

DESCRIPTIONS AND RECORDS OF SOUTH-EAST
ASIATIC ODONATA (II)

by

M. A. LIEFTINCK
(Zoölogisch Museum, Buitenzorg).

The first part of this paper was issued in 1937 under the same title ¹⁾. Material for the second part of it has been collected since 1932 chiefly by Mr. L. COOMANS DE RUITER in West Borneo, but of late years several fine collections have been made by other correspondents, especially by Mrs. M. E. WALSH, in West Sumatra and the lowlands of East Borneo.

Many more new Malaysian species than I can afford to describe at one time are available for study, but I fear that the reports on them must be spread out over a long period.

The material at my disposal of Malaysian *Amphicnemis* and *Oligoaeschna* has been fairly complete; and the descriptions have been drawn up and the synonymy worked out, in several cases, from the types of the species, so that it is hoped that comparatively few errors will have crept in.

SYSTEMATIC.

Fam. CALOPTERYGIDAE.

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| <i>Neurobasis chinensis longipes</i> | HAGEN, re-defined, | |
| | key. | Borneo. |
| — | — <i>chinensis</i> LINNÉ, key. | India to S. China and
Sumatra. |
| — | — <i>florida</i> HAGEN, key. | Java. |

Fam. EUPHAEIDAE.

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|----------------------|--|---|
| <i>Euphaea impar</i> | SELYS (incl. <i>inaequipar</i> SELYS), | |
| | re-defined. | Malaya, Sumatra,
Anambas I., Borneo. |
| — | <i>subnodalis</i> LAIDLAW, notes. | Borneo. |

Fam. LESTIDAE.

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| <i>Lestes praeivius</i> , sp. n. | | Enggano I.; Borneo. |
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Fam. MEGAPODAGRIONIDAE.

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|-------------------------------------|--|-----------|
| <i>Podolestes buwaldai</i> , sp. n. | | Sumatra. |
| — <i>coomansi</i> , sp. n. | | Sumatra. |
| — <i>orientalis</i> SELYS, notes. | | (Borneo). |

¹⁾ Treubia, 16, 1937, p. 55 - 119, figs.

Fam. PLATYSTICTIDAE.

Drepanosticta barbatula, sp. n. Borneo.

Fam. PLATYCNEMINIDAE.

Coelliccia arcuata, sp. n. Borneo.
 — *coomansi*, sp. n. Borneo.
 — *octogesima* SELYS, type discussed. Malaya.
 — *palawana*, sp. n. Palawan.

Fam. AGRIONIDAE.

Ceriagrion hoogerwerfi, sp. n. Sumatra.
Amphicnemis, key to Malaysian species.
 — *ecornuta* SELYS, re-defined, type discussed. Sumatra.
 — *bicolor* (MARTIN), type discussed. Banguey I.
 — *amabilis*, sp. n. Borneo.
 — *annae*, sp. n. (= *wallacei* auct., nec SELYS). Borneo.
 — *wallacei* SELYS (= *louisae* LAIDLAW), notes. Borneo.
 — *gracilis* KRÜGER, re-defined, types re-described. Sumatra.
 — *smedleyi* LAIDLAW, notes. Mentawai Ids.
 — *billitonis*, sp. n. Billiton I.
 — *mariae*, sp. n. Borneo.
 — *martini* RIS, notes. Borneo.
 — *madelenae* LAIDLAW, emend., allo-type described. Borneo.

Fam. AESHNIDAE.

Oligoaeschna, notes on eastern species.
 — *platyura*, sp. n., key. Borneo.
 — *amata* (FÖRSTER), homotype re-described. Borneo.
 — *mutata*, sp. n., key. Borneo.
Amphiaeschna ampla basitincta, subsp. n. Sumatra.
Heliaeschna bartelsi, sp. n. (= *simplicia* auct., nec KARSCH). Sumatra, Borneo.
 — *simplicia* (KARSCH) and *vanderweelei* MARTIN, notes.

Fam. CALOPTERYGIDAE.

Neurobasis chinensis longipes HAGEN (fig. 1 c).

Full literature:

1887. HAGEN, Abh. Zool.-bot. Ges. Wien, 37, p. 648. — ♂ Mindai, Borneo (*longipes*).
 1869. SELYS, Bull. Acad. Belg. (2) 27, p. 648-649. — ♂♀ Sarawak, Borneo (*florida*).

1879. SELYS, Bull. Acad. Belg. (2) 47, p. 360 (pars: „exemplaires anormaux de Borneo”) (*chinensis*).
1897. SELYS, Ann. Soc. ent. Belg. 41, p. 428 (pars: Sarawak; Labuan) (*chinensis florida*).
1897. FÖRSTER, Ann. Soc. ent. Belg. 41, p. 208-210. — ♀ Borneo (*chinensis* var.).
1911. RIS, Ann. Soc. ent. Belg. 55, p. 234. — ♂ Sintang, W. Borneo (*chinensis*).
1920. LAIDLAW, P.Z.S. London, p. 325. — Borneo (*chinensis*).
1930. HINCKS, Sar. Mus. Journ. 4, p. 51. — ♂ Sarawak (*chinensis*).
1931. LAIDLAW, J.F.M.S. Mus. 16, p. 241. — Borneo (*chinensis*).
1936. COOMANS, De Trop. Natuur, 25, p. 72-73, fig. 1 (♂♀). — W. Borneo (*chinensis*).

Material studied: — Borneo. Brussels Museum: large series of both sexes, “Labuan” ¹⁾ (yellow label, SELYS’s handwriting), “*Neurobasis chinensis* race *florida* Hag. Labuan” (SELYS, yellow). — Michigan Museum: 1 ♀ juv., “Labuan, Borneo” (id., ex coll. SELYS). — Leiden Museum: 7 ♂ (ad.), C.E. Borneo, Exped. A. W. NIEUWENHUIS, Mahakam river, Bloe-oe, IX.1894; 5 ♂, 2 ♀, id., Katoengan Mts., MAX MORET (indet.). — Buitenzorg Museum: 1 ♀, C.E. Borneo Exped. 1925, Koetai, H. C. SIEBERS, 12 ♂, 5 ♀; W. Borneo, environs of Singkawang, loc. diff. (riverine), II, VI, VII, VIII.1932, I.1933, I.1934, L. COOMANS DE RUITER.

In the “Monographie des Caloptérygines” (1854), SELYS and HAGEN have commented on the variability of the wings of the ♀. The following quotations may prove that the name *florida*, first proposed by HAGEN, applies to a ♀ from Java lacking a pseudo-pterostigma and with only a vestige of a white spot at the nodus; whereas in typical *chinensis*, the nodal spot is invariably quite distinct, the pseudo-pterostigma being nearly always present, at least so in the hind wing.

“N o u s avons hésité longtemps si nous ne séparerions pas, du moins comme race les exemplaires de J a v a de ceux du continent asiatique, mais aujourd’hui nous sommes portés à ne pas les décrire séparément” (p. 75); „Ce qui nous avait portés à croire à deux espèces, c’était l’aspect remarquable de la première femelle que nous avons reçue de Java: elle n’a aucun vestige de ptérostigma aux quatres ailes et les secteurs ne sont pas même écartés à la place où il se trouverait (chez la vraie *chinensis*, il manque parfois aux ailes supérieures). Les ailes sont presque incolores, mais cela peut tenir à l’âge de même que l’oblitération presque complète du point nodal blanc” (p. 76). “M. Hagen a examiné depuis un second exemplaire femelle, de Pulopenang.....” (p. 76). „M. Hagen avait d’abord nommé cette variété ou race de Malaisie *Neurobasis florida*” (p. 76). — The spacings are mine.

¹⁾ Labuan, on the N.W.-coast of Borneo, *sec.* HAGEN, *op. cit.* 1887, p. 648. See also: H. M. PENDLEBURY & F. N. CHASEN, “A Zoological Expedition to Mt. Kinabalu, British North Borneo (1929)”: — “The island of Labuan, classical ground to a naturalist, is now a very poor locality for collecting. The area of original jungle left is extremely small and limited to scanty patches on the tops of the hills and in the ravines. Many of the animals obtained there by early naturalists no longer exist on the island.” (Journal F. M. S. Museums, 17, 1932, p. 8 footnote 8).

It is necessary to emphasize this point, as SELYS obviously misused the name *florida* when attributing it definitely, and first, to specimens from Sarawak, collected by WALLACE. These Bornean examples, as has been ascertained

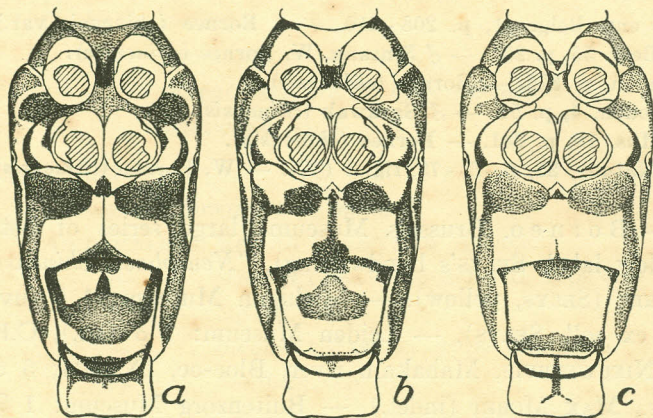


Fig. 1. Ventral aspect of meso-metathorax of *Neurobasis chinensis chinensis* (L.) (N. Sumatra, a); *N. chin. florida* HAG.-SELYS (W. Java, b); and of *N. chin. longipes* HAGEN (W. Borneo, c). Males.

by HAGEN many years later, differ very markedly from true *florida*, and from typical *chinensis* as well.

HAGEN's description of *Neurobasis longipes* (*loc. cit.* 1887) goes well with our series of specimens from different parts of the island, and I content myself with referring all specimens before me to *longipes*. So far as my material goes, the dif-

ferences found seem to clearly indicate subspecific kinship between *chinensis*, *florida*, and *longipes*.

The following key is based on a rich material of both sexes from various sources, including specimens of typical *chinensis* from Ceylon, Tonkin, Malaya, Sumatra and Nias.

Key to the Malaysian subspecies.

1. Venter of thorax conspicuously marked with black on the metepimeron and intersternum; median spot on intersternum large, brilliant metallic green (fig. 1 a-b). Legs very long but comparatively shorter and less slender than in *longipes*; anterior femora always less than 9 mm long; posterior femora < 9 - 9.5 mm, reaching back to the basal 2/9 of segm. 3. Posterior tibiae 1 mm shorter on an average than in *longipes*. Opaque area of hinder wing begins at base in *sc*, slightly distal to *arc* between *R + M* and *Cu*, at the first cross-vein in *cu*, and at base in the area posterior to *A*; a maximum of 3 rows of hyaline postero-marginal cells from about 1 - 2 mm beyond the wing-base to the end of the supplements between *Cu*_{2a} and *Cu*₂ (only one cell at the beginning and end of the area). ♀ At least with the nodus and subnodus of the hinder wing conspicuously creamy-white or -yellow in colour. 2

1'. Venter of thorax poorly and indistinctly marked with light or darker brown; a small, crescent-shaped and slightly metallic-green spot on the intersternum (fig. 1 c). Legs extremely long and slender, much thinner than in the preceding subspecies, anterior femora 8 - 8.5 mm long; posterior femora 10 - 10.5 mm, reaching back to the basal half of segm. 3. Posterior tibiae 1 mm

longer on an average than in the preceding subspecies. Bases of hinder wings more extensively hyaline; opaque area (maximum extent) begins at sc_8 , at 4-6 cells distal to the origins of M_{1-2} in the space between $R + M_{1-2}$ and M_3 , at the end of q , slightly proximal to cu , some distance proximad between the recurrent branch of Cu_{2a} and A . Area posterior to Cu_{2a} hyaline. ♂ Apices of fore wings more pointed than in the preceding subspecies; hind wings comparatively broad but very gradually expanded, greatest width beyond the middle of its length, apices more evenly rounded and hence tips more pronounced than in *chinensis* and *florida*; width and length of hw. 9.3-9.7: 29.5-30 (W. Borneo). ♀ Nodus and subnodus of all four wings slightly yellowish; no creamy spots. Pseudo-pterostigma absent from both pairs of wings. Distribution: Borneo. **longipes**

2. ♂ Wings broader; hinder pair more conspicuously expanded before the middle of their length, e.g. width and length of hw. 10-10.5: 31-32 mm, greatest width of hind wing at middle of its length. ♀ All four wings with an opaque creamy-yellow patch at nodus which usually covers the first cell distal to it. A large, creamy-white to citron-yellow pseudo-pterostigma in hinder wings, covering 7-10 cells, the nervures traversing it often incomplete and often missing in places; space between C and R holding the stigma distinctly expanded. Pseudo-pterostigma in fore wings small, covering 5 cells at a maximum, or entirely absent. Distribution: India and Ceylon, through Burma and Siam to S. China; Malaya, Sumatra, Nias. **chinensis**

2'. ♂ Wings narrower; hinder pair more evenly expanded before the middle of their length, thence narrow, with the distal third more parallel-sided and with the tips more rounded than in *chinensis* and *longipes*, e.g. width and length of hw. 9.2-9.5: 31-32 mm. Greatest width of hind wing at middle of its length. ♀ All four wings with the nodus and the subnodus creamy-yellow but with a vestige only of an opaque creamy-yellow spot immediately distal to it, filling up barely the basal fourth of the first cell distal to the nodus. No traces of a pseudo-pterostigma. Distribution: Java. **florida**

Fam. EUPHAEIDAE.

Euphaea impar SELYS.

1859. SELYS, Bull. Acad. Belg. (2) 7, p. 441-442 (*impar*), 442 (*inaequipar*). — ♂♀ Mt. Ophir, Malaya (*impar*), ♂ Sarawak (*inaequipar*).
1898. KRÜGER, Stett. Ent. Zeitg. 59, p. 78. — ♂ N.E. Sumatra.
1902. LAIDLAW, P.Z.S. London, p. 87. — ♂ Kelantan.
1920. LAIDLAW, Rec. Ind. Mus. 19, p. 27 (key, as subspecies) (*Pseudophaea*).
1920. LAIDLAW, P.Z.S. London, p. 327. — ♂ Sarawak (*Pseudophaea inaequipar* as subspecies).
1924. LAIDLAW, J. Mal. Br. Roy. As. Soc. 2, p. 298, 299. — ♂ Anambas I.
1930. HINCKS, Sar. Mus. Journ. 4, p. 51. — ♂ Sarawak (*inaequipar*, as subspecies).
1930. RIS, Mitt. Münch. Ent. Ges. 20, p. 85 (key), 85-86 (♂ Mt. Ophir, ♂ Sarawak, descr.) (*impar* + *inaequipar*).
1933. LAIDLAW, Bull. Raffles Mus. 18, p. 78. — ♂ Sarawak (*inaequipar*).

costalis SELYS and *laidlawi* KIMMINS, I wish to include a few remarks on the closely allied *E. subnodalis* LAIDLAW, based on material in the collection of the Michigan Museum, Ann Arbor, and in Dutch collections.

E. subnodalis takes rather an intermediate position between *subcostalis* and *laidlawi* in that the shape of the seminal vesicle on the second abdominal segment differs from both; its posterior margin is more convex than in *subcostalis* but less so than in *laidlawi*, whilst the lateral projections, though better pronounced than in *laidlawi*, are much less pointed than in *subcostalis* (fig. 2).

The hind wings of the ♂ of *subnodalis* are decidedly narrower than those of the two species just mentioned.

The anal appendages are very similar to those of *tricolor* SELYS; and, when looked at from aside, are almost of equal width from base to apex.

Fam. LESTIDAE.

Lestes praeivius, sp. n. (fig. 3).

Material studied: — 1 ♂, 1 ♀ (ad.), E. Borneo, N. Koetai, Sangkoelirang distr., Maloewi, April 1937, M. E. WALSH leg. — 2 ♂, 1 ♀ (ad.), Enggano Id. (off the S.W.-coast of Sumatra), Boeah-boeah, May 30, 1936, J. K. DE JONG leg. Holotype ♂ and allotype ♀, Maloewi, E. Borneo, April 1937, in the Buitenzorg Museum.

Male (ad.). — Labium pale yellow. Mandible-bases, labrum, genae and anteclypeus, blue. Postclypeus black with two large blue spots on either side of the middle line. Remaining parts of the head bronzy-black; no pale spots behind the eyes. Rear of the head pruinose blue. Antennae brownish-black.

Prothorax dull bronzy-green above, sides blue, strongly pruinose; a thick black stripe over the transverse suture of propleuron. Synthorax, colours faded, Russian blue on mesepimeron. Dorsum marked by a pair of dull metallic-green antehumeral stripes, shaped similarly to those of *L. praecellens* and only little broader than in that species, straight on their inner border and well separated from one another by a distance scarcely narrower than their own width, deeply crenulate or lobed on their outer border. Each of these bands is surrounded by a blackish line that neatly follows the crenulations, the median interstice being of the same colour. Mesepimerites marked with two (or three) blackish dots; one on the upper end of the humeral suture and one, distinctly larger, shoulder-spot on the middle of the lower portion of the mesepimeron; this humeral spot is connected by a vague patch of brown to a blackish point along the lower end of the humeral suture.

Sides of the thorax with a black dot at lower end of the incomplete first suture and a slightly larger, triangular spot covering the spiracle. Two posterior black dots along lower margin of metepimeron. Venter of thorax pale-coloured, poststernum with two black points, one on each side of the median line. Sides and under surfaces rather coarsely powdered with light blue.

Coxae yellowish, striped with black posteriorly, heavily pruinose blue.

Femora dirty yellow with a thick black exterior stripe and a fine lateral line. Tibiae bright yellow, or greenish, exteriorly, black inside. Tarsi and spines black.

Wings hyaline, pterostigma deep black. Neuration as for genus, similar to typical *praemorsus* but the wings are definitely less abruptly petiolated and the nodal index is higher. Postnodals $\frac{14.14}{13.13}$ (type, Borneo), $\frac{14.14}{12.13}$, $\frac{15.16}{14.14}$ (paratypes, Enggano).

Abdomen marked similarly to *praemorsus*; dorsal marks dull bronzy-green, those on 2-7 after the slight sub-apical constriction a little more expanded, and with the basal blue annule a trifle larger than in that species. Segm. 8-10 black, each with an ochreous point on the middle of the sides. Abdomen with segm. 1 pruinose blue aside and underneath, otherwise not pruinose.

Superior anal appendages light yellow, extreme bases and exterior teeth sharply defined black. Inferior pair pale reddish-brown, yellow interiorly. Superiors forcipate, gently and regularly incurved, to meet at their apices, each with a strong sub-basal intero-dorsal tooth and with the interior sub-median projection armed with three strong unequal teeth. Inferiors broadly triangular in ventral view, divaricate, tapering, the tips rounded, not projecting beyond the level of the sub-basal tooth of the superior appendage, fringed apically with a bunch of golden yellow hairs (omitted in the left figure).

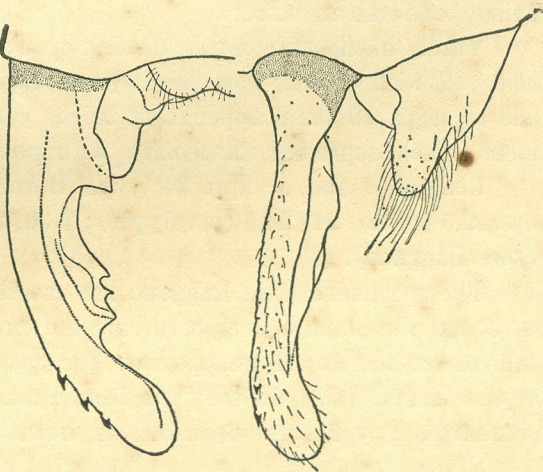


Fig. 3. *Lestes praeivius*, sp. n. Male anal appendages, dorsal view (left side), and right side-view.

Female (ad.). — Generally similar to the male, but for the following differences.

The whole of the anterior surface of the head, as far upwards as the insertion-point of antennae, dirty yellowish-brown. Postclypeus with two diffuse brownish spots. Frons marked off laterally by a narrow bronze-green streak which is connected with the dark colour on the upperside of the head. Metallic-green colour on the vertex reduced: antennae and ocelli surrounded by large, confluent yellow rings, so that only the interspaces remain bronze-green. Epicranial lobes entirely dull bronze-green. Occipital area yellowish, sutures and a few points on either side, brown. Rear of the head black, slightly pruinose. Antennae dark brown, articulations between basal joints yellow.

