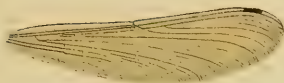
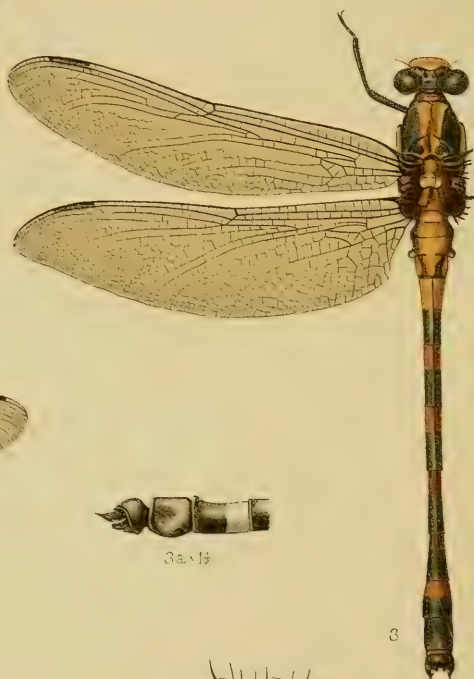






2



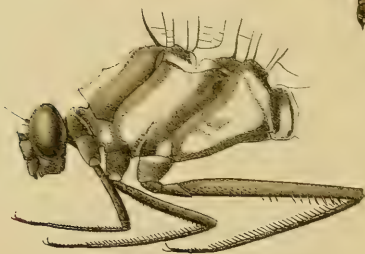
5



3a. 1/2



7. 1/2



4. 1/2

Figs 1, 2, 7. H. D. S. (see text)

Edwin Wilson, Cambridge.

DRAGONFLIES FROM THE MALAY PENINSULA.

2. On a Collection of Dragonflies made by Members of the Skeat Expedition in the Malay Peninsula in 1899-1900.  
By F. F. LAIDLAW, B.A.

[Received December 28, 1901.]

(Plates V. & VI.<sup>1</sup> and Text-figures 10-12.)

In drawing up an account of the Dragonflies collected by members of the Skeat Expedition, I have thought it worth while to include in my list not only the names of species represented in this collection, but also of all those which I have been able to find recorded as having occurred in the Malay Peninsula. It will be seen that the list is a fairly large one, although it is impossible to suppose that the full richness of the fauna of this part of the world has been as yet revealed.

Noticeably this is the case with the *Gomphinae*; it is worthy of remark that our collection contained five specimens representing four different species, and that none of these were identical with any species previously found in the Peninsula. I have been able through the courtesy of Mr. Kirby to add to my list the names of the species taken by Mr. Ridley, specimens of which are in the British Museum. I have to thank both Mr. Kirby and Dr. Sharp very sincerely for many useful suggestions and much kind assistance.

Lastly, I have to thank the other members of the Expedition for their kind assistance in making the collection.

I have given references in every case where possible to Mr. Kirby's 'Catalogue of the Odonata,' published in 1890, where full allusion to papers published before that date will be found.

The following notes on the habits of some of the species collected may be of interest:—

**LIBELLULIDÆ.**—Almost without exception the numerous members of this family avoid forests and are to be found in flat open country, rice-fields, and clearings near the forests, especially where there happens to be a stagnant pool in the neighbourhood.

Certain very common and widely spread species are to be found wherever there is a suitable locality. Such are especially *Orthetrum sabina* and to a lesser extent *Pantala flavescens*, *Tholymis tillarga*, *Trithemis trivialis*, *Trithemis aurora*.

Certain other species with a very wide range in the Oriental Tropics seem to prefer the neighbourhood of the sea. Such are the members of the genus *Ryothemis*, also *Neurothemis tullia* and *Brachythemis contaminata*.

The rarer and more characteristic species are only to be found in up-country clearings. The only species that I saw actually in the forests were *Camacinia gigantea*, *Cratilla metallica*, *Tyrio-*

<sup>1</sup> For explanation of the Plates, see p. 92.

*bapta torrida*, *Orthetrum pruinolum*, and *Calothemis biappendiculata*. Others for the most part were caught playing round stagnant water. Rapidly running streams are invariably avoided except by *Tyriobapta torrida*.

On the other hand, the *ÆSCHNIDÆ* are mostly found in the forests, any small stagnant pool is an excellent locality; the species of *Gynacantha* and *Anax guttatus* are sometimes seen in the open. The large species of the *Gomphine* are also forest insects. Thus my specimen of *Sieboldius grandis* was taken in the same locality (a small muddy pool frequented by wild pig) with two males of *Amphibeschna ampla*; this locality also yielded *Pericnemis stictica* and *Lestes ridleyi*.

Another forest-haunting group is found amongst the *CALOPTERYGIDÆ*. *Vestalis amœna* never occurs in the open, nor over rapidly running water: probably *Echo* and *Climacobasis* have similar habits; they resemble *Vestalis amœna* so closely that they may perhaps be often mistaken for this very common species. The other *Calopterygine* are only to be found playing over rapidly running streams and rivers, and their beautiful iridescent wings add greatly to the charms of a sun-lit river-scene. *Rhinocypha fenestrella* sometimes forsakes the main stream for the shady rivulets that wander through the forest, but most of the species prefer the wider waters. The lovely *Neurobasis chinensis* wanders farther down the river perhaps than other species, but I have never seen it near the mouth of a river, or in fact after the stream had become sluggish and polluted.

Of the *Agrionine* numerous species are found in rice-swamps: few make their home in the forests, amongst these are *Pericnemis stictica* and *Lestes ridleyi* referred to above, as well as one or two species of *Psilocnemis*, *Amphilestes*, and a few of the *Protoneurous* group.

