female (ad.). — Neural characters not differing from those of typical *dohrni*; position of *Rs*-fork and shape of anal loop also similar. Rusty-brown basal spots present on both pairs of wings.

Body-colouring as in typical *dohrni*. Second abdominal segment somewhat more inflated in both dimensions, with well developed auricles, which are about half the size of those of the ♂, semicircular in outline and carrying two sharp teeth along posterior border; width of segm. 2 across the auricles 6.0 mm. Constriction of segm. 3 very conspicuous, resembling that of the ♂ closely, narrowest diameter 0.7 mm, width at apex of segment 2.0 mm. Otherwise similar to typical *dohrni*.

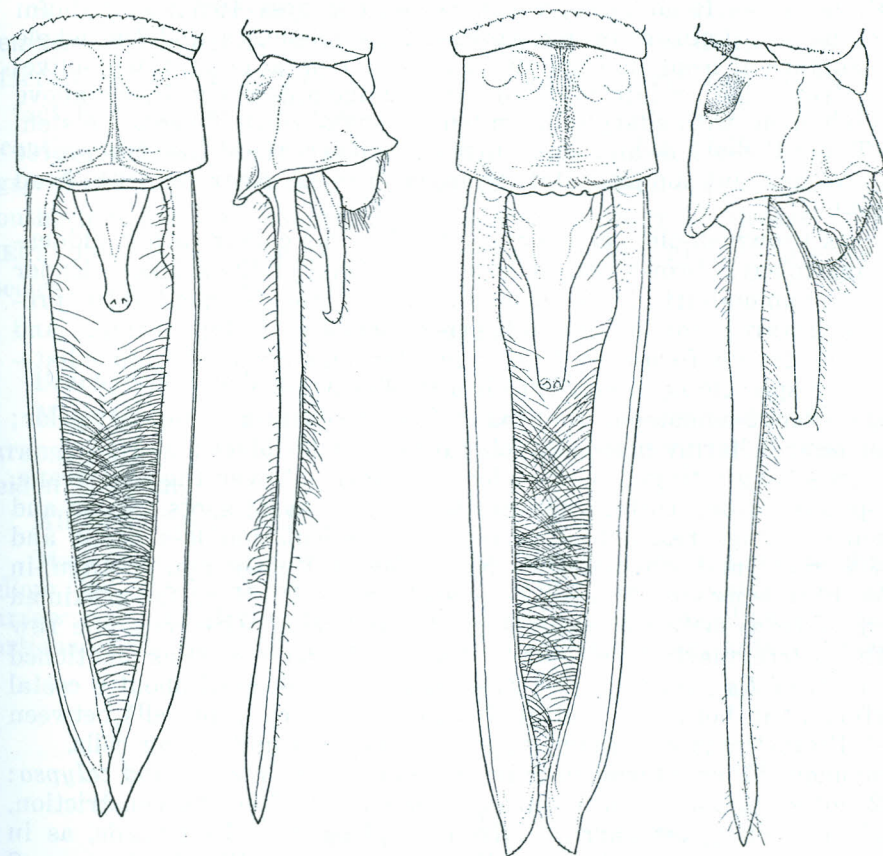


Fig. 10. Left figures: *Gynacantha dohrni* KRÜGER, ♂ anal apps, dorsal and right lateral view, after specimen from Ampah (S.E. Borneo). Right figures: *Gynacantha calliope*, sp. n., Waigeu I. (holotype), ♂ anal apps, dorsal and right lateral view.

Measurements: ♂ abd. + app. 55.6, app. sup. 7.7, hind wing 48.0 : 13.3, pt. fore wing 4.2; ♀ abd. (apps. broken off) 46.5, hw. 46.0 : 13.0, pt. fw. 3.3 mm.

Gynacantha demeter RIS is a close ally of *dohrni*, but it averages slightly smaller in size and can be held apart fairly easily from the latter by its uncoloured wing-bases and slightly different anal appendages. Of *demeter* we have for comparison a fine series captured by Mr L. COOMANS DE RUITER in West Borneo.