Pro- and synthorax isabella-coloured, the former slightly pruinose white, laterally. Bronze-green spots on dorsum and sides of thorax distinct, similar in principle to those of the male, but considerably more reduced. Mesepisternal

bands narrow, the pale interstice equal in width to the bands themselves. Lateral brown spots distinct, arranged as in the opposite sex. Infraepisternites and lower portions of metepimera pruinose-white, as are the underparts of the thorax and the outer surfaces of all coxae.

Wings hyaline, pterostigma shaped as in male, dark brown in colour (type), or grey-brown (parallotype). Postnodals $\frac{14.14}{13.13}$ (type), $\frac{16.17}{15.16}$ (parallotype).

Abdomen robust, with cylindrical segments. Ground-colour pale olive-yellow, basal segments intermingled with green. Dorsal marks light bronzy brown with slight metallic lustre on basal segments; apical expansions very distinct. Terminal segments black, 8 and 9 each with an ochreous (or bluish) lateral spot, whilst 10 is brown with two small dorsal spots, most of the sides being yellowish in colour.

Valves black, with a pale median spot and with the serrulate lower margin also yellowish; border very slightly convex in lateral view; tips not surpassing end of segm. 10. Anal appendages bright yellow, a little longer than tenth segment, much depressed, lanceolate, with pointed tips.

Length: ♂ abd. + app. 34 (type, Borneo), 35.5-38 (paratypes, Enggano), hw. 22.5 (type), 24-24.5 (paratypes); ♀ 30, 23 (allotype, Borneo), 34, 28 (paratype, Enggano).

The specimens from Enggano are exactly identical with the Bornean type, save that the obscure lines bordering the trifid bronze-green marks on the dorsum of the thorax are unapparent. The ground-colour of the dorsum and sides of the thorax (faded in the type from Borneo), according to RIDGWAY'S colour standards, may be best described as 'burn blue' in the other males.

This new species is the fourth representative of a small species-group, or 'Artenkreis', of which *L. praemorsus* SELYS, originally described from the Philippines, was the first to be reported. This last-mentioned species ranges from India to the Bismarck Archipelago; and although it will doubtless be possible to distinguish a number of local races for it, the separation of the many insular forms is by no means easy for each subspecies presents a considerable amount of colour variation ¹⁾. It is my hope to deal with them in due time since I have now been able to study topotypes of this species.

The three other species are I think certainly very closely related to *L. praemorsus*, but two of them at least present some striking morphological peculiarities, or even colour-differences, which I suppose are constant and of specific value. These species all occur within the limits of the area of distribution of *praemorsus*:

L. pertinax LIEFT. (Nova Guinea, 15 Zool. 5, 1932, p. 493-495, fig. 1. — Terra typica: New Guinea.

L. praecellens LIEFT. (Treubia, 16, 1937, p. 59-62, fig. 2-3. — Terra typica: Java.

¹⁾ Cfr. SCHMIDT, Arch. Hydrobiol. Suppl. 13, 1934, p. 331-334, figs. 20-27.

L. praeivius, sp. n. (*huj. op.*). — Terra typica Borneo; further distribution: Enggano Id. ¹⁾.

L. praeivius differs from *praemorsus* in the evenly curved shape of the superior anal appendages, which at the end of their second third are armed with a few robust interior teeth, absent in *praemorsus*. It further differs from typical examples (and from the indo-malaysian subspecies *decipiens* KIRBY as well) in its superior size, shorter and black pterostigma, in its less petiolated wings, and in details of colouring.

L. praeivius is easily distinguished from *praezellens* by the presence of blackish dots on the metapleurae of the thorax.

Lastly, our new species differs from *pertinax* chiefly in the longer inferior appendages. In their outward appearance, colour-design and pruinescence, *praeivius* and *pertinax* are very much alike, whilst the shape and armature of the superior appendages of the male are also strikingly similar in these two species. For these reasons *praeivius* may ultimately prove to be a subspecies of the Papuan *pertinax*.

Fam. MEGAPODAGRIONIDAE.

Podolestes buwaldai, sp. n. (fig. 4 b).

Material studied: — 1 ♂ (ad.), E. Sumatra, Riouw Res., Rengat, Pangkalankasai, April 2, 1939, P. BUWALDA leg. Holotype in the Buitenzorg Museum.

Male (ad.). — Head almost entirely black. Hinge and base of median lobe of labium brown, darker towards apex, lateral lobes black; labrum shining. Genae and frons, between the insertion-point of antennae and margin of compound eyes, smooth and with slight metallic-blue reflections. Occipital ridge slightly bluish pruinose. Antennae black.

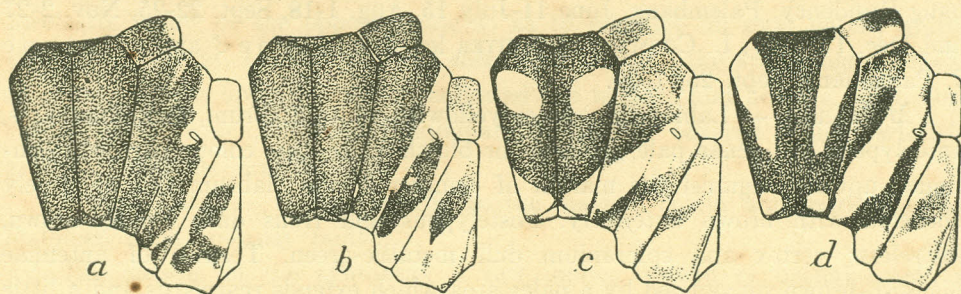


Fig. 4. Colour-pattern of synthorax of *Podolestes chrysopus* SELYS ♂ (W. Borneo, a); *P. buwaldai*, sp. n. ♂ (E. Sumatra, b); *P. coomansi*, sp. n. ♂ (E. Sumatra, c); *P. orientalis* SELYS ♀ (E. Borneo, d).

Prothorax black, thinly pruinose blue; suture between median lobe and epimeron marked off by an irregular yellow line. A yellow basal point on either side of the anterior lobe and a transverse streak of the same colour on each side along base of posterior lobe.

¹⁾ This record was erroneously given for *praemorsus* in my latest account of this species (*loc. cit.* p. 63).

Thorax black above as far down as the first lateral suture, mesepisterna and mesepimera with metallic-green lustre. Metapleurae dull ochreous, with two sharply defined, oblique, metallic-green bands, shaped as in fig. 3 b.

Venter auburn, paler among the sutures.

Coxae and trochanters auburn, paler behind. Outer surface of all femora Sandford's brown, apices darkened, chestnut-coloured; inner surfaces bright orange-chrome. Tibiae salmon-orange exteriorly, inner surfaces orange-chrome. Tarsi orange-rufous, apical joint darkened towards tip; claws brown. Spines orange-rufous.

Wings identical in shape, and neuration also similar, to those of typical *chrysopus*. Pterostigma black. Nodal index $\frac{14.15}{14.14}$.

Abdomen coloured similarly to *chrysopus*, and anal appendages exactly identical in shape with those of that species. (See my description and drawings of *P. chrysopus* SELYS, from W. Borneo, in *Treubia*, 15, 1935, p. 181 - 183, fig. 3).

Length: abd. + app. 30, hw. 22.7 mm.

Female unknown.

This new species is closely allied to *P. chrysopus*, SELYS, both in the general wing-structure and the colour-pattern of the abdomen, as in regard to the structure of the anal appendages of the male. It differs very strikingly in the colour of the legs and in details of the thoracic colour-pattern, which, in *chrysopus*, are very constant characters (fig. 4 a).

I have much pleasure in naming this species after Dr. P. BUWALDA, who as a botanist took great interest in collecting insects as well.

Podolestes coomansi, sp. n. (fig. 4 c, 5).

Material studied: — 17 ♂, 17 ♀ (4 ♂, 6 ♀ juv.), S.E. Sumatra, Palembang Residency, Palembang, June 11-July 15, Aug. 1-18, Sept. 22-25, Nov. 2-27 and Dec. 11, 1937, L. COOMANS DE RUITER leg. Holotype ♂ and allotype ♀, Palembang, Sept. 25, 1939.

Male (ad.). — Labium bluish- or yellowish-white. Labrum, mandible-bases, anteclypeus and genae pale greenish- or bluish-white, this colour narrowly continued upwards against the margin of compound eyes; labrum shining, finely bordered with brown anteriorly. Postclypeus and frons dark bronzy-brown, lustreless; vertex and epicranium dull metallic-green. Torulus of antennae blackish-brown surrounded by a paler area which extends rearwards and a little inwards as an indistinct, slightly curved, rusty-brown stripe, ceasing on the outer side of each lateral ocellus. Antennae dark brown, pedicel pale brown, darkened apically. Occipital plate with two small pits, one on each side. Rear of the head black, pruinose.

Prothorax clear blue, anterior and posterior lobes dark brown, propleurae pale vinaceous-fawn (RIDGWAY), slightly pruinose.

Synthorax dull bronzy-black with slight greenish reflections above. Dorsal pale markings sharply defined, and of a delicate calamine-blue. Ante-alar

triangles filled in with blue. The sides, beyond the humeral suture, are less vividly coloured, usually burn blue or light glaucous blue with two parallel, oblique, tawny bands which at times are very indistinct (fig. 4 c). Metepimeron and under surfaces pale glaucous blue, thinly pruinose in aged individuals.

Legs vinaceous-buff, the tibiae usually rather more pale olive-buff; spines, and apices of all femora, dark brown.

Wings very different in shape from those of *orientalis*, *chrysopus* and *buwaldai*, more abruptly expanded beyond the petiole, decidedly broader and with the apices broadly and rather abruptly rounded ¹⁾. Distance between base of wing and Ax_1 only little longer than the space between Ax_1 and Ax_2 (about $1\frac{1}{3}$ in fore wing, less than $1\frac{1}{2}$ in hinder wing). Quadrilateral much longer than in *orientalis*; costal side in fore wing twice as long, and in hind wing almost three times as long as distal side. Two postquadrangular antenodal cells in all wings. Pterostigma light to dark brown, distinctly shorter than in *orientalis*. Nodal index $\frac{15-18}{14-18}$.

Abdomen short, shaped and coloured much as in *orientalis*. Segm. 1 pale brown, sides bluish-white; 2 with the dorso-basal calamine-blue mark slightly less deeply indented posteriorly, sides pale blue. Remaining segments similar to *orientalis*. Segm. 7-10 less obscured than in that species and with traces of blue mid-dorsal spots at extreme base only. Tenth segment roof-shaped, dark brown above; sides of 9 and 10 indistinctly marked with pale blue.

Sup. anal apps. dark reddish brown, apical third black. Basal third of inferior pair yellow, the remainder shining black. Superior pair shorter than the inferiors, of simple structure; apices truncated. Inferior pair broad and contiguous basally, thence narrowed and somewhat outbent on middle, finally again widened and provided interiorly with a stout tooth-like projection that meets its fellow of the opposite side so as to embrace an oval notch; apices strongly divergent, bluntly pointed; seen from the side the appendage thickens to a knob whose upper surface is hollowed out in part and bears a small corrugated area, which, in aged individuals, is densely covered with a whitish, granular, pruinescence (fig. 5).

Female (ad.). — Closely similar to the male in colour and markings, but abdomen more robustly built.

The dorsum of the synthorax is raw umber instead of bronzy-black, a narrow stripe over the median carina being Sanford's brown in colour. Mesepi-

¹⁾ Neither MUNZ's nor RIS's figures of the wings of the supposed ♂ and ♀ of *P. orientalis* agree exactly with those of true examples of this species from Borneo, Billiton and South Sumatra, described by me in a previous paper (*loc. cit.*, *antea*). In our series both pairs of wings are narrower and decidedly more pointed apically than it would appear from these illustrations. On the other hand, the apices of the wings of *P. coomansi* are still more rounded off than in the two specimens of *orientalis* examined by MUNZ and RIS, so that there may exist yet another Malaysian species of *Podolestes*, intermediate in this respect between *orientalis* and *coomansi*. (See MUNZ, Mem. Amer. Ent. Soc. 3, Philad. 1919, pl. 10 fig. 60; and RIS, Zoöl. Meded. Leiden, 10, 1927, p. 15-16, fig. 7).

meral blue patches (antehumeral spots), very slightly larger than in the male, only little longer than broad.

Wings hyaline or slightly enfumed with obscured border beyond *pt* in old specimens; similar in shape to the male or even a little broader. Neuration as in the opposite sex. Nodal index $\frac{13-16}{14-16}$.

Abdomen coloured similarly to the male. Apical segments dark brown, almost black in old specimens, with bronzy-green or -blue reflections. Blue basal spot of segm. 2 only shallowly indented posteriorly, those on 3-7 slightly

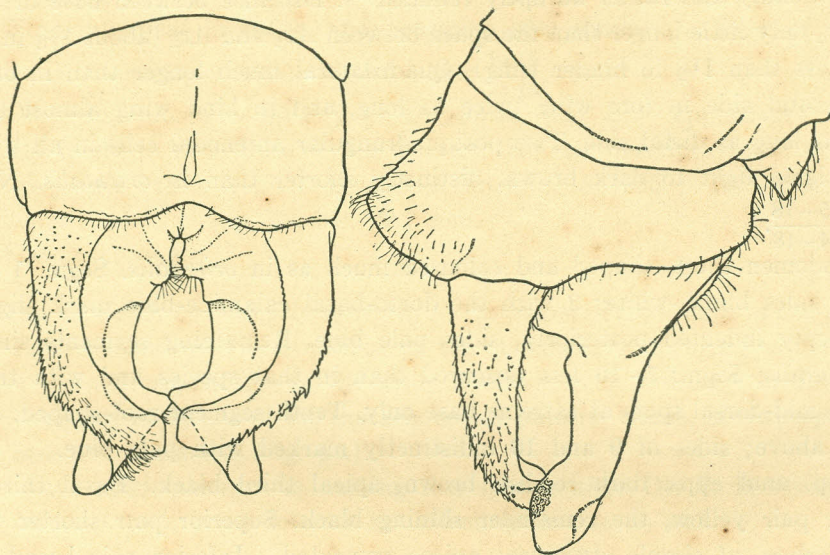


Fig. 5. *Podolestes coomansi*, sp. n. ♂. Anal appendages, dorsal view and right side.

enlarged and all blue mid-dorsally. Segm. 8 with narrow, complete, blue basal annule, the blue colour extending finely along the mid-dorsal carina as far as the middle of the segment; 9 with the blue basal annule still narrower, incomplete laterally, but with the median off-shoot stouter, extending almost to end of segment.

Anal appendages almost as long as segm. 10, rather swollen, but tips acutely pointed. Valves brown, of simple structure, not surpassing end of segm. 10.

Length: ♂ abd. + app. 29 - 31.5, hw. 22 - 24; ♀ 27.5 - 29; 23.8 - 25 mm.

This fine new species is chiefly remarkable for its colouring and for the peculiar, broadly rounded wings. The ♂ is easily distinguished from *P. orientalis* SELYS, by the different shape of its anal appendages, whilst the ♀ resembles the ♂ in that the antehumeral blue bands on the dorsum of the mesothorax are in the form of isolated, oval (or wedge-shaped) patches, whereas in the ♀ of *orientalis* they are band-like, widest ventrally and bluntly pointed above, occupying the lower two-thirds of the mesepisternite (fig. 4 d).

Named in honour of Mr. L. COOMANS DE RUITER, of Manado (Celebes), in recognition of his continuous help and activity.

Fam. PLATYSTICTIDAE.

Drepanosticta barbatula, sp. n. (fig. 6).

Material studied: — E. Borneo, N. Koetai, Sangkoelirang distr., Batoe Besi, June 1937, M. E. WALSH leg. Holotype in the Buitenzorg Museum.

Male (ad.). — Labium pale yellow, tips of lateral lobes brown. Labrum and anteclypeus creamy greenish-white; labrum with the anterior border sharply defined black. Mandibles shining black, upper angle (between labrum and anteclypeus) filled up with a triangular creamy-white spot. Postclypeus shining bronzy-black, finely and transversely striate. Frons and vertex bronzy-black with slight lustre; epicranial lobes dull bronzy-black, rear of the head shining black with purplish reflections. Antennae with the first joint blackish-brown, second joint light brown, the remaining joints missing. Parorbital and transverse postoccipital carinae well developed, the former narrow but rounded, the latter acute, without angulate lateral extremities.

Prothorax chrome-yellow intermingled with green; a deep black spot over the middle, widest posteriorly and almost pointed anteriorly, ceasing at base of anterior lobe and covering the median third of posterior lobe (this dorsal mark almost identical in shape to that of *D. attala* LIEFT., cf. Treubia, 14, 1934, p. 472 fig. 2, ♂). Propleurae bronzy-black. Posterior lobe short and broad (still shorter than in *attala*), of simple structure, depressed, hind margin perfectly straight in dorsal view, side-portions evenly rounded.

Synthorax, as far down as the first lateral suture, including the mesinfraepisternum, shining greenish bronzy-black with slight coppery reflections on mesepimeron. Sides light ochreous, intermingled with green, with a strongly contrasting black stripe joining the second suture, tapering ventrally, at extreme dorsal end; this stripe is about twice as wide as the metepisternal pale band, but soon diminishes in width, attaining only half its width at level of the spiracle, which it does not include; posterior limit of this black stripe rather diffuse ventrally. Metepimeron for the greater part and under surfaces pale yellow or whitish. Ante-alar triangles pale-coloured (blue in life?).

Legs pale; coxae and trochanters pale yellow; femora somewhat darker with an irregularly broken stripe along exterior surfaces, and with traces of two pale brownish bands; knees blackish. Tibiae and tarsi dirty ochreous, tibiae obscured basally and distal fourth of last tarsal joint black. Claws reddish; spines all brown.

Wings hyaline. Accessory basal postcostal nervure situated midway between base of wing and Ax_1 . Ac oblique, placed midway between Ax_1 and Ax_2 ; it meets the wing-margin well before the production of the proximal side of q , joining Ab at margin under an obtuse angle in all wings. Ab almost $1\frac{1}{2}$ times longer than Ac . Cu_1 reaching the hind margin at 4 cells distal to level of subnodus. Postnodals 12 in all wings. M_3 arises slightly distal to subnodus in all four wings, Rs between nodus and Px_1 . M_2 originates at the 6th or 7th postnodal in fore, at the 6th in hinder wing. M_a 2-3 cells distal to M_2 in fore as well

as in hinder wings. Two postquadrangular antenodal cells. Pterostigma jet-black surrounded by a very fine pale line, about $1\frac{3}{4}$ to 2 times longer than high, slightly widened distally; costal side only very little shorter than anal side; proximal angle rather acute, distal side slightly convex.

Abdomen enormously drawn out and very slender, apical segments strongly dilated. Segm. 1-2 brownish above, greenish-yellow aside; dorsum of 2 blackish basally and with a yellow longitudinal mid-dorsal stripe, widest basally and fading away posteriorly; 3-7 with narrow yellow basal rings, thence brown, becoming black apically. Segm. 8-10 deep black, lateral tergal margins of 8 broadly yellow; 9 with two widely distant squarish blue spots, one on each side of the middle, reaching half the length of segment; 10 black. Membrane between segm. 9 and 10 also blue.

Anal appendages, superiors about twice as long as segm. 10, moderately stout; basal part black, hollowed out interiorly and strongly inwardly curved; distal part yellowish, rather abruptly downbent. A small but very acute spine projects from the inner (mesial) margin of the dorsal surface. Proximal portion

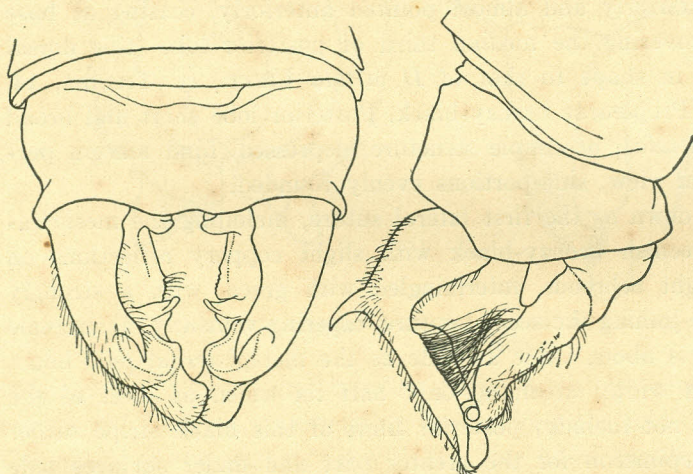


Fig. 6. *Drepanosticta barbatula*, sp. n. ♂. Anal appendages, dorsal view and right side.

of distal part of superior appendage expanded and slightly hollowed out, shining yellow framed in black; from the exterior surface originates a dense brush-like bunch of stiff ochreous hairs, placed in a row and directed backwards like a whale's beard; distal portion of same cylindrical, dull ochreous in colour. Inferior appendages pale ochreous, slightly obscured apically, bent at first upwards, then outwards and finally twisted and bent upwards again. At about half-way its length each appendage carries a strong acute spine, arising from its inner surface and directed obliquely upwards, inwards and a little backwards (fig. 6).