In many genera the females are exceedingly rare; this is especially the case with the *Calopterygine* genera *Euphœa* and *Dysphœa*. It has been suggested that the soberly coloured females do not attract the notice of collectors to the same extent as the males, and that hence they are rarely found in collections: but I can assert positively that in their own haunts the females are exceedingly rare; to the best of my belief, I saw only one, a female of *Euphœa ochracea*, which I secured.

### Family LIBELLULIDÆ.

#### Subfamily LIBELLULINÆ.

(Species marked with an asterisk are not represented in our Collection.)

\**ZYXOMMA PETIOLATUM* Ramb.

*Zyxomma petiolatum*, Kirby, Cat. Odonata, p. 35.

East Indies. Singapore (*Ridley*).



THOLYMIS TILLARGA (Fabr.).

*Tholymis tillarga*, Kirby, Cat. Odonata, p. 1; Selys, Ann. Mus. Genov. (2) x. p. 439.

Common in the Eastern Tropics.

PANTALA FLAVESCENS (Fabr.).

*Pantala flavescens*, Kirby, Cat. Odonata, p. 1; Selys, Ann. Mus. Genov. (2) x. p. 440; Ris, Arch. f. Naturg. Jahrg. 66, p. 175.

Found in the tropics of both worlds.

CAMACINIA GIGANTEA (Brauer).

*Camacinia gigantea*, Kirby, Cat. Odonata, p. 2.

Two fine males were taken at Kwala Aring, where this species is fairly abundant near pools in open spaces. It is very difficult to catch, being a powerful flier. It haunted the same localities as *Neurothemis stigmatizans*, which resembles it very closely in colour, though of course much smaller.

HYDROBASILEUS EXTRANEUS (Hagen).

*Hydrobasileus extraneus*, Kirby, J. Linn. Soc., Zool. xxiv. p. 547, pl. xli. fig. 1, ♀.

Recorded from Penang.

RHYOTHEMIS PHYLLIS (Sulz.).

*Rhyothemis phyllis*, Kirby, Cat. Odonata, p. 5; id. Journ. Linn. Soc., Zool. xxiv. p. 549; Selys, Ann. Mus. Genov. (2) x. p. 443.

This species is common along the east coast of the Peninsula. Specimens were collected at Singgora, Kota Bharu, Kelantan, and at Trengganu. Occurs throughout the Malay Archipelago.

\*RHYOTHEMIS FULGENS Selys.

*Rhyothemis fulgens*, Kirby, Cat. Odonata, p. 6.

Singapore (*Selys*); Dindings (*Ridley*). Borneo, Malay Peninsula, Sumatra.

\*RHYOTHEMIS CURIOSA Selys.

*Rhyothemis curiosa*, Kirby, Cat. Odonata, p. 6.

Singapore (*Selys*). Sumatra. Perhaps a race of *R. fulgens* (*Selys*, Ann. Mus. Gen. xxvii. p. 451).

\*NEUROTHEMIS FULVIA Drury.

*Neurothemis fulvia*, Kirby, Cat. Odonata, p. 7.

*Neurothemis sophronia*, Selys, Ann. Mus. Genov. xiv. (1879) p. 292.

Malacca (*Selys*). China, Bengal, Nepaul.

NEUROTHEMIS FLUCTUANS (Fabr.).

*Neurothemis fluctuans*, Kirby, Cat. Odonata, p. 7; Selys, Ann. Proc. Zool. Soc.—1902, Vol. I, No. V.

Mus. Genov. (2) x. p. 446; Karsch, Abh. v. d. Senckenberg. nat. Gesell. xxv. 1. p. 219.

Common at Kwala Aring. Widely spread in the Eastern Tropics.

NEUROTHEMIS STIGMATIZANS (Fabr.).

*Neurothemis stigmatizans*, Kirby, Cat. Odonata, p. 7; Karsch, Abh. v. d. Senckenberg. nat. Gesell. xxv. 1. p. 218.

Plentiful at Kwala Aring. Like the last a common and variable insect.

NEUROTHEMIS DISPARILIS Kirby.

*Neurothemis disparilis*, Kirby, Cat. Odonata, p. 8.

Two specimens from Kwala Aring. Singapore (Ridley); Borneo.

NEUROTHEMIS TULLIA (Dru.).

*Neurothemis tullia*, Kirby, Cat. Odonata, p. 8; id. Journ. Linn. Soc., Zool. xxiv. p. 550.

Common near the mouth of the Kelantan River and for some thirty miles up the river. A common Eastern species.

TRITHEMIS (?) TRIVIALIS (Ramb.).

*Trithemis trivialis*, Kirby, Cat. Odonata, p. 18; id. Journ. Linn. Soc., Zool. xxiv. p. 550 (1894).

*Trithemis (?) trivialis*, Selys, Ann. Mus. Genov. (2) x. p. 467 (1891); Kirby, Ann. & Mag. Nat. Hist. (7) v. p. 531 (1900).

*Diplacodes trivialis*, Karsch, Abh. v. d. Senckenberg. nat. Gesell. xxv. 1. p. 219.

Widely distributed, ranging from India and Ceylon to Japan. I obtained specimens at Kwala Aring and Kota Bharu, Kelantan. Taken also by Mr. Ridley in Province Wellesley.

As pointed out by Mr. Kirby (Ann. & Mag. *loc. cit.*), this species probably requires the creation of a new genus to receive it.

TRITHEMIS AURORA (Burm.).

