

DESCRIPTIONS AND RECORDS OF SOUTH-EAST ASIATIC ODONATA.

By

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Material for this paper has been collected during the past several years chiefly by Messrs. L. COOMANS DE RUITER of Singkawang, Western Residency of Borneo, and F. J. KUIPER, of Tandjong Pandan, Billiton.

There are about 130 species contained in the collection made for me by Mr. COOMANS DE RUITER in West Borneo, and the number of new species discovered by him is now raised to 16, there being still several more which require further examination and study.

The Billiton collection made by Mr. KUIPER contains 86 species, and of the 9 novelties 6 are here described as new (3 of these occur also in Borneo).

Full lists of these two exceedingly interesting collections will, it is hoped, be published separately as soon as the last difficulties in identifying them have been surmounted.

Other material of the greatest interest was borrowed for study from the University Museum of Michigan, Ann Arbor, through the good offices of Mrs. LEONORA K. GLOYD. From her I obtained a great many Asiatic Odonata, chiefly from the Malay Archipelago, which form part of the FÖRSTER and WILLIAMSON collections.

In other cases assistance is noticed when treating of the species, in connexion with which such assistance was rendered.

SYSTEMATIC.

Fam. LIBELLAGINIDAE.

<i>Libellago dorsocyana</i> , sp. n.	Borneo.
— <i>aurantiaca</i> (SELYS).	Sumatra, &c.
— <i>stigmatizans</i> (SELYS).	Malaya, Sumatra.

Fam. LESTIDAE.

<i>Lestes praezellens</i> , sp. n.	Java.
— <i>praemorsa</i> SELYS.	Notes on characters and distribution.

Fam. PLATYSTICTIDAE.

<i>Drepanosticta sharpi</i> (LAIDLAW).	Malaya.
— <i>fontinalis</i> , sp. n.	Malaya.
— <i>pytho</i> , sp. n.	Sumatra.
— <i>bartelsi</i> , sp. n.	Java.
— <i>ephippiata</i> , sp. n.	Celebes.

Fam. PROTONEURIDAE.

<i>Elattonaura analis</i> (SELYS).	Malaya, Borneo.
— <i>longispina</i> , sp. n.	Billiton, Borneo.
— <i>coomansi</i> , sp. n.	Banka, Billiton, Borneo.
— <i>aurantiaca</i> (SELYS).	Sumatra, Banka, Billiton, Borneo.
<i>Prodasinoura tenebricosa</i> , sp. n.	Borneo.
— <i>haematosoma</i> , sp. n.	Borneo.

Fam. AGRIONIDAE.

<i>Pseudagrion coomansi</i> , sp. n.	Banka, Billiton, Borneo.
— <i>celebense</i> , sp. n.	Celebes, Halmahera.
— <i>papuense</i> (TILLYARD).	Australia (Queensland).
— <i>perfuscatum</i> , sp. n.	Borneo.
<i>Teinobasis leonora</i> , sp. n.	Malaya.
<i>Amphicnemis kuiperi</i> , sp. n.	Billiton.
<i>Mortonagrion appendiculatum</i> , sp. n.	Billiton.

(With new localities for the known species).

Fam. LIBELLULIDAE.

<i>Brachygonia puella</i> , sp. n.	Billiton.
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Fam. CORDULIIDAE.

<i>Hemicordulia magica</i> , sp. n.	Bali.
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Fam. GOMPHIDAE.

<i>Onychogomphus rappardi</i> , sp. n.	Sumatra.
— <i>naninus</i> (FÖRSTER).	Tonkin.
— <i>aemulus</i> , sp. n.	Sumatra.

Fam. LIBELLAGINIDAE.

Libellago dorsocyana, sp. n. (fig. 1).

Material studied: — S. Borneo, 1 ♂ (ad.), Afd. Sampit, Kota Waringin River; Riamtiwata, Dec. 1935, J. J. MENDEN leg. The specimen is the holotype.

Male. — Labium and mouth-parts shiny black, base of middle- and side-lobes of labium yellow. Labrum and base of mandibles shiny black, the former with very slight purplish reflex. A vertical yellow spot on the genae. The convex anterior part of the clypeus (anteclypeus) transversely rugose, brilliant metallic-violet, indistinctly yellowish at extreme base; the flattened dorsal surface also rugose, brilliant metallic-green; posterior surface black, unmarked. Dorsal surface of head velvet-black; a point on either side of the posterior ocelli, the occipital plate, and a round spot at each end of it upon the postocular lobes, clear yellow. Antennae black. Rear of the head deep black.

Prothorax black, spotted with bright yellow; as follows: — a diamond-shaped median streak along anterior lobe; a large, rather lozenge-shaped spot upon the middle of the swollen posterior division of the prothorax and two

slightly smaller spots of the same colour along the sides: one about middle and a second just before posterior margin; finally, a tiny comma-shaped yellow line along posterior margin between the mid-dorsal and lateral yellow spots.

Synthorax dead black, marked with bright greenish-yellow as shown in fig. 1. Mesothoracic triangle short, black; median carina finely yellow; antehumeral stripes situated very near to the humeral suture, incomplete, widest below and tapering dorsally. Ante-alar triangles each with a triangular yellow spot. Dorsal ends of antehumeral lines indicated by isolated yellow points. Metepisternal and metepimeral bands obliterated, the former divided up and consisting of two angular patches, the lower one (nearest to the spiracle) largest. Ventral surface of thorax black.

Legs entirely black; basal fourth of all femora with a fine yellow interior line.

Wings hyaline, bases flavescent to a level between quadrangle and nodus in anterior pair, to the nodus in the posterior pair of wings, the yellow tint very diffuse distally. No pterostigma in front wing but its apex with a sharply defined, non-metallic, brownish-black spot, extending inwards for about 2.3 mm, its limit almost straight from costal margin to the middle of the wing, from which point it curves gently outwards to reach the opposite margin of the wing at the termination of the vein *M*_s. Pterostigma of hind wing normal, black, covering slightly more than two cells; extreme apices smoky.

Abdomen comparatively broad and much flattened dorso-ventrally, widest point (between segm. 3 and 4) 1.8 mm, thence gradually a little narrowed towards apex. Black: segm. 1 with a narrow transverse blue spot on either side of the middle, and with a yellow lateral point. Dorsum of segm. 2-7 light sky-blue; each joint has a black intersegmental ring and the blue marks are surrounded by black, as is shown in fig. 1. Mid-dorsal carina well developed on segm. 3-8. Segm. 8-10 and anal appendages deep black, as is the entire ventral surface of the abdomen.

Length: abd. + app. 13.5, hw. 16, pt. 0.7 mm.

This fine new species may be distinguished from its congeners by the rich blue colouring of the abdomen and by the peculiar side-markings to the thorax.

Libellago aurantiaca (SELYS).

Material studied: — S. Sumatra, 1 ♂, Lampoeng Residency, Terbanggi-hilir near Menggala, Aug. 14-20, 1936, M. BARTELS Jr. leg.; 1 ♂, same region (more southerly), Bergen Estate, 150 m alt., March 28, 1937, J. VAN DER VECHT leg. — Besides these, there are good series of both sexes in the Buitenzorg Museum from West Borneo and Billiton I.



Fig. 1. *Libellago dorso-cyana*, sp. n. ♂. Dorsal view of head and abdomen, and colour-pattern of synthorax.

The differences between the males of *L. sumatrana* (SELYS) and *aurantiaca* (SELYS) have been enumerated by H. ALBARDA, who offered coloured drawings to support his views (VETH's Midden Sumatra, 4, 5, 1881, p. 10, pl. III fig. 1-3): In the original description of *sumatrana*, the specific value of these characters was called in question by SELYS, who suggested that *sumatrana* should possibly be a local race of *aurantiaca*, from the Malay Peninsula (4e Add. Syn. Calopt. 1879, p. 52 sep.).

Apart from its much smaller size, however, *L. aurantiaca* is easily distinguished from *sumatrana* by the darkly coloured labrum and clypeus, these parts being always bronzy-black in adult specimens. The dorsal surface of the head is marked with 9 isolated light spots, the two largest of these being rather quadrangular in form and green in colour, placed on the frons, and followed immediately behind by two much smaller ones between the antennae; then follow two longitudinal spots, one on each side of the lateral ocelli, and lastly, there are three pale spots along the occipital margin. The head-markings of *L. sumatrana*, on the other hand, differ widely from those of *aurantiaca*: they are much enlarged, most of the frons being orange, while the spots on the vertex are united and rather in the form of a horse-shoe, open posteriorly, around the ocelli.

The colour-pattern of the thorax and abdomen is also different in the two species. The abdomen of *aurantiaca* is of a brick red colour while that of *sumatrana* is orange-red. A further means of distinction is found in the colour of the 10th segment of the abdomen, which is always black above in *sumatrana*, whereas it bears a large brick red dorsal spot in *aurantiaca*.

Recently, SCHMIDT (Arch. Hydrobiol. Suppl. 13, 1934, p. 325 - 326, tfig. 12) has also classified *sumatrana* as a subspecies of *aurantiaca* but I cannot accept this view for not only do these two insects differ widely from each other in a number of apparently quite constant characters but their area of distribution overlaps, at least so in South Sumatra, where they occur in close vicinity, inhabiting the same district.

L. aurantiaca is new to the Sumatran fauna.

The known distribution is as follows:

L. aurantiaca: — Tonkin (sec. MARTIN), Burma (Mergui), Siam, Malay Peninsula, Sumatra, Billiton, Borneo.

L. sumatrana: — Sumatra, Simaloer, Nias, Sipora, West Java.

Libellago stigmatizans (SELYS).

1932. LIEFTINCK, Konowia, 11, p. 2, 9 - 11 (descr. and key) — ♂ Mt. Ophir and Perak

Further material: — Malay Peninsula, 1 ♂, Kelantan, leg. WATERSTRAD. 1903 vdt., labelled by FÖRSTER "*Micromerus stigmatizans* Selys"; in the Michigan University Museum, Ann Arbor. — S. Sumatra, 3 ♂, Lampoeng Residency, Berga Estate, 150 m alt., March 28, 1937, J. VAN DER VECHT leg.

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Previously only known from the Malay Peninsula, this rare species has

quite unexpectedly turned up in South Sumatra, the area of its distribution now being considerably extended.

Our Sumatran specimens agree in almost every detail with the males from Kelantan and Perak, and with the type from Mt. Ophir in the Brussels Museum, discussed by me in a previous paper.

The colour of the pale spots on the dorsum of segments 1-4 or 1-5 of abdomen varies from yellowish (type Mt. Ophir) or bright orange-red (Perak) to deep green. In the Kelantan male the dorsal spots of segm. 1-2 are green, those on segm. 3 are green basally turning to orange in their distal half, while those on 4 and 5 are orange. Lastly, in our Sumatran individuals the thoracic and abdominal marks are uniform green without orange intermingling. Occasionally, the spots on segment 5 are obsolete or altogether wanting (two males from Sumatra).

This species is easily recognized by the shape of the black apical spot to the front wing and by the presence of a pterostigma; also by the fine red head-markings and the broad green antehumeral bands. The metepisternal green fascia is divided into two parts by a transverse black bar.

Fam. LESTIDAE.

Lestes praecellens, sp. n. (fig. 2-3).

Material studied: — S. Java, 4 ♂, 1 ♀ (ad.), Tjidamar, near Tjidaoen, about 100 m alt., forest-pool near Sempoertjongong, Nov. 5-8, 1935, M. BARTELS Jr. leg. Holotype ♂ and allotype ♀ Nov. 5, 1935. S.W. Java, 3 ♂, 4 ♀ (1 ♂ ad.), Oedjoeng Genteng Bay, road-side pool near the coast, March 27-29, 1937, AUTHOR leg.

Allied to *praemorsa* SELYS.

Male (ad.) — Labium pale yellow. Mandible-bases and genae yellow-green, labrum deep blue. Colour of the face much faded but in the living insect the entire anterior surface of the head, the clypeus excepted, appears to be bluish-green, upwards to a level slightly anterior to the antennae. Clypeus dull brown, the anteclypeus also blue in fresh individuals; frons and vertex dull brown, the latter with very low bronzy reflections. An orangish point on each side against the posterior ocelli. Postocular lobes and occiput matt greenish-bronze, almost black. Behind the eyes a large orange-brown spot, bordered with black along margin of compound eyes. Rear of the head largely black, densely pruinose-blue. First joints of antennae black, the flagellum reddish-brown. Eyes brown, dark olive-blue in living specimens.

Prothorax dark pinkish-brown, densely pruinose-blue, especially along the sides; dorsum with a longitudinal twin-spot and with the middle of the posterior lobe, dull metallic-green. Synthorax isabella-coloured or buffy olive on dorsum, the sides shading into bright honey-ocher to chamois, specially upon the lower (posterior) portion of the metepimerites. Dorsum of thorax (mesepisternites) marked by a pair of dark metallic-green antehumeral stripes (not noticeably

variable in our series of specimens), straight on their inner border and well separated from one another by a distance equal to their own width, deeply crenulate or lobed on their outer border. This band is widest dorsally, with a somewhat quadrate or sub-triangular lobe projecting from its upper end, a much smaller median lobe (with or without irregularly indented lateral border), and a slightly outcurved prolongation at the lower part of the band, which is evenly narrowed ventrally. Median carina unmarked. Mesepimerites marked with three metallic-green dots: one very small one on the upper end of the humeral suture, one much larger and somewhat elongate spot on the middle of the mesepimerum, and a third, rather more rounded one, along lower portion of the humeral suture, opposite the median prolongation of the mesepisternal band. Thoracic sides otherwise unmarked save for two brownish spots, one

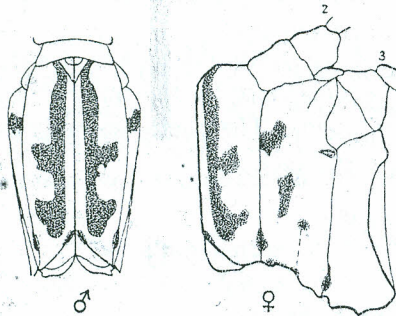


Fig. 2. *Lestes praecellens*, sp. n. Types. Dorsal view of ♂ synthorax and colour-pattern of ♀ synthorax.

at lower end of the incomplete first suture, and one at dorsal end of the second suture. *Metepimerum and under surfaces unmarked* (fig. 2). Dorsum of thorax rather obscured in most specimens and very thinly powdered; the entire metepisternum, the infraepisternites, the anterior (upper) portion of metepimerum, and the middle of the ventral surface, coarsely powdered with light blue. In most specimens the lateral bronzy-green marks are much obscured and pruinose, so that the spots are made out with difficulty. In the living male the entire thorax, including the ventral surface is pruinose blue, except a honey-ocher stripe along latero-ventral margin.

Outer surfaces of the pale coxae heavily pruinose. Legs dull yellow-brown; femora with a complete black exterior stripe and a narrow posterior line. Tibiae bright greenish-yellow exteriorly, black interiorly. Tarsi and spines black.

Wings hyaline, or strongly tinted with yellow-brown, except most of the petiole. Pterostigma dark reddish-brown with a fine reddish costal line. Neuration as for genus, very similar to *praemorsa* but wings slightly less abruptly petiolated than in that species and with the pterostigma comparatively longer.

Postnodals $\frac{12-14}{11-13}$.

Abdomen marked similarly to *praemorsa*; the dorsal marks dull bronzy-black; those on segm. 2-7 not noticeably constricted before the sub-apical expansions, and basal annules also a little smaller than in that species. Sides of segm. 1-2 citron-yellow, intermingled with green, light parts of succeeding segments less vividly coloured. Segm. 8-10 uniform blackish-brown, lacking distinct pale spots. Basal segments not pruinose but dorsum of segm. 10 powdered with light blue in well-coloured specimens.

Superior anal appendages ochreous, the bases and tips sharply defined black; inferior pair black. Superior pair shaped as in fig. 3. Inferiors broad

and much swollen basally, widely divaricate, the distal third of each suddenly narrowed, forming finger-like appendages, which are directed backwards and provided apically with a bunch of golden yellow hairs; the apices are always invisible in dorsal view but they do not reach beyond the basal tooth-like projection of the superior appendages.

Female (ad.) — Differs from the male only in a few minor respects, especially in the colouring of its body. Mandibles and genae pale brownish-yellow, the latter intermingled with green dorsally. Labrum, clypeus and anterior surface of frons dirty olive, postclypeus and frons indistinctly mottled with brown. Dorsal surface of head as in male; indefinite pale spots are also visible on either side of the occipital crest.

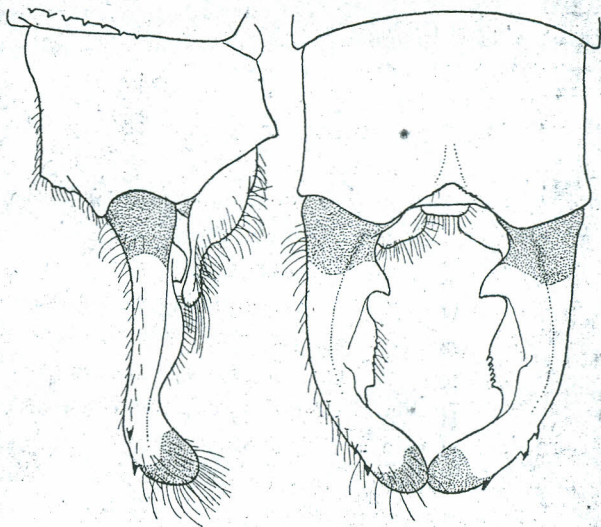


Fig. 3. *Lestes praecellens*, sp. n. Type. Male anal apps., right side and dorsal view.

Pro- and synthorax isabella-coloured, the former

very slightly pruinose. Bronzy-green spots on dorsum and sides of thorax very distinct, arranged as in fig. 2. Lower portion of metepisternum (the area around the spiracle) and most of the metepimerites clear olive ocher, *unmarked*. The infraepisternites, a narrow area along lower part of second suture, and the dorsal margin of the metepimerum, pruinose-white, as are the underparts of the thorax and the outer surfaces of the coxae.

Wing-membrane tinged with grey-yellow. Pterostigma light brownish-olive between black nervures; centre isabella-coloured. Postnodals $\frac{13-13}{11-12}$.

Abdomen robust with cylindrical segments. Colouring identical to the male, sides olive-yellow to olive-grey. Dorsal marks not or scarcely constricted before the subterminal expansions. Terminal segments coloured as in male but 8 and 9 have each of them a diffuse, ochreous lateral spot and 10 is apparently wholly light blue above and along the sides, with a fine black line only along posterior border.

Valves black, reddish-brown interiorly, lower margin almost straight (slightly convex on middle in side-view); tips not surpassing end of segm. 10. Anal appendages much depressed, lanceolate, apices pointed; bright yellow, tipped with black.

Length: ♂ abd. + app. 34-37, hw. 23-24; ♀ 33, 25 mm.

This species was discovered by Mr. BARTELS in 1935 and found back again quite recently about 85 miles towards the west, in apparently rather similar surroundings.

On March 27, 1937, while collecting in the coastal forest along the path-way leading to the cocoa-nut plantation of Tjitespong, near the rest-house of Oedjoeng-Genteng, my wife and I took our first specimens of *L. praecellens* in the act of emerging. The locality is a sunny pond-like marsh with stagnant water, almost knee-deep at the shallow edge but increasing perhaps to 2 metres around the exposed coral-rock in the centre of the pool. The bottom of this pond is an old coral-reef but it is covered with soft mud and on the surface are water-plants and floating algae. There were plenty of tadpoles of at least two species of frogs (*Rana* and *Rhacophorus*) and a rich aquatic insect-fauna. We visited this pool four times and managed to secure 36 species of dragonfly.

Judging from the finding of teneral, I believe that all individuals of *L. praecellens*, at least in this locality, must emerge at about the same hour of the day for we secured six freshly emerged specimens between 9 and 11 a.m., on three successive days. All of them were found with their wings held closed over the back, hanging on the stems and leaves on the sunny side of a bush of reed, at some distance from the bank. These were captured, and, by the absence of dark spots to the lower parts of the thorax, proved to be *praecellens*.

Now it is interesting to note that the same bush of reed yielded several males of *L. praemorsa* as well, but these appeared later on the morning and no teneral of this species were noticed. Each had its favourite position, hanging on the stems with wings loosely opened and the abdomen held downwards in a S-like curve, a striking attitude peculiar to this species. Though we watched carefully, we found only one place along the pool where the adult of *praecellens* was living. This was on March 29, in the tangly growth of ferns and shrubs overhanging a dark corner of the pool. Although extremely similar to *praemorsa*, it was at once recognized by its slightly larger size, by the unspotted metepimerum and by the less vividly coloured abdomen.

Probably *praecellens*, soon after emergence and on being disturbed, flies into the nearest bush, and its avoiding open water may account for its relative scarceness.

The exuvia being also found, I hope to discuss elsewhere the characters of the larva of *praecellens*.

Lestes praemorsa SELYS.

In the above description of *praecellens*, this new species has repeatedly been compared with *praemorsa* SELYS, on account of its bearing a striking *prima facie* resemblance to that species. Yet it is distinguished at once from *praemorsa* by the absence of black spots on the yellow-coloured metapleurae, the ventral border and the under surfaces of the thorax. This appears to me to be quite

an important specific character to which LAIDLAW ¹⁾ has not called attention in his account of North Indian *L. praemorsa*. In fact, these lateral and ventral points are always present and plainly visible even in heavily pruinosed examples. Recently, E. SCHMIDT has published useful sketches of the thoracic pattern of *praemorsa*, after specimens from N. Sumatra and after the type from Manila (Philippines), and in all these the spots are well shown ²⁾.

A further very reliable means of distinction between these two species is found in the shape of the bronzy-black markings on the abdominal segments 2 to 7 which, in *praemorsa*, are noticeably constricted before the apical widening of each while in *praecellens* the contraction of these marks is very unapparent. The anal appendages of the male of *praecellens* are different in shape from those of Sumatran and Javan *praemorsa*, especially the inferior pair, which are widely divaricate, abruptly turning into narrow, finger-shaped processes not visible in dorsal view, whereas in *praemorsa* from the Great Soenda Islands they do not so closely fit to the sup. apps., being in the form of pyramidal or bluntly triangular processes, which are directed freely backwards.