Gynacantha calliope, sp. n. (fig. 10, right)

Material. — Waigeu I. (off N. W. New Guinea) : Camp Nok, 2500 ft, iv. 1938, L. E. CHEESMAN. Holotype in the British Museum.

Between *calypso* RIS and *nausicaa* RIS.

Male (ad.). — Head large, width across the eyes 10.5 mm. Labium orange-cinnamon. Labrum orange-rufous. Mandible-bases and the whole anterior surface of head, as far upwards as the frontal crest, tawny-olive, middle of frons slightly intermingled with orange anteriorly. Frons above orange-cinnamon, with sharply delimited blackish-brown T-spot, the stem of the T parallel-sided and only little narrower than the transverse portion. Vertex black. Occipital triangle brown. Rear of the head cinnamon-buff.

Thorax brownish-olive above and laterally, this colour rather suddenly changing to sayal-brown and tawny-olive at level of the spiracle. Under surfaces cinnamon-buff. Dark ground-colour of the thoracic sides prolonged downwards for a short distance between metepisternum and metinfraepisternum, forming a tiny triangular dark brown dot immediately below the spiracle (symmetrical on both sides).

Legs orange-cinnamon, the coxae and trochanters slightly paler; apices of femora hardly noticeably obscured; bristles black.

Wings strongly tinged with yellowish-brown all over the membrane, more especially along costal and anal border; no basal spots. Shape and venuration of wings resembling *calypso*, but reticulation less dense and *Rs*-fork narrow and symmetrical. Venuration distinctly denser than in *nausicaa*. Fore wing with two rows of cells between *M*₁-*M*₂, as far proximad as about mid-way between nodus and *pt*; hind wing with only one row but with 3-4 irregularly divided cells at about the same level as mentioned before. Fork of *Rs* situated well proximal to *pt* (at level of about 6 costal cells before *pt* in both fore and hind wing). Three rows of cells between *Rs*-*Rspl*. Pterostigma cinnamon, braced, covering 5 underlying cells.

Abdomen rather intermediate in shape between *nausicaa* and *calypso*: segm. 2 not so broad, 3 not so strongly expanded after the constriction, and abdomen much less narrowed from the base of 4 backwards, as in *calypso*, but more compactly built than in *nausicaa*. Width of segm. 2 across the auricles 6.1 mm, at the constriction 1.0 mm, at the apex of 3 3.0 mm; length of segm. 3 7.0 mm. Auricles with 5-7 teeth posteriorly. Colour of segm. 1 sayal-brown, on dorsum of succeeding segments blackish-brown; ventral surface of all segments cinnamon-buff. Blue marks discoloured and rather indistinct, apparently very similar in size and arrangement to those described for *nausicaa* and hence of larger size and less obscured than in *calypso*.

Superior anal appendages black, the inferior one orange-cinnamon, obscured basally and with the extreme tip also somewhat darkened. Sup. apps. long, straight and very narrow, resembling those of *calypso* fairly closely though distinctly shorter, more inwardly curved apically, and with the opposing hairs along the inner border of the blades more evenly distributed. Inf. app. about one-third as long as superior pair, relatively longer and less abruptly narrowed apically than in *calypso*, almost identical in shape to that of *nausicaa*.

Abd. + app. 52.5 + 7.9, hind wing 51.0 : 14.0, pt. fw. 3.4 mm.

Female unknown.

A careful comparison of this example with good series of all eastern members of the genus have led me to regard it as a distinct species. It differs widely from both *kirbyi* KRÜGER and *rosenbergi* BRAUER, belonging in fact to a group of Celebesian and Moluccan species of which I have recently published re-descriptions and a key (*Treubia*, 1948, 19 : 417-428, figs). This group contains *arsinoe* LIEFT. (Talaud Is.), *calypso* RIS (southern Moluccas), *nausicaa* RIS (Celebes & northern Moluccas), *pasiphae* LIEFT. (northern Moluccas), *penelope* RIS (Celebes), and the present new species from Waigeu.

Fam. LIBELLULIDAE

Brachydiplax sollaarti, sp. n. (fig. 11a-b)

Material. — S. Sumatra: 1 ♂ (ad.), Lampong distr., Tandjongkarang, Bergen Estate, 50 m, 26.xii.1952, A. SOLLAART. Holotype in the Leiden Museum.