*Trithemis aurora*, Brauer, Verh. zool.-bot. Ges. Wien, xviii. p. 117 (1868); Selys, Ann. Mus. Genov. (2) x. p. 465 (1891).

*Trithemis intermedia*, Kirby, Proc. Zool. Soc. 1886, p. 327, pl. 33. fig. 4.

*Trithemis yerburii*, Kirby, Cat. Odonata, p. 18.

*Trithemis aurora*, Kirby, Journ. Linn. Soc., Zool. xxiv. p. 551.

This beautiful species was fairly common in September in marshy rice-fields at Ulu Aring. Mr. Ridley has collected it in Singapore.

BRACHYTHEMIS CONTAMINATA (Fabr.).

*Brachythemis contaminata*, Kirby, Cat. Odonata, p. 21; id.

Journ. Linn. Soc., Zool. xxiv. p. 551; Selys, Ann. Mus. Genov. (2) x. p. 468 (1891).

A widely spread Oriental species; common on the lower reaches of the Kelantan River and in the town of Trengganu.

*CROCOTHEMIS SERVILIA* (Drury).

*Crocothemis servilia*, Kirby, Cat. Odonata, p. 21; Selys, Ann. Mus. Genov. (2) x. p. 468 (1891).

Kwala Aring in August, in an open space near forest. East Indies and Australia.

*BRACHYDIPLAX MARIA* Selys.

*Brachydiplax maria*, Kirby, Cat. Odonata, p. 22.

Kwala Aring. Dindings and Selangor (Ridley). Borneo.

\**BRACHYDIPLAX MELANOPS* Selys, Ann. Mus. Genov. xxvii. p. 457.

*Brachydiplax melanops*, Kirby, Cat. Odonata, p. 22.

A small species from Selangor taken by Mr. Ridley, and now in the British Museum, probably belongs to the species indicated by de Selys, agreeing with it in its small size. Abdomen 16.5 mm. long; hind wing 22.5. The thorax and first fore segments of abdomen blue-pruinose. 6 prenodals and 5 postnodals on the fore wing. Internal triangle free.

*BRACHYDIPLAX PRUINOSA*, sp. n.

Length of abdomen 18.5 mm. Length of hind wing 24 mm.

♂. *Head* yellowish grey, margins of the upper and lower lips black, frontal tubercle, and upper surfaces metallic blue. Eyes brown.

*Prothorax* and *thorax* coppery green dusted over with very pale blue 'bloom.' *Abdomen*: first five segments grey, also coated with 'bloom,' the rest black, second and third segments with a transverse carina; legs black; pterostigma and venation black.

Fore wings: 8 antenodals, 6 or 7 postnodals. Discoidal triangle free, followed by two rows of cells.

Hind wings: 7 antenodals, 6 or 7 (usually 7) postnodals. The hind wings have a faint tint of yellow at their base.

Two males from Kwala Aring taken in August.

\**MICRODIPLAX DELICATULA* Selys.

*Microdiplax delicatula*, Kirby, Cat. Odonata, p. 22.

*MACRODIPLAX VITTATA* Kirby.

*Urothemis vittata* Kirby, Journ. Linn. Soc., Zool. xxiv. p. 552, pl. 42. fig. 2.

A male specimen from Kwala Aring. Mr. Kirby tells me that this species should be referred rather to the genus *Macrodiplax*

than to *Urothemis*. The last postnodal cell is as long or a little longer than the pterostigma in the fore wing.

**TYRIOBAPTA TORRIDA Kirby.**

*Tyriobapta torrida*, Kirby, Cat. Odonata, p. 32; Karsch, Abh. v. d. Senckenberg. nat. Gesell. xxv. 1. p. 221 (1890).

This species haunted a small forest stream close to the village of Kwala Aring. It was apparently confined to this locality in that neighbourhood. A common Bornean insect.

**CRATILLA METALLICA (Brauer).**

*Protorthemis metallica*, Kirby, Cat. Odonata, p. 30; Selys, Ann. Mus. Genov. (2) x. p. 461; Karsch, Abh. v. d. Senckenberg. nat. Gesell. xxv. 1. p. 221.

*Nesoxenia metallica*, Kirby, Cat. Odonata, p. 180.

*Cratilla metallica*, id. Ann. & Mag. Nat. Hist. (7) v. p. 542.

Common at Kwala Aring and on Gunong Inas.

**ORTHETRUM SABINA (Ill.).**

*Orthetrum sabina*, Kirby, Cat. Odonata, p. 35.

Abundant all along the East Coast. Ranges through the East Indies to Australia.

**ORTHETRUM PRUINOSUM (Burm.).**

*Orthetrum pruinatum*, Kirby, Cat. Odonata, p. 38; Ris<sup>1</sup>, Arch. f. Naturg. Jahrg. 66, p. 185, pl. ix. fig. 3.

A single specimen (♂) from Kwala Aring, September 1899. East Indies.

**ORTHETRUM TESTACEUM (Burm.).**

*Orthetrum testaceum*, Kirby, Cat. Odonata, p. 39.

A pair, *in cop.*, from Kwala Aring, September. Also a single male from the same locality. Recorded from Java.

**ORTHETRUM NICEVILLEI Kirby.**

*Orthetrum nicevillei*, Kirby, Ann. & Mag. Nat. Hist. (6) xiv. p. 112 (1894).

Described from specimens from Tenasserim. A single specimen from Ulu Aring, September 1899.