L. praemorsa is a very wide-ranging species. I have now seen specimens of a great many localities, viz. from Peninsular India (Nilgiris, 4000 ft. and Coorg, ex coll. FRASER), the Malay Peninsula, Sumatra, Billiton I., Enggano I., W. Java, Kangean I., Palawan, Celebes, Boeroe I., and New Guinea. It has not yet been recorded from Borneo but will doubtlessly be found there sooner or later.

The type is from Manila (cf. SCHMIDT, *antea*), and a short note on the male, also from the Philippines, has been published by RIS after specimens in his own collection (now in the Senckenberg Museum).

Specimens which I have from different parts of the Malay Archipelago resemble each other closely so far as the colour-pattern of the thorax and abdomen is concerned. SELYS and LAIDLAW (loc. cit. *antea*), and more recently SCHMIDT, however, have emphasized the point that the dorsal thoracic marks are individually variable and this is very obviously the case throughout our series of insular specimens.

A number of insular subspecies may ultimately prove distinguishable when the anal appendages of the male, especially that of the Philippines, are studied more closely, for I notice well marked differences in the structure of these organs.

Fam. PLATYSTICTIDAE.

Drepanosticta sharpi (LAIDLAW) (fig. 4, 5a).

1907. FÖRSTER, Fasc. Malay. Zool. 4, p. 10 (sep.) — ♂ Kelantan, leg. WATERSTRADT (*Platysticta quadrata*, partim: FÖRSTER).

1907. FÖRSTER, Fasc. Malay. Zool. 4, p. 10-11 (sep.) — ♂ (juv.) ♀ Bukit Besar (*Platysticta*).

¹⁾ Rec. Ind. Mus. 19, 1920, p. 154-155. In LAIDLAW's text-fig. 3 of the thoracic colour-pattern, moreover, these side-spots are not shown, possibly because of the dense powdery substance which covers the sides of the adult insect?

²⁾ Archiv f. Hydrobiol. Suppl. 13, 1934, p. 331-334, figs. 20, 22-27.

1924. LAIDLAW, J. Mal. Br. Roy. As. Soc. 2, p. 304-305, pl. 5 fig. 7 (♂ apps. sub *sharpei*). — ♂ Jor in Perak.
 1931. LAIDLAW, J. Fed. Mal. States Mus. 16; p. 189. — ♂ Pahang.
 1934. FRASER, Stylops, 3, p. 136-137, fig. 3 (♂ apps.) — ♂ East Mergui.

Material studied: — 1 ♂ (semiad., pinned), labelled: "Prov. Kelantan, Ost-Malacca, Rolle vdt. 1903, leg. Waterstradt/*Platysticta quadrata* De Selys ♂", both labels in FÖRSTER's hand. In the University Museum of Michigan, Ann Arbor.

This is evidently the specimen referred to by LAIDLAW (loc. cit. 1931, p. 189) as having been recorded by FÖRSTER sub *P. quadrata* SELYS, without comments. Its measurements are: abd. + app. 41, hw. 23.5 mm (not 40 and 29, respectively, as given by FÖRSTER!). Postnodals and subpostnodals $\frac{13}{12}$ $\frac{13}{12}$. Anal veins present in all wings, their position similar to LAIDLAW's specimen from Pahang.

The actual specimen, though not fully coloured, is in good condition and fits LAIDLAW's descriptions of *D. sharpi* (1924 and 1931) closely, as also FRASER's account of the Mergui specimen. Especially the decidedly pentagonal shape of the pterostigma and the doubled costal cells posterior to it, seem to be distinctive features of this species (fig. 5a). The structure of the anal appendages is almost exactly alike FRASER's drawing of these organs from a specimen of Mergui. This author was the first to mention the inwardly directed, fine black spine on the inner side to the base of the apical portion of the inferior appendages (fig. 4).

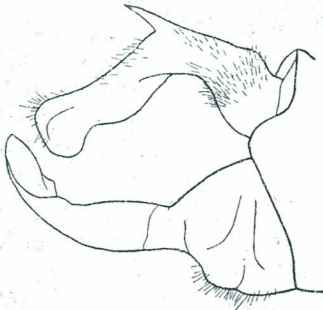


Fig. 4. *Drepanosticta sharpi* (LAID.), Kelantan. Male anal apps., right side.

I admit that the body-measurements of *sharpi*, as given by LAIDLAW and FRASER, are reliable; LAIDLAW (1907, 1924 and 1931) gives 42 (teneral type), 45 and 40, respectively, for the abdomen; 23 (type), 25 and 22.5, respectively, for the hind wing; FRASER's specimen measured 49 for the abdomen and 26 for the hind wing; lastly, the measurements of FÖRSTER's male are noted above. This would suggest a great variability in size of the male of *D. sharpi*, viz. abd. + app. 40 - 49, hw. 22.5 - 26 mm.

The differences between *sharpi* and the next species, *fontinalis*, sp. n., are enumerated under that species.

***Drepanosticta fontinalis*, sp. n. (fig. 5b, 6).**

Material studied: — 1 ♂ (ad., pinned and relaxed), labelled: "Kelantan Ost Malacca, Heine vdt. 1903/*Platysticta quadrata kelantana* n. rasse Förster", both labels in FÖRSTER's hand. In the University Museum of Michigan, Ann Arbor.

Male (holotype). — Labium pale yellow. Labrum, anteclypeus and dorsal two-thirds of the mandible-bases ivory-yellow; labrum with the anterior border

sharply defined black, the black margin just visible from above. Postclypeus shining black. Frons and vertex shiny bronzy-green with purplish reflections on middle, rear of the head bronzy-black. First joint of antennae brown, the second joint yellow, brownish apically, flagellum brown. Parorbital carina barely indicated, transverse postoccipital carina very low, the side-edges small, obtuse-angulate.

Prothorax pale on anterior half, black posteriorly. Anterior lobe and the dorsal tubercles of the middle lobe ivory-yellow, the former with an irregular, transverse, black stripe along its front margin; sides of middle lobe dirty yellowish turning to black posteriorly. Posterior lobe black, short and broad, depressed, slightly widened distally, with the side-edges rectangular, very little projecting, rounded apically.

Dorsum of synthorax, as far down as the first lateral suture, deep bronzy-black, the surface rather dull and covered with microscopical striae, except the mesinfraepisternites, the lower (convex) portion of each mesepimerite, and the dorsal ends of the mesepisternites, which are smooth and shining. Sides pale green, with a broad, slightly oblique, black band, covering the posterior three-fifths of metepisternum and posteriorly surpassing the second suture for a short stretch, passing downwards to the level of the spiracle to acquire ventrally and posteriorly a rusty-brown colour. The green fascia thus enclosed is decidedly narrower than the black lateral band behind it, especially on dorsal end; it tapers dorsally but, ventrally surrounds the spiracle, acquiring soon a dull yellow colour, and thence passes downwards to the second pair of coxae, which are also yellowish, as is the lower third of the metinfraepisternites. Metepimerites green dorsally, fading to dull yellow ventrally and underneath.

Coxae, trochanters and legs dull yellow; all femora with a complete, sharply defined, deep black exterior line and diffuse brown postmedian rings. Last tarsal joint blackish apically; spines brown, claws reddish.

Wings hyaline, basal veins reddish-brown. Anal veins present in all wings, their position similar to *sharpi*, hence not forming an Y-shaped brace. Postnodals and subpostnodals coincident, $\frac{15.15}{13.13}$. Pterostigma quadrangular, costal side shorter than anal side, deep black surrounded by a fine pale line; cross-veins posterior to the pterostigma not divided (5b).

Abdomen long and slender. Segm. 1 pale yellow (possibly greenish in life), shading into black posteriorly, and with the dorsal apical membrane pale. Dorsum of segm. 2 dark brown, sides yellow; the dorsal black mark rapidly

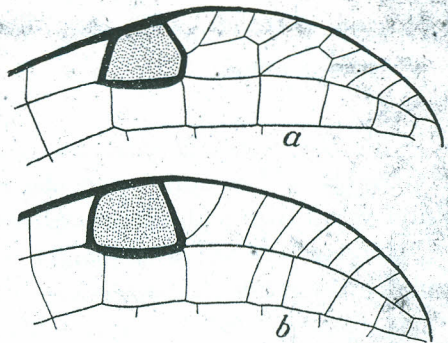


Fig. 5. Apex of right front wing of *a*, *D. sharpi* (LAIP.), and *b*, of *D. fontinalis*, sp. n., both from Kelantan. Males.

expands posteriorly so as to cover also part of the sides (bordering-line in profile view running obliquely from antero-dorsal to postero-ventral edge of segment). Segm. 3 - 5 blackish-brown with diffuse light basal rings, pale brown dorsally and yellow laterally, occupying about one-sixth of the length, and similarly coloured postmedian rings occupying about one-fifth of the length of segment; terminal black rings sharply delimited and of the same length as the pale basal rings. On segm. 6 the anterior pale ring is smaller, dimly defined dorsally, and the subterminal ring is almost invisible. Segm. 7 black. Segm. 8 blue with a deep black dorso-lateral marking, irregularly rounded



Fig. 6. *Drepanosticta fontinalis*, sp. n. Male anal app., left side; a, right inferior app., ventral side.

Length: abd. + app. 42, hw. 25 mm.

Female unknown.

With *Drepanosticta quadrata* (SELYS), *viridis* FRASER, *sharpi* (LAIDLAW) and possibly a few others, the above described *fontinalis* seems to form a natural group within the genus. All of them have the anal veins *Ac* and *Ab* well separated at the wing-margin. Of these, *quadrata*, from Singapore, is decidedly the smallest species, its abdomen measuring 35 and the hind wing 21 mm. There are only 11 - 12 postnodals in the wings. It is not possible from the description alone to give further distinctive features of *quadrata*, of which only the type is known.

D. viridis, from Mergui, Lower Burma, is distinguished from the other species of the group by the extreme length and attenuation of its abdomen, which is exactly double the length of the wings. The males of the two other, similarly coloured species, *sharpi* and *fontinalis*, differ markedly from each

posteriorly and extending rather further apicad dorsally than laterally, occupying the basal two-thirds on mid-dorsum, slightly more than the basal half on the sides; lower margin of the tergite bordered with blue; there is, besides, a comma-shaped black spot placed about the postero-lateral edge of the segment and attached to the hind margin. (These black spots merge one into the other in our specimen of *sharpi*). Segm. 9 entirely blue, save for a transverse, black, dorsal basal stripe and a thick black stripe along the entire lower margin of the segment. Segm. 10 black.

Anal appendages black, shaped as described *postea* (fig. 6).

other in the shape of their anal apps., but it is a matter of some little difficulty to tabulate these differences and to determine the limits of variation of these species. The occurrence in close vicinity is interesting but more material of both of them is necessary to reveal some more differences in the body-colouring and to confirm the striking peculiarities found in the region of the pterostigma of the former species.

sharpi (Kelantan).

Thorax with the dark stripe along 2nd lateral suture not or hardly entering the metepimeral space posteriorly, distinctly narrower at level of the spiracle than the pale metepisternal fascia anterior to it.

Pterostigma pentagonal, the outer margin broken below its middle, followed by two irregular rows of cells (interchanged alternately by a single cell in three of the wings) (fig. 5).

The blue spot on dorsum of segm. 8 strongly convex anteriorly, its border curving gently downwards and *backwards*, meeting the posterior margin of the segment about half-way down, so that the lower half of the posterolateral portion of the segment remains black and well separated from a pale stripe along lower margin of the tergite.

Anal apps. of compact build. Superiors in profile view shaped like the head of a race horse with the basal half shaped much like its neck and the apical portion rather like its (long and grotesque) muzzle. Inf. app. without angular mid-dorsal projection at the end of the basal third; apical twisted portion gently upcurved, spoon-shaped (fig. 4).

fontinalis (Kelantan).

Thorax with the dark stripe along 2nd lateral suture broad, entering the metepimeral space posteriorly, equally broad at level of the spiracle to the pale metepisternal fascia anterior to it.

Pterostigma quadrangular, followed by a single row of cells (fig. 5).

The blue spot on dorsum of segm. 8 concave anteriorly, its border curving downwards and *forwards*, so that the entire lower half of the segment remains blue.

Anal apps. very slender. Superiors in profile view much more drawn out and thinner, so that the likeness to a horse's head is lost; basal half more abruptly narrowed with its lower margin strongly concave, apical half slenderer, definitely parallel-sided subapically. Inf. app. with a distinct mid-dorsal angular projection at the end of the distal third; apical twisted portion more abruptly narrowed and slenderly lanceolate (fig. 6).

Drepanosticta pytho, sp. n. (fig. 7).

Material studied: — W. Sumatra, 1 ♂ (semiad.), Padang, 1913 (? ROLLE vend.), labelled on the envelope: "Platysticta, Grosskopf, W. Sumatra, Padang", in FÖRSTER's handwriting. Holotype in the FÖRSTER collection, now in the University Museum of Michigan, Ann Arbor (no. 1252).

Male (semiad.) — Labium pale yellow. Labrum, anteclypeus and dorsal portion of the mandible-bases creamy-white; labrum with the anterior border sharply defined black, the black margin visible from above. Postclypeus shining black. Frons and vertex bronzy-green, rear of the head glossy black. Antennae with the first two joints yellow, the flagellum brown. Parorbital and transverse postoccipital carinae not developed, barely indicated.

Prothorax pale greenish-yellow, the posterior lobe black. Posterior lobe with the lateral posterior margin produced as very long and filamentous projections, which are directed obliquely upwards and backwards; apices very thin and apparently obtusely pointed, with no apical enlargement or tuft of hairs; in lateral aspect these processes are a little longer than the prothorax itself.

Dorsum of synthorax, as far down as the first lateral suture and including the mesinfraepisternites, shining bronzy-black, with purple reflections. Over the middle of the dorsum, joining the median carina on both sides, runs a narrow, pale yellow stripe, about 0.7 mm broad on its widest (lower) point, diminishing gradually in width upwards, where it is very narrow, tapering to a point about 1 mm below the ante-alar triangles, which themselves are ochreous-brown (possibly bronzy-black in the adult insect). Thoracic sides bright greenish-yellow, marked with a complete, bronzy-black band over the second suture which is widest on its dorsal end (about same width as the metepisternal pale band), slightly outbent at level of the spiracle, which is surrounded by yellow, and continued downwards between the coxae of the middle and posterior pair of legs. Metinfraepisternites with the posterior third yellow. Metepimerum, coxae and under surfaces of thorax pale yellow.

Legs pale yellow; all femora with indistinct greyish-brown median rings and the extremities also darkened; apical third of last tarsal joint black. Spines brownish-yellow.

Wings long and very narrow; hyaline. Postnodals $\frac{13.13}{12.12}$; sub-postnodals 12 in all wings. Y-shaped vein sessile (stem wanting), V-shaped. Pterostigma reddish-brown, subquadrangular, proximal side slightly oblique, hence costal side distinctly shorter than anal side, surmounting one cell.

Abdomen attenuated and enormously drawn out, almost twice longer than hind wing. Dorsum of segm. 1 brown, sides yellow and posterior margin blackish laterally. Segm. 2 with a brown dorsal marking, narrowed anteriorly, the basal third of which deepens in colour to almost black; over the middle of this segment runs a fine yellow line which is widened and sharply defined anteriorly. Segm. 3 - 7 brown, these segments progressively darker from before backwards; 3 with vestiges of yellow dorsal spots, and bases of 3 - 6 with pale yellow basal

markings restricted to the sides and underneath, extending further apicad ventrally than laterally. Dorsum of segm. 8-10 deep black, sides dark brown; basal third of 8 with a complete, clear blue ring; sides of 9 and 10 very dark brown.

Anal appendages dark brown, inferior tooth of superiors and apices of inferior appendages black. Superiors in dorsal view slender and well separated at origin though evenly turned inwards and hence rather approximated towards apices; exteriorly almost straight, with a slight convexity at $\frac{1}{3}$ of their length, interiorly also straight but abruptly incurved at the same point and hollowed out so as to form a narrow, sub-apical rounded projection, invisible in lateral view, the apices turned mesiad, distinctly expanded, depressedly hoof-shaped, the tips overlapping; in lateral view the sup. apps. are semicircularly curved ventrad and apicad, the basal two-thirds cylindrical, furnished with a strong spine-like interior tooth, which is directed ventrad; apices rather expanded, shaped as in fig. 7. The inferior apps. are shorter than the superiors, straight and irregularly tapered, provided half-way their length with a blunt interior projection, and at $\frac{3}{4}$ their length with a curved and finely pointed interior tooth, which is turned dorsad and caudo-mesiad; distal portion of each twisted on itself, with a subapical enlargement, the apex finely pointed, directed backwards and slightly outwards. Penis with the shaft-spines identical in size and arrangement to those of *D. kruegeri*, *sundana* and *arcuata*.

Length: abd. + app. 48, hw. 26 mm.

Female unknown.

This new species is abundantly distinguished from all other Malaysian species by the extreme slenderness of the abdomen and wings. It differs from the members of the *sundana*-group, especially *arcuata* LIEFT., by the longer processes of the prothoracic hind-lobe, by the pale stripe joining the median carina of the thorax, by the much longer abdomen, by the different armature of the curiously bent upper anal appendages, and by details of coloration. From *D. bispina* FRAS. and *D. tenella* LIEFT., both also from Sumatra, *pytho* differs by its larger size. It is easily differentiated from *bispina*, of which only one imperfect female has been made known, by the colouring of the legs, thorax and abdomen.

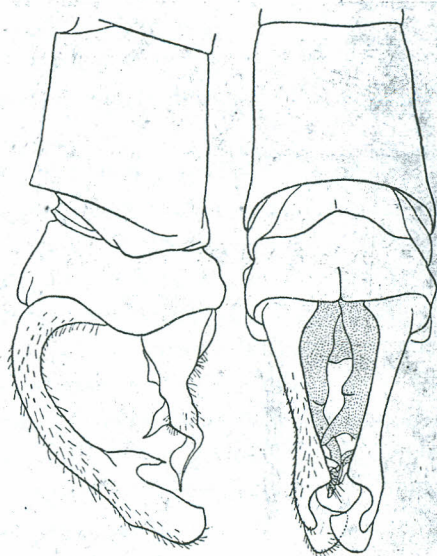


Fig. 7. *Drepanosticta pytho*, sp. n.
Male anal apps., right side and dorsal view.

(It would appear to me that it is not worthy of recommendation to describe as new species imperfect females, nor even complete examples of that sex, of the genus *Drepanosticta*).

The following species are now known from Sumatra and the satellite islands:—

D. arcuata LIEFT. — *Treubia*, 14, 1934, p. 469 - 471.

D. bispina FRAS. — *Mém. Mus. Royal d'Hist. Nat. Belg. (hors série)*, 1932, p. 5 - 6.

D. kruegeri LAID. — *J. Mal. Br. Roy. As. Soc.* 4, 1926, p. 228 - 229 (Mentawai Arch.).

D. pytho, sp. n. — Of this paper.

D. tenella LIEFT. — *Misc. Zool. Sum.* XCII + XCIII, 1935, p. 7.

***Drepanosticta bartelsi*, sp. n. (fig. 8).**

Material studied: — S.W. Java: 3 ♂, 2 ♀, Tjidamar, near Tjitoë, about 40 m alt., Sept. 13 - 16, 1935 and 1 ♀, same locality, Nov. 28, 1935, M. BARTELS Jr. leg. Holo- and allotype: Sept. 13, 1935.

Male (ad.) — Labium dark brown. Labrum, mandible-base and anteclypeus creamy-white, the labrum with a broad, dark brown anterior border, scarcely visible from above; postclypeus, frons, vertex and rear of the head brilliant bronzy-black. Antennae with the first joint dark brown, the second joint brownish-yellow, the flagellum darkened. Parorbital and transverse postoccipital carinae well developed, the latter with obtuse-angulate lateral extremities, similar in form to that of *D. gazella* LIEFT.

Prothorax bright creamy-yellow, the anterior and posterior lobes wholly black. Posterior lobe with the lateral posterior margins produced as very long and slender projections, directed straight upwards; in caudal view each of these finger-like processes is slightly outbent on middle, flattened in the transverse plane, with no apical enlargement or tuft of hairs, the tips being almost pointed; in lateral view the processes appear equal in length to the prothorax itself and are very slightly forwardly curved.

Synthorax throughout bronzy-black, very shining. Metepisternum, from the spiracle upwards to almost reaching the upper margin of that space, with a sharply delimited, creamy-yellow band along the first lateral suture, which covers the anterior three-fifths of the metepisternite; lower end of this stripe rather pointed, upper end rounded. Metepimerum for the greater part bronzy-black but about the dorsal third of this space pale flesh-coloured, the transition-line sharply delimited, oblique. Under surfaces deep bronzy-black, except the posterior two-fifths, which are pale flesh-coloured.

Coxae and legs pale yellow; all femora with indistinct greyish-brown postmedian rings and the extremities black; apical half of last tarsal joint also darkened. Spines yellowish.

Wings hyaline. Postnodals $\frac{13-14}{12-13}$, subpostnodals $\frac{13}{12}$. Y-shaped vein almost

sessile, or with a very short stem. Pterostigma warm cinnamon-brown, sub-quadrangular, costal side distinctly shorter than anal side, basal side not curved but oblique, distal side convex.

Abdomen dark brown; first segment yellowish, slightly darkened above; sides of 2 also yellowish, dorsum more darkened; 3-7 each with a pale yellow basal ring, widest laterally and not sharply defined posteriorly, occupying about one-fourth, that on 7 about one-third of the length of segment. Segm. 8 blackish-brown, basal half of sides yellow. Tergite of segm. 9 sharply defined pure azure-blue, this colour extending also a little over the sides, which are deep black (the black colour invisible from above). Segm. 10 and anal appendages black, apices of superior pair brownish (fig. 8). Penis with numerous long shaft-spines.

Female (ad., allotype). — Only differs from the male as follows: — Labrum light blue, the anterior border brownish-black. Posterior lobe of prothorax of simple structure, lateral posterior margin without any projections other than a very low convexity on each side; posterior lobe itself in the form of a depressed, shortly trapezoidal plain figure, the lateral sides of which converge and the hind margin being straight.

Postnodals $\frac{13-15}{12-13}$, subpostnodals $\frac{12-13}{11-12}$. Wing-tips slightly smoky.

Abdomen widening distally, pale markings on segm. 7 obscure. Distal two-thirds of the 9th tergite, with the exception of the lower portion of the sides, sky-blue, limits indistinct. Segm. 10 very small, dark brown. Anal appendages subequal in length to segm. 10, conical, black. Valves blackish-brown, slender, lower margin very slightly convex, apices projecting well beyond the tips of appendages.