Allied to *farinosa* KRÜGER.

Male (ad.). — Labium and mandibles entirely black. Labrum chrome-yellow, its distal one-third deep black. Anteclypeus, postclypeus and a narrow stripe bordering the frons anteriorly, greenish-yellow, the lateral portions of the postclypeus with a blackish stripe along anterior margin.

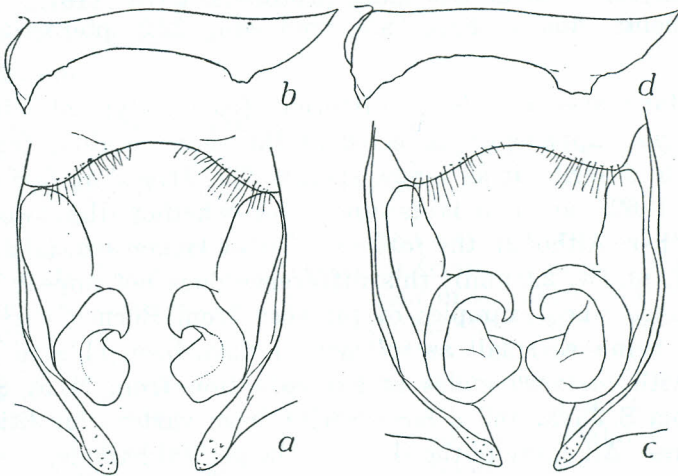


Fig. 11. *Brachydiplax sollaarti*, sp. n., ventral view of ♂ genitalia of 2nd abd.-segment (a), and lateral view of left superior anal appendage (b). The same (c and d) of *Brachydiplax farinosa* KRÜGER. Both specimens from the same locality in S. Sumatra.

Frons and vertex shaped similarly to *farinosa*, both brilliant metallic blue, the antero-lateral edges of the frons less broadly filled in with yellow than in *farinosa*. Occipital triangle and rear of the head glossy black.

Prothorax and synthorax throughout dark metallic black with greenish and reddish-coppery reflections, the under surface almost lustreless. Ante-alar triangles, a pair of mid-dorsal spots, one on either side of the dorsal carina, and the thoracic sides very thinly, overlaid by light blue pruinescence. Legs entirely black; armature similar to *farinosa*.

Wings slightly tinged yellowish all over the membrane. Bases of hind wings with a distinct amber-coloured spot in *sc*, *cu* and the anal field, extending from base to slightly beyond *Cux* and ill-defined exteriorly. Neuration very similar to *farinosa*, but *Cu*₁ in fore wing more strongly convex and shorter than in that species, entering the wing margin at level of subnodus, instead of much beyond that level in *farinosa*. Pterostigma shorter and narrower than in that species, bright yellow (not dark ochreous, or brown) between thick black nervures. Antenodals 8-9 on fore, 7-8 on hind wing; postnodals 7.

Abdomen shaped similarly to *farinosa*, wholly black in colour, the sides of the first three segments with low bronzy reflections. Dorsum and sides of segm. 1-5 overlaid by a coarse bluish-white pruinescence, very similar to *farinosa*, the ventral surface of the abdomen uniform black.

Genitalia very inconspicuous when viewed laterally, similar in principle to *farinosa*, but anterior lobe with the lateral angles distinctly less protuberant, and hamuli — though similarly curved inwards — very different in shape from those of that species, as shown in fig. 11a and c.

Anal appendages black, appendix inferior shaped similarly to *farinosa*, but the superiors slightly more slender, with the subterminal inferior projection relatively shorter and more protuberant (fig. 11b).

Measurements: abd. + app. 18.7, hind wing 22.3, pterostigma fore wing 1.6 mm.