Length: abd. + app. 48, hw. 24.5 mm.

Female unknown.

This new species is probably most closely related to the *rufostigma*-group of *Drepanosticta*, but it is abundantly distinguished from all Bornean species of this group by the dense brush-like row of hairs on the innerside of the superior appendages of the male. In this respect *barbatula* approaches a small

group of Malayan species, described by Dr. LAIDLAW, which are remarkable for the presence on the superior anal appendages of a curious process, which itself carries a pencil-like brush of long hairs. The lower appendages in these species are of very complex structure, differing widely in shape from those of *barbatula*. Our new species is also peculiar for the extreme length of the abdomen.

D. barbatula is the tenth species known to occur in Borneo.

Fam. PLATYCNEMINIDAE.

Coeliccia arcuata, sp. n. (fig. 7-8).

Material studied: — 2 males, 3 females, E. Borneo, N. Koetai, Sangkoelirang distr., Kariorang, Batau Besi and Babi Djoeton, April 1934, May-June, 1937, M. E. WALSH leg. Holotype ♂ and allotype ♀, Batau Besi, May-June, 1937, in the Buitenzorg Museum.

Male (semiad.). — Labium pale orange-yellow. Labrum wholly black. Mandible-bases, genae and anteclypeus bright blue. Postclypeus, frons and vertex black, postclypeus very shining, base and apex of second joint of antennae and a pair of elongate transverse marks just posterior to the antennae, on either side connecting each lateral ocellus with the margin of compound eye, blue. These head-marks are irregular in shape, rather expanded mesially, narrower and linear laterally. Remainder of head black, save for a pair of very small, transverse, blue postocular spots, restricted to the middle of the epicranial lobes and just visible in dorsal view.

Prothorax with anterior and posterior lobes black, middle lobe blue with a fine median black line. Transverse lateral suture black. Posterior lobe simple, its free margin with a very shallow concavity so as to form a minute obtuse-angulate projection on either side of it.

Synthorax bronzy-black above, light orange-yellow at the sides and underneath; antehumeral stripes broad, complete, gently tapering to a point dorsally and ceasing about 0.5 mm before ante-alar triangles, which are black; at the top of either shoulder and outdistancing the stripes, lies an oval yellow spot. On the side of the thorax a black line, narrowly connected dorsally with the black of the mesepimeron, on the second lateral suture, stopping short 0.5 mm before the spiracle.

Legs with the coxae and trochanters pale orange-yellow. Femora yellow with fine blackish exterior line and with the knees also obscured; tibiae and tarsi dirty yellowish, tibiae finely black interiorly and with black apices, distal half of last tarsal joint and claws black. Spines brown.

Wings hyaline. Neuration very similar to *flavostriata*, LAID. Costal side of *q* a trifle longer in both pairs of wings, and hence distal side slightly less oblique than in that species. Pterostigma blackish-brown, shaped much as in *flavostriata* but a trifle longer, and costal side very slightly shorter than anal side. 14 postnodals in fore wing, 13 in hind wing.

Abdomen slender. Segm. 1 bright yellow, with a thick median line of black, 2 yellow-brown, paler below, with narrow black apical ring; 3-6 each with

an indistinct, transverse basal yellow ring, interrupted mid-dorsally (most conspicuous on 3), and narrow black apical rings. The remaining segments progressively darker, 9-10 black; 9 with a large blue dorsal patch, bluntly pointed basally, and 10 with a mid-dorsal point of the same colour, at extreme base. Articulation between 9 and 10 likewise blue.

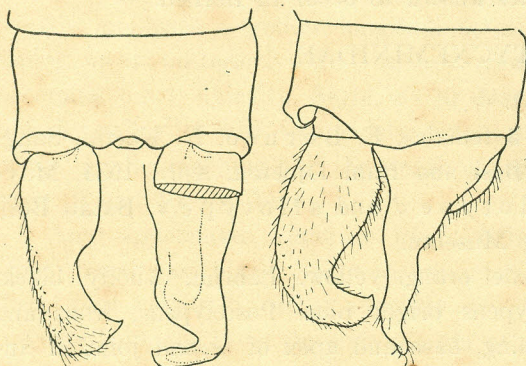


Fig. 7. *Coelliccia arcuata*, sp. n. ♂. Anal appendages, dorsal view and right side.

Anal appendages black, superior pair longer than segm. 10, inferiors a trifle longer than the superiors. Superior pair cylindrical, rather stout, very slightly incurved in dorsal view, evenly but strongly downbent in side-view; each carries a short, acute, internal tooth (not visible in dorsal view) at the end of its basal fifth, which is directed ventrad and slightly basad. Inferior appendages slender, cylindrical, incurved apically (fig. 7).

Female (ad.). — Differs from the male only in details of coloration and in the shape of the prothorax. Posterior lobe of prothorax shaped as shown in fig. 8, the median division of the lobe depressed. Antehumeral stripes and metepisternum blue.

Wings with $\frac{12-14}{11-13}$ postnodals.

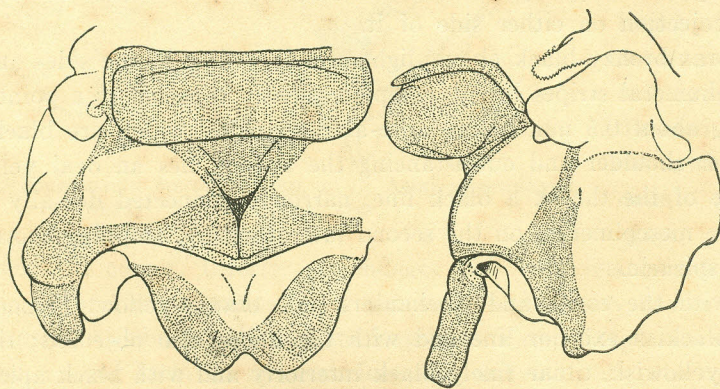


Fig. 8. *Coelliccia arcuata*, sp. n. ♀. Prothorax, dorsal view and right side.

Abdomen coloured as in male. Distal $\frac{2}{5}$ to $\frac{1}{3}$ of segm. 8 entirely, and a thick stripe bordering the tergal margin, bright blue; 9 and 10 and anal appendages wholly black. Valves very long, with slightly convex ventral border, projecting beyond apex of segm. 10 for almost twice the length of this segment.

Length: ♂ abd. + app. 35 - 35.5, hw. 20.5 - 21; ♀ 32 - 36.5 (incl. valves), 21 - 24 mm.

This species falls in LAIDLAW's Group 3, of *membranipes* (RAMB.), and seems to find its nearest allies in *flavostriata* LAID., *campioni* LAID., *lieftincki* LAID., and the species next to be described as *coomansi*, sp. n. ¹⁾ It is easily distinguished from all these by the different shape of the ♂ anal appendages and the structure of the ♀ prothorax.

***Coelliccia coomansi*, sp. n. (fig. 9 - 10).**

Material studied: — 2 males, 1 female (ad.), W. Borneo, Singkawang, Mt. Poteng, 400 m alt., Jan. 31, 1932 (holotype ♂ and allotype ♀), April 1, 1934, L. COOMANS DE RUITER leg., in the Buitenzorg Museum.

Male (ad.). — Head coloured as in the preceding species (*arcuata*, sp. n.), but lower margin of mandible-bases bordered with black and basal half of labrum sharply defined pale blue. Postclypeus black, very shining.

Prothorax with anterior and posterior lobes black, except the side-edges of the anterior lobe, which are yellow; middle lobe orange-yellow with a fine median black line and with a thick black stripe over the lateral suture. Posterior lobe with a very shallow median concavity.

Synthorax bronzy-black above, ground-colour uniform orange-yellow including the antehumeral stripes and the shoulder-spot, the former being less pointed dorsally than in *arcuata*. On the side of the thorax the black stripe joining the second suture is shorter, rather tapering ventrally and ceasing midway between upper margin and the spiracle.

Legs coloured similarly to the preceding species.

Wings hyaline. Neuration as in the previous species. Quadrilateral identical in shape to *flavostriata* ²⁾. Pterostigma blackish-brown, shaped exactly as in *flavostriata*. 13 - 15 Post-nodals in fore wing, 13 - 14 in hind wing.

Abdomen long and slender. Colouring similar to *arcuata*, but terminal segments entirely black.

Anal appendages black, of slender build; superior pair almost twice as long as segm. 10, inferiors distinctly longer than the superiors. Superior pair forcipate in dorsal view, straight in side-view, flattened dorso-ventrally towards the

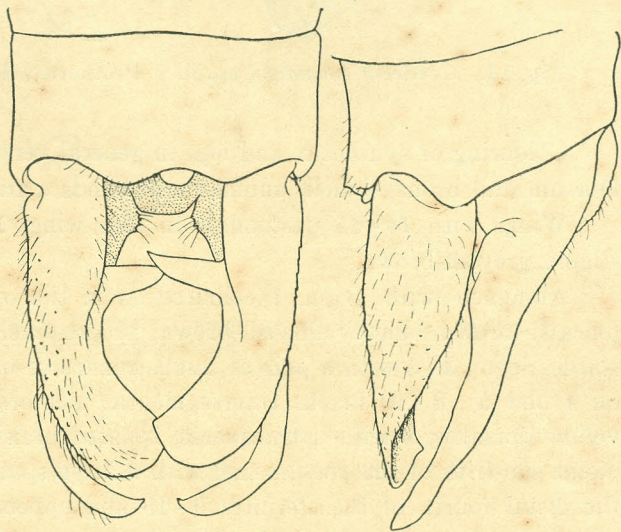


Fig. 9. *Coelliccia coomansi*, sp. n. ♂. Anal appendages, dorsal view and right side.

¹⁾ Cf. F. F. LAIDLAW, A Revision of the genus *Coelliccia*. Rec. Ind. Mus. 34, 1932, p. 7-42, 3 pls.

²⁾ Cf. F. F. LAIDLAW, P. Z. S. London, 1918, p. 223 fig. 1 (wings ♂).

free extremity; each carries a very robust pointed internal spur slightly before the middle, which is directed mesiad almost under a right angle. Inferior appendages very slender, cylindrical, incurved apically (fig. 9).

Female (ad.). — Head coloured as in the male, but labrum wholly black.

Pale marks on dorsum of prothorax reduced to paired, greenish-yellow spots on the middle lobe and a yellow patch of the same size as the dorsal spots on either side of the anterior lobe. Posterior lobe strongly modified, carrying an enormous, mid-dorsal, bladdery structure which projects obliquely upwards and backwards; this projection is wedge-shaped in profile view and rounded off dorsally, and in frontal view appears to consist of a single very broad median lamella, roughly triangular in outline, convex anteriorly and folded together to the long axis of the body, with the free posterior angles curved towards each other and meeting in one point, enclosing an oval opening when viewed from above (fig. 10).

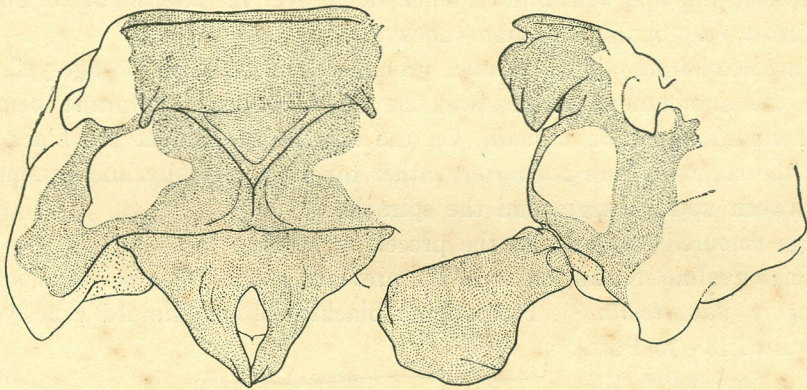


Fig. 10. *Coelliccia coomansi*, sp. n. ♀. Prothorax, dorsal view and right side.

Colouring of synthorax and legs in general very similar to that of the male. Dorsum dull bronzy-black, antehumeral bands a trifle broader, greenish-yellow.

Wings with 14 - 15 postnodals in fore wing, 13 - 14 in hind wing. Pterostigma greyish-brown.

Abdomen with segm. 1 coloured as in the opposite sex, dorsum of 2 - 7 blackish-brown, sides yellowish-brown, progressively darker from before backwards. Segm. 3 - 5 with a pair of small transverse basal yellow streaks (vestigial on 4 and 5), 8 - 10 black. Intersegmental membranes between 7 - 8 and 8 - 9 yellow dorsally; 8 with a transverse, isolated bluish-green band, occupying the distal one-fifth of the dorsum and with a large spot of the same colour covering the distal fourth of the sternite; 9 - 10 and appendages black.

Anal appendages conical, pointed, shorter than segm. 10. Valves black, ventral margin slightly convex, tips yellowish, projecting beyond apex of segm. 10 for about the length of this segment.

Length: ♂ abd. + app. 36.5 - 38, hw. 22; ♀ 35.5 (incl. valves), 23.5 mm.

Coellicia octogesima, SELYS (fig. 11 - 12).

1863. SELYS, Bull. Acad. Belg. (2) 16, p. 157-158. — ♀ Singapore (*Trichocnemis*).
 1886. SELYS, Mém. cour. Acad. Belg. 38 (4), p. 117 - 118. — ♀ Singapore (*Trichocnemis*).
 1932. LAIDLAW, Rec. Ind. Mus. 34, p. 40 - 41 (orig. descr. quoted).

Material studied: — 1 ♀ (ad., holotype), labelled: "Sing". (round, white), "Mal. W." (yellow, SELYS's hand), "*Tr. octogesima* S." (yellow, SELYS), in the Brussels Museum.

The type of this species is a ♀ in the Brussels Museum collection; and LAIDLAW's type-designations in this author's revision of the genus *Coellicia*, should be transposed. (LAIDLAW thinks it very unlikely that the two sexes described by DE SELYS should be conspecific).

I have made sketches in the Brussels Museum of the prothorax, the quadrilateral spaces of fore and hinder wings, and of the colour-pattern of the synthorax of the type, and I find these details well agreeing with those of a fine series of females collected by Mr. COOMANS DE RUITER in western Borneo. The last-mentioned examples I had associated with males from the same locality, identified by me as *C. macrostigma*, LAIDLAW, with some misgivings. According to LAIDLAW (*loc. cit.*), the ♀ of *macrostigma* (from Baram, Sarawak) is destroyed, which is extremely unfortunate. Since my specimens of *macrostigma* from West

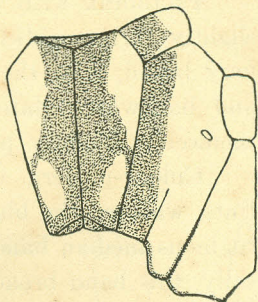


Fig. 11. *Coellicia octogesima* (SELYS), ♀ holotype. Colour-pattern of synthorax.

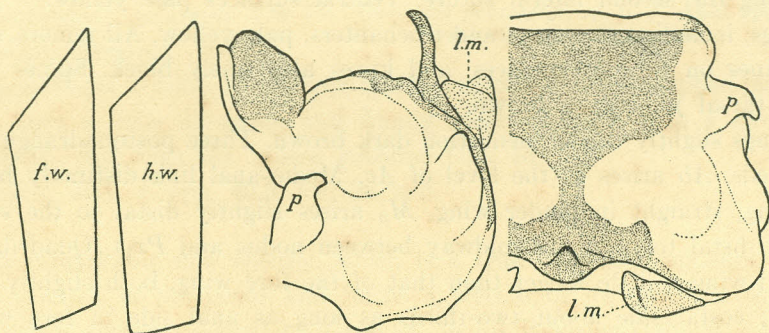


Fig. 12. *Coellicia octogesima* (SELYS), ♀ holotype. Quadrilateral space of fore and hind wing (left), and prothorax, left lateral and dorsal aspect. *p*, lateral process of middle lobe; *l.m.*, lamina mesostigmalis.

and East Borneo differ a little from the descriptions of that sex as given by LAIDLAW, I hope to describe in detail both sexes of our series in a forthcoming paper on Bornean dragonflies.

The middle lobe of the prothorax of the type of *octogesima* carries on either side a tooth-like, sub-acute lateral process (*p*), which rises close behind the junction of the anterior and median lobes, as in other species of the *membranipes*-group. The lamina mesostigmalis is indicated in fig. 12 as *l.m.*



Coelliccia palawana, sp. n. (fig. 13).

Material studied: — 1 male (ad., holotype), Philippine Islands, Palawan Id., Alfonso XIII, March 6, 1935. K. KUWASIMA leg., in the Leiden Museum.

Male (ad.). — Labium yellow. Face, anterior to the fronto-clypeal suture, entirely Lumiere blue. Postclypeus black. Antennae and frons, as far upwards as the median ocellus, rusty-brown (ferruginous, after RIDGWAY). Vertex dark blue-green, epicranium Lumiere blue. Rear of the head greyish-blue.

Prothorax with the anterior and posterior lobes ferruginous, middle lobe slightly darker mid-dorsally; propleuron Lumiere blue. Posterior lobe short and very broad, with the hind margin slightly convex, directed obliquely upwards and backwards; lateral angles sharply pronounced, rectangulate, the apices themselves slightly projecting and bluntly pointed in frontal view.

Colour-pattern of synthorax composed merely of rusty-brown and blue tints, whereas the black bands are completely gone. Dorsum with a large ferruginous median band, occupying the inner two-thirds of each episternite; dorsally, this band broadens in a curve that runs parallel to the dorsal margin of the episternite so as to meet the impressed blackish streak at the upper end of the humeral suture, about 0.5 mm below the dorsal margin. Ante-alar triangles rusty-brown. A second band of the same ferruginous colour covers most of the mesinfraepisternite and the lower $\frac{6}{7}$ of the mesepimeron; laterally, this band does not reach the spiracle, and dorsally, is cut off obliquely. Lateral third of each mesepisternite, dorsal one-seventh of the mesepimeron, and the whole of the thoracic sides, Lumiere blue. There is, besides, a very narrow rusty-brown line along the second lateral suture. Ventral surfaces pale yellow.

Legs, including the coxae and trochanters, pale yellow. All femora with fine black lines on exterior surfaces, and knees also finely black. Spines and tips of last tarsal joint dark brown.

Wings slightly tinged, neuration dark brown. Three postquadrangular antenodal cells. *Ab* arises at the level of *Ac*. Medio-anal link distinctly broken in fore wing, straight in hinder wing. *M*₃ arises slightly distal to the subnodus, *Rs* well distal to it (about midway between nodus and *Px*₁). Quadrilateral of the hind wing a little longer than that of the fore wing, both slightly widened distally; costal side about two-thirds as long as anal side in fore wing, but almost $\frac{7}{8}$ as long in hinder wing, hence proximal and distal sides of hindwing quadrangle but slightly divergent. *M*₂ in fore wing arises at the 8th, in hindwing at the 7th postnodal; *M*_{1a} in fore wing two cells, in hindwing three cells further distad. Nodal-index $\frac{18\ 17}{18\ 16}$. Pterostigma short and high, subquadrate, deep black in colour; proximal side equal in length to costal side, which is slightly but distinctly shorter than anal side. Anal side markedly, distal side very slightly convex, distal angles almost 90°. Border of the wing-tips entire.

Abdomen with segm. 1 brownish on dorsum, blue aside; 2 light brown with elongate, rectangular blue patch, occupying the dorsal three-fifths and bordered posteriorly by an ill-defined, transverse, dark brown annule, followed by a pale

brown apical ring, the transverse suture being black. Segm. 3-7 with narrow, dark brown ring at extreme base, followed by two oblique pale blue streaks (absent on 4-7); the remainder of these segments chestnut-coloured, progressively darker from before backwards, and each with quite distinct, pale bluish or whitish sub-terminal rings, broadly interrupted by black on the dorsum of 6 and 7; sides pale brown. Segm. 8 black, the apical fourth sharply defined clear blue. The entire dorsum of segm. 9, the intersegmental membrane, and the whole of 10, blue.