**ORTHETRUM sp.**—Our collection includes a female *Orthetrum* belonging to a species distinct from, but closely allied to, *O. sabina*. The abdomen is shorter, 26 mm., and distinctly stouter, the anal appendages are black, and the sides of the thorax are not so distinctly marked with black. I have been unable to identify it.

**LYRIOTHEMIS PRIAPEA Selys.**

*Lyriothemis priapea*, Kirby, Cat. Odonata, p. 25.

This genus is closely allied to *Orthetrum*, but differs in the

<sup>1</sup> Dr. Ris (*loc. cit.*) records *O. chrysis* from Malacca.



strongly curved sectors and in having three or four cross nervules in the submedian space of fore and hind wings.

A single specimen, a male, from Kwala Aring.

*POTAMARCHA* *OBSCURA* (Ramb.).

*Potamarcha obscura*, Kirby, Cat. Odonata, p. 180.

*Potamarcha congener*, Selys, Ann. Mus. Genov. (2) x. p. 459.

*Potamarcha obscura*, Karsch, Abh. v. d. Senckenberg. nat. Gesell. xxv. 1. p. 219.

This species is common at Kwala Aring, where I took two females and several males. Closely allied to *Lathrecista*, it differs in having the eighth abdominal segment in the female dilated, and the triangle of the hind wing traversed. (See also Selys, *loc. cit.*)

*LATHRECISTA* *TERMINALIS* Kirby.

*Lathrecista terminalis*, Kirby, Cat. Odonata, p. 30.

A single male from Kwala Aring. Recorded and described from Borneo.

\**LATHRECISTA* *SIMULANS* (Selys).

*Lathrecista simulans*, Kirby, Cat. Odonata, p. 30; Selys, Ann. Mus. Genov. (2) x. p. 458.

Recorded from Borneo, Sumatra, Ceylon, Malacca, and Burmah.

\**AGRIONOPTERA* *LINEATA* Brauer.

*Agrionoptera lineata*, Kirby, Cat. Odonata, p. 31; Selys, Ann. Mus. Genov. xix. (1879) p. 302.

Malacca. Philippines.

\**AGRIONOPTERA* *MALACCENSIS* Selys.

*Agrionoptera malaccensis*, Selys, Ann. Mus. Genov. xxvii. p. 461; Kirby, Cat. Odonata, p. 31.

(This genus differs from the preceding in the absence of the supernumerary antenodal nervule of the front wings, and in having several cross nervules in the submedian space, as well as in the position of the base of the triangle of the hind wings, in front of the arculus. The two genera closely resemble each other in coloration.)

\**AGRIONOPTERA* *NICOBARICA* Brauer.

*Agrionoptera nicobarica*, Kirby, Cat. Odonata, p. 31.

Singapore, Nicobar Is.

\**AGRIONOPTERA* *SEXLINEATA* Selys.

*Agrionoptera sexlineata*, Kirby, Cat. Odonata, p. 31.

Recorded from Malacca.

\**CALOTHEMIS* *BIVITTATA* (Ramb.).

*Calothemis bivittata*, Kirby, Cat. Odonata, p. 42.

*CALOTHEMIS BIAPPENDICULATUS* Selys.

*Calothemis biappendiculatus*, Kirby, Cat. Odonata, p. 42.

♂. Length of abdomen 22 mm. Length of hind wing 28 mm.

Wings hyaline, slightly tinged with yellow at their bases.

Pterostigma black, 2 mm. in length, covering 3 cells.

*Fore wing.* 19 antenodals, the last continuous, 9-10 postnodals. Discoidal triangle traversed, followed by two rows of cells. 2 supra-triangular cross nervules, 2 cross nervules in the lower basal cell. Internal triangle divided into 3 cells.

*Hind wing.* 2 supra-triangular, 3 lower basal cross nervules. Discoidal triangle traversed.

*Head.* Lower lip yellow, upper lip black, eyes brown, occipital triangle black, rest of head steely-blue black except a yellow mark at the side behind each eye.

*Prothorax* black.

*Thorax* black above, dull brown below. Legs brown.

*Abdomen.* Segments 1 and 10 black, the rest bright red. Segments 2-3 with transverse carina. Segments 3-9 strongly triangular in cross section. Rising from the bases of the genital ramules are two long branches, standing at right angles to the body.

♀ unknown.

I took two specimens of this insect at Kwala Aring. They differ from the type in having the upper surface of the thorax rich black instead of brown. Otherwise they closely resemble it, especially in the very remarkable genital organs on the second abdominal segment.

\**ORCHITHEMIS PULCHERRIMA* Brauer.

*Orchithemis pulcherrima*, Kirby, Cat. Odonata, p. 42; Karsch, Abh. v. d. Senckenberg. Nat. Gesell. xxv. 1. p. 228.

Singapore (*Ridley*). Malacca (*Selys*).

*DIPLACODES NEBULOSA* (Fabr.).

*Diplacodes nebulosa*, Kirby, Cat. Odonata, p. 42.

A single specimen was taken at Kota Bharu, Kelantan. There are specimens in the British Museum taken by Ridley in Province Wellesley. Widely distributed in the East Indies.

*ACISOMA PANORPOIDES* Ramb.

*Acisoma panorpoides*, Kirby, Cat. Odonata, p. 43.

Kwala Aring. One specimen, ♂. Tropical regions of the Old World.

*TETRATHEMIS HYALINIA* Kirby.

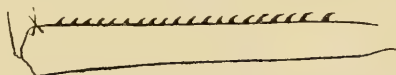
*Tetrathemis hyalinia*, Kirby, Cat. Odonata, p. 44.