Female (paratypes). — Differ very markedly from the allotype female by the prothoracic hind-lobe carrying the same long projections on each side as are found in the male; these processes are but little shorter and either slightly less or, in the second specimen, slightly more forwardly bent than in the male, but otherwise are very similar.

Length: ♂ abd. + app. 31 - 32.5, hw. 19 - 20; ♀ 28.5 - 29.5, 19 - 20.5 mm.

I have much pleasure in naming this new species after MAX BARTELS JR., who since 1935 has sent me a vast amount of material and field-notes on Javan and Sumatran Odonata.

Closely related to *D. gazella* LIEFT., also from Java, but differing from that species by the longer and slenderer horns at the posterior lobe of the

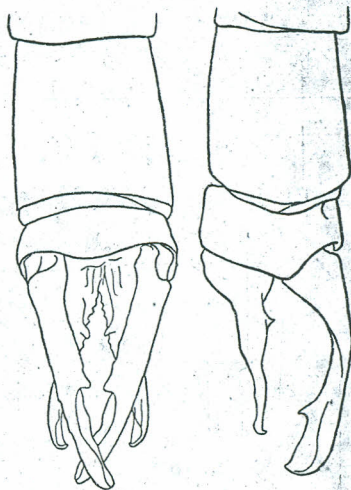


Fig. 8. *Drepanosticta bartelsi*, sp. n. Type. Male anal apps., dorsal view and left side.

prothorax and by the much longer and straighter anal appendages of the male; the sub-apical inferior tooth of the superior pair of appendages is decidedly smaller and the inferiors are not so long as in *gazella*. Colour-differences are slight and not of much value in discriminating the two species, for, in specimens of *gazella* from low country, the extension of the bronzy-black pattern on the thoracic sides and underparts is identical to that of *bartelsi*, whereas in a series of both sexes from higher levelled localities, the underside of the thorax as well as most of the metepimerites, are pale in colour. The presence or absence of blue "recognition-marks" on the ninth abdominal segment of *gazella* seems to be also dependent on local influences; in lowland specimens they are always well developed, while in mountain specimens of West Java this segment is invariably brown. In the original series from Mt. Slamet (Mid Java), about 800 metres above sea-level, however, segm. 9 is blue in both sexes.

The male anal appendages are short and strongly curved throughout our series of *gazella* (about 80 individuals examined from various localities in West and Mid Java). Recently, I took a long series of typical *gazella* in heavy forest near Tjimerak (Penandjoeng Bay, 200 m alt.), about 90 miles east of the locality where *bartelsi* was discovered.

In the original description of *gazella* I have erroneously stated that the ivory-white band on the thoracic sides runs over the mesepimerum; it should be read: metepisternum (see: Tijdschr. v. Ent. 72, 1929, p. 110 and 114). In this species the shaft-spines of the penis are equally well developed as in *bartelsi*, *spatulifera* and the *sundana*-group of species.

***Drepanosticta ehippiata*, sp. n. (fig. 9).**

Material studied: — N. Celebes: 2 ♂ (ad.), Tondano near Manado, April 1935, C. VAN BRAEKEL leg., acq. June 11, 1935.

Male (ad.). — Labium brown. Labrum, anteclypeus, mandible-bases and mesal portion of the genae, creamy-yellow; labrum with the anterior border well defined dark brown, the black margin visible from above. Genae with a black stripe ascending along margin of compound eyes. Frons and vertex bronzy-black, rear of the head metallic greenish-black, very shining. Antennae yellowish, flagellum brown. Parorbital and transverse postoccipital carinae well developed, the former low and rounded, the latter with acutely angulate lateral extremities.

Prothorax bronzy-brown, mottled with dull yellow, the anterior lobe yellow except on middle; the posterior lobe produced posteriorly as two caudally directed, pale yellow processes, extending dorsally over the synthorax, in dorsal view shaped much as in *D. lymetta* COWLEY (Philippines), but with the widened apical part depressed, distinctly swollen, smoothly shining and in the form of slightly divergent, shortly stalked halteres, which are about $1\frac{1}{2}$ times longer than the posterior lobe itself and entirely devoid of apical hairs.

Synthorax bronzy-brown, finely punctured above and on most of the mesepimerites and hence not very shining on these parts; lower portion of mesepi-

merum and most of the metepimerum appearing darker, scarcely punctured, shiny black at certain angles. A well defined, elongate, creamy-yellow band extending from the spiracle upwards to near the dorsal margin of the metepisternum, rounded on both ends and scarcely widened dorsally; about the dorsal third of the metepimerum pale yellow. Venter black on anterior half, pale yellow behind.

Coxae and legs pale yellow; all femora with distinct brown postmedian rings and the extremities blackish-brown; apex of the last tarsal joint darkened. Spines brownish-yellow.

Wings of the usual shape, hyaline. Postnodals and subpostnodals coincident, $\frac{15-16}{14-15}$. Y-shaped vein sessile (stem wanting). Pterostigma reddish-brown, subquadrangular, the proximal side but slightly oblique.

Abdomen slender, of the usual form. Segm. 1-2 blackish-brown, 1 unmarked, 2 with a basal yellow spot each side. Segm. 3-6 black, each with a complete basal yellow ring, extending slightly further apicad laterally than dorsally, occupying the basal one-sixth to one-seventh (lateral view); 7 dark brown with the basal pale rings indistinct, occupying one-fourth of the length; 8-10 black, unmarked. Sternites coloured similarly to the tergites, except the eighth that bears a conspicuous basal yellow mark.

Anal appendages short, entirely yellow, the superior pair about three times the length of segm. 10, the inferiors subequal to the superior pair. In dorsal view the superiors broad basally, each with a short, acute, tooth-like spine along upper margin, directed mesiad, at about half-way its length; slightly twisted and hollowed out mesially, gradually narrowed apically, the apices broadly rounded; in lateral view straight, very broad basally but tapering rapidly, the tips rounded. Inferior appendages widest basally, in dorsal view with the apical half parallel-sided and straight exteriorly, the apices strongly turned mesiad; interiorly also straight with a preapical mesial projection, thereafter strongly concave, tips narrow; in profile view almost straight, the apices slender and turned mesiad, without tufts of hairs (fig. 9).

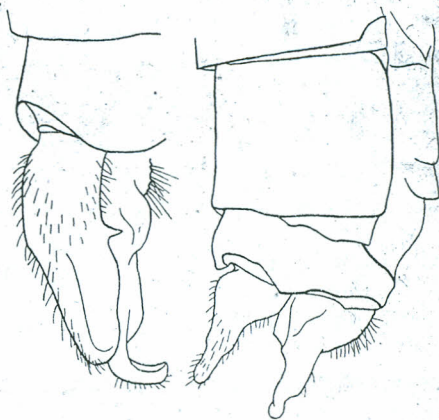


Fig. 9. *Drepanosticta ephippiata*, sp. n. Type. Male anal apps., dorsal view (left half) and right side.

Penis not different in principle from that of *D. mylitta* COWLEY, and allies; shaft-spines long and fine, though not very numerous.

Length: abd. + app. 31.5 (holotype) — 32.2, hw. 21 (holotype) — 22 mm.

Female unknown.

A small species, evidently allied to a group of Philippine species, recently described by COWLEY (Descriptions of three new species of *Drepanosticta* (Odonata) from the Philippine Islands, Trans. Royal Ent. Soc. London, 85, 1936, p. 157 - 168, figs.). It differs from all these by the complete pale band over the thoracic sides, and by the knob-like tubercles along the margin of the posterior lobe of the prothorax. Possibly most closely related to *D. megametia* COWLEY. It is the first member of the genus known from Celebes.

Fam. PROTONEURIDAE.

The Malaysian species of *Elattonaura* COWLEY.

The most recent classification of the "*Disparoneura*-complex", a reference to which is given under each species discussed in the following pages, is that suggested by J. COWLEY, whose arrangement of the various genera composing it will be adopted by the writer.

Malaysia is inhabited by four species of *Elattonaura* (*Disparoneura* olim), two of which are here described for the first time. For an enumeration of the remaining species, all of which are of a more western occurrence, the reader is referred to COWLEY's paper. One may, with tolerable confidence, predict more additions to the Malaysian fauna, though there is reason to suspect that the genus will prove not to occur more eastward than Borneo.

Elattonaura analis (SELYS) (fig. 10a, 11a).

1860. SELYS, Synops. Agrion. Proton. p. 23-24 sep. — ♂♀ Mt. Ophir, Malaya (*Alloneura*).
1886. SELYS, Revis. Syn. Agrion. p. 161 (key), 169 sep. (note). — Same specimens (*Disparoneura*).
1898. KRÜGER, Stett. Ent. Ztg. 59, p. 111 (no descr.). — ♂ def. N.E. Sumatra (*Disparoneura*).
1907. FÖRSTER, Fascic. Malayenses, Zool. 4, p. 11 (no descr.). — ♂ Kuala Kangsar, Perak (*Disparoneura*).
1915. LAIDLAW, Sarawak Mus. Journal, 2, p. 275 (no descr.). — ♂ Baram, Sarawak (*Disparoneura*).
1920. LAIDLAW, Proc. Zool. Soc. London, p. 340 (no descr.). — ♂ N. Borneo (*Disparoneura*).
1931. LAIDLAW, J. Fed. Mal. States Mus. 16, p. 190 (no descr.). — ♂ Pahang (*Disparoneura*).
1936. COWLEY, Ann. Mag. Nat. Hist. (10) 17, p. 518, 523 (synonymy).

Material studied: — Malay Peninsula: 2 ♂ (abdomen partly missing), Kuala Kangsar, Perak, ROLLE vend. 1903 - 1904, labelled "*Disp. analis* SELYS", (in FÖRSTER's hand); pinned specimens in the University Museum of Michigan, Ann Arbor. — W. Borneo: 7 ♂, Singkawang, Piong San Rd. and Tjapkala Rd., April 4 1932 and Dec. 9, 1931; 1 ♂, id., Mampawa, forest-stream near Andjoengan, March 19, 1932; 7 ♂, id., Bengkajang, forest-stream, April-July 1932 and June-Oct., 1933; all L. COOMANS DE RUITER leg. N.W. Borneo, Sarawak,

Lio Matu, Nov. 1, 1914, J. C. MOULTON leg., determined as *analis* by Dr. F. F. LAIDLAW and in his collection.

Male (W. Borneo & Perak).—Anterior surface of the head chrome-yellow to orange. A small, longitudinal black impression on the middle of the labrum. Postclypeus and frons black. A broad, parallel, transverse orange band between the eyes, the borders of which are slightly irregular. Remainder of head black. Antennal joints brownish or orangish basally.

Prothorax: dorsum and sides black; median division with a large, angular dorso-lateral marking and with three pairs of orange spots on mid-dorsum, two of which are placed upon middle of anterior lobe; posterior lobe entire, orange in colour, the median third black.

Synthorax. dark bronzy-green, marked with orange, as in fig. 10a. Venter pale yellow. Legs pale orange, femora with indistinct subapical rings and a brown mottling along the outer sides. Tibiae and tarsi yellowish, darkened interiorly.

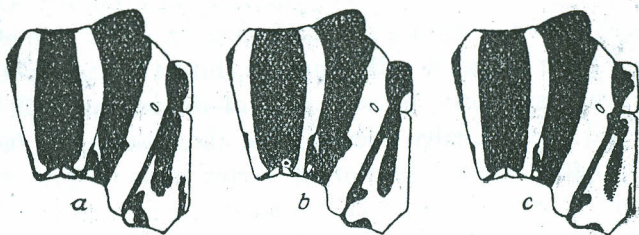


Fig. 10. Diagrams of colour-pattern of synthorax; a, *Elattonneura analis* (SELYS) ♂; b, *E. longispina*, sp. n., ♂; c, *E. longispina*, sp. n., ♀. W. Borneo.

Pterostigma sepia-coloured or blackish-brown. Postnodals $\frac{13-15}{11-13}$

Abdomen: segm. 1 dark brown with a triangular yellow side-spot and the articulation orange. Segm. 2 black with a yellow stripe along lower margin, a small side-spot of the same colour near distal border (often connected with the lower stripe), and a large leaf-like orange spot on dorsum; this dorsal spot is either isolated or connected with the distal margin by a fine line. Extreme bases of segm. 3-6 orange, these segments otherwise lighter to darker brown, with long blackish-brown apical rings and narrow sub-apical yellow annules. The brown ground-colour of these segments gradually deepens posteriorly and is almost black on segm. 6. Segm. 7-10 black, 7 with vestiges of two basal yellow spots and with the articulations between 7-8 and 8-9 also yellow. Distal $\frac{1}{3}$ to $\frac{2}{5}$ of segm. 9 and the whole of segm. 10 orange on dorsum, sides black.

Anal appendages orange, tips of the interior spine of superior pair and apices of inferior pair black (fig. 11a).

Length: abd. + app. 27-30.5, hw. 16-17.5 mm. (♂ Sarawak: 33, 20 mm).

Female.—A full description of this sex has never been published. SELYS' notes on the structure of the prothoracic hind-lobe are quoted *postea*. In the original description the following notes on the colouring are given: "Bandes du thorax d'un vert pâle; la tache du 2e segment en raie. Appendices courts, larges."

I have not seen examples.

Elattoneura longispina, sp. n. (figs. 10 b-c, 11b, 12).

Material studied: — W. Borneo: 1 ♂ Pontianak, Peniti River, Febr. 24, 1931; 2 ♂, Singkawang, Tjapkala Rd., April 4, 1932; 13 ♂, 2 ♀, id., forest-marsh near Bakoean, Febr. 17, 1932 (including holo- and allotype), Jan. 22, 1933 and Jan. 22, 1934. All L. COOMANS DE RUITER leg. — C. Billiton I: 11 ♂, 5 ♀, Aer Madoe, Jan. 20, 1936, F. J. KUIPER leg.

Closely allied to *E. analis*.

Male (ad., W. Borneo). — Anterior surface of the head pure cream-coloured to bright citron-yellow. Labrum with a fine dark mid-basal impression and sometimes with an extremely narrow black border. Anteclypeus in most specimens with two diffuse brownish spots on either side of the middle. Postclypeus and frons black. A rather narrow, bright orange spot, concave anteriorly and convex posteriorly, between each of the lateral ocelli and the margin of compound eye; mesially, the limits of these two spots fade away and merge into the black on the middle of the vertex so as to form a discontinuous transverse band between the eyes. Remainder of head black.

Prothorax black; the dorso-lateral orange markings more reduced than in *analis*; a large triangular spot on each side upon the median division coalescing anteriorly with a side-spot upon the anterior lobe, and vestiges only of orangish spots on the middle of the latter; posterior lobe entire, black in colour, only the lateral edges orange.

Synthorax dark bronzy-green, similarly marked with orange as in *analis* but antehumeral stripes narrower and posterior edge of the metepimerum usually less spotted with black. Venter pale (fig. 10b).

Legs and wing-neuration not different from *analis*. Pterostigma sepia-coloured. Postnodals $\frac{11-14}{11-12}$. Tips decidedly more rounded than in *analis*.

Abdomen: segm. 1 black with the yellow side-marking larger and irregular in outline; articulations orange. Segm. 2 with the sides more extensively yellow than in *analis*, so as to surround a complete, bronzy-black dorso-lateral band which is rather constricted beyond the middle, and, on mid-dorsum, is completely divided into two portions by a very fine orange median line; this line scarcely broadens mid-way its length and in most individuals does not reach the posterior margin of the segment. Segm. 3-6 similarly coloured to *analis* but the basal orange spots interrupted on middle. Segm. 7-10 black, the basal lunules of 7 vestigial or absent and articulations between 7-8 also dark in colour; 10 with an orange spot, narrowed basally, upon mid-dorsum; articulations between 9-10 and a very low triangular spot covering the apical fifth of 9, also pale-coloured; or apical segments wholly black.

Anal appendages orange, tips darkened; or almost black (fig. 11b).

Male (juv.) — Pale colours of head and thorax light blue instead of orange. Abdomen with the first six segments light sepia-coloured marked with white spots and dark brown terminal rings. Pale spots on segm. 10 and 9 whitish, as are also the appendages.

With age and maturity the body-colouring passes through blue, greenish-yellow and pale orange stages to finally acquiring the deep orange tint of the adult.

Male (juv.-ad., Billiton). — All except two males are of the blue colour-stage in which only the transverse fascia between the eyes is more or less orange-coloured; in the two sub-adult specimens the head-markings and antehumeral stripes are bright orange but the thoracic sides have remained blue. No structural or size-differences.

Female (Borneo and Billiton). — Differs from the male only in that the light colours of the thorax and abdomen are paler, those of the head being more extensive. Labrum, genae and mandible-bases

pale yellow to light blue; labrum with a black median point and postclypeus irregularly striped with blue along base (not wholly black, as in the male). The transverse pale band between the eyes is blue instead of orange, of even width throughout and not interrupted on middle.

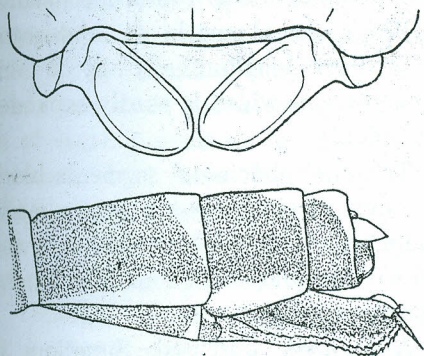


Fig. 12. *Elattonneura longispina*, sp. n. ♀, W. Borneo. Posterior lobe of prothorax (dorsal view), and terminal segments of abdomen (left lateral view).

Abdomen with the bronzy-black marking on the back of segm. 2 constricted after the middle and divided longitudinally by a fine white line; sides of this segment with a diffuse brownish posterior spot. Basal and subterminal annules

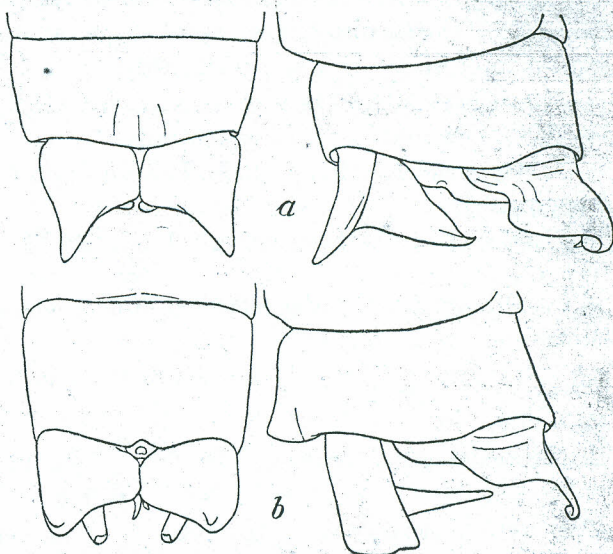


Fig. 11. Male anal apps. of *a*, *Elattonneura analis* (SELYS), dorsal view and right side, and *b*, of *E. longispina*, sp. n. W. Borneo.

Prothorax black, marked with pale blue as in the male; posterior lobe depressed, strongly modified, entirely divided into two ear-like lobes, the side-edges of which only are blue in colour (fig. 12).

Synthorax bronzy-green; pale markings identical to the male. Antehumeral stripes blue, sides paler, turning to yellowish or white underneath (fig. 10c).

Legs yellowish, the brown mottling and rings more definite than in the male. Wings as in the opposite sex.

of 3 - 7 very distinct, those of segm. 7 small, and restricted to the sides. Segm. 8, 9 and 10 deep black, dorsum of each with a very conspicuous, light blue apical spot, widest posteriorly, that on 8 triangular in form and occupying about $\frac{1}{6}$ to $\frac{1}{3}$ of the length, that on 9 suddenly constricted and produced anterad into a narrow median stripe almost reaching the end of segm. 8, that on 10 complete and also triangular in shape. A clear yellow stripe along lower tergal margin of segm. 8 and 9 (fig. 12).

Appendages almost as long as segm. 10, clear yellow, triangular in dorsal view but much flattened dorso-ventrally.

Valves slender, shining black, lower margin straight, tips surpassing end of segm. 10.

Length: ♂ abd. + app. 28 - 29, hw. 16.5 - 17; ♀ 27 - 29, 17 - 18 mm.

As will appear from the following table, the males of this species are easily distinguished from *analis*:

<i>analis</i>	<i>longispina</i>
Labrum and genae orange.	Labrum and genae citron- or creamy-yellow.
Transverse fascia between the eyes broad and complete, bright orange.	Transverse fascia between the eyes narrower and obliterated on middle of vertex, deep orange-red.
Median division of prothorax with orange twin-spot, mid-dorsally.	No orange spots on middle of prothorax.
Black interspace between ventral portions of antehumeral stripe about $1\frac{1}{2}$ times broader than the stripe itself.	Black interspace between ventral portions of antehumeral stripe at least twice broader than the stripe itself.
Black dorsal mark on abd-segm. 2 divided into two equal portions by an oval orange spot which is pointed anteriorly and stalked posteriorly.	Black dorsal mark on abd.-segm. 2 divided longitudinally by a fine orangish line which is hardly expanded on middle.
Articulations between segm. 8 - 9, dorsum of 10 and distal half of dorsum of 9 orange.	Terminal abdominal segments black in adult specimens; segm. 9 at a maximum with a triangular apical spot and 10 with a squarish pale mark in teneral specimens only.
Anal apps. orange. Superiors in dorsal view broad with narrow, pointed tips, provided interiorly with a large, acutely pointed, shelf-like projection. Inf. apps. large, apices narrowed and incurved.	Anal apps. obscured. Superiors in dorsal view flattened and obtuse, in side-view abruptly and almost rectangularly truncated; inner projection in the form of a very long and narrow inferior spur. Inf. apps. broad at base, distal half abruptly narrowed, with slenderly incurved end-hooks.

Although I have not seen specimens, the female of *analis* seems to differ from *longispina* by the shape of the posterior lobe of its prothorax: "Lobe postérieur du prothorax très-largement échancré, les côtés formant deux lobes élevés en pointe et deux lobes déprimés". In *longispina* the side-edges are depressed and rounded off, while the lobes are of large size and in the form of depressed, ovoid, and shiny black cups (fig. 12).