Anal appendages black, superiors bluish-ochreous on middle, distal portion of inferiors chestnut-coloured. Superior pair stout, strongly downbent apically, at first sub-cylindrical, thence greatly compressed for the distal two-thirds of each, apices narrow and tapering in dorsal view, very broadly and somewhat irregularly rounded in side-view, each provided with a short interior sub-apical hook, directed obliquely backwards and downwards, followed

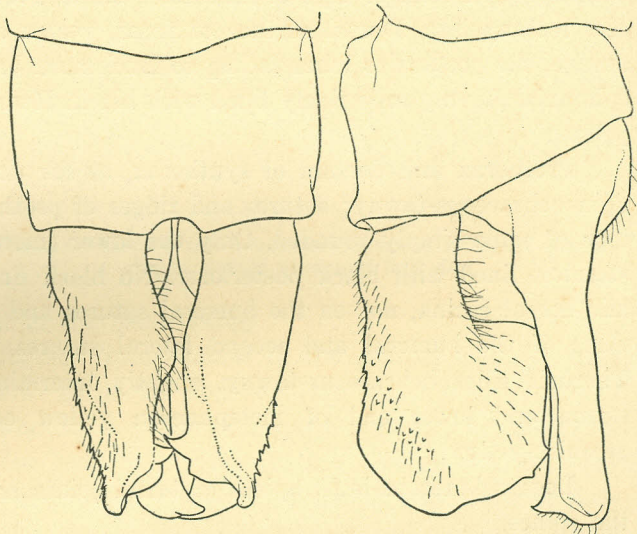


Fig. 13. *Coelliccia palawana*, sp. n. ♂. Anal appendages, dorsal view and right side.

by a blunt tubercle. Inferior appendages a trifle longer and much slenderer than the upper pair, thick at base, then a little divergent and finally incurved, each with a strong sub-apical tooth, but with the apices rounded (fig. 13).

Length: abd. + app. 40.5, hw. 26 mm.

This remarkable new species, which is a true *Coelliccia*, appears to stand entirely isolated in the genus and forms a section of its own. To the arrangement of the species adopted by LAIDLAW, in his Revision (*loc. cit.*), a 'Group 4 of *palawana*' may be added, characterized by the veins M_3 and Rs originating well distal to the subnodus, and by the presence of 3 discal cells in all wings.

It seems to be quite distinct from any of the other described species by the highly peculiar colour-pattern of the head and thorax, which is composed of soft rusty-brown and blue tints. *C. palawana* is further remarkable for the shape of the pterostigma and the anal appendages.

I have to thank Mr. KENZO KUWASIMA of Maloong (Basilan I.), who sent me a great many Philippine dragonflies for examination and study, for the presentation of this fine new species.

Fam. AGRIONIDAE.

Ceriagrion hoogerwerfi, sp. n. (fig. 14).

Material studied: — 1 ♂ (ad.), N. Sumatra, Atjeh government, Meloeuwak, mountain-lake Laoet Tiga Sagi, ca 1500 m alt., April 24, 1937, A. HOOGERWERF leg. Holotype in the Buitenzorg Museum.

Male (ad.). — Labium salmon-buff. The whole anterior surface of the head, as far upwards as the frontal ridge and including the basal two joints of antennae, bright orange. Tips of mandibles black. Frontal ridge sharply pronounced, rectangulate. Dorsal surface of frons, vertex and epicranium ochraceous-orange, the postocular lobes fading to Buckthorn brown. Lateral extremities of epicranial furrow very finely lined with black. Rear of the head pale greenish-yellow.

Prothorax and dorsum of synthorax, as far down as the humeral suture, light ochraceous-tawny; sutures and ridges of prothorax dark brown; posterior lobe of same simply rounded. Only the lower (mesostigmal) ridges of mesepisternites lined with black posteriorly. No black lines along either side of the mid-dorsal carina, nor on the humeral sutures and alar ridges. Dorsal impressions of the humeral and second lateral sutures with a minute black line. Thoracic sides ochraceous-tawny, slightly intermingled with green. Infraepisterna and lower end of metepimeron yellow ochre. Under surfaces pale greenish-yellow.

Legs ochraceous-buff, apices of tarsal joints and claws black, as are also the spines.

Wings light amber, extreme apices smoky. Pterostigma greyish-brown, much longer than high, oblique and parallel-sided. *Ab* arises at level of *Ac* in all wings. Postnodals $\frac{13\ 12}{11\ 11}$.

Abdomen grenadine-red, the sides of first and second segments paler. Segm. 6 with a very fine, sharply defined, black apical ring, restricted to the dorsum. Posterior five-sevenths of the dorsum of 7, and the whole of that of 8-10, deep shining black, except for a pair of minute reddish dorsal points, on either side of the middle line, near the apex of 7. Sides of 7-8 and 10 pale reddish, those of 9 black. Sternites light red, paling to yellowish posteriorly. Intersegmental membranes between 7-10 finely yellowish. Posterior margin of segm. 10 pinched and strongly excavated, showing a rounded, \wedge -shaped ridge which is minutely denticulated.

Anal appendages much shorter than segm. 10, superiors entirely black, inferiors yellow basally. Superior pair globular, rather twisted and with a small, curved interior sub-apical projection. Inferior pair distinctly longer than the superiors, with inflated bases, tapering, distal third more abruptly narrowing and inclined a little inwards and strongly upwards (fig. 14).

Length: abd. + app. 27.5, hw. 20 mm.

Female unknown.

This interesting new species differs from its congeners, and especially from other red-bodied species, such as *C. erubescens*, SELYS, by the deep black terminal segments of the abdomen. The anal appendages are rather similar to those of *erubescens*, but the superiors are black, and there is only one very small interior tooth. *C. hoogerwerfi* seems to be most nearly allied to *bellona*, LAIDLAW¹⁾, from Mt. Matang, Sarawak, and Mt. Kinabalu (Borneo). It differs from that species in the longer petiole of the wings, *Ab* in the wings of *bellona* originating well before the level of the cubito-anal cross-vein, whereas in *hoogerwerfi* the two veins are coincident, the position of *Ac* distal to *Ax*₁ being identical in the two species.

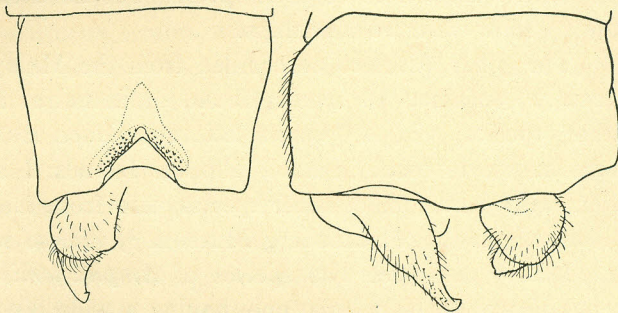


Fig. 14. *Ceriagrion hoogerwerfi*, sp. n. ♂. Anal appendages, dorsal view and left side.

C. hoogerwerfi differs further from *bellona* in the sharply defined, deep black upper side of segments 8 - 10 of the abdomen, the distal five-seventh of 7 being also black in colour, whereas in *bellona* the apical segments are gradually and indefinitely obscured. The anal appendages of the two species are very similar, but the inferior pair of *bellona* are decidedly longer than those of *hoogerwerfi*. I have compared the type of this new species with two males and two females of toptotypical *bellona* in my own collection and in that of the Michigan Museum, Ann Arbor, from Mt. Kinabalu. *C. hoogerwerfi*, I think, is also remotely allied to *pendleburyi*, LAIDLAW²⁾, from the hill-country of Perak. It is easily distinguished from that species by its orange face, the absence of black lines on the dorsum of the thorax, and by the bright orange-red abdomen. It differs further from *pendleburyi* in the basal portion of the 7th abdominal segment being red instead of black, in the absence of brown basal annules to the base of 7 - 10, and in the short and rounded superior anal appendages, which in *pendleburyi* taper toward the apex, being equal in length to the inferior pair.

Dedicated to Mr. A. HOOGERWERF, the intrepid explorer of the high mountains of Atjeh.

Genus *Amphicnemis* SELYS.

The following synopsis includes notes on some previously described Malaysian species of *Amphicnemis*, of which I have been able to examine the types; descriptions of four new species are also given based on material collected for

¹⁾ F. F. LAIDLAW, Sarawak Mus. Journal, 2, 1915, p. 274; Journal F.M.S. Mus. 17, 1934, p. 560 - 561, fig. 4 (apps. ♂).

²⁾ F. F. LAIDLAW, Journal F.M.S. Mus., 16, 1931, p. 198 - 199, fig. 6 (apps. ♂).

me by Mr. L. COOMANS DE RUITER in western Borneo and Sumatra, by Mrs. M. E. WALSH in eastern Borneo, and by Mr. F. J. KUIPER in the island of Billiton.

The table will, I hope, be of assistance in identifying the Malaysian members of the genus; these have been arranged in such a manner as to indicate the salient characters of each species, but no attempt has been made in the key to show their relationships.

The genus, hitherto unrecorded from the Malay Peninsula and Java, until recently contained 10 species found in Sumatra, Billiton and Borneo. Three other species, viz. *A. furcata* BRAUER, *glauca* BRAUER, and *lestoides* BRAUER, were known to occur in the Philippine Islands. I have compared the types of them with a number of other species, also from the Philippines and as yet undescribed, in the Senckenberg Museum ¹⁾. These will not concern us here.

I have also seen two species of *Amphicnemis* from Celebes, so that the genus proves to be a large one, having a wide distribution in the Archipelago. Many other species in all probability await discovery.

Key to the known Malaysian species.

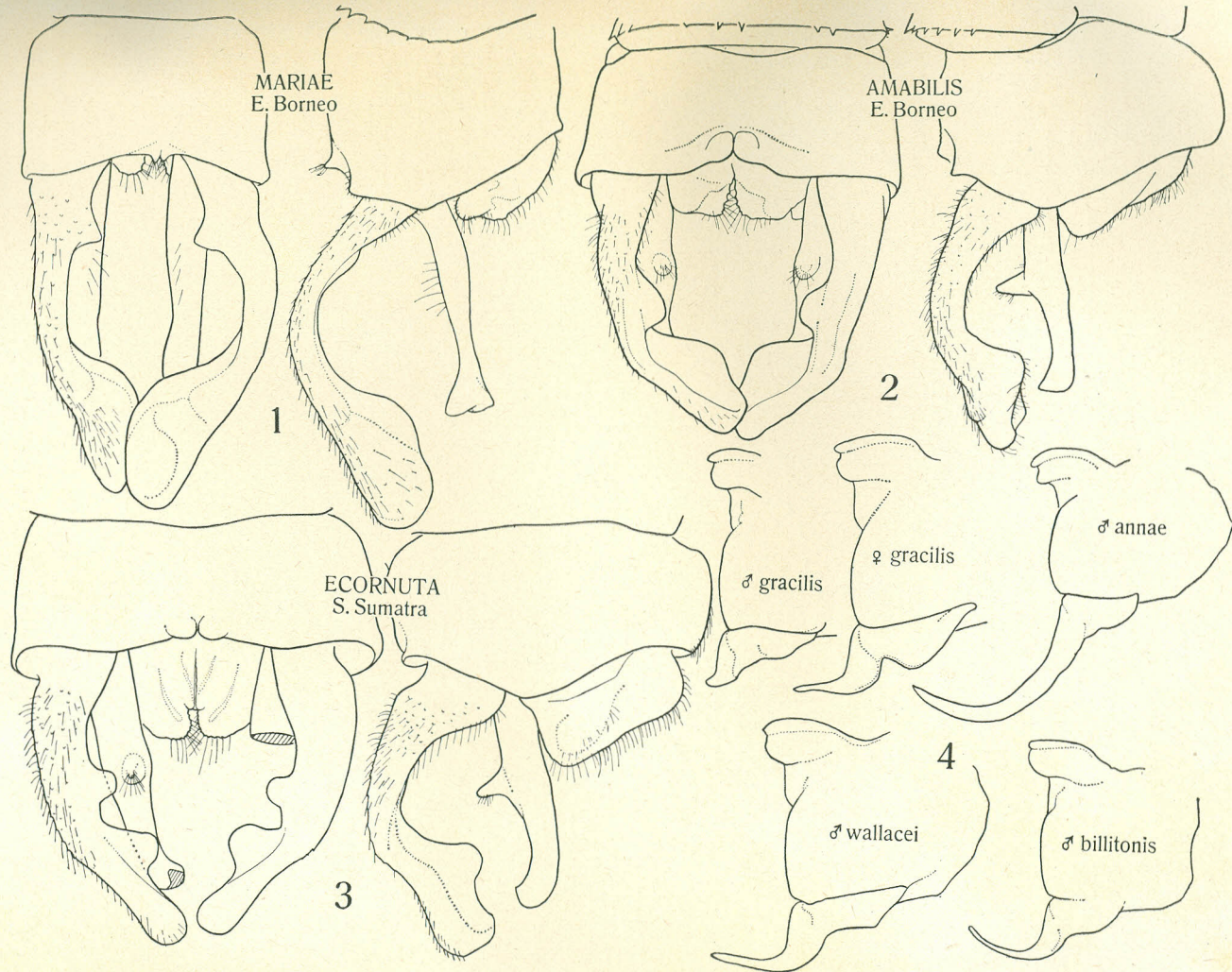
Males.

1. Hind margin of posterior lobe of prothorax simply rounded, without any indication of a median spine. 2
- Hind margin of posterior lobe of prothorax armed with a median spine, or with a small, triangular, median protuberance. 7
2. *Pt* of both pairs of wings lozenge-shaped and very oblique, colouring of that of f.w. not entirely different from that of the hinder pair of wings. 3
- *Pt* of both pairs of wings almost square; colouring of that of f.w. dark grey or reddish-grey, broadly surrounded by white (semiad.), or blackish (ad.), and with the entire border white; *pt* of h.w. entirely orange, including the border. Labrum orange-yellow, base brownish with three more or less confluent black points or spots. Femora orange, knees black, no exterior black stripe. Sup. anal apps. almost twice as long as inferior pair, the latter not widened apically. Extremely slender species, abd. + app. 33, hw. 20-20.5 mm. Hab.: Borneo. **martini**
3. *Pt* unicolorous in all wings, grey to black, whether or not surrounded by a narrow pale ring, and with the border black. Labrum shining black, its anterior margin yellowish or white. Dorsum of prothorax and the whole of the mesepimeron metallic-green; mesinfraepisternites similarly coloured, or at most partly yellow. Legs variable. Sup. anal apps. distinctly longer

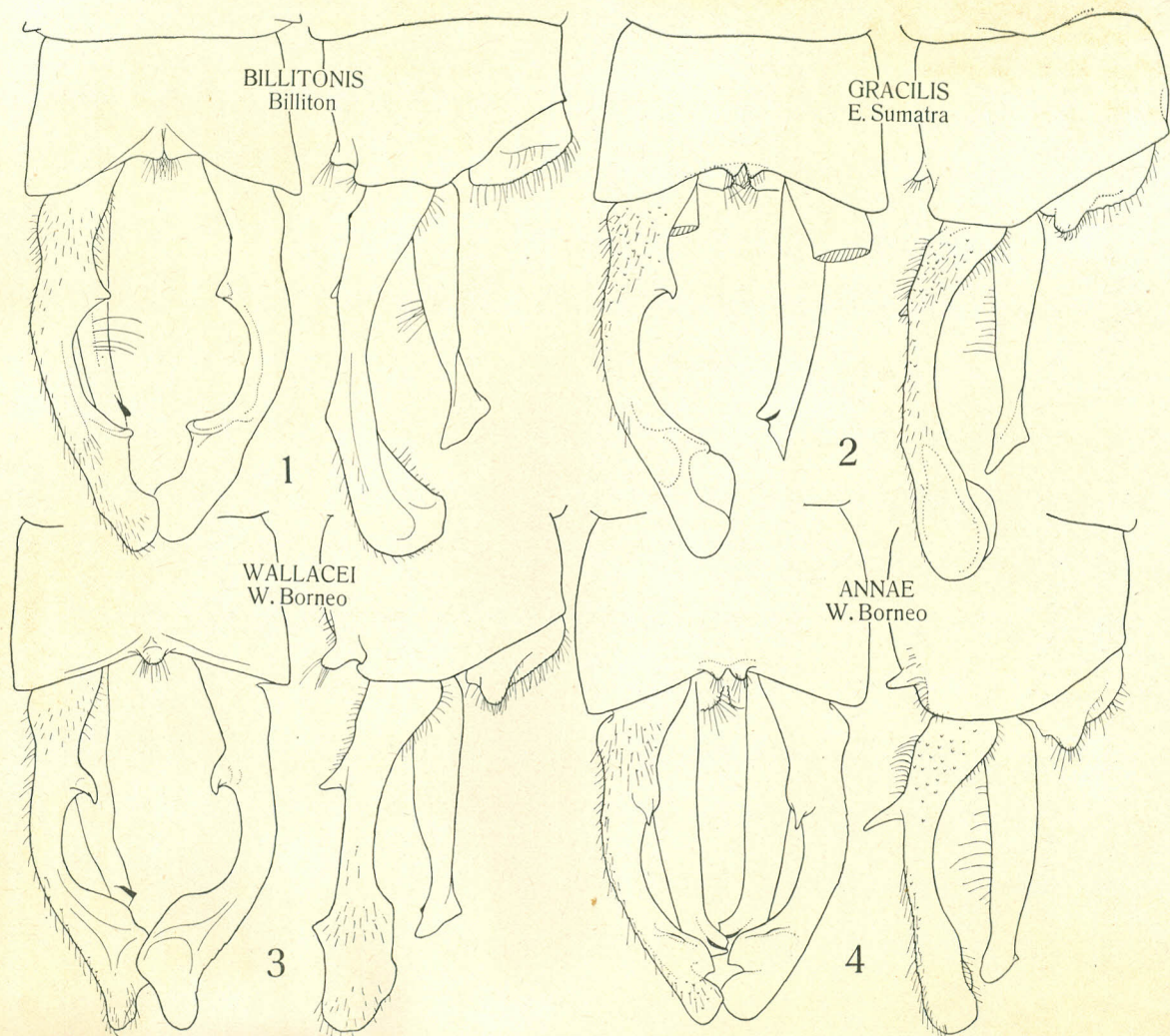
¹⁾ Recently, NEEDHAM and GYGER (The *Odonata* of the Philippines, II. *Zygoptera*, in Philipp. Journ. Sci. 70, Nov. 1939, p. 239-314, 12 pls.), have transferred *A. glauca* and *A. lestoides* to the genus *Pericnemis*, leaving only *furcata* in *Amphicnemis*. From a study of the types of these species I find that they are true *Amphicnemis*, as are also the 5 new species of *Pericnemis*, reported by NEEDHAM and GYGER from these islands. Lastly, *Teinobasis dentifer*, NEEDH. & GYGER, of which I have examined both sexes, should, I think, also be transferred to *Amphicnemis*.