The two species of this genus which are represented in our collection exhibit a very remarkable sexual dimorphism which has not, I believe, previously been remarked. The males have a

very extraordinary development of the armature of the second and third pairs of femurs. This development is paralleled in the American genus *Macrothemis* and its allies and also in the Old World genera *Schizonyx*, *Neurocena*, *Zygonyx*, and *Zygonidia*, amongst other *Libellulince* (see Calvert, Pr. Ac. Philad. 1899, p. 246).

*Tetrathemis hyalinia* has in the male, on each of the second pair of femurs, on their antero-inferior surface, 17 short straight spines directed towards the knee, increasing gradually in size, but the last three longer than the rest, more widely separated and increasing rapidly. On the antero-inferior surface of each of the third pair of femurs is a row of some 20 short curved teeth, their apices directed away from the knee, decreasing gradually in size distally; at the end of the series is a single short straight spine directed towards the knee (see text-fig. 10).

Text-fig. 10.



Third femur of *Tetrathemis hyalinia* ( $\times$  about 10).

*TETRATHEMIS PULCHRA*, sp. n. (Plate V. fig. 3.)

Length of abdomen, ♂ 16 mm., ♀ 15 mm. Length of hind wing, ♂ 17 mm., ♀ 17.5 mm.

Wings hyaline, reticulation black. Fore wings tinged with orange from the base about halfway to the nodus. Hind wings tinged with orange about as far as the nodus.

*Fore wings.* 8-9 (usually 8) antenodals, 5 (in one case on one side 6) postnodals; 1 supra-triangular cross nervule; 2 cross nervules in the lower basal cell. Triangle followed by a single row of cells.

*Hind wings.* 6 or 7 (usually 7) antenodals, 5 postnodals; no supra-triangular cross nervule; 2 cross nervules in lower basal cell.

*Coloration in the male.* Face black with yellow marks as follows: lateral lobes of lower lip, nasus, and rhinarium. The vertex and tubercle are metallic coppery black. Back of head and prothorax black.

*Thorax* black above, a few yellow spots between the wings. Sides citron-yellow with two black bands. The first of these runs from immediately in front of the first pair of wings obliquely downwards to between the second and third pair of femurs. The second runs from immediately in front of the second pair of wings down behind the third pair of femurs. The whole ventral surface is black, save that the yellow colour of the flanks extends for a short distance over the ventral surface along either side. The legs are black, inner surface of first pair of femurs citron-yellow.

*Abdomen* black, with the following yellow marks:—a spot on either side of segments 1-6, very small on 6, traversed by a black

line following the transverse carina in 3-4. On segment 7 a dorsal yellow spot divided longitudinally by the black mid-dorsal carina. Traces of a transverse carina are present on segment 5. The abdomen is slightly dilated at its base, but from segment 4 onwards very slender.

*Coloration* in the female as in the male. The traces of a transverse carina in segment 5 are more distinct laterally. The abdomen is broader and of practically equal circumference throughout.

In the male there are on the antero-inferior surface of the femur 17 short curved teeth directed towards the knee, and increasing in size distally very gradually. These are followed by three straight spines inclined in the same direction; the first of these is the shortest and the last the longest.

The third femur is provided on the antero-inferior surface with a row of 23 thorn-like teeth with their apices directed away from the knee. These increase gradually towards the distal end of the femur.

\**NANNOPHYA PYGMÆA* Ramb.

*Nannophya pygmæa*, Kirby, Cat. Odonata, p. 45.

The British Museum has a number of specimens of this species from Singapore.

#### *Genera of uncertain position.*

*NEUROCENA IDA* Hagen. (Plate V. fig. 1.)

*Zygonyx ida*, Hagen, Ver. Ges. Wien, xvii. p. 62; Brauer, op. cit. xviii. p. 370 & p. 742; Selys, Ann. Soc. Ent. Belg. xii. p. 96; id. Ann. & Mag. Nat. Hist. (4) iii. p. 274; id. C. R. Soc. Ent. Belg. xxxv. p. cxxvii.

*Pseudomacromia luxuriosa*, Karsch, Berl. ent. Zeitschr. xxxviii. p. 21.

*Zygonyx ida*, id. Ent. Nachr. xxi. p. 203; Calvert, P. Ac. Philad. 1899, p. 246.

*Neurocena ida*, Kirby, Ann. & Mag. Nat. Hist. (7) v. p. 541.

This appears to be an exceedingly variable species, and the single specimen I obtained differs to a certain extent from those described hitherto, so that it seems worth while to give a fairly full account of it.

The length of the hind wing is 42 mm., of the abdomen 38 mm.

The wings are hyaline, faintly tinged with yellow, which becomes vivid towards the outer extremities of the fore wings. In a male in the British Museum Collection the wings are almost colourless. The reticulation is black.

*Fore wings.* 14 antenodals; on the left side the outermost is continuous, on the right side discontinuous. 7 to 8 postnodals. *Internal triangle of both wings free*, discoidal triangle free. (The internal triangle is usually divided into two or three cells; de Selys states that in two females examined the discoidal triangle



is free, in three females crossed; in males it is normally free.) Two rows of post-triangular cells. Nodal sector strongly waved at its middle. Arculus at the level of the second antenodal. Two cross nervules in the submedian space.

*Hind wings.* 10-11 antenodals, 9-9 postnodals. Discoidal triangle traversed. (According to de Selys the discoidal triangle of the hind wing in the female is normally traversed; of 13 males 7 had it traversed and 6 free.) The triangle is followed by two rows of cells. The British Museum specimen (male) has but one row of post-triangular cells in the hind wings. Pterostigma in the females is about 3.75 mm. long, in the male about 2.25 mm. Sectors of triangles of hind wings widely separated at their origins.