***Elattoneura coomansi*, sp. n. (fig. 13).**

Material studied: — W. Borneo: 2 ♂ Pontianak, Mt. Ambawang, March 13, 1931; 3 ♂, 4 ♀, Singkawang, forest-marsh near Bakoean, July 20, 1932; all L. COOMANS DE RUITER leg. — Banka I.: 2 ♂, between Pangkal Mundoe and Aer Pandan, Sept.-Oct., 1929; 6 ♂, Pangkal Mundoe, Oct. 1929 & Sept. 10, 1931, J. VAN DER VECHT leg. — Billiton I. (SW): 1 ♂, 3 ♀, Kepang, April 13, and 1 ♂ (W), Seroe, June 16, 1936, F. J. KUIPER leg.

Male (ad.). — Head coal-black, lustreless, except the labrum which is rather shiny; labium dark flesh-coloured, tipped with black. Pro- and synthorax also dull black without any pale markings except the poststernum, which is slightly paler (purplish brown). Thoracic sides, coxae and underparts pruinose blue.

Legs black, tarsal claws brown. Wings uncoloured but membrane tinged with greyish-brown in aged individuals. Pterostigma brownish-black, surrounded by a fine pale line; lozenge-shaped, with the distal side rather convex. Nodal

index $\frac{14-17}{13-15}$.

Abdomen very slender, unicolorous black, with faintest indication of dark brown spots along-side of segm. 2 and at extreme base of 3; subterminal rings obsolete in sub-adult specimens and sides of segm. 1 pruinose in aged individuals. Last three intersegmental rings possibly green or blue in life.

Anal appendages: superior pair blackish-brown; inferiors dirty yellow-brown, tips black (fig. 13a). The inferior tooth-like projection of the upper pair of appendages very large, its lower margin often concealed (not so in our drawing).

Female (ad.). — Labium brownish-yellow, tips of side-lobes darkened. Labrum, genae, base of mandibles and anteclypeus yellow-brown, the labrum with a dark mid-basal impression. Head otherwise black, with an indistinct

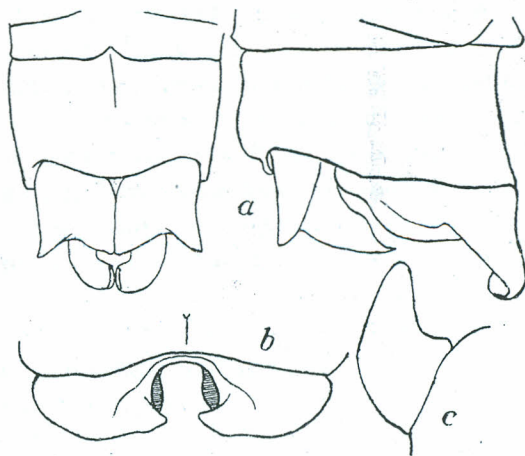


Fig. 13. *Elattonneura coomansi*, sp. n. W. Borneo. a, male anal apps., dorsal view and right side; b, female posterior lobe of prothorax, dorsal view and c, the same, right side.

brownish stripe between the antennae, crossing the anterior ocellus. Basal joints of antennae brown.

Prothorax bronzy-black with a large, pale brown spot on the middle portion and with the side-edges of the posterior lobe also pale. Posterior lobe deeply excised on middle, forming two lobes, the lateral portions of which are rounded and depressed, the inner ones bending straight upwards and somewhat inwards and forwards, in such a way as to nearly meet one another in the median line; the tips are bluntly pointed (fig. 13b-c).

Synthorax dull bronzy-black as far down as the first lateral suture; mesepimerites with slight dark metallic-green shine. Sides purplish flesh-coloured, with the metinfraepisternites mainly black and with an isolated, bronzy-green stripe on middle of the metepimerum. Dorsal end of second suture and lower edge of metepimerum also with a dark spot. Ventral surfaces and coxae flesh-coloured, thinly pruinulent.

Legs pale brown, apices of femora and spines dark brown.

Wing-membrane smoky, especially along the nervures. Pterostigma rather higher than in the male, blackish-brown.

Abdomen dark brown above, or wholly black, paler along the sides; segm. 3-6 with blackish-brown apical rings and with very small, paired, basal yellow annules on segm. 3-7 (often indistinct or absent altogether). Segm. 8 and 9 black, tergites of each with a thick, greenish-yellow stripe along lower margin, that on 9 being widest. Segm. 10 obscure blue (or green?), save for a narrow, black basal stripe, nearly interrupted mid-dorsally.

Anal appendages also blue-green in colour, triangular in outline, flattened dorsally, with bluntly pointed tips. Valves brown, basal two-thirds of lower margin straight in lateral aspect, distal third widened, with the lower margin convex, surpassing apex of segm. 10.

The females from Billiton differ from those of Borneo in that the dorsum of the 9th abdominal segment bears an additional bluish-green spot (roundish or triangular in shape) on the apical half of the segment.

Length: ♂ abd. + app. 27-29.5, hw. 18-19; ♀ 28-30, 20-21 mm.

By its sombre colours this new species comes nearest to *E. tetrica* (LAID.) and *E. nigerrima* (LAID.), from Peninsular India, but it differs from both by the black face, lacking bluish spots entirely, and by the armature of the female prothorax and male appendages.

I have named it in honour of Mr. L. COOMANS DE RUITER, who discovered so many new species in Western Borneo.

Elattoneura aurantiaca (SELYS) (fig. 14).

1886. SELYS, Revis. Syn. Agrion. p. 161 (key), 169-170 sep. — ♂♀ Sarawak (*Disparoneura*).

1913. LAIDLAW, Proc. Zool. Soc. London, p. 76 (note) (*Disparoneura*).

1936. COWLEY, Ann. Mag. Nat. Hist. (10) 17, p. 518, 523 (synonymy).

Material studied: — S. Sumatra: 2 ♂, Lampong Res., Terbanggi-hilir near Menggala, Aug. 14, 1936, MAX BARTELS leg. — W. Borneo: 4 ♂, Pontianak, Peniti River, Febr. 24, 1931; 10 ♂, 2 ♀, Singkawang, forest-marsh near Bakoean, Febr. 17 and July 19 - 20, 1932; 1 ♂, idem, Tjapkala Rd., April 4, 1932; all L. COOMANS DE RUITER leg. — Banka I.: 1 ♂, Kali Mundoe, Sept. 10, 1931, J. VAN DER VECHT leg. — Billiton I.: 10 ♂, Tjeroetjoek, Aug., Sept. and Dec. 1935, April and Sept. 1936; 3 ♂, Roewah, Sept. 17, 1935; 1 ♂, Tandjong Pandan, July 22, 1936; all F. J. KUIPER leg.

This species, which is apparently rather a common insect where found, has not been recorded from anywhere since the original description was published some fifty years ago. Some descriptive notes are here given in addition to those already given by SELYS.

Male (ad.). — Labium yellowish; genae, labrum and anteclypeus pale creamy-yellow with slight greenish intermingling; labrum with a dark basal impression. Postclypeus and frons Pompejan-red (RIDGWAY), the latter with a bronzy-black patch between the base of antennae and the eye-margin, and an indefinite, dark, transverse line between the antennae. A transverse, Pompejan-red band connecting the eyes and crossing the vertex, where it is widest. Occipital lobes, occiput and rear of the head dark bronzy-green, slightly pruinose-blue underneath. Basal joints of antennae yellow-brown, remainder black.

Prothorax Jasper-red above, with the sutures only black; sides pale, pruinose.

Dorsum of synthorax (inclusive of the ante-alar triangles) with a complete, median longitudinal band, bronzy-green in colour and occupying the inner two-thirds of each mesepisternite, which, for the rest, is bright Jasper-red in fully coloured specimens. Thoracic sides, as far down as the second lateral suture, Jasper-red, with rudiments only of bronzy-green stripes along upper end of the three sutures, that along first lateral suture longest. Mesinfraepisternites, lower portion of mesepimerum and metepisternum (ventral to the spiracle), and most of the metepimerum pale yellowish or whitish, thinly overled with light blue pruinescence. Ventral surfaces also pale, slightly pruinose-white. Coxae pale, pruinose exteriorly.

Legs pale yellow; femora with indistinct sub-apical rings and with the apices also brown. Tibiae and tarsi unmarked.

Wings hyaline, or slightly tinged with brown along the nervures. Pterostigma almost square, very slightly widened distally. Nodal index $\frac{13-15}{11-12}$.

Abdomen shaped and coloured as given in the original description. Articulation between segm. 1-2 finely black and sides of these segments usually pruinose-white.

Anal appendages dirty orangish, superior pair usually brownish above, and apex of inferior tooth also darkened; shape as described in the original diagnosis (fig. 14).

Female (ad.). — Differs from the male in that the mouthparts are pale bluish-green, the band between the eyes being wider and coloured yellow anteriorly and pale blue posteriorly. The bronze-green band on the dorsum of the thorax is joined on either side by a rusty-brown stripe, which is ill-limited

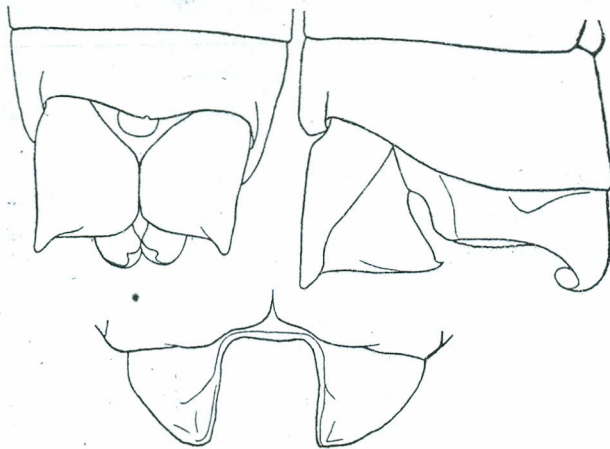


Fig. 14. *Elatoneura aurantiaca* (SELYS), W. Borneo. Male anal apps., dorsal view and right side; bottom: posterior lobe of ♀ prothorax, dorsal view.

laterally and merges into the fleshy or creamy-yellow colour of the sides.

Prothorax wholly pale in colour; shape of posterior lobe as described by DE SELYS, the two lobes subtriangular in outline and rather concave dorsally but only slightly elevated (not "fortement redressées"!) (fig. 14).

Abdomen light brown, darker posteriorly. Antepical pale spots of segm. 3 - 6 less distinct than the

fine, white, basal annules; apical rings dark brown. Segm. 8 - 10 lighter to darker brown. Valves slender and straight, pale brown in colour, apical portion slightly convex below; tips of valves not projecting beyond the tuberculum.

Size variable: ♂ abd. + app. 29.5 - 35, hw. 17.5 - 21; ♀ 30 - 32, 19 - 19.5 mm.

Descriptions of two new species of *Prodasineura* COWLEY.

Pending a revision of the genus *Prodasineura* (*Caconeura olim*), for which an examination of a number of types and of more material from other regions seems very needed, I am able in the following to supply in advance the diagnoses of two new species from W. Borneo, thanks to the rich amount of material sent to me for some years by Mr. L. COOMANS DE RUITER. Although I believe them to be well characterized and readily recognizable species, I hope to publish a more detailed account of them later; in addition to the descriptions and for comparison with the terminal abdominal appendages of other species of the genus, I figure outline drawings of the same parts of the males described hereafter as new, but detailed sketches of the female prothoracic organs will be supplied later.

Prodasineura tenebricosa, sp. n. (fig. 15).

Material studied: — 3 ♂ (ad.), W. Borneo, Singkawang, forest-brook near Bengkajang, Oct. 11 - 28, 1932 and June 15, 1933; 1 ♂ (ad.), same loc., Piong San River, Dec. 8, 1931; 4 ♀ (one juv.), same loc., Raja River near Montrado, Oct. 22, 1931. All L. COOMANS DE RUITER leg. Holotype ♂ Bengkajang, June 15, 1933, allotype ♀ Raja River, Oct. 22, 1931.

Male (ad.). — Squamae of labium yellowish. Head otherwise entirely black, save for a minute reddish spot on either side between the posterior ocellus and the antenna. Mouth-parts, genae and frons shiny.

Pro- and synthorax throughout deep black without any pale markings other than a short, pale yellow ventral stripe joining the spiracle of the thoracic sides, a very fine whitish line along middle of the second lateral suture, and a similar, slightly broader, whitish stripe along lower margin of metepimerum. There is also a white point below the sinuses of the hind wings on top of the second suture. Venter of thorax clear greenish-white, with a broad, black longitudinal band on each side along margin.

Legs black; whitish marks about the articulations of coxae and trochanters, and a white ring round the base of the femora; all tibiae creamy-white exteriorly. Tarsal claws distinctly toothed apically.

Wings very narrow, hyaline. Superior sector of the triangle in front wing reaching posterior margin of the wing slightly before the middle of or to the very end of the first cell following the quadrilateral, in the hind wing ending at or slightly before the subnodus; inferior sector of the triangle absent. Post-nodals $\frac{14-15}{12-13}$. Pterostigma rather oblique and about one and one half times longer than wide, very slightly widened apically, covering slightly more than one underlying cell; deep black.

Abdomen long and excessively slender; shining black. Segm. 1 with a dull yellow side-spot, the lower margin and the transverse articulation between 1 and 2 also pale. Segm. 2 entirely black, save for a sharply delimited fine white line along lower margin. Each of the segments 3-7 has no other marks than an extremely narrow (though sharply defined) white dorso-lateral basal ring, incomplete below. Remaining segments and anal appendages deep black. Appendages shaped as in fig. 15.

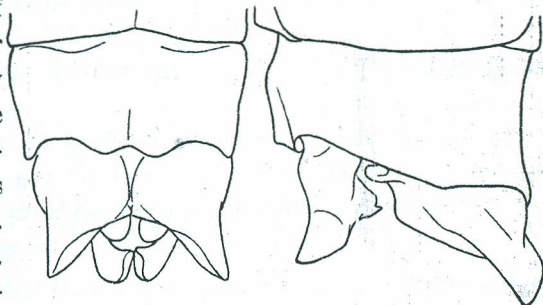


Fig. 15. *Prodasineura tenebricosa*, sp. n. Male anal apps., dorsal view and right side.

Female (ad.). — Labium yellowish-white, the lateral lobes black. Anterior surface of head shining black; mandible-bases with a triangular whitish spot, separated from a white point on the extreme base, next to each gena. Head otherwise coloured as in male, the reddish spot between posterior ocellus and antenna larger, rather triangular in outline and clearly defined.

Prothorax entirely black; posterior lobe perpendicularly raised, middle portion low and straight-margined, the lateral edges produced on either side into triangular, ear-like lobes, broad at base, placed in the transverse axis of the body and directed straight upwards.

Synthorax deep black; yellowish-white side-markings similar in principle to

the male but slightly enlarged: the fine line along second suture does not extend entirely upwards but ventrally coalesces with the pale band along lower margin of metepimerum, which is a little broader than in the opposite sex, though not extending upwards for the entire length. Venter of thorax palest greenish-white, the black longitudinal band on either side of the middle obsolete.

Legs as in male, basal fourth of the inner surfaces of posterior femora with an additional yellow stripe, widest basally.

Wings hyaline, neuration not different from the male. Pterostigma very dark brown.

Abdomen long and slim, throughout shining black. Segm. 1 with the sternite and a spot on the side dull yellow; 2 as in male and with a vestige of a pale postero-lateral spot. Whitish basal lunules of segm. 3-7 also similar though obscured. Segm. 8-10 and appendages deep black, 8 and 9 each with a sharply defined bluish-white stripe along lower margin of the tergite, that on 9 widest. There is a fine, pale line along the posterior border of segm. 9 and 10, while the last segment bears a strong median longitudinal keel. Anal appendages vestigial, black. Valves short and slender, not surpassing the end of abdomen but distinctly projecting ventrally along with the 8th sternite, whose ventral margin, in profile view, is in line with that of the valves.

Length: ♂ abd. + app. 31.5-32, hw. 19-20; ♀ 32-33, 20 mm.

This species evidently comes nearest to *P. gracillima* (SELYS), doubtfully recorded from Celebes (or Borneo?), but it differs from that species by the genae and the base of the labrum being shining black instead of pale-coloured; moreover, the colouring of the thoracic sides and abdomen is entirely different in the two species, and there is no median longitudinal line on the abdominal segments 2-4. The female of *tenebricosa* also does not fit SELYS's description of *gracillima*.

It is unfortunate that the male of *P. gracillima* was described from an imperfect specimen, with the last segments of abdomen missing.

In addition to other characters, both sexes of *tenebricosa* may be distinguished from other species of the genus by the conspicuously white outer surfaces of the tibiae.

***Prodasineura haematosoma*, sp. n. (fig. 16).**

Material studied: — 17 ♂, 7 ♀, W. Borneo, Singkawang, forest-brook near Bengkajang, April to December, 1932, June and December, 1933; 3 ♂, 1 ♀, same loc., near Oedoek, Dec. 12, 1931; 1 ♂, same loc., near Penaring, March 18, 1932. All L. COOMANS DE RUITER leg. Holo- and allotype Bengkajang, June 15 and Oct. 13, 1933.

Male (ad.). — Head entirely black above and below, save for a fine yellowish line on base of labium; face glossy black. Prothorax entirely black. Synthorax deep black with slight bronzy reflections above; a narrow yellow metepisternal stripe across the spiracle: either straight, complete and fairly

broad (semiad., Penaring), or widest below, tapering dorsally and extending for about two-thirds of its length from the anterior margin. Lower border of metinfraepisternites and metepimerum with a yellow margin, widening dorsally to form a triangular marking filling up the postero-dorsal edge of the metepimerum. Ventrally the thorax is yellow, save for two sharply defined black bands, incomplete anteriorly, on either side of the middle.

Legs black; coxae marked with yellow apically, trochanters yellow, black at the articulations. First two pairs of femora with a yellow ring at base, posterior femora with the basal half of the inner surfaces also yellow; posterior two pairs of tibiae striped with yellow exteriorly. Tarsal claws distinctly toothed.

Wings narrow, hyaline or slightly tinged. Superior sector of the triangle in front wing ending one cell proximal to, at the level of, or half a cell distal to the subnodus, in the hind wing ending at one cell proximal to, at the level of, or to slightly beyond the subnodus; inferior sector of the triangle absent.

Postnodals $\frac{13-15}{11-12}$. Pterostigma normal, covering one cell, black.

Abdomen deep black, marked with carmine above, as follows: segm. 1 black, except a triangular yellow side-spot along hind margin; 2 with a longitudinal carmine spot, occupying the anterior three-fourths of the dorsum, almost touching anterior margin but suddenly tapering posteriorly and ending in a fine point; occasionally the apex of this spot is prolonged backwards and attached to the posterior margin of the segment. Dorsum of segm. 3-6 with carmine bands, running nearly the whole length of segment, the apical eighth or ninth of these segments bearing sharply defined, deep black rings. Segm. 7-10 black.

Anal appendages shaped as in fig. 16. Superior pair clear yellow, the ventro-apical*teeth black;

interior tooth-like projection smaller than the terminal ventral tooth and directed obliquely inward (not visible in dorsal view). Inferior appendages reddish-brown, apices incurved, black.

Female (ad.). — Differs considerably from the male.

Labium as in the opposite sex; labrum, mandible-bases and a mesial spot on the genae clear yellow, the labrum with a round black mid-basal impression and with the margin also black. Head otherwise black, with a very fine but complete pale orange line connecting the eyes across anterior ocellus, just behind the antennae; this stripe occasionally a little widened on both sides. Antennae dark brown. Rear of the head black.

Prothorax black with three pale orange dots on each of the lobes, the anterior two confluent. Posterior lobe erect, hind margin produced on either

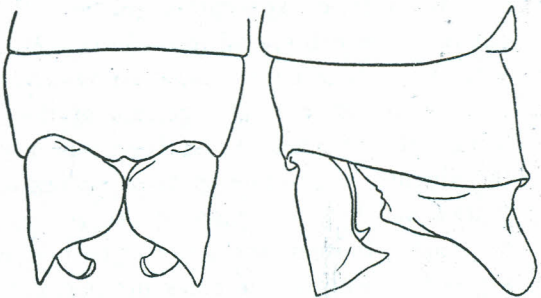


Fig. 16. *Prodasineura haematosoma*, sp. n. Male anal apps., dorsal view and right side.

side so as to form a bluntly pointed, horn-like projection, flattened in the transverse plane, directed upwards and then forwards.

Synthorax black with narrow, almost straight, pale orange antehumeral stripes, which are evenly narrowed upwards, tapering to a fine point, ceasing at about $1\frac{1}{2}$ to $\frac{1}{2}$ mm before the ante-alar triangles. These black, each with a fine, orange, transverse spot on middle.

Thoracic sides deep black, each with a complete, well defined yellow metepisternal band along first suture, including the spiracle. Metepimerum also yellow posteriorly, the metinfraepisternites for the greater part black. Under surfaces clear yellow, marked with black as in the male.

Legs yellowish but all femora striped with black exteriorly, and anterior tibiae also with a black line.

Wings clear, neuration as in male. Pterostigma pale greyish-brown.

Abdomen slender, dull sepia-brown, paler beneath. Dorsum of segm. 1 dark brown, with a yellow side-spot; 2 also darkened above, with indistinct pale median line. Base of 3 with distinct though small yellow twin-spot, and 4-6 also with an indication of minute basal and subterminal pale spots. Last four segments not or scarcely darkened, uniform brown. Valves small and but slightly projecting ventrally, tips not surpassing anal appendages.

Length: ♂ abd. + app. 29-31, 16.5-18; ♀ 28.5-32, 17-19 mm.

Allied to *P. hyperythra* (SELYS); *P. hosei* (LAIDLAW) and *P. peramoena* (LAIDLAW), which are all from Borneo. *P. haemosoma* differs from *hyperythra*, with which it is most closely related, by the shiny black labrum, by the differently coloured basal segments of the abdomen, and by the segments 7-8 being entirely black. From *hosei* our new species differs by the black genae, the absence of carmine spots or stripes on the prothorax and dorsum of synthorax, and by the carmine dorsal stripes on segments 4-6 of abdomen. From *peramoena* the new species is to be distinguished by the absence of a red line across the head, by the black prothorax, and by the presence of carmine dorsal stripes on segments 4-6 of abdomen.

Fam. AGRIONIDAE.

Pseudagrion coomansi, sp. n. (figs. 17 and 18d).