- than the width of segm. 10, only little longer than inferior pair, the latter slightly and obliquely widened apically. Species of moderate size. 5
- *Pt* bicolorous in both pairs of wings, but more obviously so in f.w. than in h.w. Labrum shining black, its anterior margin broadly bordered with yellow. Dorsum of prothorax yellow, with a median, inverted T-shaped, metallic-green mark. Mesepimeron at least partly, mesinfraepisternites entirely yellow. Legs yellow, or ochreous, femora without black exterior stripe, knees black. Sup. anal apps. shorter than the width of segm. 10. Inf. anal apps. antler-like, armed with a robust, upwardly directed process about the middle of each. 4
4. Sup. anal apps. with two rounded tubercles along inner margin of each, one about the middle, the other (slightly larger one) between the first tubercle and the narrowed apex of the appendage (pl. 15 fig. 3). Posterior lobe of prothorax with the metallic-green median spot crescent-shaped, covering most of the lobe. Species of larger, though variable, size; abd. + app. 43 - 45, hw. 24.5 - 27 mm. Hab.: Sumatra. **ecornuta**
- Sup. anal apps. with only one tubercle along inner margin of each, about the middle of the appendage; distal third widened and thickened, forming a scoop-like expansion, which is slightly hollowed out on the inner side (pl. 15 fig. 2). Posterior lobe of prothorax with the metallic-green median spot covering about one-third of the lobe. Species of moderate, though variable, size; abd. + app. 38 - 42, hw. 22 - 24.5 mm. Hab.: Borneo.
- amabilis**
- Sup. anal apps. in profile view more abruptly downbent before the middle of each, ante-median inferior tubercle well visible; the widened distal portion larger than in *amabilis*. Head, prothorax and synthorax coloured similarly to the preceding species. Length: abd. + app. 41.5, hw. 24.5 mm (holotype). Hab.: Banguay Id. (N. Borneo). **bicolor**
5. "Labrum metallic bronzy-green. Posterior margin of prothorax produced on either side into a sharply projecting angle. Legs primrose yellow, with a fine black ring at each articulation. Sup. anal apps. ending in a disc so that they have rather a paddle-like shape, the shaft a little bowed with a small dorsal tooth at its middle. Abd. + app. 34, hw. 19 mm." (orig. descr.). Hab.: Borneo (not seen). **remiger**
- Labrum shining black, its anterior margin yellow, or white. Posterior margin of prothorax with rounded side-edges. 6
6. Posterior lobe of prothorax evenly rounded on middle. Femora pale ochreous with sharply defined black apical rings, but without black exterior stripes. The metallic-green colour on dorsum of synthorax surpasses the first lateral suture postero-dorsally and forms an angular off-shoot that terminates against the dorsal margin, about mid-way between first and second lateral sutures. Mesepimeron with minute yellow spot about extreme upper end of humeral suture. Dorsal half of mesinfraepisternites bronzy-green. Sup. anal apps. with the sub-apical tubercle broad and irregular,

- well visible in profile view, inner margin between tubercle and apex of appendage markedly concave (Treubia 16, 1937, p. 100 fig. 23). Abd. + app. 33.5 - 36.5, hw. 19 - 20 mm. Hab.: Billiton. **kuiperi**
- Posterior lobe of prothorax slightly projecting on middle, forming a minute, triangular, median protuberance. Femora yellow, striped with black exteriorly and with narrow, black, apical rings. Metallic-green colour on dorsum of synthorax more extensive laterally, extending postero-dorsally to the first lateral suture. No exterior yellow spot about upper end of humeral suture. Dorsal two-thirds of mesinfraepisternites bronzy-green. Sup. anal apps. with the sub-apical tubercle small, acute-angulate in oblique dorsal view, invisible in profile view, inner margin between tubercle and apex of appendage only slightly concave (J. Mal. Br. Roy. As. Soc. 4, 1926, p. 221, fig. 3). Abd. + app. 36 - 37.5, hw. 20 - 21 mm. Hab.: Mentawai Ids. (Siberot & Pagei). **smedleyi**
7. *Pt* of f.w. dark grey with paler margin, that of h.w. (adulti!) bright orange, darker in the centre. Labrum for the greater part orange-yellow, spotted with brown or black basally. Antero-dorsal corner of mesepimeron filled up by an elongate, triangular, yellow spot. Posterior margin of prothorax armed with an enormous, median cylindrical horn, nearly vertical, metallic-green at its base dorsally, pale reddish for its basal half, almost hyaline towards the extremity, proportionately much longer than in *annae*, only little shorter in fact than anterior femora; lateral angles of posterior margin obtuse-angulate. Inf. anal apps. antler-like, each with a strong spine directed inwards and upwards at its middle. Small and extremely slender species, abd. + app. 32, hw. 18.5 - 19 mm. Hab.: Borneo. **madelenae**
- *Pt* of f.w. and h.w. not different in colour. Labrum shining black, its anterior margin more or less distinctly yellow or white. Antero-dorsal corner of mesepimeron bronzy-green. Posterior margin of prothorax armed with a median spine of variable size, either very short and triangular, or long and upcurved, though always considerably shorter than anterior femora, metallic-green in colour. Inf. anal apps. simple, without median spine. ... 8
8. Median spine of prothoracic hind-lobe long and slender, hooked upwards and usually forwards. 9
- Median spine of prothoracic hind-lobe very short, narrowly and bluntly triangular, directed upwards and very slightly forwards; side-angles well pronounced, obtuse-angulate (pl. 15 fig. 4). Pale fascia in front of frons isolated, or almost so, separated from the eye-margin by a black longitudinal streak. 11
9. Median spine of prothoracic hind-lobe much longer than median lobe, evenly upcurved; lateral angles of posterior lobe in dorsal view rounded (pl. 15 fig. 4). Pterostigmata irregular in shape, with costal side distinctly shorter than anal side, greyish-brown, with paler margin. Sup. anal apps. armed with a strong sub-median, dorsal spine; apical part of each appendage in dorsal view with a small but distinct interior incision; apices of inf.



Pl. 15. — Structural characters of Malaysian species of *Amphicnemis*.
1-3. Male anal appendages, dorsal view and right side.
4. Right lateral view of prothorax.



Pl. 16. — Male anal appendages of Malaysian species of *Amphinemesis*, dorsal view and right side.

- anal apps. abruptly incurved (pl. 16 fig. 4). Femora with the black exterior stripe incomplete and indistinct. Length: abd. + app. 34 - 35, hw. 18.5 - 19 mm. Hab.: Borneo. **annae**
- Median spine of prothoracic hind-lobe about equal in length to median lobe, abruptly upcurved. Sup. anal apps. with the ante-median dorsal projection short, tooth-like or triangular; apices of inf. anal apps. straight or very slightly incurved. Femora distinctly striped with black exteriorly... **10**
- 10.** Pterostigmata deep black, usually without pale margin, costal side only very little shorter than anal side. Median spine of prothoracic hind-lobe strongly curved upwards and forwards; lateral angles of posterior lobe in dorsal view rounded (pl. 15 fig. 4). Sup. anal apps. from base to apex evenly inwardly curved in dorsal view, with the ante-median dorsal projection short and triangular; apical fourth of each in dorsal view, with distinct interior rim, followed by a shallow concavity; tips rather widened and club-shaped in profile view (pl. 16 fig. 1). Length: abd. + app. 34 - 35, hw. 19 mm. Hab.: Billiton. **billitonis**
- Pterostigmata greyish- to dark brown, with fine grey margin; shape irregular, costal side distinctly shorter than anal side. Median spine of prothoracic hind-lobe very similar to that of *billitonis* though usually less strongly forwardly curved; lateral angles of posterior lobe in dorsal view produced as a pair of small, outwardly directed, obtuse-angulate lobes (pl. 15 fig. 4). Sup. anal apps. evenly inwardly bent in dorsal view; tips, after the widened sub-apical part of each appendage, rather abruptly outcurved; ante-median, dorsal projection longer, narrowly triangular and usually somewhat curved (pl. 16 fig. 3). Length: abd. + app. 36 - 38.5, hw. 19.5 - 22 mm. Hab.: Borneo. **wallacei**
- 11.** Dorsum of prothorax entirely metallic-green, anterior lobe dorsally with a reddish point on either side of the middle. Metallic-green colour of synthorax reaching as far down as the spiracle. Metepisternum with the dorsal metallic-green spot tapering, its lower margin curving gradually towards the dark colour on mesonotum. Mesinfraepisternites almost wholly metallic-green. Femora with the knees black and with a black exterior stripe. Anal apps. pl. 16 fig. 2, superiors only slightly downbent in profile view. Abdomen very long and slender, abd. + app. 37.5 - 39, hw. 20.5 - 21 mm. Hab.: Sumatra. **gracilis**
- Dorsum of prothorax only partly metallic-green: anterior lobe yellow with a fine black anterior border, anterior third to half of middle lobe also yellow. Metallic-green colour of synthorax ending sharply and in a straight line dorsal to the first lateral suture and hence not reaching the spiracle. Metepisternum with the upper metallic-green spot quadrangular, meeting the dark colour on mesonotum almost under a right angle. Mesinfraepisternites with only the upper half (or less) metallic-green in colour. Femora with the knees black, but lacking a black exterior stripe. Anal apps. pl. 15

fig. 1, superiors strongly downcurved in profile view. Abdomen comparatively shorter, abd. + app. 36 - 37, hw. 21 - 22.5 mm. Hab.: Borneo. **mariae**

Females ¹⁾).

1. Hind margin of posterior lobe of prothorax without any indication of a median spine. 2
- Hind margin of posterior lobe of prothorax armed with a median spine, or with a small, triangular, median protuberance. 4
2. *Pt* of both pairs of wings almost square, yellow centred with dark grey, the border dark brown. Basal half of labrum reddish brown with three more or less confluent blackish points at extreme base, distal half light yellow. Posterior lobe of prothorax narrow, its hind margin evenly rounded; lateral divisions wanting. Dorsal surfaces of prothorax and mesepisterna, almost as far as the humeral suture, brilliant metallic-green, upper part of sides red (juv.) or blue-green (ad.), succeeded laterally and underneath by pale yellow colouring. Extremely slender species, abd. 31.5 - 34, hw. 20 - 22 mm. Hab.: Borneo. **martini**
- *Pt* of both pairs of wings very oblique. Species of more robust build. ... 3
3. Prothorax dull brown, dark bluish-green or blue dorsally (ad.), or throughout carmine (juv.); posterior lobe rather rectangular in dorsal aspect but with rounded side-edges, margin in side-view somewhat upcurved, distinctly undulated when looked at from behind. Sides of synthorax dark blue or blue-green (ad.), or carmine (juv.). *Pt* dark grey with pale margin, its border black; costal side distinctly shorter than anal side. Abd. 32 - 35, hw. 19.5 - 21.5 mm. Hab.: Billiton. **kuiperi**
- Prothorax pale grey or yellow in colour, dorsum with an inverted T-shaped median, metallic-green mark; posterior lobe short and broad and with hind margin almost straight in dorsal aspect, in lateral view distinctly upcurved and in the form of an acute ridge; lateral divisions of the lobe well-developed, produced laterally as a pair of obtuse- or rectangulate lobes. Synthorax metallic-green dorsally, sides bright yellow (juv.) to greyish-blue (ad.), including the mesinfraepisternites. *Pt* bicolorous in both pairs of wings but more obviously so in f.w. than in h.w., costal and distal borders in f.w. yellow. Large species, *ecornuta*: 41 - 43, 26.5 - 27 mm, hab.: Sumatra; *amabilis*: 36.5 - 40, 25 - 26 mm, hab.: Borneo. **amabilis** + **ecornuta**
4. Median spine of prothoracic hind-lobe small and bluntly pointed, only little longer than the lobe itself, directed almost straight upward; lateral divisions well developed, rounded. Thorax unicolorous green (ad.), or red (juv.), without metallic-green band, mid-dorsally. Abd. 32.5 - 34.5, hw. 21.5 - 22 mm. Hab.: Billiton. **smedleyi**
- Median spine of prothoracic hind-lobe distinctly longer than the lobe itself, usually curled upwards and forwards. 5

¹⁾ The females of *A. bicolor* (MARTIN), *mariae* sp. n., and *remiger* LAIDLAW, are still unknown.

5. Posterior lobe of prothorax narrow, lateral divisions wanting; median division produced into a long cylindrical horn, broad at base, nearly vertical, metallic-green in colour, tapering rapidly towards the pale-coloured extremity. Labrum orange-yellow, basally reddish-brown spotted with black. Dorsum of pro- and mesothorax, including most of the mesepimera and mesinfraepisternites, brilliant metallic bronzy-green; sides and under surfaces yellow. Legs throughout pale orange. (Red colour-phase unknown). Very slender species, abd. 31.5, hw. 20 mm. Hab.: Borneo. **madelenae**
- Posterior lobe of prothorax broader, with well developed lateral divisions. Labrum shining black with broad yellow margin. Dorsum of pro- and mesothorax not metallic-green. **6**
6. Lateral divisions of prothoracic hind-lobe produced as a pair of long, acute-angulate, bluntly triangular, outwardly directed lamellae; median spine long and slender, curved upwards and gently forwards, about equal in length to the mid-lobe and posterior lobe (without spine) taken together. Pro- and synthorax unicolorous red. (Dark colour-phase unknown). Abd. 34.5 - 35, hw. 20.5 - 21 mm. Hab.: Borneo. **annae**
- Lateral divisions of prothoracic hind-lobe shorter, rectangulate or obtuse-angulate; median spine shorter, about as long as the mid-lobe of prothorax, or even shorter. **7**
7. Median spine of prothoracic hind-lobe longer than in male, but distinctly shorter than mid-lobe of prothorax, directed straight upwards and only very slightly forwards; lateral divisions of posterior lobe prominent, strongly convex (pl. 15 fig. 4). Abd. 36 - 39, hw. 22 - 23.5 mm. Hab.: Sumatra.
- gracilis**
- Median spine of prothoracic hind-lobe as long as in male and about equal in length to the mid-lobe of prothorax; lateral divisions less prominent and more angulate. **8**
8. Median spine of prothoracic hind-lobe directed almost straight upwards, lateral divisions obtuse-angulate. Abd. 34.5 - 38.5, hw. 21 - 23.5 mm. Hab.: Borneo. **wallacei**
- Median spine of prothoracic hind-lobe curled upwards and forwards, lateral divisions rectangulate. Abd. 33.5 - 36, hw. 20.5 - 22.5 mm. Hab.: Billiton.
- billitonis**

Amphicnemis ecornuta SELYS (fig. 15, pl. 15 fig. 3).

1889. SELYS, Ann. Mus. civ. Genova, 7 (27), p. 482 - 483. — ♂ C. Sumatra (Fort de Kock).
1898. KRÜGER, Stett. ent. Zeitg. 59, p. 123-125. — ♂♀ N.E. Sumatra.
1913. LAIDLAW, P.Z.S. London, p. 74 (key).
1937. LIEFTINCK, Treubia, 16, p. 101 (note).

Material studied: — 1 ♂ (semiad.), holotype, labelled: "Fort de Kock, Sumatra, WYERS" (yellow, SELYS's hand) under drawer-label: "*Amphicnemis ecornuta* SELYS n. sp." (id.); 1 ♀ (ad.), "DOHRN, Sumatra, Soekaranda" (printed), "*Amphicnemis ecornuta* SELYS ♀ Sumatra KRÜGER" (SELYS's hand). Both speci-

mens in the Brussels Museum. 1 ♂, 1 ♀ (ad.), "DOHRN, Sumatra, Soekaranda" (♀ allotype), in the Stettin Museum. — 1 ♂ (ad.), S. Sumatra, Lampong residency, Tandjong Karang, Kedaton Estate, Wai Rilau, 150 m alt., March 26, 1937, J. VAN DER VECHT leg., in the Buitenzorg Museum.

For a detailed description of this magnificent species the reader is referred to KRÜGER's account.

The ♂ from South Sumatra resembles closely the two other examples, from Fort de Kock and Deli (including the type), with which I have compared it. The type, though fully matured, has obviously been preserved in alcohol and

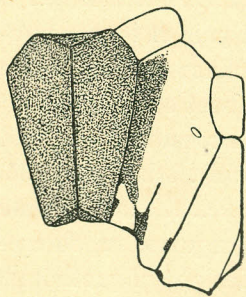


Fig. 15. Colour-pattern of synthorax of *Amphicnemis ecornuta* SELYS, ♂ (Lampong res., left), and of *A. amabilis*, sp. n. ♂ (E. Borneo, right).

this may largely account for its exceptionally small size; the anal appendages are shrivelled and the colour of the legs has faded to an uniform pale yellow. The only difference which I can make out is that the dorsal anastomosis of the metallic-green juxta-humeral (mesepimeral) fascia (fig. 15) is obliterated in the type. This slight difference I regard as of no importance.

The anal appendages of the ♂ differ but slightly from those of *amabilis*, sp. n. (cf. pl. 15 fig. 2 & 3).

Measurements of Lampong ♂: abd. + app. 45, hw. 26.5 mm.

***Amphicnemis bicolor* (MARTIN).**

1897. MARTIN, Ann. Soc. ent. France, 66, p. 593-594. — ♂ Banguey Id. (*Teinobasis*).

Material studied: — 1 ♂ (ad.), "*Telebasis bicolor* MARTIN, Type, Banguey" (yellow, MARTIN's hand), in the Paris Museum.

This is a true *Amphicnemis*. The type agrees in most respects with *A. amabilis*, sp. n., from which it appears to differ in the shape of the superior pair of appendages. Other details are given in the key to the species. Unfortunately, my notes on the type of this species are incomplete, and I am unable to give a sketch of its anal appendages. Dr. LAIDLAW, who also examined the type, informs me in a letter that the inferior appendages are armed with a robust spine, which is directed upward. The ♀ is unknown.

***Amphicnemis amabilis*, sp. n. (fig. 15, pl. 15 fig. 2).**

Material studied: — 13 ♂, 11 ♀ (mostly ad.), E. Borneo, N. Koetai, Sangkoelirang distr., Kariorang, Pelawan Besar, Batau Besi & Maloewi, April-June, 1937, M. E. WALSH leg., in the Buitenzorg Museum. Holotype ♂ and allotype ♀, Kariorang, April 1937.

Male (ad.). — Labium Maize-yellow. Labrum shining black with broad citron-yellow margin. Mandible-bases, genae, and anteclypeus bright greenish-yellow, as is also an isolated curved stripe in front of frons. Anteclypeus with two black spots, postclypeus wholly shining black. The rest of the head bronze-green above. Antennae brown, first two joints with a bluish spot, third joint with yellow anterior streak. Rear of the head black; a pale blue stripe along the eye-margin, tapering to a point posteriorly.

Prothorax cream-coloured; anterior lobe finely bordered with black; dorsum with a trapezoidal bronzy-green mark traversing the length of the mid-lobe, narrowing to a longitudinal streak against anterior lobe, and broadening suddenly to a transverse, crescent-shaped spot covering the middle one-third of the posterior lobe. Seen from above, the lateral angles of the posterior margin are produced a little, but in side-view they are cut off under right angles.

Synthorax above very brilliant metallic blue-green; mesepimeral (juxta-humeral) lustrous spot, and dorsal anastomosis along upper end of first lateral suture, slightly variable in extent, usually shaped as shown in fig. 15. Mesinfraepisternites, sides and under surfaces bright yellow.

Coxae buff-yellow, femora light cadmium in full-coloured individuals, tibiae and tarsi paler; extremities of all femora and tibiae narrowly ringed with black; apices of tarsal joints and spines also black.

Wings hyaline. Pterostigma very oblique, but with parallel sides, bicolorous. In fore wing the costal and distal border (and the upper half of the proximal border as well) are bright yellow, the lower half of the proximal and the entire anal border being black in colour, whilst the blackish-brown centre occupies only the lower proximal portion of *pt*. In the hinder wings *pt* is blackish-brown, its margin yellow, most distinctly so along costal border, which, itself, is yellow or pale brownish, according to age and maturity. Postnodals $\frac{12-13}{11-12}$.

Abdomen long and slender. Segments 1 and 2 metallic-green above and with narrow black apical rings, clear yellow aside. The succeeding segments are dark metallic-brown, becoming progressively darker (black from 7 to 10); 3-7 with very narrow yellow anterior rings, interrupted mesially; sides and under surfaces yellow. Terminal segments rather inflated, deep black with slight metallic-green lustre, hind margin of 10 reddish-brown.

Anal appendages pure white, or pale yellow, shaped as shown on pl. 15 fig. 2.

Female (ad.). — Closely similar to the male and differing only in that the prothorax and the sides of the synthorax are olive-buff or vinaceous-buff (discoloured?) in fully matured examples.

Pterostigmata less definitely bicolorous than in the male and occasionally obscured so much as to present only a yellow costal border to the *pt* of fore wings. Neuration otherwise as in the opposite sex.

Abdomen coloured much as in the male, the yellow anterior rings enlarged, though interrupted mid-dorsally. Segments 8 and 9 each with an irregular yellow or bluish-green side-spot; 10 and anal appendages black. Basal half of genital

valves yellow, distal half black, tipped with yellow, projecting beyond apex of abdomen for about the length of segment 10.

This new species is very closely allied to, if not identical with, *A. bicolor* (MARTIN), from Banguay. *A. ecornuta* SELYS, from Sumatra, is also very similar; and these three species form a distinct section within the genus, characterized by the simple structure of the prothorax in both sexes, the bicolorous pterostigma, the reduction of the metallic-green marks on the dorsum of pro- and synthorax, and by the more compact build of the anal appendages. The males of all three species are peculiar for the presence of a strong spine on the upper-side of the inferior appendages.