Rhinarium and nasus livid yellow. Frons and vertex metallic blue-green. Thorax metallic blue-green. Abdomen slightly thickened at its base, metallic black with fine transverse yellow lines at the bases of segments 2 and 3 and on the transverse carinae of those segments. A yellow spot on either side of the second segment.

Legs black. In the males on each of the second pair of femurs are a number of short teeth directed towards the knee. On the third pair are 25 short teeth; of these the first eight or nine are directed towards the knee, then follow one or two not inclined, then eleven or twelve directed towards the trochanter, last one or two not inclined. In the females all the teeth on the hinder femurs are directed towards the knee.

#### ZYGONIDIA MALAYANA, sp. n.

Length of abdomen 34.5 mm. Length of hind wing 42 mm. Length of pterostigma 3.75 mm. Breadth of hind wing 13 mm.

Wings hyaline, reticulation black, pterostigma black, membranule brownish grey.

*Fore wings.* 16 antenodals, the last on the right side is discontinuous, that on the left continuous. 9 postnodals. Internal triangle divided into three cells, discoidal triangle crossed by a single nervule and followed by three rows of cells. Nodal sector waved at its middle. Two cross nervules in lower basal cells. Arculus between the level of the first and second antenodal.

*Hind wings.* 10-11 antenodals, 10-11 postnodals. Discoidal triangle traversed, followed by two rows of cells. Sectors of triangle scarcely separate at their origin. Lower basal cell with a single cross nervule.

*Head.* Labrum black, bases of the mandibles bright yellow. Rhinarium dull yellowish brown, nasus black along its ventral margin, for the rest yellow. Genæ yellow. Frons and tubercle metallic violet, but frons yellow at the sides. Tubercle truncate anteriorly, occipital triangle black.

*Prothorax* brown, posterior lobe with a rounded backwardly directed projection at the middle of its posterior margin.

*Thorax* metallic green, marked with dull yellowish brown as follows:—a fine line along the mid-dorsal carina; a lateral band



running from the second and third femora to between the wings. The whole ventral surface is yellowish brown, and this colour extends for a short distance along the humeral suture and on to the sides of the metasternum. Between the wings dorsally are three yellow spots, one behind the other.

*Abdomen* black, very slightly dilated at its base. Yellow lateral spots on segments 1, 2, 3. Base of segments 2, 3, 4 with a fine transverse yellow line; mid-dorsal carina with a scarcely perceptible yellow line from segments 3 to 7. Longitudinal yellow marks ventrally on segments 3, 4, 5 on either side of the middle line. Anal appendages black. Transverse carinae on segments 2, 3. On segment 2 there is on either side anteriorly a small tuft of fine black hairs.

*Legs* black. In the male the second pair of femurs have each a row of 18 antero-inferior short spines directed towards the knee, and increasing in size gradually from above downwards. These are followed after a short gap by three long straight spines which are also directed a little downwards (see text-fig. 11). The third pair of femurs have each 26 antero-inferior short subequal spines all directed towards the knee, save the last six, which are not inclined. Then follow two longer spines inclined towards the knee.

Text-fig. 11.



Second femur of *Zygonidia malayana*.

This species differs from *Zygonyx iris* chiefly in that the discoidal triangle of the lower wing is followed by two rows of cells, not by three; and in the absence of any dorsal markings on segment 7 of the abdomen, in the coloration of the thorax, and length of the pterostigma. It is more closely allied to *Zygonidia insignis* (Kirby, A. M. N. H. (7) v. p. 540), from which it is chiefly distinguished by its smaller size, the fewer reticulations in the postnodal spaces of the hind wings, and in the details of the spines on the second and third pairs of femurs of the male. In *Z. insignis* the second pair of femurs have each a row of 18 antero-inferior spines, followed by three much longer spines. The first 12 are directed towards the knee, the next six are not inclined, the three long spines are slightly inclined towards the knee. The third pair of femurs have each some 24 short spines, the first 14 inclined towards the knee, the last 10 scarcely inclined, followed by two longer spines inclined to the knee.

I caught two specimens of *Zygonidia malayana* at Kwala Aring in September. These, like all the other recorded specimens

belonging either to the genus *Zygonia* or to *Zygonyx*, are both males.

The character of the last antenodal cross nervule seems to be very variable. In one specimen of *Zygonyx iris* it is accidentally complete (de Selys, C. R. Soc. Ent. Belg. xxxv. p. cccxvii). In one of the two known specimens of *Zygonia insignis* it is accidentally incomplete on one side (Kirby, A. M. N. H. (7) v. p. 540). On one side of both specimens described above it is incomplete, on the other complete.

These two preceding species, together with their allies, probably constitute a separate section of the *Libellulinae* approximating somewhat closely to the *Corduliinae*. See Calvert, *loc. cit.*

ONYCHOTHEMIS TESTACEA, sp. n. (Plate V. fig. 2.)

Length of abdomen 33.5 mm. Length of hind wing 40 mm. Length of anal app. of ♂ 2.5. Breadth of hind wing 13.5 mm.

Wings hyaline, reticulation black. Pterostigma 4 mm. long.

*Fore wings.* 15 antenodals, 10–11 postnodals. Internal triangle divided into three cells. Discoidal triangle narrow, with a single cross vein, followed by three rows of cells: no supra-triangular nervule. Nodal sector waved, a single cross nervule in the lower basal space; membranule long, grey. Upper sector of triangle curved. Sectors of arcus stalked.