1916. RIS, Supplem. Entom. no. 5, p. 41 fig. 17 (apps. ♂), 42. — ♂ Sintang, W. Borneo (*microcephalum*).

Material studied: — N.E. Banka I.: 1 ♂ (ad.), Pangkalpinang, Nov. 1, 1929, J. VAN DER VECHT leg. — Billiton I.: 30 ♂, 8 ♀ (ad.), distributed all over the island and fairly common, F. J. KUIPER leg. — W. Borneo: 3 ♂ Singkawang, Bengkajang Rd., Nov. 16, 1931; 12 ♂, 1 ♀, same loc., Patengahan Rd., Dec. 1931, Febr. 18, July 19-20, 1932, and Jan.-Febr. 1933; 2 ♂, same loc., Montrado, Oct. 22, 1931. All L. COOMANS DE RUITER leg. Holotype ♂ Montrado, Oct. 22, 1931, allotype ♀ Patengahan, Febr. 18, 1932.

Male (ad.). — Labium pale yellow. Anterior surface of head, as far upwards as level of anterior ocellus, apple-green, unmarked, save for a black basal point on the labrum, and three more or less confluent black spots on postclypeus. First joint of antennae blue, the remainder black. A transverse, bronzy-black fascia across the ocelli connecting the eyes. This transverse band is irregularly delimited anteriorly, projecting somewhat anterad between median ocellus and each of the antennae; there is besides, a black, rather crescent-shaped point on the middle of frons, situated between the base of antennae. Rearward, the black cross-band continues on each side along the margin of compound eye, enclosing large, sky-blue (? green) postocular spots, which are just separated from a transverse green bar at occipital margin. Rear of the head black, slightly pruinose, with a broad greenish stripe along the eye-margin.

Prothorax black above, blue along sides; dorsum with a large, rectangular blue spot in the centre, which is divided mesially by a narrow, longitudinal, black line, and with ε blue point on each side. Anterior and posterior lobes likewise blue.

Synthorax striped with black as appears from fig. 18d. Antehumeral bands broad, slightly indented by black dorsally. Sides with a conspicuous black dot between ante-alar border and the spiracle, and with a crescent-shaped spot at dorsal end of second suture. Venter and coxae pale bluish-green or rather yellowish or ochreous, both slightly powdered with blue.

Legs green, femora with a thick black stripe along their outer sides and with the knees also black; tibiae and tarsi ochreous, the last tarsal joint and claws darkened apically. Spines blackish.

Wings clear or tinged with greyish-brown. Postnodals $\frac{10-11}{8-9}$. Pterostigma diamond-shaped, dark sepia-brown.

Abdomen slenderer and apical segments a little more widened than in *microcephalum*, but less so than in *nigrofasciatum*. Blue, marked with black on dorsum, as follows: — segm. 1 with a black spot at base. Segm. 2 with a broad, rectangular, black marking occupying the entire dorsum, except posteriorly, where it is suddenly constricted and connected with the posterior margin by a tiny, short stalk; near its base this black spot encloses a distinct central spot of blue. This anterior blue spot varies greatly in size and form: in the majority of specimens it is rectangular in outline but in others it is reduced to an oval spot. In others still, the black dorsal mark is rather narrowed anteriorly and in the form of a fork-like structure, the prongs of which do not extend as far as the base of segment.

Dorsum of segm. 3-6 with complete, longitudinal, bronzy-black bands, growing wider from before backwards and touching the anterior margin of segments; on segm. 3 it is gradually narrowed anteriorly but not pointed. On the base of each of these segments there are thus only small blue spots interrupted by the median line. Segm. 7 entirely black dorsally; 8-9 sky-blue, each with a thick black ring along posterior margin. Dorsum of 10 black, sides blue.

curved a little dorsad and only visible in oblique postero-dorsal view (see fig. 2, LIEFTINCK, loc. cit., and fig. 49, SCHMIDT, loc. cit.) angulate or tooth-like projection, which is placed further distad and hence is always plainly visible in dorsal view (fig. 17).

The specimens from Billiton I. do not differ much from typical examples of *W. Borneo*. They are on average larger and the black spots on the labrum and the postclypeus may be reduced or absent; on the other hand, in a few specimens the median portion of the transverse black band between the eyes extends anteriorly to a level between clypeal suture and anterior ocellus, thus assimilating the crescent-shaped median spot.

P. coomansi in some respects resembles also *P. microcephalum* and may be mistaken for it. In *W. Borneo* as well as in Billiton, these two species fly together and are equally common, at least in certain localities in Billiton. *P. coomansi* is easily distinguished from it by its slender forms, the conspicuous black spot on the thoracic side, the blue-framed black band on dorsum of segm. 2 of abdomen, and by the widely different appendages.

A single ♂ from Sintang, *W. Borneo*, described and figured by RIS (loc. cit.) as *microcephalum*, almost certainly belongs to *P. coomansi*. The sketch of the appendages of this male strongly suggests *coomansi*, as does the description of the peculiar shape of the dorsal spot on segment 2 of abdomen: "eine extreme Form der Zeichnung zeigt das ♂ von Sintang, ein Rechteck von drei Viertel der Segmentlänge mit schmalem terminalem Stiel und blauem Punkt in der Mitte." (loc. cit. p. 42).

The number of blue-and-black *Pseudagrion* is steadily increasing with a better knowledge of the Malaysian fauna, and the discrimination of the many Oriental species is growing difficult.

***Pseudagrion celebense*, sp. n. (figs. 18c and 19).**

1916. RIS, Suppl. Entom. 5, p. 40-42 fig. 18 (apps. ♂). — ♂♀ Paloe and Takala Mts., N. & S. Celebes (*microcephalum*).

Material studied: — N.W. Celebes: 3 ♂ (ad.), Paloe, Jan. 1937, AWIBOWO leg. Central E. Celebes: 1 ♂ (imperfect), 1 ♀ (ad.), Kali Tominanga, Aug. 22, 1932, Prof. Dr. R. WOLTERECK leg. — N. Halmahera I. (Northern Moluccas): 3 ♂ (ad.), Tobelo, June-July, 1931 and April 1933, M. J. VAN DIEJEN leg. Holotype ♂ Paloe, Jan. 1937; allotype ♀ Tominanga, Aug. 22, 1932.

Stature of *P. calosomum* LIEFT. and *australasiae* SELYS, but nearest to *schmidtianum* LIEFT. and *pelecotomum* LIEFT.

Male (ad.) — Deep blue and black. Labium whitish. Anterior surface of head, as far upwards as level of anterior ocellus, pure azure-blue, without any dark markings. First antennal joint blue, remainder black. A transverse black fascia across the ocelli connecting the eyes, slightly irregularly delimited in front as well as posteriorly. Postocular spots large, azure-blue, touching the eye-margin laterally in one point. Occiput with a transverse, whether or not

isolated, blue median stripe. Rear of the head black, slightly pruinose, with a blue stripe along the eye-margin.

Prothorax blue; dorsum, the anterior lobe excepted, black with a squarish mid-dorsal blue twin-spot and a circular spot on either side of this; the posterior lobe also finely bordered with blue.

Synthorax azure-blue, marked as in fig. 18c, the median and humeral black stripes rather broad.

Coxae and legs blue, all femora with their outer sides sharply defined deep black; tibiae and tarsi yellow, the tarsal joints black apically. Spines black.

Wings hyaline, pterostigma pale brownish, very oblique but with parallel sides, almost twice longer than deep. Postnodals $\frac{11-12}{9-10}$.

Abdomen azure-blue and black; terminal segments

but slightly widened in lateral dimension. Segm. 1 with a transverse dorsal basal spot, its posterior margin finely black laterally; 2 blue with a small, definitely triangular, dorsal subapical black spot not extending anterad beyond the middle of segment and connected to a narrow apical annule by a short linear stalk. Segm. 3-5 with moderately broad dorsal bands pointed anteriorly

and connected with the posterior rings of preceding segments, expanding sub-apically and then contracting again to join narrow apical annules; 6-7 similar but expanding continuously as far as apex of segment; 8-10 azure blue, 8 with extremely narrow black

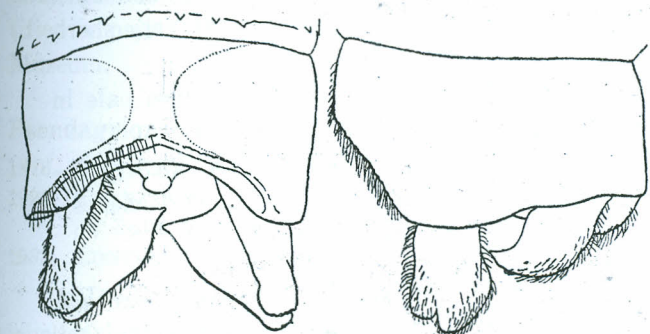


Fig. 19. *Pseudagrion celebense*, sp. n. Paloe (type). Male anal apps., dorsal view and right side.

apical annule and 10 with a tiny X-shaped marking covering little of the dorsum. Segm. 10 very short.

Anal appendages very short, black, shaped as in fig. 19. Superiors with the interior shelf-like projection enormous in size, concave dorsally and much

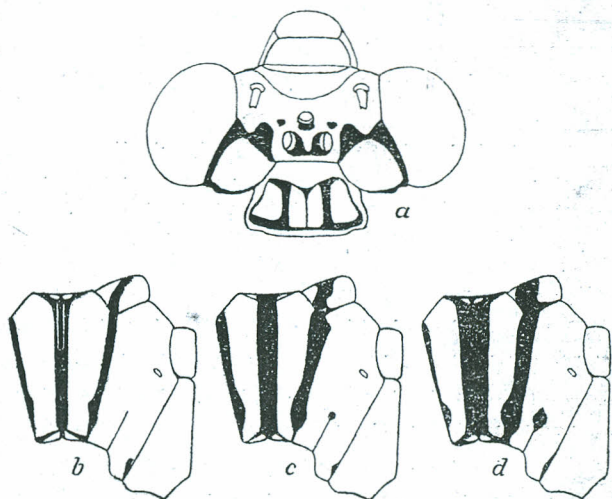


Fig. 18. Dorsal view of head of ♂ *Pseudagrion papuense* TILL. (Queensland, a), and diagrams of thoracic colour-pattern of ♂ *P. papuense* TILL. (b), *P. celebense*, sp. n. (c), and *P. coomansi*, sp. n. (d).

widening basally, terminating into a pointed end-hook, which is directed mesiad; the median portion of this interior projection bears a large, yellowish spot. Inferior apps. yellow, in ventral view with the basal half toothed interiorly, the apical portion upcurved and strongly pointed.

In one of the paratypes the dorsal end of the black humeral fascia, after being constricted somewhat, is recurved laterally, entering with its apex the mesepimerum for a short distance, and in the third specimen from Paloe the 9th abdominal segment, in addition to the 8th, is finely margined with black apically.

Female (ad., allotype). — Closely similar to the male but differing as follows. Labrum with anterior margin yellowish and with three black points along base: one median spot and two lateral, marginal ones. Postclypeus darkened. Black transverse band between the eyes broader and postocular spots a little smaller.

Prothorax largely black: anterior lobe with a transverse green stripe, median division with the pale twin-spot on mid-dorsum smaller, and with a roundish pale spot on each side of it; sides greenish, pruinose; posterior lobe black, its margin slightly raised, finely bordered with yellow, the horns extremely short.

Ground-colour of synthorax yellowish-green instead of azure-blue; otherwise *exactly similar to the male*: with the same three black stripes; sides rather more yellow than green. Venter pale, pruinose-white.

Legs as in male. femora with black markings less in evidence (narrowed basally) but also extending along their full length. Wings as in male.

Abdomen dark greenish (discoloured). Black markings wider than in the male but very similar in principle, progressively broader from base to apex. The black longitudinal mark on segm. 2 extending its whole length, triangularly widened before the apex but continued basad as a narrow median stripe. Segm. - 10 apparently pale-coloured (green?), with traces of two subterminal black spots, one on each side of the middle, on 8 and 9. Tenth segment very short, whitish, with a triangular black median spot along base.

Anal appendages darkened, shorter than segm. 10, conical. Valves pale in colour, not reaching apex of last segment.

Length: ♂ abd. + app. 28.5, hw. 18.5 (type); 29.5 - 31.5, 19.5 - 20.5 (paratypes); ♀ 31, 22 mm. (RIS: ♂ 30 - 32, 19 - 21, ♀ 31, 21.5 mm) [all from Celebes].

♂ abd. + app. 31.5 - 32.5, hw. 20.5 - 21 mm. [Halmahera].

This is decidedly not *P. microcephalum* (RAMB.), as was thought by RIS (c. cit.), who gave a description and an outline-sketch of the male appendages of specimens given to him by Dr. L. MARTIN and collected in the same locality whence our typical series came.

The ♂ of *P. celebense* is abundantly differentiated from *microcephalum* by its more robust build and the enormous development of the interior division of the upper appendage, with its single basal tooth, which will serve to its easy recognition. When seen from aside, the superior pair of appendages is

but slightly notched apically, and the upper branch is much the smaller and at the same time shorter than the lower one; the inferior appendages also differ very markedly from those of *microcephalum*: they are curved upwards and taper gradually to a fine apical point, thus resembling those of *P. schmidtianum* LIEFT. (Timor), *pelecotomum* LIEFT. (New Guinea) and *papuense* TILLYARD (S. New Guinea and Queensland), three species with which it possibly forms a rather natural group, distinguished from other blue species of the Oriental region by the shortness of the 10th abdominal segment, the declivous blue sub-anal plate (situated posteriorly to the hind margin of the segment and the anal wall), and by the shape of the inferior appendages.

The ♀ of *celebense* resembles that of *australasiae* SELYS (= *bengalense* LAIDLAW), which, so far as I know, is the only other species known to occur in the Malay Archipelago having isochromatic females.

This is in full accordance with RIS's notes on the supposed ♀ polymorphism of "*microcephalum*" (sens. lat.); on page 43 of his paper, he remarks:

b) Bei einigen Exemplaren erscheint eine vollständige aber unregelmässig buchtige schwarze Linie auf der Schulternaht und Teile feiner schwarzer Linien, die jederseits in geringem Abstände die Mediannaht begleiten (das eine ♀ von Palu [and from] Gladstone)". — These are possibly *microcephalum*.

c) Eine fast völlig andromorphe Form mit schwarzer Zeichnung auf der Dorsalseite des Kopfes fast wie beim ♂, breiter schwarzer Binde auf der Mediannaht des Thoraxdorsum, schwarzer Linie auf der Schulternaht (Ceylon-BUGNION [probably *australasiae* or an allied species], und das zweite ♀ von Palu) [certainly *celebense*].

The true *P. microcephalum* occurs also in Celebes and differs but slightly from the western (Malaysian) type. I possess a quite typical ♂ from Mapangat, near Menado (N. Celebes), a ♀ from Makassar (S. Celebes), and lastly, I identified a pair from the Lompo Batang Mts., in S. Celebes, for the Hamburg Museum.

***Pseudagrion papuense* TILLYARD (figs. 18a-b and 20).**

1876. SELYS, Synopsis Agrion., p. 506. — ♂ and ♀, Queensland (*australasiae*, pars).

1926. TILLYARD, Rec. Australian Mus. 15, p. 159 - 160. fig. 1 - 2 (apps. ♂ and body). — ♂♀ Lake Murray, S. New Guinea.

1932. LIEFTINCK, Nova Guinea 15 Zool. 5, p. 567 (key ♂).

Material studied: — Australia: 1 ♂ (ad.), E. Queensland, Rockhampton, labelled: "R/32"/*Pseudagrion Australasiae* Selys ♂ Rockhampton (purple label in SELYS's handwriting)/gold/*Pseudagrion australasiae* Selys (Museum-label). Metatype of *australasiae*, in the Brussels Museum.

This specimen is of considerable interest inasmuch as it served to SELYS's description of *P. australasiae* (= *bengalense* LAIDLAW) in the Synopsis, along with the typical series of *P. Besoar* (Malaya). As I have pointed out elsewhere ("Konowia", 15, 1936, p. 167 - 170, figs.), the name *australasiae* should be

applied in the first place to the specimens from P. Besoar, while the Queensland specimens might be referable to an other species.

Now, our specimen from Rockhampton, labelled by SELYS himself *australasiae*, is certainly quite distinct from that species, as it is from any of the other described forms, except *P. papuense* TILL. I have not been able to satisfy myself that this specimen is certainly the true *papuense*, but although I had no occasion to obtain a paratype for comparison, I can give no reason for

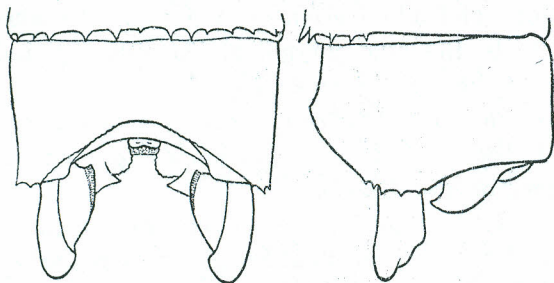


Fig. 20. Male anal apps. of *Pseudagrion papuense* TILL. from Queensland, dorsal view and right side.

supposing that it is not correctly referred to that species.

In the structure of its appendages it agrees perfectly with TILLYARD'S sketches of these organs. As regards colours, our example shows less of the extreme reduction of black marks upon head and thorax, but the face is without black spots (fig. 18a). On the

other hand, the markings of the abdomen, especially the isolated, trapezoidal, black mark dorsally towards the apex of segm. 2, strongly suggests *papuense*, as do the other body-markings. In our specimen the 10th segment bears an X-shaped black dorsal mark instead of a crescentic black basal patch as occurs in the type from New Guinea.

The measurements are practically alike: abd. + app. 28.5, hw. 18.5, fw. 20, total length 35 mm.

***Pseudagrion perfuscatum*, sp. n. (fig. 21).**

Material studied: — W. Borneo: 26 ♂, 1 ♀ (mostly ad.), Singkawang, Lohabang Rd., Tjapkala Rd., Mampawa Rd. near Sjakok, and environs of Bakowan, Aug. 22 - 24, Oct 17 - 28, Nov. 5 - 16 and Dec. 7 - 9, 1931; 10 ♂, 3 ♀ (ad.), same loc., Montrado-Lohabang Rd. and Bengkajang, Jan. 16 - 20, July 12 - Aug. 9, and Nov. 7 - 11, 1932. All L. COOMANS DE RUITER leg., collected along small forest-brooks. Holo- and allotype: Bengkajang Rd., Nov. 5 - 16, 1931.

Male (ad.) — Labium light brown, labrum and anteclypeus sepia-coloured; postclypeus, genae and frons, as far upwards to level of median ocellus, a rich ferruginous or rather purplish-brown; similarly coloured are the first two joints of antennae, a spot in front of each lateral ocellus, and rather small, completely isolated, circular postocular spots. The remaining parts of the head buff-black dorsally. Rear of the head, excepted a clear yellow line along the eye-margin, jet-black, coarsely powdered with blue.

Prothorax sepia-brown, coarsely pruinose along sides.

Synthorax dusky brown, sutures black. A thick black line along median carina, diffusely limited exteriorly; a similar line at humeral suture, widened ventrally and occupying the dorsal third to half of mesinfraepisternum, and

the ante-alar triangles, black. Thoracic sides coarsely bluish pruinose. Mesepimera gradually more densely powdered with blue from above downwards. Lateral sutures scarcely visible, the brown ground-colour of metapleurae thickly powdered with pale blue, as are also the ventral side and the outer surfaces of the coxae. Aged individuals have the thorax so much obscured that only the middle of the mesepisternites remains brown.

Legs brown. Femora almost wholly darkened: a spot at base and the proximal half of interior faces remain ferruginous. Outer sides of tibiae yellowish brown, the inner ones black. Tarsi and spines black; claws ferruginous, tipped with black.

Wings hyaline, occasionally evenly tinged with yellow, especially in their distal two-thirds. Postnodal cross-veins $\frac{12-14}{10-11}$. Pterostigma small, diamond-shaped, dark red in colour.

First abdominal segment brown, with a blackish basal spot, usually invisible, the entire segment being densely powdered with blue. Dorsum and sides of 2-8, with the exception of vestigial anterior brown lunules, completely shining bronzy-green, the sides of segm. 2 being powdered with blue. Distal half of tergal margins pale brown underneath. Terminal segments, from base of segm. 8 towards apex, gradually widened apically, as in *pruinose* and in all the races of *pilidorsum*. Segm. 9 deep brownish-red, above with a thick black stripe along posterior margin, occupying the distal half of the segment; 10 black.

Anal appendages slender in dorsal view, rather robust in side-view; superiors black, marked with reddish-brown interiorly; inferiors dark brown. Superior pair in dorsal view widely distant, divaricate, directed straight backwards, rather concave and each provided interiorly with a small, submedian, ventral denticle and, moreover, with a somewhat larger, rounded, subapical, dorso-median tubercle; in side-view they appear broad and almost straight cut off at apex. Inferior appendages decidedly shorter than superior pair, shaped as is shown in fig. 21.

Male (semiad.) — Differs from mature specimens by the absence of blue powdering upon the thoracic sides and on basal

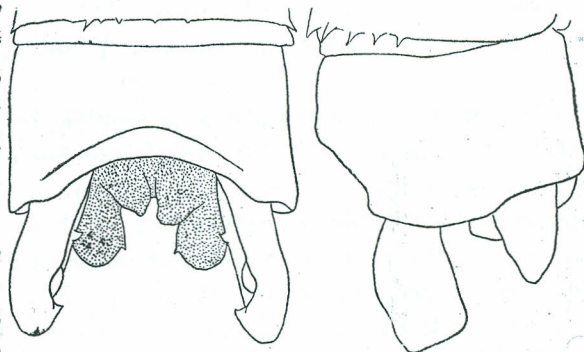


Fig. 21. *Pseudagrion perfuscatum*, sp. n. Male anal apps., dorsal view and right side.

segments of abdomen. The black stripe along humeral suture is rather thickened at dorsal end of same, and is markedly widened ventrally, forming a spot-like marking situated in the edge between humeral and mesinfraepisternal suture. Ante-alar triangles filled in with brown. A short !-shaped black line at dorsal

end of first lateral suture, and a crescentic black mark at dorsal end of second suture.

Metepimerum and ventral surface of thorax pale yellowish-brown; coxae light brown. Wings hyaline, pterostigma sepia-coloured. The red marking at base of segm. 9 of abdomen ferruginous, very conspicuous.

Female (ad.) — Head coloured similarly to semi-adult males: face rather more cinnamon-brown than ferruginous. Black marks on the dorsum reduced to three black dots, one behind each of the ocelli, and a thick stripe surrounding the globular, somewhat triangular, postocular spots. Rear of the head as in male.