This solitary specimen is so different from a typical adult ♂ of *farinosa* that was apparently collected at the same locality, that I feel no hesitation to describe it as a new species. The true ♂ of *farinosa* was labelled 10.xi.1952, so that it is uncertain whether the two insects occurred together. Although the *farinosa* ♂ is of larger size (abd. + app. 20.5, hw. 25.7, pt. fw. 2.0 mm), this difference does not appear to be of much importance since examples of *farinosa* from Borneo vary in this respect, some being as small as *sollaarti*. I have been able to compare this species with *farinosa* males in our collection from N. E. Sumatra, two males from S. Java, and a large series from various localities in E. and S. E. Borneo. All agree in the shape of the genital hamule, the absence of an amber-coloured spot at the base of the hind wings, the yellow-white labium (which at times is only bordered with black), and in having the vein *Cu*₁ of the fore wing longer and less strongly curved than in *sollaarti*.

Full-coloured males of *farinosa* have the thorax pruinescent light blue save two complete, uncoloured, parallel bands roundabout the thorax,

one running from the third pair of coxae upwards under a right angle with the latero-ventral border and meeting its fellow from the opposite side on the dorsal half of the mesepisterna (in front of the ante-alar triangles), and a second, slightly narrower, band crossing the spiracle and ending under the anterior wing. These bands may exist also in well preserved males of *sollaarti*, though in the present specimen they are unapparent. The membrane of the hind wing of adult *farinosa* has often a milky-white tinge at its extreme base.

Onychothemis coccinea, sp. n.

1920. LAIDLAW, Proc. Zool. Soc. London : 324. — ♂ Tatau (Sarawak?), Borneo (*culminicola celebensis*).
1930. HINCKS, Sarawak Mus. Journal, 4 : 55 (*Orthetrum chrysis*, pars).

Material. — M a l a y P e n i n s u l a : 1 ♂ (ad.), labelled: "O. Malacca, Kelantan Prov., Waterstradt leg., Rolle vdt. 1903", in F. FÖRSTER'S handwriting (Michigan Museum, Ann Arbor). B o r n e o : 1 ♂ (ad.), Sarawak, Ulu Mukah, "abdomen bright red in life", *Orthetrum chrysis*, det. W. D. HINCKS (Sarawak Museum, Kuching); 7 ♂, 1 ♀ (ad.), S. E. Borneo, Kutai, Balikpapan, Sungai Mentawir, sea-level, 2 & 22-23.x.1950, and Sungai Wain, id., 3.xi.1950, A. M. R. WEGNER. Holotype ♂ and allotype ♀ S. Mentawir, 23.x.1950, in the Leiden Museum, paratypes in M.Z.B. and the Sarawak Museum.

Allied to *culminicola* FÖRST.

Male (ad.). — Labium, mandibles and labrum, cinnamon-buff, the mandible-bases slightly darker, tawny-olive, and labrum with a very narrow brownish basal streak. Clypeus, frons and vertex unicolorous Saccardo's umber, the upper surface of the rounded frontal tubercles with very slight metallic-blue lustre. Occipital triangle cinnamon-brown, with two indistinct ochraceous-tawny spots; rear of the head similarly coloured.

Prothorax and most of the synthorax Sanford's brown to burnt sienna, marked with bright yellow as follows. A transverse disk-shaped mark along distal border of posterior lobe of prothorax; a sharply defined fine line running along whole length of the mid-dorsal thoracic carina and narrowly separating the brown colour of the ante-alar triangles; and two complete lateral stripes, one (about 0.6 mm wide) running precisely half-way between the humeral and second lateral sutures, and a second (about 1 mm in width) bordering the posterior part of the metepimeron. There are, moreover, vestiges of diffuse yellowish streaks placed just anterior to the humeral and second lateral sutures, about half-way up their course. All nota bright chrome-yellow. Ventral surface of thorax sayal brown.

Legs black; coxae, trochanters and inner surfaces of all femora at extreme base, brown. Tarsal claws toothless.

Wings hyaline, or suffused with brownish-yellow all over the membrane, bases unspotted. Neuration black, not differing from *culminicola*. $13\frac{1}{2}$ - $16\frac{1}{2}$ antenodals on fore, 9-11 on hinder wings; 10-13 postnodals on fore, 11-13 on hinder wings (σ Kelantan: *Ax* $13\frac{1}{2}$ - $14\frac{1}{2}$, 9-9; *Px* 11-12, 10-12). Pterostigma narrow and of small size. Membranula smoky black.