I have seen a number of undescribed species from Celebes and the Philippines, which seem to fit this section of the genus more appropriately than the Malaysian species-groups of *wallacei* and *martini*.

***Amphicnemis annae*, sp. n.** (pl. 15 fig. 4, pl. 16 fig. 4).

1911. RIS, Ann. Soc. ent. Belg. 55, p. 236-237 (key), fig. 5 (♂ apps.). — ♂ (nec ♀ !)
W. Borneo (*A. wallacei*).

1913. LAIDLAW, P.Z.S. London, p. 70; 74 (key ♂), pl. 4 fig. 7 (♂ proth.). — ♂ Sarawak
(*A. wallacei*).

Material studied: — 1 ♂ (ad.), 2 ♀ (juv., red), W. Borneo, Singkawang, forest-marsh near Tjapkala, Jan. 16, 1934, L. COOMANS DE RUITER leg. Holotype ♂ and allotype ♀ in the Buitenzorg Museum.

This very distinct species has long been known as *wallacei*; but since SELYS's type of *A. wallacei* is indistinguishable from the species described by LAIDLAW as *louisae*, this name unfortunately should be dropped as a synonym of *wallacei*.

Only few specimens of *annae* were known, and no descriptions of it are available in the literature. I believe its position to be closest to *wallacei*. The supposed allotype ♀ of *wallacei*, described by RIS, neither belongs to *wallacei* nor even to *annae*, and I am unable at the present to identify it from the description alone.

The following notes may be added to those given in the key to the species of both sexes:—

Male (ad.). — Labium pale yellow. Mandibles yellow, each with a large, slightly diffuse, triangular, brownish spot upon middle. Labrum shining black, its anterior margin bright yellow and fringed with yellow hairs. Anteclypeus yellow, postclypeus shining black. Frons in front black with two yellow spots, one on each side of the middle. Dorsal surface of head metallic-green. Antennae brown, basal joints striped with yellow anteriorly. Rear of the head black.

Prothorax metallic-green above, anterior lobe with a pair of round orangish spots, one on each side of the middle; propleuron also metallic-green, its lateral border yellow.

Synthorax metallic-green, as far down as the first lateral suture and the spiracle, including the dorsal two-thirds of the mesinfraepisternites and the dorsal fifth of the metepisternites. Sides and under surfaces pale yellow.

Legs yellow, spines brown. Femora pale ochreous, with sharply defined black apical ring; a very diffuse brownish line runs along the distal half of their posterior surfaces (most marked on anterior pair of femora).

Wings hyaline; M_3 arises at the subnodus or slightly distal to it, R_s about midway between subnodus and Px_1 . Pterostigma greyish-brown with fine yellow margin. Postnodals 12 - 13 in fore wing, 10 - 11 in hind wing.

Abdomen coloured as described for "*louisae*" (= *wallacei*) by LAIDLAW. Tenth segment pale reddish-brown basally and along posterior margin. Anal appendages of the same colour, shaped as shown on pl. 16 fig. 4.

Female (red colour-phase). — Head coloured much as in the opposite sex, but pale areas slightly enlarged. Labrum with the distal half yellow, frons with a complete yellow anterior fascia, and a yellow line along margin of compound eyes.

Pro- and synthorax, and legs throughout scarlet-red. Spine of posterior lobe of prothorax equal in length to that of the male. Ante-alar triangles metallic blue-green. Postnodals 12 - 13 in fore wing, 11 in hind wing.

Abdomen with segm. 10 and appendages whitish; valves also pale-coloured, slightly surpassing end of abdomen.

Apparently a very scarce species.

***Amphicnemis wallacei* SELYS** (pl. 15 fig. 4, pl. 16 fig. 3).

1863. SELYS, Bull. Acad. Belg. (2) 16, p. 153. — ♂ Sarawak.

1877. SELYS, Ibid. (2) 43, p. 128 - 129. — Same specimen.

1913. LAIDLAW, P. Z. S. London, p. 71, 74 (key ♂♀), pl. 4 fig. 5 (♂ proth.), 5a (♂ apps.). — ♂♀ Sarawak (*A. louisae*).

Material studied: — 1 ♂ (semiad.), labelled: "Sar." (round, white), "Borneo W." (yellow, SELYS's hand), "*Amphicnemis Wallacei* D.S. ♂ Surrawak" (brown, SELYS's hand), holotype in the Brussels Museum. — 15 ♂ (mostly ad.), 18 ♀ (3 ad., green, 15 juv., red), W. Borneo, Singkawang, Bengkajang Rd., forest-marsh near Bakoean, near Montrado, and Sempadang, Dec. 19, 1931, July 19 - 20, Aug. 25 - 30, Sept. 16 - 17, Oct. 11, and Dec. 21, 1932, Jan. 16, 1934; 1 ♂ (ad.), W. Borneo, Padang Tikar Id. (Batoe Ampar), Mar. 12, 1931. All L. COOMANS DE RUITER leg., in the Buitenzorg Museum.

A fine series of specimens was obtained by Mr. COOMANS from the marshy forests of West Borneo, and these agree in all essential characters with LAIDLAW's description and sketches of *A. louisae*. A recent examination of the type of *A. wallacei*, in the Brussels Museum, has brought to light that *louisae* is the same species as *wallacei*, and that the supposed examples of *wallacei* recorded by RIS and LAIDLAW in reality belong to a species previously unknown to science, for which I proposed the name *annae*, and of which a description is given above.

SELYS's type specimen, collected by WALLACE, though still in excellent condition, is not quite matured; the anal appendages and the prothoracic spine are exactly identical in structure with those of our series, but the legs are missing.

There are 12 postnodal cross-veins in both fore wings, 11 in the hinder pair. I can find nothing to distinguish our specimens from the type, except that the nodal index varies from $\frac{11-13}{10-12}$.

Apart from the well-marked differences in the shape and armature of the anal appendages, *wallacei* is easily distinguished from *annae* by the much shorter prothoracic spine, the sharply defined black lines along the posterior surfaces of all femora, and by the complete yellow stripe in front of frons, which is not (or only narrowly) interrupted by black in the median line.

Female. — Young individuals of this sex are as vividly coloured as those of *annae*, but the possession of a shorter spine on the prothoracic hind lobe will serve to their easy recognition.

The adult ♀ may be briefly described as follows:—

Head coloured much as in the red form; mandible-bases with a diffuse brownish central spot, basal three-fifths of labrum shining black. Pale fascia in front of frons entire, scarcely constricted on middle. Dorsal surface of head dark metallic bluish-green, or almost lustreless.

Pro- and synthorax dull greyish- to greenish-brown dorsally, growing paler laterally; sides in fully matured examples usually glaucous-green, under surfaces much paler. Ante-alar triangles metallic-green.

Legs, including the coxae, cream-buff; all femora definitely striped with black exteriorly and with the knees also deep black. Spines and extremities of tarsal joints black.

Abdomen with segments 1 and 2 lustrous brown above, each with a terminal metallic-green ring. The rest of the abdomen greyish-brown, pale yellowish below, progressively darker posteriorly, the apical segments (with the exception of 10) being dark brown. Dorsum of 9 with two roundish, pale, sub-apical spots, 10 and appendages entirely greenish-white. Valves also pale-coloured, barely surpassing the anal appendages.

***Amphicnemis gracilis* KRÜGER** (pl. 15 fig. 4, pl. 16 fig. 2).

1898. KRÜGER, Stett. ent. Zeitg. 59, p. 121-123. — ♂♀ Soekaranda, ♀ Liangagas (N.E. Sumatra).

1913. LAIDLAW, P.Z.S. London. p. 74 (key ♂♀, not seen).

Material studied: — 1 ♀ ad., defective, "DOHRN, Sumatra, Soekaranda" (a 1-l o t y p e), 1 ♀ juv., head, prothorax and segm. 7-10 of abdomen lost, "Liangagas, DOHRN" (p a r a t y p e), in the Stettin Museum. 7 ♂ (mostly ad.), 18 ♀ (12 ad., blue or green, 6 juv., red), E. S u m a t r a, Palembang, Nov. 8-23, 1937, L. COOMANS DE RUITER leg.; 2 ♂, 2 ♀ (ad.), Palembang, Nov. 14, 1937 & April 1, 1938, J. J. VAN DER STARRE leg.; 1 ♂ (ad.), id., Riouw Res., Inderagiri, Pangkalankasai, April 4, 1939, P. BUWALDA leg. All in the Buitenzorg Museum.

This species has not revealed itself since the time of its description.

I am much indebted to Herr Dr. A. KÄSTNER, of the Naturkundemuseum, Stettin, for the loan of KRÜGER's types of *gracilis*, which I have thoroughly

There are 12 postnodal cross-veins in both fore wings, 11 in the hinder pair. I can find nothing to distinguish our specimens from the type, except that the nodal index varies from $\frac{11-13}{10-12}$.

Apart from the well-marked differences in the shape and armature of the anal appendages, *wallacei* is easily distinguished from *annae* by the much shorter prothoracic spine, the sharply defined black lines along the posterior surfaces of all femora, and by the complete yellow stripe in front of frons, which is not (or only narrowly) interrupted by black in the median line.

Female. — Young individuals of this sex are as vividly coloured as those of *annae*, but the possession of a shorter spine on the prothoracic hind lobe will serve to their easy recognition.

The adult ♀ may be briefly described as follows:—

Head coloured much as in the red form; mandible-bases with a diffuse brownish central spot, basal three-fifths of labrum shining black. Pale fascia in front of frons entire, scarcely constricted on middle. Dorsal surface of head dark metallic bluish-green, or almost lustreless.

Pro- and synthorax dull greyish- to greenish-brown dorsally, growing paler laterally; sides in fully matured examples usually glaucous-green, under surfaces much paler. Ante-alar triangles metallic-green.

Legs, including the coxae, cream-buff; all femora definitely striped with black exteriorly and with the knees also deep black. Spines and extremities of tarsal joints black.

Abdomen with segments 1 and 2 lustrous brown above, each with a terminal metallic-green ring. The rest of the abdomen greyish-brown, pale yellowish below, progressively darker posteriorly, the apical segments (with the exception of 10) being dark brown. Dorsum of 9 with two roundish, pale, sub-apical spots, 10 and appendages entirely greenish-white. Valves also pale-coloured, barely surpassing the anal appendages.

***Amphicnemis gracilis* KRÜGER** (pl. 15 fig. 4, pl. 16 fig. 2).

1898. KRÜGER, Stett. ent. Zeitg. 59, p. 121 - 123. — ♂♀ Soekaranda, ♀ Liangagas (N.E. Sumatra).

1913. LAIDLAW, P.Z.S. London. p. 74 (key ♂♀, not seen).

Material studied: — 1 ♀ ad., defective, "DOHRN, Sumatra, Soekaranda" (a 1-1 o t y p e), 1 ♀ juv., head, prothorax and segm. 7 - 10 of abdomen lost, "Liangagas, DOHRN" (p a r a t y p e), in the Stettin Museum. 7 ♂ (mostly ad.), 18 ♀ (12 ad., blue or green, 6 juv., red), E. S u m a t r a, Palembang, Nov. 8 - 23, 1937, L. COOMANS DE RUITER leg.; 2 ♂, 2 ♀ (ad.), Palembang, Nov. 14, 1937 & April 1, 1938, J. J. VAN DER STARRE leg.; 1 ♂ (ad.), id., Riouw Res., Inderagiri, Pangkalankasai, April 4, 1939, P. BUWALDA leg. All in the Buitenzorg Museum.

This species has not revealed itself since the time of its description.

I am much indebted to Herr Dr. A. KÄSTNER, of the Naturkundemuseum, Stettin, for the loan of KRÜGER's types of *gracilis*, which I have thoroughly

compared with our fine series of specimens and found them well agreeing. The type ♂ from Soekaranda is lost and the authorities of the Stettin Museum were unable to trace it, but fortunately the description of the male is very detailed and the agreement with the Palembang specimens is so close that I have no hesitation in referring them to KRÜGER's species.

Female (ad.). — The adult specimens that I take to be the ♀ of this species are identical with KRÜGER's example. I have made KRÜGER's "mittelreifes ♀" the allotype of *gracilis*; the colours of the thorax of this specimen are faded and the various black spots and stripes mentioned in KRÜGER's description are very obviously due to postmortem decomposition. In our series of females no two examples are exactly alike, the colouring of the dorsal surface varying from cinnamon- or olive-brown to 'medal-bronze' (RIDGWAY), whilst the sides are dark bluish glaucous (or greenish glaucous-blue) in matured specimens. Several females show the same thoracic colour-pattern as KRÜGER's examples; but there are no real antehumeral stripes, and the black spots or stripes are merely apparent. The ante-alar triangles are metallic-green, and the under surfaces pale yellow.

Legs, including the coxae, yellow; femora and anterior tibiae striped with black exteriorly, knees and apices of tarsal joints also black.

The abdomen is coloured similarly to *wallacei* and *annae*.

Female (juv.). — The type of KRÜGER's red colour-phase lacks its head and prothorax, as well as the terminal abdominal segments. Our specimens agree with the description in all respects, except that the prothorax is entirely red.

Nearest to *smedleyi*, LAIDLAW, from the Mentawai Islands, which is probably only a subspecies of *gracilis*, of the main island.

***Amphicnemis smedleyi* LAIDLAW.**

1915. RIS, Tijdschr. Ent. 58, p. 13 - 14. — ♀ Simaloer Id. (*louisae*).

1926. LAIDLAW, J. Mal. Br. Roy. As. Soc. 4, p. 232 fig. 3 (apps. ♂). — ♂♀ Siberoet & Pagai Ids. (*louisae smedleyi*). ◊

Material studied: — 2 ♂ (ad., crushed), 2 ♀ (one ad., one juv.), Siberoet Id., Sept. 1924, C. BODEN KLOSS & N. SMEDLEY, ex coll. F. F. LAIDLAW.

These specimens differ from *wallacei* (= *louisae* LAID.) in a number of characters, which I have enumerated in the key to the species. The ♂ is easily distinguished from *wallacei* by the different shape of the superior anal appendages and by the absence of a prothoracic spine. The ♀ has been described at length by RIS.

This species is obviously most closely related to *gracilis*, KRÜGER, and *kui-peri*, LIEFT., two species in which the prothoracic spine is either also reduced, or absent altogether. Apart from the differences found in the sculpturing of the hinder lobe of the prothorax, the ♂ of *smedleyi* may be distinguished from

that of *kuiperi* by the presence of a black streak to the outer surface of all femora; it differs further from *kuiperi* in the shape of the superior anal appendages, which bear a very close resemblance to those of *gracilis*, being in fact practically identical with those of that species (pl. 16 fig. 2). On comparing *smedleyi* with *gracilis*, these species proved to resemble each other very closely, and I could find no other distinctive features than those mentioned already in the key to the species. Granting the characters of the prothorax to be constant, there should be no difficulty in separating them; but it is doubtful if these differences are of specific significance. In view of the rarity of these extremely delicate species in collections, it seems worth recording the observed differences even on the small series available. Personally I am of opinion that *smedleyi* is only a subspecies of the Sumatran *gracilis*, KRÜGER.

Amphicnemis billitonis, sp. n. (pl. 15 fig. 4, pl. 16 fig. 1).

Material studied: — 6 ♂ (ad.), 15 ♀ (8 juv., red, 7 ad., blue), Billiton I. (west), Tjeroetjoek and Goenoeng Aoer, Sept. 21 - 27, Oct. 3, Nov. 19, and Dec. 24, 1935, April 7, 1936, F. J. KUIPER leg., in the Buitenzorg Museum. Holotype ♂ and allotype ♀: Tjeroetjoek, Dec. 24, 1935.

Obviously most closely allied to *wallacei*, SELYS.

Male (ad.). — Differs from *wallacei* in the following respects:

All but the middle of the anterior margin of labrum shining black. Pale fascia in front of frons broadly interrupted on middle. Metallic-green colour on dorsum of synthorax more extensive laterally and ceasing at the spiracle (*wallacei*: slightly before level of spiracle). Pterostigma blackish-brown or black, without yellow margin in adult specimens (*wallacei*: greyish-brown with distinct yellow margin in both pairs of wings). The structural differences are given in the key to the species.

Anal appendages white, or wax-yellow in the younger male, pale brown tipped with purplish-black in matured individuals (pl. 16 fig. 1).

Female. — The red and blue-green colour-phases are inseparable from those of *wallacei* and *gracilis*, described before. The tip of the prothoracic spine is yellowish or almost hyaline in adult specimens.

Amphicnemis mariae, sp. n. (pl. 15 fig. 1).

Material studied: — 3 ♂ (one ad.), E. Borneo, N. Koetai, Sangkoelirang distr., Pelawan Besar & Kariorang, May-June, 1937, M. E. WALSH leg., in the Buitenzorg Museum. Holotype ♂: Pelawan Besar, May 1937.

Male (ad.). — Head coloured as described for *annae*, but labrum with anterior, ochreous, margin broader and with the yellow fascia in front of frons barely interrupted in the middle line.

Colouring of pro- and synthorax as described in the key. In all three specimens there is a fine comma-shaped yellow spot lying close against

the upper margin of the mesepimeron, on each side of the dorsal end of the humeral suture.

The squarish lustrous spot covering the upper part of the mesepisternum is separated from the dark colour on the mesepimeron by a fine yellow line. Sides and under surfaces pale yellow.

Legs pale yellow, apices of all femora and tibiae, spines and tips of tarsal joints, black.

Neuration identical to the other species of the same group. Postnodals $\frac{13-14}{11-12}$. Pterostigma greyish-brown, with pale yellow margin.

Abdomen coloured as in *wallacei*; distal margin of segment 10 whitish. Anal appendages yellowish-white, shaped as shown on pl. 15 fig. 1.

Female unknown.

This new species is easily distinguished from its allies by the reduction of the metallic-green colour on the dorsum of the pro- and synthorax, and by the anal appendages, which appear to resemble those of *remiger* fairly closely.

Named in honour of Mrs. M. E. WALSH, in appreciation of her constant help in collecting Odonata.

Amphicnemis martini RIS.

1911. RIS, Ann. Soc. ent. Belg. 55, p. 236 (key ♂), 237 - 238, fig. 6 (apps. ♂). — ♂ W. Borneo.

1913. LAIDLAW, P.Z.S. London, p. 72 - 73; 74 (key). — ♂♀ Sarawak.

Material studied: — 5 ♂ (semiad.-ad.), 6 ♀ (2 juv., red, 4 ad., blue), W. Borneo, Singkawang, forest-marsh near Bakoean, Dec. 7, 1931, Febr. 17 - 19, July 19, 1932, L. COOMANS DE RUITER leg., in the Buitenzorg Museum.

Male. — These specimens agree exactly with RIS's account of *A. martini*, save that in the fully adult examples the colour of the pterostigmata of the fore wings is deep greenish-black centred with dark brown and with the border yellow, whilst those of the hinder wings are throughout bright orange. There are $\frac{14-15}{13}$ postnodal cross-nerves. In the semi-adult males the thoracic sides and legs are yellow.

The colour of the tenth abdominal segment varies from yellow to pale blue. Anal appendages wax-yellow to pale brown. Superior pair decidedly shorter than in *wallacei* and allied species, each with a distinct triangular protuberance at about the middle of their length, directed obliquely inwards and upwards, followed by a similar (slightly more robust) triangular expansion, which projects horizontally inwards; the median incision between these two projections (RIS, *loc. cit.* fig. 6) is visible only in oblique dorsal view. Inferior pair of appendages only half as long as the superiors, cylindrical, tapering, slightly divergent, tips evenly and but slightly upcurved.

Female (ad.). — Legs pale yellow, femora striped with black exteriorly and with the extremities also finely black. Anterior pair of tibiae with the basal one-third of the outer surfaces black.

Valves not projecting beyond the apex of abdomen.

Female (juv.). — The red colour-phase of this species is peculiar for the brilliant metallic-green episterna of the mesothorax, which, in the red-bodied females of other species, are of the same colour as the rest of the thorax. There is also a median bronze-green spot on the middle of the prothorax that covers the whole of the posterior lobe as well.

The coxae, tibiae and tarsi are yellowish whilst the femora are red, lacking black exterior stripes.

Amphicnemis madelenae LAIDLAW.