Prothorax black above, brown along side; dorsum spotted with brown, as follows: a transverse streak along anterior lobe, followed by a median twin-spot; a large, circular spot on each side, and a much smaller mid-dorsal twin-spot upon median lobe; three yellow marginal spots on the posterior lobe. Prothoracic horns long, acutely pointed, directed forwards and a little sideways.

Synthorax coloured similarly to the semi-adult male, dorsum darker than the sides; median suture, ante-alar ridges and upper margin of mesopleurae bordered with black; two black dots on each side upon lower end of mesepimerum (just behind the prothorax), and the upper third of the mesinfraepisternum also black. Sides with the black spots as in the male. Ventral surfaces pale olivish-yellow, pruinose-white, as are the coxae and the lower ends of the second lateral suture.

Legs flesh-coloured; distal half of femora striped with black, the streak on posterior pair obliterated; tibiae pale yellow with a black interior line; tarsi obscured, claws reddish. All spines black.

Abdomen exactly similar to the male; the bronzy-green mark on dorsum of segm. 2 complete and but slightly narrowed towards the base of segment. Dorsum of segm. 8 - 10 wholly black, except yellow intersegmental membranes; sides of 9 and 10 largely yellow. Valves pale, not projecting beyond posterior margin of segm. 10.

Length: ♂ abd. + app. 30 - 33, hw. 19 - 21.5; ♀ 31.5 - 32, 22 - 23 mm.

As follows from the above description, this is decidedly not *P. pruinosum* (BURM.), from which it differs in a number of important characters. Firstly, in the adult male of *pruinosum*, the ground-colour of the thorax is velvet brownish-black without any markings, and the entire pro- and synthorax¹⁾ as well as the first two abdominal segments are densely powdered with blue, whereas in *perfuscatum* the sutures are black and only the sides and under surfaces of the thorax with the sides of segm. 1 and 2 are pruinose. Secondly, *pruinosum* is distinguished by the deep ochreous colouring of the face which contrasts sharply with the velvety black upper surface of the head. Even in very old males the upperside of the thorax of *perfuscatum* always remains brown, interchanged alternately with median and humeral brownish-black bands,

¹⁾ *Not*: "Thoraxdorsum tief samtartig rotbraun ohne Zeichnung, Seiten dicht weisslich bereift", as stated by RIS (Nova Guinea 13 Zool. 2, 1915, p. 97).

the sides only being powdered with light blue. This combination of colours gives the insect a striking appearance. The two last abdominal segments of *pruinorum* are also powdered with blue dorsally, whereas in none of the males of *perfuscatum* these segments are pruinose, the ochreous basal ring on segm. 9 being always conspicuous.

The anal appendages of the male, although being very similar in principle, also differ in the two species. In *pruinorum* and its races the superiors in side-view are slenderer and bear a small, apical ventral projection which is absent in *perfuscatum*, while the inferior apps. of that species are longer than in *pruinorum*. The armature of the inner surface of the superior pair is likewise different.

The ♀ of *perfuscatum* may be differentiated from that of typical *pruinorum*, apart from the different shape of the prothoracic hind-lobe, by the following particulars. Rear of the head black, with a narrow, yellow stripe bordering the eyes (*pruinorum*: lateral two-thirds of the underside yellow with two curved black stripes entering into it from the mesial black spot); humeral suture with a black line, first lateral suture with a !-shaped upper line and dorsal third of mesinfraepisternum black (*pruinorum*: humeral suture with a black dot on upper end only, first lateral suture and mesinfraepisternites unmarked).

P. pruinorum (BURM.) has been recorded twice from the island of Borneo: it was reported from Mt. Merinjak (Sarawak) by LAIDLAW (Sarawak Mus. Journ. 2, 1915, p. 275) and from Murud (also Sarawak) by HINCKS (loc. cit. 4, 1930, p. 51). Although its occurrence in Borneo is by no means precluded, some little doubt arises as to the correct identification of these Bornean specimens (only 3 males have been made known).

Another point of interest seems to be the question whether *perfuscatum* might possibly be considered a participant of the formenkreis *pilidorsum* BRAUER, defined by me in a previous paper (Revue Suisse Zool. 43, 1936, p. 127-134, figs.). The close similarity of the male appendages suggests real affinities with *pilidorsum* (even more so than with *pruinorum*), but the colouring of the body of our Bornean examples of *perfuscatum* differs so widely from typical *pilidorsum* of the Philippines, that the former should better stand as a distinct species.

A noteworthy fact in the geographical range of *pilidorsum* is the discontinuous distribution of its races (LIEFTINCK, loc. cit.).

Teinobasis leonora, sp. n. (fig. 22).

Material studied: — Malay Peninsula: 1 ♂ (ad.), Penang, STAUDINGER vend., unidentified in the University Museum of Michigan, Ann Arbor (no. 1152). The specimen is the holotype.

Male (ad.) — Labium, base of mandibles and genae yellow. Labrum orange with a brownish streak along side-margin. Anteclypeus dull orangish, postclypeus reddish-black, slightly paler along base. Frons, to level of the transverse carina, orange; this colour for a short distance extends upwards along margin

of compound eyes. First two joints of antennae orange, the flagellum slightly darkened. Vertex and epicranium metallic-green, rather shining. A tiny orange streak between each lateral ocellus and the antennal base, and the occipital plate, orange. Rear of the head black, slightly pruinose.

Prothorax entirely orange, its posterior lobe very short, depressed, simply rounded.

Synthorax orange, marked only with a broad median longitudinal metallic bluish-green band, occupying almost the inner three-fourths of each mesepisternite; this band is only very slightly narrowed dorsally and its side-edges are rounded off ventrally. Ante-alar triangles orange, posterior ridge of each black.

Legs light orange; spines also pale in colour, numbering five on posterior femora. Tarsal claws lacking an inferior tooth.

Wings hyaline; neuration orangish. The nervure *Ac* situated much nearer Ax_2 than Ax_1 . Postnodals $\frac{13.13}{12.13}$, subpostnodals $\frac{12.12}{12.12}$. M_3 and R_s well separated at base, R_s arising at the subnodus, M_3 distinctly curved and originating well proximal to it. Three antenodal postquadrangular cross-veins. Cu_2 zigzagged three cells distal to the subnodus. Pterostigma elongately lozenge-shaped, sides parallel, not quite covering one cell, pale greyish-brown in colour, surrounded by a yellow line.

Abdomen slender, dull bronzy-brown to almost black on first seven segments; the marks become gradually darker from before backwards and, on the basal segments, are ill-limited laterally. Sides of 1 - 2 and lower margin of 3 - 7 orangish. Segm. 3 - 6 with tiny yellow basal annules, interrupted mid-dorsally. Basal two-thirds of segm. 8 reddish-black (? due to decomposition), turning

to orange distally; 9 - 10 and appendages orange.

Upper branch of sup. anal app. about two-thirds of the length of segm. 10, its inner margin strongly incurvate in dorsal view, the apex turned inwards with a black, hook-like tip. Lower branch almost as long as the upper one, triquetral, rather broadened dorso-ventrally, its apex upcurved, black. Inferior appendage distinctly shorter than the superior one, stout at base, tapering to an acute, black-tipped point and provided along its upper margin with a low tubercle (fig. 22).

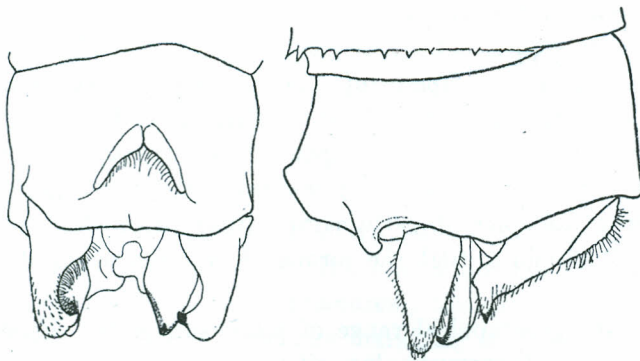


Fig. 22. *Teinobasis leonora*, sp. n. Penang. Male anal apps., dorsal view and right side.

Quite distinct from the other Malaysian species by the shape of its appendages. Allied perhaps most closely to *T. rajah* LAIDLAW, from Sarawak,

which is said to have the upper pair of appendages very small and curved inwards at their extremities, with a small inwardly directed spur.

Dedicated to Mrs. LEONORA K. GLOYD, of the University Museum of Michigan, Ann Arbor, who has very generously entrusted me with the FÖRSTER collection of South East Asiatic Odonata and part of the WILLIAMSON collection.

***Amphicnemis kuiperi*, sp. n. (fig. 23).**

Material studied: — Billiton I.: 21 ♂, 19 ♀ (semiad. or ad., ♀ of the red and blue colour-phase), Tjeroetjoek, Tandjong Pandan and Seroe (W.B.), Aug. to Dec. 1935, Febr. 1937; id., Mendanau Id., Febr. 3, 1936. All F. J. KUIPER leg. Holo- and allotype: Tjeroetjoek, Aug. 1935.

Male (ad.) — Labium yellowish-white. Genae and mandible-bases pale yellow, the latter with a large, greyish-black spot. Labrum shiny black, the distal third sharply defined ochreous (or yellowish-white); anteclypeus ochreous-yellow with an undulated blackish-brown basal stripe. Postclypeus shining black. Frons with a well defined, transverse, ochreous band occupying the lower three-fourths of the vertical surface, widest laterally. Area between this band and the margin of compound eyes on either side black. A yellow anterior spot at the base of each antenna; these black, the first two joints pale apically. Dorsal surface of head bronzy-black, the occipital lobes rather shiny, metallic-green. Rear of the head black.

Prothorax, dorsum brilliant metallic-green or bronzy-black, sides clear ochreous; the dorsal black marking strongly constricted behind the anterior lobe. Posterior lobe rather short, depressed, its margin evenly rounded.

Dorsum of synthorax, as far down as the first lateral suture and including the ante-alar triangles, brilliant metallic or bronzy-green with reddish or purplish reflections in aged individuals. Postero-dorsally, the metallic colour surpasses the first suture, forming a slightly angular off-shoot which terminates against the dorsal margin about mid-way between the first and second lateral sutures. A minute yellow spot along dorsal margin of mesepimerum about extreme upper end of the humeral suture. Dorsal half or mesinfraepisternites also bronzy-green, its lower border in line with that of the mesepimeral colour. Thoracic sides pale ochreous fading to yellow underneath. Dorsal margin of metepimerum with two black points, one at dorsal end of second suture and one about the postero-ventral edge of the said space.

Femora pale ochreous, all of them with sharply defined black apical rings and extreme bases of tibiae also black. Tibiae and tarsi yellow; tarsal claws without inferior tooth. Spines black.

Wings hyaline. Postnodals $\frac{12-13}{10-11}$. Origin of M_3 usually distinctly distal to the subnodus, rarely at the subnodus ¹⁾. Pterostigmata equal in front and hind pair of wings, dark grey with a narrow pale margin; costal side almost

¹⁾ In RIS's key to the two Bornean species *A. wallacei* and *martini* (Ann. Soc. ent. Belg. 55, 1911, p. 236), one should read M_3 instead of Rs .

twice longer than opposite side; proximal side very oblique, distal side but slightly convex.

Abdomen extremely thin and slender, as in all species of *Amphicnemis*, from base of segm. 8 till the apex rather widened in both dimensions. Segm. 1-2 brilliant metallic-green above, clear ochreous aside; the dorsal mark of 1 is narrowed anteriorly and 2 has a very narrow basal annule, interrupted on mid-dorsum. The succeeding segments are of a dull brown colour, becoming progressively darker posteriorly (7-9 black, often with purplish reflex), their under surfaces yellowish-white. Segm. 3-5 or 3-6 have, in addition, very diffuse pale brown subterminal and basal annules, which are often indistinct or absent altogether. Segm. 10 indistinctly black, bases and sides dirty ochreous; apical tonguelet of the tergite not incised, simple.

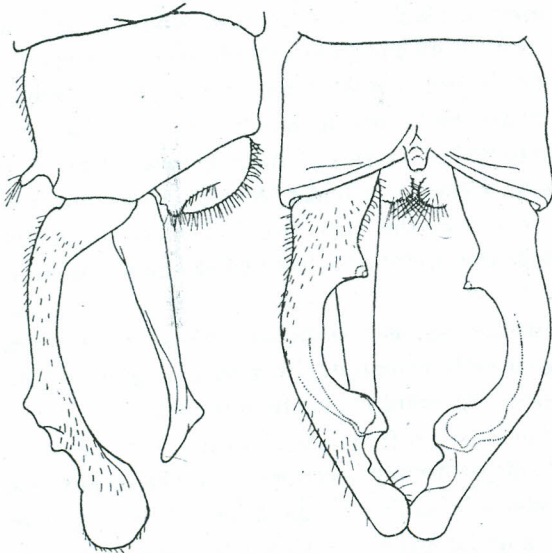


Fig. 23. *Amphicnemis kuiperi*, sp. n. Male anal apps., right side and dorsal view.

Anal appendages entirely pure white in semiadult males, growing darker in aged individuals; in very matured specimens they are dull brownish-ochreous, mottled with black. Superior pair evenly but distinctly curved in profile view, strongly outbent on middle and finally again approximated in dorsal aspect, with a very definite sub-apical nod, when viewed obliquely from above. The sub-apical tubercle upon this nod smoothly flattened interiorly and surrounded by an almost acute posterior rim. Inferior appendages shaped as in fig. 23.

Female (ad.) — Head coloured as in male; the pale frontal band usually narrowly constricted in the median line, dull bluish instead of ochreous.

Prothorax dull brown above, sides dark bluish-green or blue, slightly pruinose below. Posterior lobe somewhat longer than in male, rather rectangular in dorsal aspect but with the side-edges rounded; the lobe consists of three parts, viz.: one median horizontal division with a strong mid-dorsal longitudinal carina on each side of which the surface is rather deeply and triangularly impressed, and a lateral part which is about half so broad and whose surface is also somewhat concave. Seen from aside the posterior margin of the lobe is somewhat upcurved, and when looked at from behind the margin is distinctly undulated.

Synthorax with the mesepisternites uniform dark olive-brown; sometimes with traces of pale antehumeral stripes due to decomposition; sides throughout

dark blue, or blue-green, fading to whitish on postero-dorsal third of metepimerum. Mesinfraepisternites with a brownish stripe along humeral suture, and the dorsal end of second suture also with a small brownish dot. Ante-alar triangles metallic-green. Under surfaces pale blue.

Coxae yellow, pale blue at base; legs yellowish-white, all femora with a black exterior stripe and with the knees also blackish; tarsi pale ochreous. Spines brown.

Wings hyaline; neuration as in male. Pterostigma scarcely paler in colour.

Abdomen coloured much as in the male but dorsum of basal segments dark brown with low metallic sheen on segm. 1 only; sides of 1-2 clear yellow to pale green, the dorsal mark sharply delimited and decidedly narrowed anteriorly. Segm. 9 bears a conspicuous clear yellow dorso-lateral spot on each side behind the middle and 10 is entirely pale blue (or white).

Anal appendages and valves white or yellowish, darkened in aged individuals; valves projecting well beyond end of segm. 10.

Female (red, juv.) — Head coloured as before, pale tints lights yellow, strongly contrasting with the shiny black parts. Prothorax, legs and synthorax throughout carmine in the darkest individuals, coral-red in juvenile specimens (both colours according to RIDGWAY'S standard). Posterior lobe of prothorax shaped exactly as in the adult. Ante-alar triangles bronzy-green. Under surfaces flesh-coloured. Tibiae (including the spines) paler towards apices and tarsi yellow.

Pterostigma centred with grey. Coloration of the abdomen paler than in the adult female but all markings identical.

Length variable: ♂ abd. + app. 33.5 - 36.5, hw. 19 - 20; ♀ 32 - 35, 19.5 - 21.5 mm.

N.B. — Throughout our series of females the red body-colour corresponds with a weak condition of the integument, none of the red females having the abdomen so thoroughly chitinized as the blue coloured ones. It is therefore quite evident that certain females of *Amphicnemis* pass through red colour-phases to the adult stage, and that two different forms do not exist.

This species appears to find its nearest ally in *A. ecornuta* SELYS, from W. Sumatra (Fort de Kock) and N.E. Sumatra (Soekaranda), which is also characterized by the absence of a median posterior spine to the prothorax in both sexes.

A. ecornuta, according to SELYS and KRÜGER, is a much larger insect (♂ abd. 41 - 44, hw. 24.5 - 27; ♀ 41 - 43, 26.5 - 27 mm), and the male of it may be distinguished from *kuiperi* by the presence of an upwardly directed spine to the basal third of the inferior appendage (a character mentioned only by KRÜGER), which is not present in *kuiperi*.

Mortonagrion appendiculatum, sp. n. (fig. 24).

Material studied: — Billiton I.: 1 ♂ (ad.), N.B., Sidjoek, Dec. 16, 1935. 30 ♂ (ad.) 18 ♀ (ad.-juv.), W.B., Tandjong Pandan, June 17-19 and 24, 1936. Jan. 6-17, and Febr. 16-18, 1937, F. J. KUIPER leg.

Male (ad.) — Labium yellow. Anterior surface of head, as far upwards as the base of antennae, orange-yellow, the labrum bright orange. Frons, vertex and epicranium deep velvet-black, a small area behind posterior ocelli on the occiput indistinctly brown. Antennae pale brown. Postocular spots blue, widely distant, placed in the long axis of the head, reniform (rectangularly excised mesially), fitting close against the margin of compound eyes. Rear of the head bright greenish-yellow.

Prothorax purplish-brown with indistinct, cloudy, dark brown spots. Posterior lobe small, depressed, projecting straight backwards under right angles and forming a short rectangular plate, slightly concave dorsally, a little broader than long though measuring only one-third of the total width of the hind margin of the prothorax.

Dorsum of synthorax, to a level about half-way between humeral and second lateral suture, warm purplish-black, the median carina and the humeral suture finely reddish-brown. Antehumeral stripes reduced so much as to be completely divided up into a bluish point just anterior to the mesinfraepisternal suture, and a somewhat larger, oblique, elongate spot just below each ante-alar triangle and almost touching the humeral suture. Metepisternum with a blue stripe, slightly oblique and pointed posteriorly, along the spiracle, followed by a much smaller, rather triangular, blue spot filling up most of the upper edge. Metepimerum yellowish, usually with an indistinct ferruginous or brownish stripe over the second suture. Venter of thorax pale ochreous.

Coxae and legs ochreous-yellow; femora with indistinct subterminal rings, tibiae with a diffuse brownish spot near base, and apex of last tarsal joint blackish. Tarsal claws and spines ferruginous, the former distinctly toothed.

Wings slightly tinged with greyish-brown. Pterostigma smaller than the underlying cell, dark brown, elongately lozenge-shaped, rather oblique; in hind wing about $1\frac{1}{2}$ times longer than high, in front wing slightly shorter.

Postnodals $\frac{8-9}{6-7}$, subpostnodals $\frac{7-8}{6}$.

First segment of abdomen with a three-pronged black dorsal mark attached to the posterior margin, and with the sides blue. Segm. 2 dark purplish-brown on the back and alongside; this colour does not extend to the base of the segment, except in the median line, on each side of which a sky-blue basal spot is placed, restricted to the dorsum of the segment. Ground-colour of segm. 3-6 pale yellow, but all segments with dark brown marks, covering most of the dorsum and sides though constricted before the end and expanding laterally to form deep black apical rings, occupying about one-sixth of the length of segment. Besides, each segment bears a narrow but well defined basal ring, blue on dorsum, yellowish aside, occupying slightly less than one-seventh of

the length of each segment. Segm. 7 is wholly black, except a sky-blue basal spot, restricted to the dorsum, and a mid-dorsal blue point, placed just before the posterior margin of the segment (the latter sometimes wanting). Segm. 8, with the exception of a thick, black stripe each side along lower margin of tergite, sky-blue; 9 black, with a large blue dorso-lateral spot, widest at base, tapering and rather constricted posteriorly but not reaching the posterior margin. Segm. 10 very short, black.

Anal appendages black. Inferior clusive of the labrum, deep blue instead about four times as long as the superiors which are more or less truncated apically, the tips of each being rather flattened and framed dorsally (fig. 24).

Female. — Much resembling the male but differing as follows:—

Anterior surface of the head, inclusive of the labrum, deep blue instead of orange; posterior limit variable: in most specimens the blue colour does not extend upwards over the frons but in others the lower portion of the frons is likewise blue. Frons and the entire upper surface of head otherwise deep bronzy-brown, the postocular spots usually well visible, oblique, comma-shaped, blue, placed near the eye-margin (in subadult females slightly enlarged and reniform). Rear of the head dull yellowish.

Prothorax dark bronzy-brown, sides a little paler, pruinose-blue along margin. Posterior lobe with the lateral divisions extremely short and well rounded, median division projecting posteriorly as a transverse lobe which is much longer than the lateral divisions and about twice as long as broad, its side-edges well rounded and its apical margin very slightly convex. Laminae mesostigmatales well developed, curved slightly anterad so as to form minute curled hooks, when seen in oblique frontal view.

Synthorax coloured as in male; immediately behind each of the lam. mes. is a blue antehumeral (mesepisternal) stripe, widest below, extending upwards to about one-quarter the length, where it tapers to a point; on the opposite side, below the ante-alar triangles and near the humeral suture, are placed similar, though still shorter, comma-shaped blue spots which are pointed ventrally. The thoracic sides are coloured similarly to the male, only the lower third of the mesinfraepisternites and a small ventral area of the metepisternum being yellowish; blue metepisternal spots very distinct but in old specimens barely visible because of the sides being overlaid with bluish pruinescence. Under surfaces pale.

Wings as in male, membrane slightly tinged with yellow, especially the

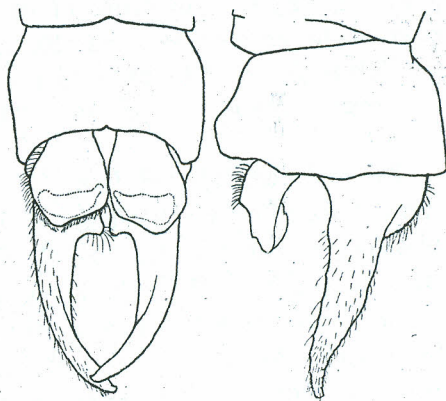


Fig. 24. *Mortonagrion appendiculatum*, sp. n. Male anal apps., dorsal view and right side.

posterior pair. Pterostigma of front wing darker brown and distinctly shorter than that of the hind one.