Abdomen unicolourous scarlet, with the exception only of a latero-basal point on either side of the anterior lobe of the genitalia, the curled apex of the genital hamule, and the distal three-fifths of the superior anal appendages, which are black.

Genital organs (including the penile organ) and anal appendages practically identical in shape to those of *culminicola* FÖRST.

Female (ad., allotype). — Head and thorax coloured as in the σ , the dark spot on top of frons somewhat better pronounced, brownish- or reddish-black with low metallic-blue lustre. Brown ground-colour of thorax somewhat deeper in tint, but yellow marks not different from the opposite sex.

Legs and wings similar to the σ , wing-membrane hyaline.

Abdomen unmarked, colours faded, but apparently all segments are uniform reddish-brown or dark brown. Valvula vulvae not developed, structure of apical tergites identical with those of *culminicola*, the 9th sternite strongly longitudinally carinate. Anal appendages sub-equal in length to segm. 10, narrowly lanceolate, conical and acutely pointed, the exterior border of each straight in dorsal view.

Measurements: σ abd. + app. 31.0, hw. 38.3, pt. 2.5 mm (paratype, Kelantan); 31.5-33.0, 36.0-38.0, 2.5-2.7 mm (Borneo); ♀ 33.0, 43.5, 3.6 mm (allotype, Borneo).

In general appearance as well as in the structure of its genital organs this remarkable species is almost a replica of the well-known Malaysian species *culminicola* FÖRSTER. It has the size and 'facies' of that species, but besides being perhaps a trifle more slenderly built, it can be distinguished from it at a glance by the brighter colour of the thorax and by having the abdomen wholly unmarked and of a brilliant scarlet red tint. Superficially, the σ indeed resembles a large *Orthetrum chrysis*, but the generic characters, coupled with the median and two lateral yellow stripes of the thorax, may serve to its recognition. It is uncertain whether FÖRSTER, at the time of describing *culminicola* (*Insekten-Börse*, 1904, 21 : 356-357), might already have received the Kelantan specimen of *coccinea*; at any rate he did not describe it, possibly on account of the rather poor condition of this example. The type of *culminicola* is a σ from Jor (Perak), collected by ALB. GRUBAUER; it was compared by FÖRSTER with *testacea* LAIDL., and he declared the two species to be closely allied, which they are not. *O. testacea* is immediately distinguished from both *coccinea* and *culminicola* by the yellow and black head markings, the dark metallic-green

thorax, and also by the reddish-black abdomen whose segments 2-8 are each of them conspicuously marked with a yellow mid-dorsal spot.

For comparison with the present series of *coccinea*, I have examined of *culminicola* 2 ♂ from the Malay States, 11 ♂ and 4 ♀ from northeast, west and south Sumatra, 3 ♂ and 1 ♀ from Borneo (1 ♂ from Ampah near Kandangan, S. E. Borneo; 2 ♂ from Sampit, S. Borneo; and one pair from near Kariorang, Sangkulirang distr., E. Borneo); and lastly, a long series of both sexes from various localities in west and east Java.

Dr RIS, in the Selysian monograph, has already called attention to the remarkable uniformity of the genitalia and the anal appendages of ♂ *Onychothemis*, these organs being of no use in discriminating the species. I am now in a position to confirm RIS's statement, for a direct comparison of the penes (dissected out from the bodies of *culminicola* and *coccinea*), has revealed that even the shape of the third penile segment, with its robust, strongly chitinised and laterally compressed black side-hooks and two curled apical filaments, is practically identical in the two species.

Zygonyx iris errans, subsp. n.

1911. LAIDLAW, Sarawak Mus. Journ. 1 : 193. — ♂ ♀ Sarawak (*iris*).
 1912. RIS, Cat. Coll. SELYS, Lib. 14 : 821, 822-823 (pars, Borneo only). — ♂ ♀ Sarawak (*iris*).
 1915. LAIDLAW, Proc. Zool. Soc. London, 3 : 26 (no descr.). — ♂ N. Borneo (*iris*).
 1920. LAIDLAW, *ibid.* : 324 (no descr.). — ♂ N. Borneo, ♀ Sarawak (*iris*).
 1926. FRASER, J. Bombay Nat. Hist. Soc. 31 : 763. — Borneo, note (*iris*).