1913. LAIDLAW, P.Z.S. London, p. 71-72, 74, pl. 4 fig. 6 (proth. ♂), 6a (apps. ♂). — ♂ Sarawak.

Material studied: — 3 ♂, 1 ♀ (ad.), W. Borneo, Singkawang, forest-marsh near Bakoean, Dec. 7, 1931 and Febr. 17, 1932, L. COOMANS DE RUITER leg., in the Buitenzorg Museum.

The following emendations are necessary to complete the original description of the male and the characters mentioned in the key.

Occiput with a yellow stripe behind the transverse carina.

Prothorax in side-view with the upper half brilliant metallic-green, the lower half pale pearly green, under surface pale yellow. Anterior lobe yellow, its free margin finely bordered with black. Lateral divisions of posterior lobe wanting, side-angles rounded in profile view.

Synthorax, as far down as half-way between humeral and first lateral suture, brilliant metallic-green. A squarish spot of the same colour occupies the upper (anterior) half of the mesinfraepisternites, succeeded posteriorly by a short yellow stripe along the mesepimeral suture. Metallic green spot on upper part of metepisternum roundish and almost isolated.

Coxae pale yellow; femora entirely orange, tibiae and tarsi yellow.

Pterostigmata of fore wings dark grey with pale orange margin and with the border orange-brown; those of the hinder pair (including the border) bright orange, darker in the centre. In the slightly younger male the *pt* of the hinder pair of wings differs but slightly in colour from those of the fore wings.

The anal appendages vary in colour from almost pure white to dirty yellowish, with pink-coloured apices.

Female (ad., allotype, androchromatic). — Differs from the ♂ only in the ground-colour of the thorax being less vividly yellow, whilst the femora are pale orange.

Spine of prothoracic hind lobe directed straight upwards, amply half as long as that of the male, being in fact about equally long as the mid-lobe of the prothorax, bronze-green in colour, its distal half dirty yellowish.

Pterostigmata of fore wings dark greyish-brown, with narrow pale margin, their border brown; those of hinder wings with the yellow margin broader, especially along costal border, which itself is pale brown in colour.

Abdomen coloured as in the opposite sex, intermediate segments pale brown above, 3-6 with distinct basal yellow rings, interrupted mid-dorsally. Terminal segments darker brown with purplish reflections above, lacking definite pale spots.

Anal appendages orangish. Valves brown, barely surpassing apex of abdomen.

The extreme delicacy of this rare species is worth mentioning. In the shape of the anal appendages and in the colour of the pterostigma of the ♂, *madelenae* comes nearest to *martini*, from which it differs (among other characters) by the absence of a prothoracic spine in both sexes.

Fam. AESHNIDAE.

Genus *Oligoaeschna* SELYS (= *Jagoria* KARSCH).

Of this genus the following species were known to science:—

- O. amata* (FÖRSTER). Insekten-Börse, 20, 1903, p. 1-2 sep. — Terra typica: Brunei, N. Borneo, ♂.
- O. bühri* (FÖRSTER). Insekten-Börse, 20, 1903, p. 2 sep. — Terra typica: Brunei, N. Borneo, ♂.
- O. martini* (LAIDLAW). Rec. Ind. Mus. 22, 1921, p. 76-77. — Terra typica: Darjiling, Himalaya, ♀.
- O. modiglianii* SELYS. Ann. Mus. civ. Genova 2 (7) 1889, p. 471-472, fig. (wings ♂). — Terra typica: Nias Id., ♂ (generotype).
- O. poeciloptera* (KARSCH). Entom. Nachrichten, 15, 1889, p. 238-239. — Terra typica: Luzon P.I., ♀.
- O. pryeri* (MARTIN). Cat. Coll. SELYS, 19, Aeschnines, 1909, p. 134-135, fig. 132 (apps. ♂), pl. 2 fig. 8 (insect ♂). — Terra typica: Japan ♂.
- O. venatrix* (FÖRSTER). Insekten-Börse, 20, 1903, p. 2-3 sep. — Terra typica: Boeton Id., S. Celebes, ♂.
- O. zambo* NEEDHAM & GYGER. Philipp. J. Sci. 63, 1937, p. 40-41, pl. 2 fig. 33-34 (apps. ♂), pl. 3 fig. 48 (wings ♂). — Terra typica: S. Mindanao, P.I., ♂.

Apart from the N. Indian *O. martini* (LAIDLAW), and the Japanese *O. pryeri* (MARTIN), only one species of *Oligoaeschna*, viz. *modiglianii* SELYS, appears to be well known and to have a fairly wide distribution in the Malay Archipelago. It has been reported from the island of Nias, the Mentawai Islands (Siberoet and Sipora), and Borneo; its occurrence in the Malay Peninsula and Sumatra is still a little doubtful.

The remaining species are obviously very closely related *inter se*.

O. modiglianii. — I have examined a couple of this species from Borneo in the MAC LACHLAN collection (now in the British Museum); 1 male from

Brunei (N. Borneo, ex STAUDINGER 1903) and several unidentified females, in the Leiden Museum; 5 males and 8 females, all from Borneo, in the Paris Museum; 3 males and 2 females, from Brunei or without indication of habitat, in the Brussels Museum; lastly, 3 males and 2 females, all from W. Borneo, in the Buitenzorg Museum.

O. poeciloptera and **zambo**. — Of *O. poeciloptera* (KARSCH), from Luzon, unfortunately only the female is known with certainty. This may be the same species as *O. zambo*; subsequently described by NEEDHAM & GYGER after 2 males from Mindanao. Possibly because of the male of *poeciloptera* being still unknown to science, *zambo* was compared with *bühri* (FÖRSTER) instead of with *poeciloptera*. *O. zambo* appears to be most closely allied to *mutata*, sp. n., but is a much larger species.

O. bühri. — Mrs. HOWARD K. GLOYD informs me that the type of this species is a single male in the Michigan Museum, Ann Arbor, labelled: Brunei, N. Borneo, Dr. O. STAUDINGER vend.

I have examined two males in the Paris Museum identified with *bühri* by MARTIN, one from "Brunnei", the other from "Borneo". The colours are faded but otherwise these examples agree in every respect with FÖRSTER's notes and with MENGER's drawing of the anal appendages of the type (MARTIN, *loc. cit.* fig. 128).

Only known from Borneo.

O. venatrix. — This species I have not seen. The male is easily distinguished from all other species of the genus by the curious fractured appearance of its superior appendages. It is only known from the island of Boeton, South Celebes.

Here follow the descriptions of two new species of *Oligoaeschna* from Borneo, and additional notes on *O. amata* (FÖRSTER).

Oligoaeschna platyura, sp. n. (fig. 16 - 17).

Material studied: — 2 ♂, 3 ♀ (ad.) 1 ♀ (juv.), E. Borneo, N. Koetai, Sangkoelirang distr., Kariorang, Pelawan Besar and Batau Besi, May-June, 1937; 1 ♂, 1 ♀ (ad.), E. Borneo, Samarinda, Dec. 1938 & March, 1939; all M. E. WALSH leg., in the Buitenzorg Museum. Holotype ♂ and allotype ♀: Pelawan Besar & Batau Besi, May 1937.

Male (ad.). — Labium orange-cinnamon, labrum tawny or ochraceous-orange, mandibles bister-coloured. Clypeus tawny-olive, sides and lower third of anterior surface of frons similarly coloured but soon becoming black from below upwards, forming a crescent-shaped black streak on top; ridge sub-acute, horizontal part of frons flattened, dark olive-brown in colour. Vertex and occipital triangle blackish-brown. Rear of the head tawny.

Synthorax velvet blackish-brown, almost black above. Dorsum with a pair of oblique, elongate-oval, green antehumeral bands, incomplete above, and with a pair of transverse, rather crescent-shaped streaks of the same colour on each side of the dorsal crest, just in front of the ante-alar triangles. On the sides

are two broad, rather diffuse, green bands, one under each wing; the anterior band occupies most of the mesepimeron and ceases at level of spiracle; the posterior band is still broader, rather rounded on both ends and covers most of the metepimeron. Between these bands, on the middle of the upper half of each metepisternite, lies a third much narrower, S-shaped or rather angular, green spot that runs parallel to the others. Infraepisternites and under surfaces brown.

Legs dark reddish-brown, apices of femora and tarsi obscured.

Wings enfumed throughout with golden brown, this forming an areola around the network of venation. Pterostigma braced, 2.2-2.5 mm in length, very slightly shorter in the hind wing, raw sienna (RIDGWAY), covering two underlying cells. Venation very similar to *modiglianii*, but decidedly denser; two rows of cells between M_4 - M_{spl} from level of nodus to near the wing-margin in both pairs of wings. Triangles 3-celled, those of fore wings occasionally 4-celled; supratrangles with 0-3 cross-nerves. Anal angle decidedly more pronounced than in *modiglianii* and *amata* (fig. 16). Antenodals $\frac{18-20}{12}$, postnodals $\frac{9-10}{12}$.

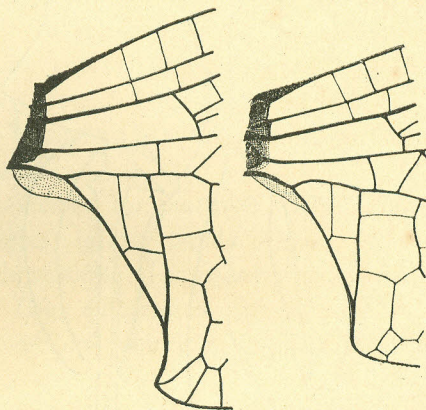


Fig. 16. Basal portion of right hind wing of *Oligoaeschna platyura*, sp. n. ♂ (left), and of *O. amata* (FÖRST.) ♂ (right).

Abdomen constricted on segment 3 (1.0-1.3 mm), rather strongly spindle-shaped beyond, acquiring its maximum width (2.7-3.2 mm) towards the end of segm. 5, from where the abdomen diminishes very gradually in width till the end of 8; 9 and 10 again very slightly broadened. Terminal segments depressed. Dark brown, basal segments paler; markings obscured (discoloured), except on basal segments of type: Segm. 1 with a green mid-dorsal mark on its distal half and a roundish lateral spot; dorsum of 2 with a basal and a terminal pair of green semi-lunar spots, interrupted in the middle line, a green point just inside the auricles and a longitudinal streak of the same colour on the posterior half of the sides. Basal two-thirds of segm. 10 dull reddish-brown, apical third blackish; basal half of segment with its dorsal surface smooth on each side of a median, longitudinal area, which is covered with numerous microscopical, transverse striae; apical half entirely, and very finely, transversely striate; the median area of this part of the segment carries in addition numerous closely set, rasp-like warts, which are crowded together on each side of a distinct longitudinal impression.

Auricles truncated apically, armed with 5-6 fine teeth.

Accessory genitalia not differing from those of *amata* and *modiglianii*.

Anal appendages shaped as shown in fig. 17; superior pair black, inferior appendage reddish-brown, its borders black.

Female (ad.). — Very similar to the male.

Frons olive-brown above, dirty orange-brown in front; superior margin finely obscured. Vertex and occipital triangle brown. Thoracic pattern similar to the male but all dorsal green marks a little narrower.

Legs coloured similarly to the male.

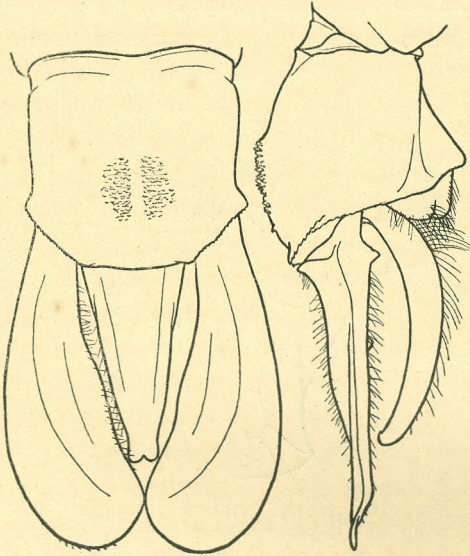


Fig. 17. *Oligoaeschna platyura*, sp. n. ♂. Anal appendages, dorsal view and right side.

Wings stained with golden yellow all over the membrane (juv.); or light golden yellow with the posterior margin of the fore wings narrowly, the anal area and the apical portion of the hind wings, from the inner end of *pt* to the end of *Cu*₂, broadly hyaline; bases to level of *Ax*₁-*Ax*₂ deep golden yellow (ad.); or throughout brownish yellow with only the anal area of the hind wings sub-hyaline (aged individuals). Pterostigma as in the male.

Abdomen in one specimen shaped much as in the type of *O. elacatura* (NEEDHAM) (= *modiglianii*)¹); in the other females the abdomen is only slightly spindle-shaped (much less so than in the male) and the segments are sub-cylindrical. All markings obscured and discoloured.

Anal appendages broken off in all specimens. Dentigerous plate shaped similarly to *modiglianii*, *amata* and *mutata*.

Length: ♂ abd. + app. 47 - 50, hw. 37.6 - 40; ♀ 39.5 - 43.5, 37 - 39 mm. Holotype ♂: 49.5, 39; allotype ♀: 40.5, 39 mm.

Oligoaeschna amata (FÖRSTER) (fig. 16).

1903. FÖRSTER, Insekten-Börse, 20, p. 1 - 2 sep. — ♂ Brunei, N. Borneo (*Jagoria*).

1909. MARTIN, Cat. Coll. SELYS, 19, Aeschnines, p. 132 - 133 (pars!), fig. 129 (apps. ♂). — ♂ Borneo (*Jagoria*).

Material studied: — 3 ♂ (ad.), labelled "Brunei" or "S. Borneo", all identified "*Jagoria poeciloptera* K." by R. MARTIN, homotypes of *O. amata* (FÖRSTER), in the Paris Museum.

According to Mrs. HOWARD K. GLOYD, the types of this species (2 males from Brunei, N. Borneo, Dr. O. STAUDINGER vend.) are in the Michigan Museum, Ann Arbor.

¹) NEEDHAM, Bull. Amer. Mus. Nat. Hist. 23, 1907, fig. 3 (insect ♀).

Without comment MARTIN (*loc. cit.*) identified FÖRSTER's *amata* with *poeciloptera* KARSCH, the male of which is still unknown. Fortunately the sketch accompanying MARTIN's description of the anal appendages of the male has been made from one of FÖRSTER's type specimens; and this drawing is sufficient proof that MARTIN's *poeciloptera* is the true *amata* of FÖRSTER.

The specimens examined by me agree closely with the original description, except that the thorax of the male is not "einfarbig sammetbraun", but is marked dorsally with a pair of oblique green antehumeral bands, followed by a transverse streak of the same colour, on each side in front of the ante-alar triangles. The sides of the thorax are also marked with green but the exact shape of the lateral bands is not easily made out because the colours have faded from decomposition. The Malaysian species of the genus *Oligoaeschna* obviously present a very uniform colour-pattern of the body.

The following notes may be added to FÖRSTER's brief diagnosis and MARTIN's description of the male.

Male. — Head coloured much as described for *platyura*. Green markings on dorsum of synthorax as in that species; lateral bands diffuse, indefinite, though apparently also similar in principle to those of *platyura* and *modiglianii*; no visible pale spots on metepisternum. Legs coloured as in *platyura*.

Wings palely suffused with greyish-yellow (sub-ad.), or with a greyish-brown tinge all over the membrane (ad.).

Pterostigma greyish-brown, shaped as in the other species, that of fore wing 2.2 mm in length. Only one row of cells between M_4 - M_{spl} (rarely and irregularly one double cell in one of the wings). Anal angle shaped as in *modiglianii*; membranula very narrow (fig. 16). Nodal index in one specimen 10.18.18. 9

10.12.12.11 *

Abdomen constricted on segment 3 (1.0 - 1.1 mm), slightly spindle-shaped beyond, acquiring its maximum width (2.3 mm) towards the end of segm. 4, from where it is at first parallel-sided, then diminishes very gradually in width till the end of 7; finally, 8 - 10 again somewhat broadened. Terminal segments depressed. Dark brown, markings obscured and discoloured. Segment 10 reddish-brown, smooth and shining, without any indication of transverse striae or warts (*cf.* MARTIN, *loc. cit.* fig. 129).

Auricles truncated apically, with 4 teeth.

Anal appendages shaped exactly as shown on fig. 129 in MARTIN (*loc. cit.*), reddish to blackish-brown, inferior appendage with its borders black.

Length: ♂ abd. + app. 46, hw. 37.5 mm (one specimen measured).

Female. — I have not seen this sex of *amata*, and although MARTIN described it in his monograph, there are neither identified nor unnamed females in the Paris Museum corresponding with this description.

***Oligoaeschna mutata*, sp. n. (fig. 18).**

Material studied: — 1 ♂ (ad., holotype), E. Borneo, Samarinda, Jan. 1939, native collector, M. E. WALSH ded.; 2 ♀ (ad.), E. Borneo, N. Koetai,

Sangkoelirang distr., Kariorang, Jan. 2 & Febr. 21, 1937, J. W. QUARLES DE QUARLES leg. All in the Buitenzorg Museum.

Male (ad.). — Head coloured similarly to *platyura*, but dorsal surface of frons with two isolated, transverse, olive-green streaks on a reddish-brown background; or, in other words, a blackish-brown T-shaped mark on the upper surface with its stem broad, changing to reddish-brown basally and attached to a broad basal band of the same colour. Vertex and occipital triangle black. Rear of the head tawny.

Synthorax brown, blackish-brown above. Dorsum marked with green as in *platyura* and *amata*. On the sides are two broad, diffuse, green epimeral bands whose antero-dorsal limits are indistinct owing to postmortem decomposition. Apparently no metepisternal coloured spots present. Infraepisternites and under surfaces brown.

Coxae brown; trochanters and femora red-brown with the apices of the latter black; tibiae darker brown, bases and apices obscured; tarsi blackish.

Wings tinted with greyish amber; anal area of hinder pair almost hyaline, wing-tips slightly smoky. Pterostigma braced, 2.0 mm in length (fore wing), 1.9 (hind wing), tawny between black nervures.

Venation open, very similar to *modiglianii*; a single row of cells between M_4 - M_{spl} . Triangles 3-celled; supratrangles with a single cross-nerve in all wings. Anal angle and membranula shaped exactly as in *amata*.

Nodal index $\frac{8.16.15. 9}{9.11.11.10}$.

Abdomen constricted on segment 3 (1.1 mm), not appreciably spindle-shaped beyond, acquiring its maximum width (2.3 mm) towards the middle of segm. 5, from where the abdomen diminishes but slightly and very gradually till the end. Terminal segments slightly depressed.

Black, dark brown on the sides of 1 and 2, marked with blue as follows:— A roundish spot on sides of segment 1; 2 with a triangular spot above the auricles, a minute triangular basal mid-dorsal spot, a pair of trapezoidal transverse dorsal spots at the jugal suture and a pair of closely approximated apical lunules of the same size as the jugal spots; segm. 3-6 each with similar, though smaller, jugal and apical spots, the former progressively smaller from before backwards and vestigial on 6, the latter in the form of narrow, transverse, dorso-lateral rings, finely constricted in the middle on 3-5, entire on 6; segm. 7 only with a narrow apical transverse streak, and 8 with a pair of apical annules; remaining segments unmarked, black. Segm. 10 dull, the entire dorsum and most of the sides very closely, microscopically, transversely striate; mid-dorsally, this segment carries in addition a number of scantily distributed rasp-like denticles, which are more or less definitely arranged in rows, whilst there is no longitudinal impression.

Auricles truncated apically, armed with 4-5 teeth.

Accessory genitalia not different from those of the allied species.

Anal appendages shaped as shown in fig. 18; superior pair black, inferior appendage dark reddish-brown, its borders and apex black.

Female (ad.).—Very similar to the male, but for the following differences:—

Head with the green frontal streaks distinct, though less sharply defined, and with the upper surface of the frons uniform brown, only the frontal crest being slightly obscured.

Synthorax uniform reddish-brown; green dorsal marks closely resembling those of the male, but lateral bands ill-limited and pale bluish instead of green.

Fore wings diffusely tinted with yellowish from the pterostigma nearly to level of arculus and beyond that level in the costal and cubital spaces; hind wings palely and diffusely amber tinted but with the anal area and the apices, from distal side of *pt* backwards to the point where *Cu*₁ meets the wing-margin, hyaline. Pterostigma ochreous-brown.

Abdomen spindle-shaped, constricted on segment 3, thence widened (greatest width over the middle of 5), finally again narrowed, with cylindrical segments. The two basal segments are brown, the remainder black. Pale markings definitely green, closely similar to male, only the lateral marks of segment 1 and 2 greatly enlarged, that on 2 in the form of a complete stripe running from base to apex of segment, parallel to the lower border of the tergite.