*Hind wings.* 9–10 antenodals, 11 postnodals. Discoidal triangle free, followed by two rows of cells. Lower basal cell with a single cross nervule. Sectors of triangle originate close together. Nodal sector waved.

*Head.* Ventral surfaces yellow, with a triangular black mark in the centre, its apex directed forwards. Upper lip black, with a reddish-brown spot on either side. Rhinarium and nasus reddish brown, with a black mark along the suture between them. Frons yellow below, steely black above. Frontal tubercle bifid, steely black. Occipital triangle black.

*Prothorax* black, with a yellow hinder margin.

*Thorax* dark metallic green, the mid-dorsal carina and a mid-dorsal line between the wings yellow. Two small orange-yellow spots on the humeral sutures on either side, the one above the other. A thin yellow band runs from immediately behind the front pair of wings downwards to between the second and third pairs of legs on either side. An orange line runs along the outer edge of the metasternum. Ventral surface black.

*Abdomen* broad, slightly dilated at its base. Segments 4 to 8 strongly triangular in section. Testaceous black with dull yellow markings. Mid-dorsal spots on the middle of segments 1 to 8. Segments 2 and 3 with a yellow-marked transverse carina; the yellow mark is discontinuous dorsally in 2, but in 3 runs into the yellow spot. Ventrally each segment from 3 to 8 has two large oblong yellowish spots on either side of the middle line. These spots extend round the lateral keel on to the sides of the abdomen and on segment 7, 8 reach to within a short distance of

the dorsal spots. Segments 9 and 10 black, segment 10 is very small. Upper appendages black, curved slightly inwards and at first downwards, but at their distal ends they turn up a little. About halfway along their ventral sides is a small tooth. Ventral appendage black, rather broad and flat, bifid at its extremity, not more than two-thirds the length of the upper pair.

*Legs* black. On each of the first pair of femurs is a single spine immediately before the knee. In the second pair on each are three long pairs of spines inclined towards the knee and distant from each other. On each of the third pair of femurs are 4 pairs of large spines, rapidly increasing distally, followed after a gap by a single pair. All inclined slightly towards the knee. On the first pair of tibiae are three pairs of long equidistant spines, on the second and third pair of tibiae are four pairs of large spines. (See text-fig. 12.)

Text-fig. 12.



Third leg of *Onychothemis testacea* ( $\times 1\frac{1}{2}$ ).

A single male from Kwala Aring.

This species differs from *Onychothemis abnormalis* (Brauer, Verh. Ges. Wien, xviii. p. 170) in having no transverse carina on the fourth abdominal segment, and in having the claws of the third pairs of legs without any sign of a tooth. I have not been able to examine a specimen of *O. abnormalis*, a Philippine Is. species, but the present species is evidently closely allied to it.

This genus appears to stand quite remote from other Libellulids, not only in the absence of a tooth on the basal claws, but in the remarkable armature of the femurs. The two species of the genus should form an independent subsection of the *Libellulinae*.

#### CORDULIINÆ.

Two members of the subfamily are known to occur in the Peninsula; these are *Macromia westwoodi*, Selys, and *Idionyx yolanda*, Selys. To these can now be added *Macromia gerstaeckeri*, recently described by Krüger from Java (Krüger, Stett. ent. Zeit. 1899, p. 335), and *Idionyx dohrni* (loc. cit. p. 326) from Sumatra.

*MACROMIA GERSTAECKERI* Krüger.

*Macromia gerstaeckeri*, Krüger, Stett. ent. Zeit. 1899, p. 335.

I caught a pair of a species of *Macromia*, which I refer to this

species, at Kwala Aring in September 1899. The male is very young.

	♂.	♀.
Length of abdomen (without appendages).	36 mm.	37.5 mm.
Hind wing .....	32	34
Pterostigma .....	2	2

♂. Antenodal nervures of fore wing 14, postnodal 7, 3. Antenodal nervures of hind wing 11, postnodal 7, 8. Supra-triangular nervures of fore wing 3 or 4, of hind wing 2. Nerves of median space of fore wing 6, of hind wing 4.

The *head* in this specimen is badly shrivelled, and it is difficult to make out the characters for the most part; the yellow 'nasus' is obvious.

*Prothorax* dull brown. *Thorax* iridescent brown, with three yellow lines on each side. The antehumeral band begins at the base of the coxæ of the first pair of legs and runs about halfway up the thorax. The middle line commences behind the middle pair of legs and runs up to behind the front pair of wings, running right across the back to join that of the other side. The hinder stripe runs along the hinder outer margin of the abdomen, starting from behind the last pair of legs. The coxæ of the first pair of legs are yellow, as also the hinder surface of those of the second and third pairs.

The *abdomen* is dull brown; segments 1-3 and 7-10 a little expanded. It has yellow markings as follows:—base of the first segment shading gradually into dull brown at its hinder end; second segment has a yellow ring covering its anterior half; third segment has two very small dorsal spots lying very close together just behind the middle of the segment; seventh segment with a transverse dorsal band taking up the anterior fifth of the segment.

Anal appendages subequal, or the inferior a very little larger than the two upper, about 3 mm. long, as long as the last two segments. The upper pair have each at about two-thirds of their length a small tooth on the outer side.

♀. *Head* and *thorax* as in the male, but the iridescent brown is replaced in the more adult female by rich metallic green. The wings have a number of vague brown marks on their outer halves.

*Abdomen.* Segments 1-6 metallic black, 7-10 dull black. Yellow markings as follows:—second segment a long spot on either side, a transverse line along its anterior margin dorsally, two small dorsal spots at about the middle of the segment; 3 with a line on either side along its lateral anterior margin not reaching the dorsal surface; 7 as in the male, but the yellow mark is broader, covering about one-fourth of the segment.