Our information about the status of Bornean *iris* has up till now been very meagre, but it is evident from the available material that we have to deal with a distinct subspecies that was briefly characterized already by LAIDLAW and RIS. We have examined good series of both sexes from western Borneo (collected by Mr L. COOMANS DE RUITER), and in the Sarawak Museum are also one male and three females which are undoubtedly conspecific.

Although superficially resembling *ida*, Malaysian examples of *iris* can be distinguished from that species by a number of slight but apparently constant characters. The triangles of the fore wing are invariably narrower and traversed by a cross-vein, the distal portions of the veins M_2-Rs , M_3-M_4 , and Cu_1-Cu_2 are still more strongly curved towards the wing-border than in *ida*, so much more so in fact that the outer angles of M_3 , M_4 and Cu_1 in the hind wing are acute instead of straight or obtuse; there are also four instead of three rows of cells between A_3 and the anal margin of hind wing, the anal area being invariably tinged with brownish-

yellow or yellow. The wings of the ♀ lack the conspicuous golden-yellow basal colouring and the brown apical spot on the fore wing, a character that may serve to separate it at once from *ida*. To RIS's description of the Bornean form of *iris*, the following emendations may be given for the ♂.

Labium orange, only the mid-lobe, the opposed edges of the lateral lobes and a narrow stripe along the inner border of the latter, black. Labrum and mandibles black, the latter with greenish stripe along lower margin. Clypeus dirty green, the postclypeus diffusely brown on middle. Frons with large triangular green spot on either side, connected with one another anteriorly by a narrow stripe bordering the fronto-clypeal suture; upper surface brilliant metallic blue.

Thorax with lower and upper mesepisternal yellow streaks along humeral suture, the lower one about three times longer than the upper; sides with complete, broad, yellowish-green band covering most of the metepisternum and continued downwards across the spiracle on to the metinfraepisternite; posterior one-fourth of metepimeron and ventral surface also yellow-green.

Second femur with regular row of ca 20 denticles, followed after the interval by 3-4 apical spines, all denticles directed towards the knee; third femur with similar row of 28-30 denticles, followed after the interval by a single short spine; denticles on proximal half directed towards the knee, those on distal half not inclined.

Two rows of cells in the discoidal field of fore wing; *Arc* at *Ax*, or a trifle proximal to it. 15½ *Ax* on fore, 11-12 on hind wing; 9-10 postnodals on fore, 11-12 on hind wing. Invariably one row of cells between *Rs-Rspl* and *Ms-Mspl*. In hind wing *Cu₁* at the anal angle of *t*.

Abdomen, three basal segments shiny, the remainder dull metallic greenish-black. Segm. 1 with small lateral yellow spot; 2 with pair of transverse yellow streaks at jugal suture, two transverse green lateral spots, and a U-shaped mark of that colour along lower margin; segm. 3 with two narrow transverse yellow rings, one basal and one jugal, both narrowly interrupted mid-dorsally, the jugal ring stopping short laterally before ventral margin of tergite, the basal ring complete and widening; sides of 3 moreover with longitudinal green mark on middle of posterior half and with broad stripe along ventral border. Remainder of abdomen unicolorous bronzy-black.

♂ abd. + app. 32.0-33.0, hw. 40.0-41.0, pt. fw. 2.5; ♀ 37.5-39.5, 46.5-48.0 mm. Holotype ♂ and allotype ♀, W. B o r n e o, Singkawang, Mt Poteng, 400 m, x.1932, L. COOMANS DE RUITER, in the Leiden Museum.

Differs in the ♂ sex from *iris malayana* (LAIDLAW) chiefly in the absence of a yellow mid-dorsal line on the abdominal segments, by the unspotted 4th tergite, and in having no yellow marks ventrally on segm. 3-5. The single short interior spine near the apex of the third femur of *errans* is also a noteworthy feature. As to the venational characters,

errans can be distinguished from *malayana* by the presence of only two instead of three rows of cells in the discoidal field of fore wing, and also by the position of the arculus, which is placed at Ax_2 and not between the level of Ax_1 and Ax_2 .