Abdomen marked similarly to the male but the sky-blue basal spots very conspicuous, larger, and extending also over part of the sides to the proximal segments, that on dorsum of segm. 2 interrupted, those on 3-7 similar to one another, largest on segm. 5. Segm. 8 black with a transverse blue basal dorsal spot occupying only one-fifth of its length; 9, 10 and appendages black, the latter about as long as segm. 10.

Valves yellow, tips projecting a little beyond apex of last segment.

Length: ♂ abd. + app. 19.5 - 20.5, hw. 10.2 - 10.5; ♀ 18 - 19, 11 - 12 mm.

Readily distinguished from all other species of the genus by the great length of the inferior appendages of the male, which are fully two and one half times longer than the superiors. It differs further from other species by the orange face and by the legs having almost the same colour.

In recent years the area of distribution of various Malaysian species of *Mortonagrion* has been considerably extended, chiefly as a result of more intensive collecting in those localities where they find a suitable home in their larval state, such as in well-aërated forest-marshes in low country, coastal swamps, etc. (see LIEFTINCK, *Stylops*, 3, 1934, p. 15).

In the following list I have entered the names of all the species at present known, with a quotation only of the original description, followed by the typical locality ¹⁾. I have taken this opportunity to put on record also additional localities, available in literature or known to me from specimens in the Buitenzorg Museum collection. These references to localities deal exclusively with thoroughly identified material, doubtful cases having been omitted.

1. *M. amoenum* (RIS) (*Tijdschr. v. Ent.* 58, 1915, p. 10, figs. — ♂♀ Simaloeer I.)
Further range: ♂♀ C. and S. Sumatra; ♂♀ S. Java; ♀ W. Borneo; ♀ ? Celebes (RIS, 1930).
2. *M. appendiculatum*, sp. n. (huj. op. — ♂♀ Billiton I.)
3. *M. falcatum* LIEFT. (*Stylops*, 3, 1934, p. 12 - 15, fig. 4. — ♂♀ Karimoen Djawa I.)
Further range: ♂♀ Billiton I.; ♂ W. Java.
4. *M. gautama* (FRASER) (*Mem. Dept. Agric. India*, 3, 1922, p. 50. — ♀ Assam).
5. *M. selenion* (RIS) (*Suppl. Entom.* 5, 1916, p. 26, figs. — ♂♀ Japan).
6. *M. simile* RIS (*Arkiv f. Zool.* 21A, 1930, p. 6 - 10, fig. 3. — ♂♀ N.E. Sumatra).
Further range: Sumatra generally; ♂ W. Borneo.
7. *M. varralli* FRASER (*J. Bomb. Nat Hist. Soc.* 27, 1920, p. 148, fig. (wings). — ♂♀ W. India). This species is the genotype.

¹⁾ Recently, SCHOUTEDEN has recorded an unnamed species of *Mortonagrion* from the Belgian Congo (*Ann. Mus. Congo Belge, Tervueren*, 1934, *Zool. Sér. III, Sect. II, T. III Fasc. 1, p. 83*).

Fam. LIBELLULIDAE.

Brachygonia puella, sp. n. (fig. 25).

Material studied: — Billiton I.: 10 ♂, 4 ♀ (semiad.-ad.), W.B., Seroe, April 2, June 16, Sept. 23, and November, 1936, F. J. KUIPER leg. Holo- and allotype: Seroe, April 2, 1936.

Nearest to *B. ophelia* RIS.

Male (ad.) — Labium pale yellow. Labrum and clypeus creamy-yellow, the clypeus usually with slight greenish intermingling. Frons and vertex rugose, throughout brilliant metallic-green or -blue, except a small triangular creamy spot filling up the lateral edges between clypeal suture and the eye-margin. Occipital triangle shining black, with two approximated, clear yellow, oval spots behind. Rear of the head glossy black, slightly pruinose blue.

Pro- and synthorax unicolorous metallic-green, pruinosed more or less densely, except the mesepisternites, which remain metallic-green even in very adult specimens, in semi-adult males the ground-colour showing obscurely through the blue pruinescence.

Coxae black, pruinose-blue, trochanters brownish, legs otherwise entirely black, the tarsal claws chestnut-coloured.

Wings hyaline, slightly tinged with grey-yellow in very matured specimens; neuration brownish-black. Intermediate in shape between *oculata* and *ophelia*, the postnodal half almost identical to *ophelia*. Position of nodus very slightly more distal than in that species though distinctly proximal to the middle of the wing. Nodal index $\frac{5.6.6.5}{5.5.5.5}$. Occasionally 5 antenodals in one of the front wings. Triangle of front wing less oblique, the lower sector or *arc* forming approximately a right angle with the distal side of *t*; costal side of *t* broken, the distal portion longer than in *ophelia*. Discoidal field of front wing narrow, with a single row of cells from base to about one cell distal to level of nodus, thence much widening, and usually with 5 marginal cells (almost identical in shape to *ophelia* but not so narrowed on middle and basal cell not divided). Anal area of front wing not differing from that species. Position of hind wing triangle as for genus, its shape much resembling that of *oculata*: very narrow, costal side distinctly broken distally, and proximal side much shorter than in *ophelia*. Discoidal field similar to the other species and *Cu*₁ forked basally so as to rise from the distal side of *t* and *Cu*₂ as well. *A*₁ slightly curved at origin (convex basally) but soon strongly arched towards the wing-margin (concave basally), forming a very irregular "anal loop" with *A*₂, consisting of two cells; three marginal cells between *A*₁ and *A*₂. *A*₃ not developed. Area posterior to *A*₂ similar to *ophelia* but wider. Venation otherwise much as in that species but distal course of main veins slightly more curved toward the wing-margin. Pterostigma pale brownish-yellow, shaped as in *ophelia*. Membranula very small, greyish.

Abdomen comparatively long and extremely slender, quite different in shape from the two other known species. Basal segments slightly but distinctly inflated in lateral dimension, about twice as high as the distal end of segm. 3. From the base of 3 the abdomen is gradually narrowed (0.3 mm on middle of segm. 5) with very thin and cylindrical segments; from base of 6 it widens gradually, reaching its widest point at end of segm. 9 (0.8 mm); 10 again slightly narrowed posteriorly. Coloration throughout shining bronzy-black with no

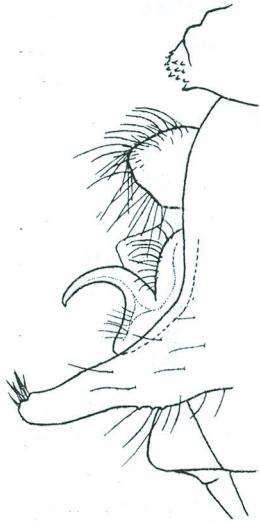


Fig. 25. *Brachygonia puella*, sp. n. Male genitalia of second segment of abdomen, left side view.

other pale markings than a diffuse yellow spot along the sides of segm. 1 (often invisible from pruinescence) and a somewhat larger one on each side before the transverse carina of segm. 2; in not fully adult males a tiny yellow lateral point is also perceivable behind the carina of the same segment. Sides of 1-2 and posterior half of dorsum of 2 pruinose blue in adult specimens.

Genitalia black, shaped as in fig. 25. Genital lobe long and narrow, tip furnished with a bunch of ca 5-6 short and stiff ochreous setae, which are directed upwards.

Anal appendages black, a little shorter than segm. 9 + 10, very similar in outline to those of *oculata* but slenderer, the apices of superior pair less acutely pointed.

Female (ad.) — Almost identical to the male but differing as follows: Mouth-parts yellowish-white; labium unmarked, labrum with a diffuse brownish mid-basal spot, mandible-bases greenish-yellow, tips black. Clypeus pale greenish-white, the postclypeus with a transverse black basal streak on middle, ill-limited anteriorly. Head otherwise as in male.

Pro- and synthorax not different in colour. Bases of front and hind wings with diffuse greyish-yellow rays in *sc* and *cu* not extending further distad than the first cross-vein in these spaces. Pterostigma pale greyish-brown. Neuration as in male.

Abdomen slender; basal and terminal segments a little widened in lateral dimension, intermediate segments thin and cylindrical. Colouring identical to the male but the pale yellow spots along the sides of segm. 1-2 slightly enlarged. Sides of 1-2 thinly pruinose.

Vulvar lamina short and transverse, about one-third of the length of the ninth sternite, not projecting ventrad, its side-edges well rounded. Anal appendages widely distant, about twice longer than segm. 10, thin and cylindrical, tips acutely pointed.

Length: ♂ abd. + app. 14-15, hw. 16.0-16.7, pt. 1.8; ♀ 14.2-14.8, 16.7-17.3, 2 mm.

Easily distinguished from *oculata* (BRAUER) and *ophelia* R1s by the uniform metallic-green or -black colouring of the body and by the anal area of the hind wing.

The generic diagnosis of *Brachygonia* as given by R1s (Cat. Coll. SELYS, Libellulinen, fasc. 11, 1910, p. 352) needs a slight modification in some respects. The posterior lobe of the prothorax in none of the species is elevated ("aufgerichtet") but lays down on the back of the synthorax. The 8th sternite in the females of *ophelia* and *puella* is not prolonged apically into a long, downwardly projecting valvula vulvae. Lastly, in *puella*, the lower sector of the areculus forms a straight angle with the distal side of the front wing triangle ("die Abknickung von *ht* erreicht den rechten Winkel nicht", loc. cit.).

B. oculata occurs also in Banka and Billiton, and I possess a small series of both sexes of the rare *B. ophelia* from W. Borneo, collected by Mr. COOMANS DE RUITER.

Fam. CORDULIIDAE.

Hemicordulia magica, sp. n. (fig. 26).

?1934. SCHMIDT, Arch. f. Hydrobiol. Suppl. 13, p. 377-378. — ♀ Bali, Danoe Bratan (*Hemicordulia* sp.).

Material studied: — Bali I. (East), 1 ♂ (ad.), Mt. Abang, 1900 m alt., April 7, 1936, "on mountain-ridge", C. G. G. J. VAN STEENIS leg. The specimen is the holotype.

Allied to *australiae* (RAMB.).

Male (ad.) — Labium yellow, labrum greyish with its anterior border orange. Clypeus and side-edges of frons dirty greyish. Anterior surface of frons pale orange, this colour slightly deepening towards the upper margin but fading to greyish dorsally along the eye-margin; dorsal surface with a transverse, sharply demarcated, brilliant metallic-green mark, which is only little broader than the vertex at base. Vertex rather high, trapezoidal in form, upper margin and side-edges well rounded, almost straight in frontal view; greyish-brown basally, turning to pale orangish on upper half. Pile on clypeus yellow, on frons and vertex long and dense, blackish-brown. Occipital triangle chestnut-brown, lighter on each side of the middle; pile blackish above, silvery-white posteriorly.

Ground-colour of pro- and synthorax a dull greyish- or olivish-yellow with brilliant metallic-green markings much reduced and generally ill-defined, as follows: — mesepisternum with an indistinct, squarish, low metallic spot on each side of the mid-dorsal carina just in front of the ante-alar triangles. A diffuse green band along the humeral suture, about 1 mm wide and continuing downwards along the mesinfraepisternal suture, thence curving gently backwards around the shoulders towards the spiracle, where it suddenly stops. The lower portion of the mesepimera thus surrounded by the metallic stripe, each with a clear yellow spot, well marked off ventrally against the metallic band

but indistinctly limited dorsally and merging into the greyish colour of the thoracic sides. Metepimerum also dull olivish-grey but with fairly distinct, straight, metallic-green band bordering the second suture and occupying about the anterior two-fifths of that space (width about 1.3 mm); ventrally, this metallic band ceases at margin and is joined by a small but distinct clear yellow marginal spot. Mid-dorsal carina of thorax brown, ante-alar triangles olive-yellow and the under surfaces pale olive-grey. Pile moderately dense, yellowish-white.

Legs slender; coxae pale brown, legs black except the inner $\frac{4}{5}$ of anterior femora and the trochanters of middle pair, which are pale brown. Tibiae and tarsi black. Posterior femora reaching back to the middle of segm. 2 of abdomen. Tibial keels present on first and third pair of legs, dark reddish-brown, those on the first pair extending basad to slightly beyond the middle of their length, those on the hind tibiae almost to the base.

Wings short, very broad, shaped as for genus. Neuration dark brown but anterior wing-veins, up to the nodus, pale brown and costa very distinctly yellow anteriorly; antenodal cross-veins in *c* and *sc* also yellowish. Membrane strongly tinted with brownish-yellow, especially in the discoidal area, but with no indication of basal yellow spots. Nodal index $\frac{5.7.7.5}{6.5.5.6}$. Cross-veins in *t* $\frac{1.1}{0.0}$; *ti* three-celled. No supplementary bridge cross-veins and no additional cubito-anal cross-veins. Pterostigma small, very dark brown. Membranule whitish basally, changing into brown.

Abdomen slender. Segm. 1-3 slightly widened (2.5 mm broad over the middle of segm. 2) and a little constricted on middle of 3 (1.5 mm), thence again very slightly expanding and almost parallel-sided up to the end of segm. 10 (widest point on segm. 6 2.3 mm, at end of segm. 10 2.0 mm). Segm. 1-2 dull olive-yellow, not metallic above but with a glossy metallic-black spot upon the middle of the sides, that on 2 extending from base to apex of segment. Segm. 3 with a complete, dull metallic-green longitudinal band restricted to the dorsum though expanding posteriorly to form an indistinct bronzy-black apical ring roundabout the segment, occupying about one-fifth of its length; sides and under-surfaces otherwise dull orangish with indefinite antemedian dark spot along lower margin, just in front of the transverse carina. Segm. 4-7 with broad metallic-green dorsal marks, constricted anteriorly and after their middle so as to form bilobate ochreous side-spots, which are well visible from above. On segm. 4 and 5 these marginal pale spots are almost completely divided into two portions, the posterior one being semicircular in outline and much the higher of the two. On 6 and 7 the spots are broadly connected along margin; on 6 the anterior portion of it is largest and rather triangular in side-view (extending $\frac{3}{4}$ upwards along anterior margin of segment), the posterior one being much the lower of the two; on 7 the constriction of the lateral spot is unapparent and the posterior portion is still lower than that of segm. 6. Segm. 7-10 are bronzy-black, except the ventral pieces of the 7th tergite, which bear

ill-defined ochreous spots. The ventral portions of the tergites 4 - 6 are brownish-yellow, the apical fifth of each of them being black.

Genital hamule brown, turning to pale yellow distally; slender, evenly narrow towards apex which is gently curved upwards and a little sideways; tips not projecting beyond posterior suture of segment. Genital lobe much shorter than the hamule, well rounded, black.

Anal appendages black; superiors a trace shorter than segm. 9 and 10 taken together, rather strong, at first straight and cylindrical, thence slightly constricted and bowed ventrad, with the distal portion rather much swollen and directed straight backwards; each with a very strong, hook-like interior spine (originating from the dorsal portion of the appendage), which is directed inwards and slightly downwards almost under right angles. Inferior appendage shorter than superiors, narrowly triangular, slightly curved, simple (fig. 26).

Length: abd. + app. 35.5, hw. 30.5:
11, pt. $\frac{1.7}{1.5}$ mm.

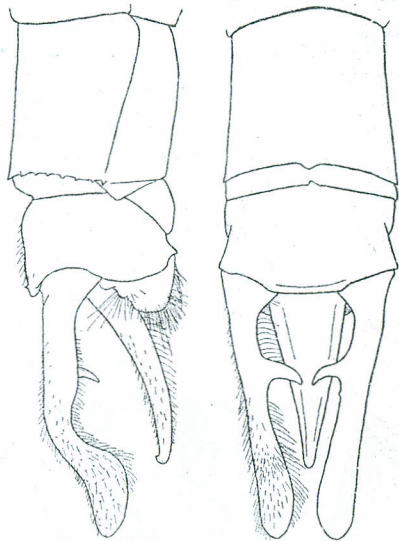


Fig. 26. *Hemicordulia magica*, sp. n. Male anal apps., right lateral and dorsal view.

This new species, though closely related to *australiae*, differs from that species by its sombre colours, the ochreous markings on the sides of the abdominal segments being decidedly more reduced than in *australiae*. On the other hand, the basal segments of the abdomen of *magica* are not metallic-green, as is the case in adult specimens of *australiae*, and the vertex is not metallic, while the green spot on the frons is also reduced and confined to its middle. In *magica* segm. 10 is entirely black, whereas in *australiae* the distal half of it is yellow. The anal appendages are similar in principle but the superiors are of more robust build and distinctly shorter than in *australiae*. The pilosity of the body of *magica* is also worthy of note and probably correlated with its occurrence in the higher mountain zone.

According to TILLYARD, *H. australiae* is a coastal species of eastern distribution and it has non-migratory habits (Trans. New Zealand Institute, 44, 1911, p. 126 - 127).

The immature ♀ described by SCHMIDT from the Bratan Lake in Central Bali (ca 1300 m alt.), is almost certainly conspecific with our male from Mt. Abang (East of the Batoer Lake, about 70 km more eastwards). The shape of the vulvar scale in this specimen is said to agree with my sketch after the allotype of *H. australiae*. *H. magica* is possibly restricted to mountainous areas.

The genus *Hemicordulia* stands in need of revision, and figures of the genital structures of both sexes are very needed.

Fam. GOMPHIDAE.

Onychogomphus rappardi, sp. n. (figs. 27 - 28).

Material studied: — S.W. Sumatra: 1 ♂ (ad.), Benkoelen Residency, Redjang distr., Pagar Goenoeng, 550 m alt., "open stream", Dec. 12, 1936, F. W. RAPPARD leg. Holotype.

Allied to *O. geometricus* SELYS.

Male (ad.) — Head coloured similarly to *geometricus*, the pale markings on labrum and postclypeus slightly more restricted. Labium dirty greenish-white. Labrum black with an oval green spot, placed transversely on either side of the middle close to the base. Mandible-bases, a small spot immediately lateral to these, and the anteclypeus, green. Postclypeus black with a minute ochreous basal spot upon each of the side-lobes. Frons black anteriorly, the basal half also deep black and sending a medial prolongation forwards in the sulcus to join the black on front of frons, the isolated upper spots rounded off behind, green in colour. Vertex, occiput and rear of the head unicolorous black. Antennae black, flagellum dark brown. Occipital ridge shaped as in *geometricus* and fringed with long black hairs.

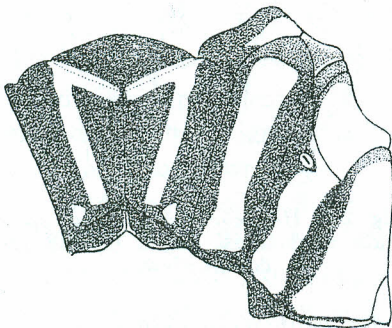


Fig. 27. *Onychogomphus rappardi*, sp. n. Colour-pattern of synthorax.

Prothorax black, the anterior lobe spotted with yellow.

Synthorax black with the green colour of the sides predominating (fig. 27). No vestiges of a humeral line but dorsal humeral spot conspicuous. Metepimerum almost entirely green, as are the under surfaces of the thorax. A diffuse, brown, crescent-shaped spot on poststernum, slightly pruinose.

Legs black except that the inner surface of the anterior pair of femora bears a greenish stripe along the whole length.

Wings suffused with greyish-brown all over the membrane. Nervures all black. Pterostigma deep black, braced, covering 3-4 cells. Nodal index $\frac{10.14.15.8}{9.11.10.9}$. Neuration practically identical to *geometricus* and agreeing also in almost every detail with WILLIAMSON's photograph of the wings of "*saundersii*" (Proc. U.S.N.M. 33, 1907, p. 310 fig. 35). Anal triangle 4-celled, anal loop two-celled. A single row of postanal cells in both front wings. Two undivided postanal cells between anal triangle and the loop. Cross-veins between sectors of *arc* to the bifurcation of M_{1-3} $\frac{2.2}{1.1}$. Fork of M_{1-3} symmetrical.

Abdomen shaped as in *geometricus*; black, marked with greenish-yellow, as follows. Segm. 1 with a mid-dorsal green spot and with the sides also largely green. Segm. 2 black above, green alongside; dorsum with a complete, longitudinal, green band expanding very slightly mid-way its length. Auricles yellow-

green, shaped as in *geometricus*. Segm. 3 with a yellow-green basal ring, occupying $\frac{1}{5}$ of the length and not quite reaching lower margin of segment, and a very narrow, mid-dorsal oval spot, pointed on both ends. Segm. 4-6 each with a complete yellow basal ring, occupying hardly more than $\frac{1}{6}$ of the length, each of these rings finely indented by black posteriorly for about one-half of its depth. Segm. 7 also with a yellow ring, which is a little larger than those on the preceding segments, occupying the basal $\frac{2}{5}$ of the segment and straight cut off behind. Remainder of abdomen entirely black.

Genitalia: (as compared with those of typical *geometricus* and with my sketch of *geometricus perplexus*) not or scarcely differing from those species, except that the basal setae on the posterior hamuli are longer (fig. 28).



Fig. 28. *Onychogomphus rappardi*, sp. n. a, genitalia of second abdominal segment, left side view; b, hamuli more highly magnified; c, left side view of ♂ anal apps.; d, left superior app., interior view.

Anal appendages almost identical in shape to those of *geometricus* but quite differently coloured. Basal two-thirds of superior pair light yellow, distal third gradually darkening, almost black dorsally but ill-limited laterally, with the lower portion yellowish and the tips brown. Superiors with the tips obliquely truncated and slightly excavated in side-view; interiorly, each of them is still more obliquely excised, as is shown in fig. 28d. Inferior appendage deep black, the branches provided with a strong, though not very acute, basal tooth, which is directed upwards and outwards; tips broken off (fig. 28c).

Length: abd. + app. 40, hw. 30, pt. 3.7 mm.

Female unknown.

Named in honour of engineer F. W. RAPPARD, forest-officer of the Residency Benkoelen.

As has been pointed out already by F. RIS, in his paper on Sumatran dragonflies (loc. cit., postea), the members of the *saundersi*-group of *Onychogomphus* are to be distinguished from the *geometricus*-group by the shape of the accessory genitalia of the second segment of the male. On comparing HAGEN's sketches of *saundersi* and FRASER's of *duaricus* with those given by me for *geometricus*, *geometricus perplexus* and *rappardi*, we notice considerable differences in the shape of the hamuli and the vesicle of the penis. Yet, these structures do not afford good specific characters throughout the genus but they can be used as convenient group-characters. It is therefore safe to say that *saundersi* and *geometricus* for instance, as representatives of a different group, are quite distinct species.