Anal appendages broken off in both females. Dentigerous plate shaped exactly as in the allied species.

Length: ♂ abd. + app. 42.5, hw. 34; ♀ (allotype) 38, 35; ♀ (paratype) 35, 33.5 mm.

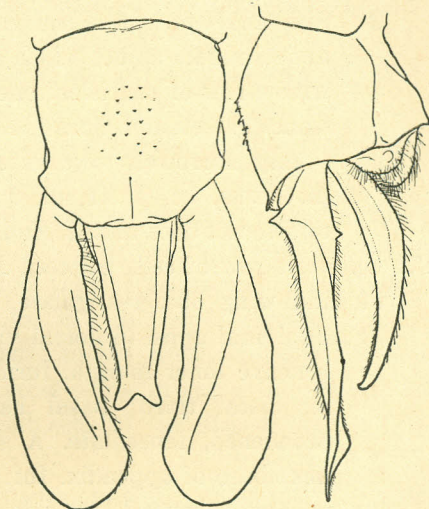


Fig. 18. *Oligoaeschna mutata*, sp. n. ♂. Anal appendages, dorsal view and right side.

Key to some species of *Oligoaeschna*.

The following key may serve to distinguish the males of five species of *Oligoaeschna*, viz. *O. amata*, *bühri*, *mutata*, *platywra*, and *zambo*, which form a group of closely allied species.

1. Two rows of cells between *M*₄-*M**spl* in both pairs of wings. Anal angle of hind wing sharply pronounced, acute-angulate, inner border slightly emarginate (fig. 16). (Shape not determined in *zambo*).
2. Sup. anal apps. in dorsal view very broadly lamellar, more than twice as broad about middle as the width at base, armed on the intero-ventral margin with a strong basal tooth, followed successively by 2-3 very

- small ones and a larger, obtuse-angulate projection before the middle of their length (the small teeth invisible in profile view). Inf. app. in dorsal view narrowly triangular, its side-margins straight, apex very slightly and narrowly bifid, the end-lobes not divergent nor produced laterad (fig. 17). Sculpture of 10th abdominal tergite, see description. Abd. 47 - 50, hw. 37.6 - 40 mm. Hab.: Borneo. *platyura*
- 2'. Sup. anal apps. in dorsal view much narrower, less than twice as broad about middle as the width at base, armed on the intero-ventral margin with a row of denticles: one sub-basal tooth, visible in profile view and somewhat stouter than the rest. Inf. app. shaped much as in *platyura*, evenly narrowed towards apex, which is but little excised (NEEDHAM & GYGER, l.c. p. 41, pl. 2 fig. 33 - 34). Sculpture of 10th abdominal tergite not determined. Abd. 49, hw. 38 mm. Hab.: Mindanao. .. *zambo*
- 1'. Only one row of cells between M_4 - M_{spl} in both pairs of wings. Anal angle of hind wing obtuse-angulate, inner border straight (fig. 16).
2. Sup. anal apps. in dorsal view narrow, gently incurvate with distinctly concave inner margin, furnished with numerous black hairs especially on distal third; basal half of each parallel-sided, apices a little broadened, lanceolate. A single strong intero-ventral tooth, situated near base of appendix. Inf. app. in dorsal view broad at base, strongly narrowed beyond, its side-margins concave, apex broadened, slightly and narrowly bifid, the end lobes distinctly produced laterad (MARTIN, l.c. p. 132 fig. 128). Dorsum of 10th abdominal segment covered with numerous microscopical teeth. Abd. 44, hw. 35 mm. Hab.: Borneo. *bühri*
- 2'. Sup. anal apps. in dorsal view evenly widened from base distalwards, broadly lamellar, almost twice as broad about middle as the width at base.
3. Dorsum of 10th abdominal segment entirely smooth and shining. Sup. anal apps. with the inner margin at first slightly concave, thence a little convex, apices evenly narrowed and bluntly pointed. A single strong intero-ventral tooth, situated near base, followed by a much smaller denticle (invisible in profile view) at about one quarter of the length of appendix. Inf. app. slenderer than in *amata*, in dorsal view at first somewhat narrowed, its side-margins slightly concave, apex broadened, strongly bifid, the end-lobes distinctly produced laterad (MARTIN, l.c. p. 133, fig. 129). Abd. 45 - 46, hw. 36 - 37.5. Hab.: Borneo. *amata*
- 3'. Dorsum of 10th abdominal segment, see description. Sup. anal apps. in dorsal view with the inner margin almost straight, apices cut off obliquely, rounded. Intero-ventral margin armed with one rather small sub-basal tooth followed by two irregular, small denticles, which are invisible in profile view. Inf. app. in dorsal view broad at base, evenly narrowed beyond, its side-margins straight,

apex slightly broadened, strongly bifid, the end-lobes distinctly produced laterad, but less so than in *amata* (fig. 18). Abd. 42.5, hw. 34 mm. Hab.: Borneo. *mutata*

***Amphiaeschna ampla basitincta*, subsp. n.**

Material studied: — 1 ♂, 1 ♀ (ad.), S.W. Sumatra, Benkoelen residency, Tandjong Sakti near Pageralam, 600 m alt., May 27, 1935 (♂, holotype), Moeara Tenam, 250 m alt., June 16 - 23, 1935 (♀, allotype), M. E. WALSH leg., in the Buitenzorg Museum.

Both sexes differ very strikingly from typical *ampla* in the greater extent of the brown basal patch to the fore and hind wings.

Male (ad.). — Base of fore wing dark burnt-brown, this colour extending to as far as Ax_2 in *c*; to half-way between Ax_{2-3} in *sc*; to the second cross-nerve in *m*; and to half-way between second and third cross-nerve in *cu*. Base of hind wing similarly coloured to as far as Ax_1 in *c* and *sc* (the costal half of *c* hyaline; basal antenodals in *sc* not counted); to the second cross-nerve in *m*; and to half-way between first and second cross-nerve in *cu*; a small basal spot of the same colour in each of the two basal cells of the anal triangle.

Body-colours faded.

Superior anal appendages a trifle broader, and more abruptly narrowed apically, than in *ampla ampla*, the distal half of each slightly outbent; otherwise identical with the typical race (e.g., *ampla*, length to breadth 6.8:1.2; *basitincta*, 6.6:1.5 mm).

Wing-bases marked with dark brown similarly, though slightly less extensively, as in the female of typical *ampla* from Java.

Female (ad.). — Body-colouring dark reddish brown; all yellow and green markings faded and unapparent.

Wings hyaline, anterior pair with a large, diffuse patch of pale brown in the area between nodus and pterostigma, broad at the costa, narrowing towards and not quite reaching the hinder border of wing; this patch very similar to typical *ampla* but more extensive and decidedly deeper in tint. There is, in addition, a small brown nodal spot in both pairs of wings filling up part of the costal cell between nodus and Px_1 . Basal patch dark burnt-brown, paler distally; cell-middles of *c* and *m* paler brown. In fore wing it extends diffusely as far out as Ax_{6-7} in *c* and *sc*; to the arculus in *m*; to almost as far as *ti* in *cu*; and from there in a curve to the posterior border of the wing, filling up almost the basal half of the anal area. In the hind wing the basal patch is more sharply limited, extending to beyond level of arculus in *c* and *sc* (Ax_{8-9} in *sc*); than abruptly back to the arculus in *m*, to the proximal side of *ti* in *cu*, and from there in line with this nervure to the border of the wing.

Genital plate (dentigerous plate) identical in shape to that of typical *ampla* ¹⁾, finely denticulate.

¹⁾ See F. C. FRASER, *Treubia*, 8, 1926, p. 474, fig. 2 (nec 3!).

Anal appendages also very similar, though comparatively less slender, and with the mid-rib broader (e.g., *ampla*, length to breadth 7.3:1.5; *basitincta*, 7.0:1.7 mm).

Length: ♂ abd. 54 + 6.6, hw. 54, pt. $\frac{3.2}{3.0}$; ♀ 52 + 7, 55, $\frac{3.2}{3.0}$ mm.

Up to the present in Sumatra the well known Javan species *Amphiaeschna ampla* has not been observed. In Java *ampla* is a moderately common species in wooded districts, inhabiting low country up to about 800 metres above sea-level. It is strictly nocturnal in habits and therefore seldom seen on the wing. The discovery of a subspecies of *ampla* in Sumatra means a welcome addition to our knowledge of its distribution.

The extent of the blackish-brown basal patch of the wings of typical *ampla* is remarkably constant in a series of 38 males and 22 females examined, from various localities scattered all over the island of Java.

MARTIN in his monograph gives excellent wing-photographs of both sexes of typical *ampla* from Java ¹⁾, which may conveniently be consulted in comparison with the above description of *A. a. basitincta*.

***Heliaeschna bartelsi*, sp. n.**

1909. MARTIN, Cat. Coll. SELYS, fasc. 20, Aeschnines, p. 161-162, fig. 162 (apps. ♂).
— ♂♀ Borneo; "Cooktown" (error). (*simplicia*).

1911. MARTIN, Genera Insect. WYTSMAN, fasc. 115, p. 26, pl. 6 fig. 1 (col. fig. ♂), 1a-b (apps. ♂) (*simplicia*).

Material studied: — 1 ♂ (ad.), labelled: "Borneo, W.K." (SELYS, yellow), "*Heliaeschna simplicia* Karsch ♂ Borneo" (SELYS, white); 1 ♂ (juv., apps. lacking), "Borneo W.K."; 2 ♀, "Borneo, W.K.", one identified with "*Heliaeschna simplicia* Karsch ♀ Borneo" (SELYS, white); all in the Brussels Museum. — 2 ♂ (ad.), S. Sumatra, Lampong Res.: Menggala, Terbangihilir, low country, Aug. 16-20, 1936, MAX BARTELS leg., in the Buitenzorg Museum. — 4 ♂, 4 ♀ (juv.-ad.), W. Borneo, Singkawang distr., near Bakoean, Febr. 18, 1932 and Jan. 22, 1933 (1 ♂, 2 ♀ juv.); Jan. 22 and April 9-10, 1934 (3 ♂, 2 ♀ ad.), L. COOMANS DE RUITER leg., in the Buitenzorg Museum.

H o l o t y p e ♂ and a l l o t y p e ♀: W. Borneo, Bakoean, April 9-10, 1934.

Male (ad.). — Mouth-parts ochraceous-orange, usually discoloured to cinnamon; labrum in one example with distinct greenish intermingling. Clypeus and frons ecru-olive (RIDGWAY), fading to olive-ocher laterally and over the sutures. Frontal ridge acute, obtuse-angulate and ^-shaped in dorsal view, the ridge itself pale-coloured. Dorsal surface of frons and vertex finely rugosely punctured, brownish-olive in colour. Occipital triangle dark brown. Antennae brown. Eyes dark greenish-blue. Rear of the head cinnamon-buff.

Synthorax short and small. Dorsum, to almost as far laterally as the humeral suture, lumière blue (RIDGWAY), including the ante-alar triangles; this

¹⁾ R. MARTIN, Cat. Coll. SELYS, fasc. 19, 1909, Aeschnines, p. 113 fig. 106 (♂), p. 114 fig. 107 (♀, sub *perampla*).

colour changing into a delicate turtle- or malachite green, laterally. Dorsum and sides unmarked save for the mid-dorsal carina, the borders of the ante-alar triangles, and the upper margin of the pleurae, which are brown. Under surfaces and coxae pale brownish or flesh-coloured; metasternum slightly pruinose. Nota and axillaries lumière blue.

Legs dark purplish-brown to almost black; inner surfaces of femora, distal third of tibiae, and all tarsi, diffusely cinnamon-rufous.

Wings very long, with the basal half rather narrow, the apical part gradually diminishing in width towards the apices, which are evenly and bluntly rounded; greatest breadth of hind wing before the nodus. Membrane strongly tinted throughout, usually deeply and evenly enfumed, save for the extreme bases, which are hyaline. Venation moderately dense, brown. Primary antenodals the first and ninth or tenth. A basal postcostal nervure invariably present in all wings. *Arc* situated mid-way between the two primary antenodals. *t* elongate, made up of 6-7 cells, distal side sinuous; basal angle situated distal to level of *Arc* for a distance about half as long as proximal side. *ht* traversed by 4-7 cross-nerves in fore wing, 5-6 in the hind (4.5 in fore wing of type). Basal part of hind wing rather narrow, base obtuse-angulate; tornus in line with distal side of anal triangle obtuse-angulate. Anal triangle three-celled, its costal side exceptionally long, scarcely less than three-fourths as long as distal side. Membranula vestigial, whitish. Anal loop oval, made up of 8-10 cells. Antenodals 22-26, postnodals $\frac{13-15}{15-18}$ ($\frac{13.23\ 23.14}{18.19.19.15}$ in the holotype). Cubital space (including *ti*) traversed by 10-11 cross-nerves in fore wing, 8-9 in the hind; *m* with 5-7 cross-nerves in fore wing, 4-6 in the hind wing ($\frac{7.5}{5.6}$ in the type). *Rs* forked a little distal to or at the level of the proximal side of *pt* in fore wing, slightly proximal to or at that level in hind wing. (In one teneral male from Borneo *Rs* forks decidedly beyond level of proximal side of *pt* in both pairs of wings). Fork narrow, with only two rows between its branches and with three marginal cells. 5-6 rows of cells between *Rs-Rspl* at the point of greatest divergence; 1 row of cells between *M₃-M₄* in both pairs of wings (usually 1-2 doubled cells about the middle of their course); 1 row of cells between *Cu₁-Cu₂* in hind wing; all wings with 3-4 rows of cells in the intervening space between *M₄-Mspl* where most widely separated. Pterostigma usually lacking a distinct brace-vein; in most individuals, however, a brace is accidentally present, at least so in one or two of the wings; *pt* long, brownish-yellow in colour, covering 3-4 underlying cells.

Abdomen of peculiar shape: basal segments cylindrical, very slightly tumid; segment 3 not constricted or only to the slightest extent; beyond the constriction the abdomen broadens very little, acquiring its maximum width towards end of segm. 4, from where the abdomen tapers again very slightly as far as the end.

Auricles exceptionally small (hardly 0.5 mm in length), armed with 3 minute apical teeth. Abdomen dark purplish- to blackish-brown with rich blue and green markings, as follows:—

Segment 1 with most of the sides blue-green and with a transverse light blue spot, occupying the apical half of the dorsum. Segm. 2 with bright blue-green AML and PL, occupying most of the sides; AD small, blue in colour; MD narrow, paired and likewise blue; PD large, paired, finely separated in the middle line, each of the spots trapezoidal, bright blue in colour. Segm. 3 with AL and ML blue, narrowly separated by the transverse carina; MD linear, blue, confluent with ML laterally; PD isolated, united mid-dorsally, forming a large semicircular blue spot, occupying about $\frac{1}{5}$ of the whole length of segment. Segm. 4-8 with AL and ML rather narrow and in the form of marginal bluish streaks decreasing in size posteriorly; MD distinct, progressively more pointed caudad from before backwards; PD isolated, dark blue in colour, forming a conspicuous semicircular dorsal spot, which is finely divided by the longitudinal carina and about one-third as long as the posterior division of the segment on 4-6, one-fourth on 7, and in the form of paired spots on 8 and 9. Segm. 10 reddish-brown, its posterior border black. Ventral surface of abdominal segments brown.

Anal appendages: superior pair brown, their borders blackish-brown fringed with dark brown hairs interiorly; inferior appendage dark brown. Sup. anal apps. shaped exactly as shown on fig. 162 of MARTIN's monograph (*loc. cit.*, p. 161); inf app. short, triangular, deeply channelled, apex with a narrow V-shaped incision, the tips acute and strongly upturned.

Female (ad.). — Resembles the male almost in all but sexual characters. Synthorax uniform dark greyish-brown with the slightest indication of some greyish-blue colouring on the middle of each mesepisternite. Nota and axillaries chrome-yellow, intermingled with green.

Legs reddish-brown, apices of anterior femora obscured.

Wings shaped as in the opposite sex. Membrane evenly tinged with yellow save for the extreme bases, which are hyaline (juv.), or deeply and evenly enfumed, especially towards the apices, the bases being hyaline or only palely tinted (ad.). Venational details very similar to male. Pterostigma long, pale ochreous, covering 3-4 cells.

Abdomen shaped much as in the opposite sex: widest at end of first segment, tapering to the end of segm. 7; base of 8 slightly constricted, but apically acquiring a little over the width of 7, then again slightly tapering to the end of abdomen. Coloration dark brown, basal segments intermingled with diffuse olive-grey; tergal margins and under surfaces light brown. Markings similar in principle to the male, but very indistinct or obscured and decidedly smaller, especially PD, which is all but invisible on segments 6-9. Terminal segments apparently unmarked.

Ovipositor extending to about half-way the length of segm. 10. Dentigerous plate produced, trapezoidal in shape and rather swollen; laterally furnished with short bristles and, apically, occasionally with some microscopical teeth, on each side just before the origin of the spines; spines two in number, much shorter than in *Gynacantha*, but hardly shorter than the plate, divaricate, evenly

and slightly downcurved apically. Shape of anal appendages unknown (fractured off in all specimens so far taken); basal portion (about 2 mm in length) extremely narrow, gently decreasing in width apically.

Length: ♂ abd. + app. 49 - 50.5, hw. 45.7 - 47, pt. $\frac{3.9-4.3}{3.8-4.0}$; ♀ abd. 48.5 - 50.5, 51.5 - 53, pt. $\frac{4.0-4.5}{3.7-4.3}$ mm.

The two Sumatran specimens do not differ in any way from our series of Borneo.

This very distinct species has no near allies. The male superficially resembles a small *Tetracanthagyna*. Both sexes are easily distinguished from all other Asiatic *Heliaeschnae* by the long and narrow wings, and by the very narrow fork of *Rs*, which has only two rows of cells between its branches whilst there are only three marginal cells. The pterostigma is decidedly longer and the apices of the wings are much more rounded off than in such species as *simplicia* (KARSCH) and its 'double', *vanderweelei* MARTIN. Neither the male nor the female show any narrowing of the abdomen at the third segment, whereas in the species just mentioned this segment in the male is strongly constricted basally, and at least slightly so in the female. The simple structure of the anal appendages of the male and the two-pronged dentigerous plate of the female may further serve to the easy recognition of *bartelsi*.

H. bartelsi has long been mistaken for *H. simplicia* (KARSCH), described also from Borneo, and until recently I thought it to be that species, following MARTIN's account in the monograph.

Now that I have examined KARSCH's type of *simplicia* in the Berlin Museum, it is quite evident that the latter is entirely different from *bartelsi*, agreeing most closely with MARTIN's species *vanderweelei*, which was erroneously described from "Liberia" ¹). I have compared the types of *simplicia* with a fine series of both sexes (from West Borneo) in the Buitenzorg Museum and found them agreeing in every respect. Not only is there a close similarity between the anal appendages and the dentigerous plates of *simplicia* and *vanderweelei*, but there is also a great resemblance in the venation, body-colouring and size. At the moment I can find no differences between them and I doubt if *vanderweelei* can be regarded as a valid species.

In the Berlin Museum is a male of this species from Palembang (E. Sumatra), identified with *vanderweelei* by Dr. E. SCHMIDT. The species *H. "vanderweelei"* is also represented in our collection by a good series of males and females, collected in the residencies of Palembang and Djambi, in East Sumatra.

FÖRSTER ²) has proposed to create a distinct genus for the Asiatic species of the genus with the name *Malayaeschna* (generotype: *Amphiaeschna simplicia* KARSCH).

¹) See RIS, Zool. Meded. Leiden, 10, 1927, p. 31 - 33, fig. 22 (apps. ♂), 23 (genit. ♀).

²) FÖRSTER, Jahrb. Nassau. Ver. Naturk. Wiesbaden, 62, 1909, p. 219.

His reasons are that the latter have a longer *t* and wings more pointed relatively than the African species; and that whilst *Malayaeschna* has a four- or six-toothed dentigerous plate, the African *Heliaeschna* have a two-pronged plate. It is worth remark that the dentigerous plate of the female of *H. univulvata* MARTIN is armed with t h r e e spines, and that the new Asiatic *H. bartelsi* approaches the Ethiopian group in the simple structure of the male superior appendages and the two-pronged genital plate of the female. For these reasons alone it does not seem advisable to accept FÖRSTER's name *Malayaeschna*.