Both sexes of this new subspecies will be described in greater detail in a forthcoming account of the entire group, including *ilia* RIS and allied species from Celebes.

***Tramea phaeoneura*, sp. n.**

1913. RIS, Cat. Coll. SELYS, Lib. 16¹ : 984, fig. 569 (♀ genit.). — ♂ ♀ (*limbata* forma *d*¹).
 1930. HINCKS, Sarawak Mus. Journ. 4 : 56. — Sarawak (*limbata*).
 1931. LAIDLAW, Bull. Raffles Mus. 5 : 92. — ♀ Mangalum I. (*limbata*).
 1942. LIEFTINCK, Treubia, 18 : 538-539. — Note (*euryle*).

Material. — Borneo: 1 ♂, 1 ♀ (ad.), N. Borneo, Dent prov., Mt Marapok, coll. G. (holo- and allotype, Mus. Leiden); 3 ♂, 6 ♀ (identified by SELYS as *rosenbergi* and by RIS as *euryle d*¹), Borneo, W.K. (= west-coast) and P. (in the Brussels Museum). Series of both sexes, W. Borneo, surroundings of Pontianak and Singkawang, 1931-1932, L. COOMANS DE RUITER; 13 ♀ (ad.), S. E. Borneo, Balikpapan, 15.xi.1950 & Mentawir river, 0-20 m, 23-24.xi.1950, A. M. R. WEGNER (along with a series of 18 ♂ and 4 ♀ of *euryle* SELYS, collected simultaneously).

This new species, originally characterized — or indicated — as the "Bornean form of *limbata*" (LAIDLAW and RIS, *loc. cit.*), was subsequently kept apart from *limbata* DESJ. (*terr. typ.*: Mauritius) by reason of their wide geographical separation, and registered under the name *euryle* SELYS (*terr. typ.*: Celebes, and common in Java; LIEFTINCK, *loc. cit.*). Although recent examination of the types of *transmarina* BRAUER and *samoensis* BRAUER (from Fiji and Samoa) will probably necessitate a further change in the nomenclature of this species, I have retained for the present the Selysian name *euryle* to designate this commonest of all oriental *Tramea*. This insect has an enormous distribution, ranging from India through Malaysia, the Austro-oriental and Philippine subregions, via Micronesia as far as the eastern pacific, and, with the exception of the Melanesian race *propinqua* LIEFT., has no near allies.

Our new species *phaeoneura*, however, adds to the difficulty in discriminating between the oriental species of the *limbata* group. It is apt to be confused with *euryle*, especially because the two species keep company in several localities (e.g. at Singkawang, W.B., and at Benoa Tua near Balikpapan, S.E.B.). The Bornean specimens of *phaeoneura* in the

Brussels and Leiden Museums have been sufficiently characterized by RIS in the monograph. When good series are available for comparison, it is fairly easily distinguished from *euryle*. Structurally, the male differs from it only in that the genital hamule is a little shorter and more slenderly hooked apically. The females can be held apart by the following differences:

euryle

Head large, measuring 8.0-8.3 mm across the eyes.

Dark stripe at base of frons broad and sharply defined anteriorly, with brilliant metallic-blue lustre.

Venation on basal part of wings reddish. Abdomen stout, diminishing gradually in width from base to apex.

Valvula vulvae longer, extending as far as apex of 9th sternite (see LIEFTINCK, *loc. cit.*, pl. 34, fig. 98 of *propinqua*).

Anal appendages long, 4.0-4.2 mm.

phaeoneura

Head smaller, measuring 7.8-8.0 mm across the eyes.

Dark stripe at base of frons slightly narrower, less sharply delimited anteriorly, brownish-black or black, lustreless or with very faint metallic blue shine.

Venation on basal part of wings dark. Abdomen slender, resembling that of ♂, slightly spindle-shaped, with distinct constriction at apex of segm. 4.

Valvula vulvae distinctly shorter, not nearly extending as far as apex of 9th sternite (see RIS, *loc. cit.*, fig. 569).

Anal appendages shorter, 2.8-3.1 mm.