Both *saundersi* and *geometricus* have been reported time and again from Sumatra but in most cases it was still a matter of some difficulty to decide to which of the two species the recorded examples should be attributed and to say precisely, from the descriptions and figures of the types, what value should be attached to certain differences which they presented. Here follows an enumeration of these Sumatran specimens:

1898. KRÜGER, Stett. ent. Zeitg. 59, p. 295 - 296. — ♂♀ Soekaranda (Deli) (*saundersi*).
 1925. CAMPION, J. Fed. Mal. States Mus. 8, p. 162 - 163. — ♂ Sandaran Agoeng (Korintji) (*saundersi*).
 1927. RIS, Zool. Meded. Leiden, 10, p. 29 - 30, 45 - 46. — ♂ Tamiai (Korintji) (*saundersi*, forma).
 1932. FRASER, Mém. Mus. Royal d'hist. Nat. Belg. (hors série), p. 17 - 18. — ♂♀ Takengon (Atjeh) (*geometricus*, local race).
 1935. LIEFTINCK, Misc. Zool. Sum. 92 - 93, p. 20 - 21, fig. 2. — ♂ Deli (*geometricus perplexus*).

With the exception of the Deli specimen, considered by me as a subspecies of *geometricus* SELYS, from Java, a correct identification of the above enumerated Sumatran specimens is impossible without re-studying them, but so much is certain that not only CAMPION's and RIS's individuals from Korintji (which in all probability are conspecific) but also KRÜGER's specimens from Deli (probably quite similar to the above mentioned ones), are fundamentally different from *geometricus* and its intimate allies.

The position of FRASER's local race of *geometricus* from Atjeh is uncertain, the male agrees in most respects with that of *geometricus perplexus* from Deli but differs in details of colouring. It has decidedly no affinity with *saundersi* and allies.

Lastly, our new species *rappardi* belongs to yet another species (or subspecies); it comes nearest to *geometricus perplexus* but differs from it by the lack bands of the thoracic sides being broader (reduced to mere lines in *perplexus*), by the median yellow spot on abd.-segm. 2 being larger, extending

its full length, and by the spots on 3-4 being still narrower. The basal spots of segm. 3-6 are indented by black posteriorly, whereas in *g. perplexus* these marks are entirely divided so as to form paired spots. Moreover, the sup. anal apps. of *rappardi* are black-tipped, and the inferior one is entirely black, whereas in typical *geometricus* and *g. perplexus* the appendages are wholly ochreous or yellow, respectively. Lastly, we notice some slight differences in the form of the genital hamules and their bristles, while the anal apps. of *rappardi* are thicker, resembling more closely those of typical *geometricus* than those of *g. perplexus*.

The question arises whether *g. perplexus* might be regarded also as an independent species but this problem cannot be solved before a comparative study has been made of the remaining Sumatran representatives of this "cluster" of species, which I hope will soon be carried through.

Onychogomphus naninus (FÖRSTER) (fig. 29-30).

1905. FÖRSTER, Wiener Entom. Zeitg. 24, p. 19-21. — ♂ Than Moi Tonkin (*Heterogomphus*).
1907. WILLIAMSON, Proc. U.S. Nat. Mus. 33, p. 314, 315-316 (not seen) (*Heterogomphus*).
1914. FÖRSTER, Archiv f. Naturgesch. 80, p. 75 (species transferred to *Onychogomphus*).
1922. LAIDLAW, Rec. Ind. Mus. 24, p. 414 (Not a *Heterogomphus*).
1930. LAIDLAW, Trans. Ent. Soc. London, 78, p. 192 (cat.) (*Acrogomphus*).

Material studied: — Tonkin: 1 ♂ (ad.), Mts. Mau Son, 3000 ft., H. FRUHSTORFER leg. (labelled by FÖRSTER on the paper cover: "*Het. nan.* ♂, Mau Son 3000"), otherwise unidentified (no. 1846 of the Michigan University Museum).

Very similar in all respects to *O. aemulus*, sp. n., but it is a larger insect.

Agrees almost in every detail with the ample description as given by FÖRSTER. The type, which is in the Ann Arbor collection, is from the limestone-hills of Langson (Long Kuong River plain) near Than Moi.

Our paratype male differs from FÖRSTER's description in the following few points:

There is no yellow point on each side near the upper end of the antehumeral stripe (fig. 29); 5th abdominal segment also with a small, oval yellow spot on mid-dorsum. In addition to the original description, it may be noted that the anteclypeus, in the paratype, is yellow, the postclypeus being wholly black (FÖRSTER: "Rhinarium und eind Punkt am Seitenrande des Nasus gelb").

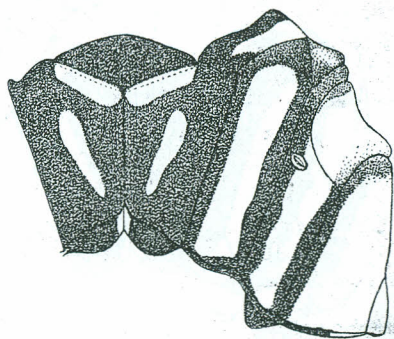


Fig. 29. *Onychogomphus naninus* (FÖRSTER), ♂ paratype, Tonkin. Colour-pattern of synthorax.

Venationally, this is a true *Onychogomphus*. The venation is identical to that of *aemulus*, except in the following respects.

Nodal index $\frac{10.16.16.10}{12.12.12.12}$. Bases slightly and very diffusely tinged with yellow. Area posterior to Cu_2 in hind wing a little broader, with three distinct side-branches between Cu_2 and A_1 , the cells between them arranged in rows. About 3-4 marginal cells divided between the veins M_3-M_4 and Cu_1-Cu_2 in hind wing. Supplementary sectors between $Rs-M_3$ and M_1-M_2 a little longer than in that species. Two rows of cells in the discoidal field of front wing to 2 cells beyond level of subnodus. Two rows of cells between M_1 and M_{1a} up to the distal end of pterostigma. Cross-veins between sectors of arculus to the bifurcation of M_{1-3} $\frac{2.2}{1.1}$.

Transverse ridge of frons better pronounced than in *aemulus*, rectangulate.

As appears from these notes, *naninus* should be placed in the same section of *Onychogomphus* as *aemulus*, *circularis* and *earnshawi*, and FÖRSTER was doubtlessly right in removing his species from *Megalogomphus* (*Heterogomphus olim*). It differs from *aemulus*, described hereafter, by its much greater size (abd. + app. 43, hw. 32.5, pt. 4 mm), the absence of a black stripe along lower margin of metepimerum, the much larger dorsal spots on segm. 3 and 4 of abdomen, and by the different shape of the genital hamules and the inferior appendage (fig. 30).

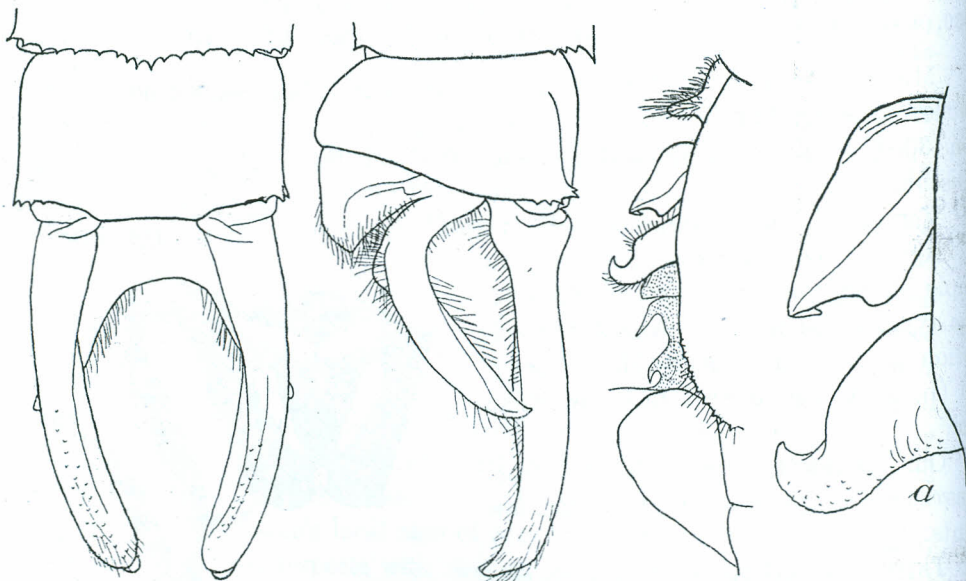


Fig. 30. *Onychogomphus naninus* (FÖRSTER), ♂ paratype, Tonkin. Anal apps., dorsal view and left side, and genitalia of second abdominal segment; a, hamuli more highly magnified.

I have neither seen specimens of *circularis* nor of *earnshawi*; the types of these species should be re-examined, and accurate drawings of the genitalia and anal appendages would seem to be of considerable assistance for a better under-

standing of relationships. Judging from the description of *circularis*, this would come very near to *naninus* (FÖRST.), and it may turn out to be the same species.

The female of *O. naninus* has not yet been described. Mrs. L. K. GLOYD, in a letter dated October 14, 1936, informs me that in the collection of the Michigan University Museum are one ♂ and one ♀ of *O. naninus* from Than Moi (Tonkin, leg. H. FRUHSTORFER), labelled by FÖRSTER "Type". She also writes me: "The ♂ and ♀ seem to be conspecific but a ♀ from Mau Son, also labelled "Type" by FÖRSTER, obviously does not belong to this species. The Mau Son ♀ is being sent to you for study".

This example bears the following labels in FÖRSTER's writing: Mau Son Berge, 3000 Fuss, Tonkin, H. Fruhstorfer/*Heterogomphus naninus* Foerster, Type ♀"; there is, besides, a label in Prof. KENNEDY's handwriting: "This ♀ is not conspecific with type ♀, C.H.K."

Judging from the venation and the form and armature of the legs this female is a species of *Merogomphus*, which does not concern us here.

***Onychogomphus aemulus*, sp. n. (fig. 31 - 32).**

Material studied: — S. Sumatra: 2 males (ad.), Lampoeng Residency, Terbangi-hilir near Menggala, August 18, 1936, MAX BARTELS jr. leg. Type and paratype in the Buitenzorg Museum.

Allied to *O. circularis* SELYS, from Upper Burma.

Black, marked with yellowish-green.

Male. — Labium greyish-yellow, the lateral lobes and the border of the median lobe bright yellow-green. Labrum black with two widely separated, oval, green spots placed on either side of the middle. Mandible-bases and anteclypeus green. Postclypeus black with a small, roundish, lateral basal green spot on either side, the strip between face and margin of compound eyes shining black. Frons with a transverse green band, constricted on middle, along upper margin, connecting the eyes but not touching the eye-margin, its anterior surface and base being black. Remainder of head jet-black. Occipital ridge simple, very slightly concave, fringed with brownish-black hairs.

Prothorax black, marked alternately with green, as follows: a mesothoracic collar interrupted in the middle line, and, connected with the collar, oblique antehumeral bands, rounded off dorsally and ceasing slightly before the ante-alar triangles, which themselves are black. No pale humeral line. Sides with three complete green bands: one on middle of mesepimerum, one on the metepisternum and a third on the metepimerum. The second lateral stripe widens ventrally, covering most of the metinfraepisternites, and, before

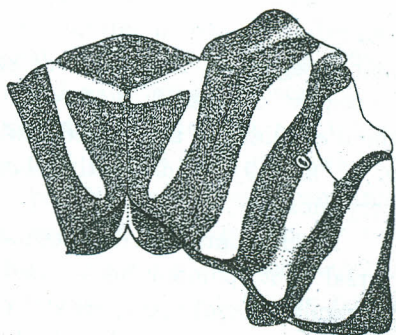


Fig. 31. *Onychogomphus aemulus*, sp. n. ♂ paratype. Colour-pattern of synthorax.

its dorsal end, shows a tendency of being obliterated (fig. 31). Venter of thorax pale greyish-yellow. In the paratype male, the antehumeral green stripes are separated from the mesothoracic collar for a short distance and taper to a point ventrally; moreover, the second (metepisternal) green stripe is not noticeably obliterated before its dorsal end.

Coxae pale greenish-yellow. Legs short, black: inner surfaces of all femora with a green stripe, widest on middle. Armature as for genus.

Wings with a greyish-yellow tinge all over the membrane, and with more distinct brown rays in *sc* and *cu* to level of the first cross-veins in these spaces. Neuration typically Onychogomphine, black including the costa. Pterostigma black, braced, covering five cells. Nodal index $\frac{10.15.16.10}{10.11.11.10}$ (type), $\frac{10.16.17.11}{11.12.11.12}$ (paratype). Anal triangle four-celled, tornus prominent; the vein A_3 , where it forms the inner margin of the lower cell of the triangle, finely denticulate. Anal loop irregular, two-celled; one row of cells between A_3 and the loop, the marginal cells divided. Anal area of front wing with a single row of cells but one or two cells divided. Branches of Cu_2 tend to take on a pectinate arrangement in front wing, with one (basally) or 2-3 (distally) cells between Cu_2 and the margin; three rows of cells between Cu_2 and the margin in hind wing. Cu_1 and Cu_2 in front wing running parallel up to level of nodus, thence strongly divaricate with 4-5 marginal cells between them; in hind wing also parallel but with the last two or three marginal cells divided. Discoidal field in front wing with two rows of cells to well beyond level of subnodus. M_3 and M_4 parallel, only slightly divaricate at the wing-margin, 3 cells between them at their distal ends in front wing, 2-3 cells in hind wing. Supplementary sectors between R_s and M_3 and between M_1 and M_2 distinct.

A single row of cells between M_1 and M_{1a} , except that the 2 to 4 marginal cells are divided. Cross-veins between sectors of arcus to the bifurcation of M_{1-3} $\frac{2.2}{1.1}$ (holotype), $\frac{3.2}{1.1}$ (paratype).

Abdomen slim and very slender. Basal segments rather inflated dorso-ventrally, less so in lateral dimension. Segm. 3-6 very thin and cylindrical, apical segments, from base of segm. 7 to end of 8 rather much widened and somewhat depressed; 8-9 with a distinct exfoliation of the lateral margins, these exfoliations are turned ventrad and not visible from above; apical portion of 8, and 9-10 distinctly flattened dorsally; segm. 9 shorter than 8, 10 very small.

Black; marked with greenish-yellow, as follows. Segm. 1 with a triangular dorsal spot, pointed basad, and with the sides largely green; 2 also with a triangular dorsal mark, constricted on the middle and pointed apicad, the sides being green with the dorsal black protruding laterally on middle of segment behind the auricles, which are green with a narrow black margin. Auricles circular, with 3-4 small marginal posterior teeth. Genitalia, including the seminal vesicle, black. Segm. 3 with a complete basal ring, occupying about one-seventh and with an isolated, oval, longitudinal dorsal spot, placed about

the middle of the segment. On segm. 4-5 the basal ring is a little smaller and interrupted on mid-dorsum, but on 6 it is again larger, occupying about one-fourth of its length, though likewise interrupted mid-dorsally. On segm. 7 the yellow ring is complete and cut off straight posteriorly, occupying the basal two-fifths of the segment; 8-10 unicolorous black. In the paratype male each of the segments 4 and 5 bears an additional, though small, oval, yellow spot placed mid-way the length of each segment.

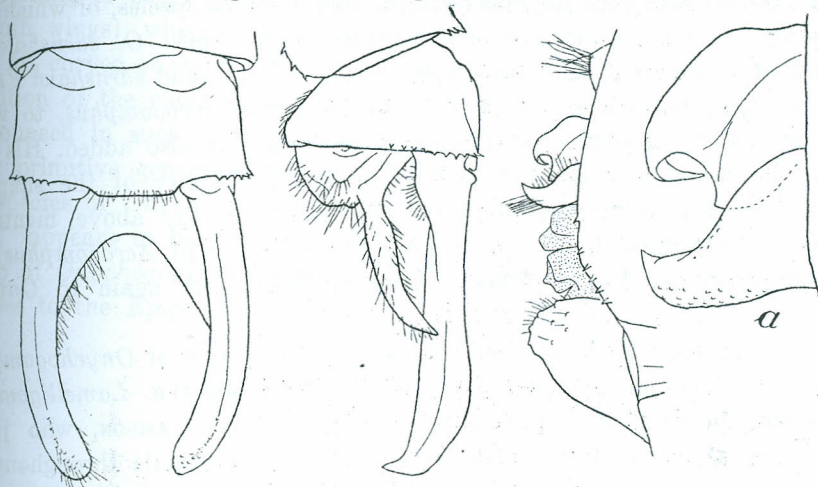


Fig. 32. *Onychogomphus aemulus*, sp. n. ♂ paratype. Anal apps., dorsal view and left side, and genitalia of second abdominal segment; a, hamuli more highly magnified. (Figs. 30 and 32 are drawn to the same scale).

Genitalia: anterior lamina transverse, very small and well rounded; anterior hamule prominent, shining black, broad and strongly ridged laterally, end-hook well developed, acute, abruptly curled inwards and upwards; posterior hamule acutely pointed, black, of equal length, slightly twisted, evenly curved forwards and a little inwards. Vesicle of penis of moderate size, black, shaped as in fig. 32. Genital lobe represented on the tergal margin by 5-6 short black teeth.

Superior anal appendages black, cylindrical, more than twice as long as segm. 10, simple, slender, slightly curved toward each other, apices rounded in dorsal view, the dorso-lateral keel low, minutely denticulate apically; in lateral view evenly widened after their middle and finally again narrowed and abruptly curved downwards, with pointed tips. No inferior denticulations. Inferior appendage black, a little more than one half as long, broadly bifid for more than two-thirds of its length, the branches simple, rounded, tapering, widely and continuously divaricate, apex slightly upcurved and bluntly pointed (fig. 32).

Length: abd. + app. 36 (type), hw. 28, pt. 3.2; 36, 28, 3.0 (paratype) mm.

Female unknown.

This new species, by the peculiar shape of its anal appendages, stands somewhat isolated among the more typical members of the genus. Venationally,

O. aemulus is a true *Onychogomphus*, and comes nearest to *O. circularis* SELYS, *O. earnshawi* FRASER, and *O. naninus* (FÖRSTER), with which it forms a group or section within the genus, which is characterized by the weak forms and hypertrophied condition of the anal appendages of the male; especially the widely divaricate inferior one being noteworthy, a shape otherwise quite unique in the genus. This modification of the normal type was first recognized by WILLIAMSON, who described an *Onychogomphus* ? species from the Toungu districts, Burma, collected for him by EARNSHAW ¹⁾. This species, of which only a single male was found, has subsequently been named *O. earnshawi* by FRASER ²⁾. In 1930 LAIDLAW ³⁾ took both *circularis* SELYS and *earnshawi* FRASER from *Onychogomphus* and placed them in the genus *Acrogomphus*, to which *Mégalogomphus* (*Heterogomphus*) *naninus* FÖRSTER was also added. His suggestion was probably supported by the evident uniformity of the shape of the inferior anal appendage of the male, which, in the above mentioned species, is very similar in form to that of the genotype of *Acrogomphus*, viz. *A. fraseri* LAIDLAW. Yet, in 1934, FRASER referred them again to *Onychogomphus* ⁴⁾.

One may suggest a new generic name for this section of *Onychogomphus*, as has been done for two other sections of the genus (i.e. *Lamelligomphus* FRASER and *Nepogomphus* FRASER), but following WILLIAMSON, who justly remarks that the form of the inferior appendage of the male throughout the genus *Onychogomphus*, even in its restricted sense, can hardly be defined as of one type, it would seem to me that *circularis* as well as *earnshawi* should better remain in *Onychogomphus*, to which *naninus* and our new species *aemulus* are now also added. For, opposed to the weak negative evidence of the form of the inferior appendage against referring *aemulus* and allied species to *Onychogomphus*, is the very positive evidence for such a relationship shown by the venation.

On comparing our new species with *Acrogomphus walshae* LIEFT. ⁵⁾, and *fraseri* LAIDLAW, the only two species of that genus I have been able to study, we notice that in *A. walshae* there are 4 cross-veins between the sectors of the arculus to the bifurcation of M_{1-3} in the front wings, 3 in hind wings. As has been pointed out by WILLIAMSON and LAIDLAW, the "spacing-out" of the cross-veins between M_{1-3} and M_4 is the character which differentiates the two subfamilies *Epigomphinae* and *Gomphinae*; this character in *O. aemulus* and *naninus* is exceedingly characteristic, while in *A. walshae* it is as unapparent as in *A. malayanus* LAIDLAW; in *A. fraseri* LAIDLAW it is apparently somewhat variable (number of cross-veins 3-5 in front wing, 1-3 in hind wing). *O.*

¹⁾ Proc. U.S. Nat. Mus. 33, 1907, p. 313-315, fig. 29/14 (thor.), 37 (wings).

²⁾ J. Bombay Nat. Hist. Soc. 30, 1924, p. 113-114 (Indian Dragonflies, pt. 19).

³⁾ Trans. Ent. Soc. London 78, 1930, p. 191-192.

⁴⁾ Fauna of British India, Odonata 2, 1934, p. 261-265.

⁵⁾ There is an evident *lapsus calami* in the name of this species as first published: it was named unintentionally *A. walshi* instead of *walshae*, although I gave an explicit derivation of the name; the error is quite evident and the emendation appears to be allowed and necessary.

aemulus and allies should therefore be placed in the *Gomphinae*, *Acrogomphus* in the *Epigomphinae*.

In addition to the venational character just mentioned, our South Sumatran *Acrogomphus walshae* differs from *Onychogomphus aemulus* and *naninus* very markedly by the shape of the fork of the median vein. In *A. walshae* (and, as appears from LAIDLAW's photograph of the wings, in *A. malayanus* as well), the forking of M_{1-3} is distinctly *unsymmetrical* (c.q. course of M_3 straight in both wings), whereas in *O. aemulus* and *naninus* the fork is *symmetrical* (c.q. M_3 curved at origin). So far as I am aware at present, the unsymmetrical condition of the common stem of M_{1-3} is a primitive character, and is best pronounced in such genera as *Leptogomphus* and *Heliogomphus*, i.e. in the more primitive genera of the oriental *Epigomphinae*. On the other hand, in the species of *Onychogomphus* examined by me, the symmetrical forking of M_{1-3} appears to be a constant character. In this point also the *circularis*-group of *Onychogomphus* shows a closer resemblance to the *Gomphinae* than it does to the *Epigomphinae*.