As Krüger has pointed out (*loc. cit.*), *M. gerstaeckeri* differs from its allies in its smaller size; and in the position of the small second tooth of the superior anal appendages of the male from the



other species possessing this character (*M. cincta* Rambur, *west-woodi* Selys, *borneensis*, *fumata* Krüger), in which the tooth lies at the middle of the length of the appendage.

*IDIONYX DOHRNI* Krüger. (Plate V. fig. 4.)

*Idionyx dohrni*, Krüger, Stett. ent. Zeit. 1899, p. 326.

♀. Length of abdomen 26 mm. Length of hind wing 26·5 mm.; breadth 8·5.

Triangles of all four wings undivided, those of the front wings with their anterior borders somewhat broken near their outer angle. Supra-triangular space crossed by a single nerve in all four wings. Triangles followed by a single row of cells; in the hind wings the nerve bordering the first cell of the row ends against the middle of the outer wall of the triangle, so that the second cell comes into contact with it (*cf.* characters of *I. optata* Selys, in Ann. Mus. Gen. (2) x. p. 472). On the margin of the wings this single row breaks up into 6 cells on the fore, 7 on the hind wings. The median space in the fore wing is traversed by a single nerve; hinder wing with two nerves in the median area.

Sectors of arculus with very long stalk, rising in both front and hind wings almost in the angle made by the arculus and the submedian vein. Wings tinged with brownish yellow, which is darkest at the base.

*Head* brown, with the upper lip dull yellow. Vertex metallic blue. *Thorax* brown-green, with three stripes on each side: the front one is yellow at the base of the front pair of legs, and fades into brown as it passes up along the thorax; the second and third are yellow. The abdomen is very dark brown, fading into black at the end; the ventral edge of all the segments except the first marginal with a fine yellow line, which is broadest on 2-3.

This species differs from all its congeners in having the median space of the lower wing traversed by two nerves. It is also a trifle smaller than the other species.

One female from Kwala Aring taken in September 1899.

I have given the characters of this and the preceding species rather fully because they show some points of variance with the types described by Krüger, and in the case of the first between the male and female.

### Family ÆSCHNIDÆ.

#### Subfamily ÆSCHNINÆ.

##### *ANAX GUTTATUS* (Burm.).

*Anax guttatus*, Kirby, Cat. Odonata, p. 84.

One specimen from Kwala Aring. Widely distributed in the East Indies.

##### *AMPHLESCHNA AMPLA* (Ramb.).

*Amphieschna ampla*, Kirby, Cat. Odonata, p. 93; Karsch, Ent. Nachr. xvii. (1891) no. 18, p. 10.



Two males of this species were taken at the foot of Gunong Inas. The larger specimen had its abdomen 64 mm. long, its hind wings each 62 mm. The upper pair of abdominal appendages measure 6.5 mm. This is a very handsome creature, the rich green and black thorax contrasting with the black yellow-ringed abdomen. Previously recorded from Java and Amboyna.

*TETRACANTHAGYNA PLAGIATA* (Waterh.).

*Tetracanthagyna plagiata*, Kirby, Cat. Odonata, p. 94.

*Gynacantha plagiata*, Karsch, Ent. Nachr. xvii. (1891) no. 18, p. 9.

I caught a female of this splendid species at Kwala Aring, in thick forest. It agrees very closely with the type specimen figured by Waterhouse, from Borneo (Proc. Ent. Soc. Lond. 1877, p. x; Trans. Ent. Soc. Lond. 1878, p. 119, fig. 4), but is somewhat smaller. The length of the hind wing is 69 mm., breadth 22 mm.; length of abdomen 56 mm.; breadth of head 15 mm. Recorded from Borneo and Sumatra.

My specimen has a small supernumerary spine on the right side in addition to the four normal spines on the end of the abdomen.

*GYNACANTHA ROSENBERGII* Brauer.

*Acanthagyna rosenbergii*, Kirby, Cat. Odonata, p. 95.

*Gynacantha rosenbergii*, Karsch, Ent. Nachr. xvii. (1891) no. 18, p. 9; Krüger, Stett. ent. Zeit. 1898, p. 278.

A single male and two females from Kwala Aring. Two other females probably belong to another species, but I have not been able to compare them with a series. They are from the same locality as the rest.

\**JAGORIA PÆCILOPTERA* Karsch.

*Jagoria pæcioptera*, Kirby, Cat. Odonata, p. 91; Krüger, Stett. ent. Zeit. 1898, p. 329.

Recorded by Krüger (*loc. cit.*) from Singapore.

Subfamily GOMPHINÆ.

Apparently only three species of Gomphine Dragonflies have hitherto been recorded from the Peninsula. These are:—

Legion GOMPHUS.

*Microgomphus chelifera* Selys (Mt. Ophir, Sumatra).

*Macrogomphus thoracicus* McLach. (Perak).

Legion LINDENIA.

*Ictinus melanops* Selys (Malacca).

Our collection contains five specimens referable to the following species:—

Legion GOMPHUS.

*Gomphus consobrinus* ♂ ♀, sp. n.

*Onychogomphus geometricus*, var. *nigrescens* n. (Kwala Aring, Kelantan), ♀.

Legion GOMPHOIDES.

*Sieboldius grandis* (♂, Gunong Inas, Perak).

Legion LINDENIA.

*Gomphidia perakensis*, sp. n. (♂, Gunong Inas, Perak).

#### Legion GOMPHUS.

GOMPHUS CONSOBRINUS sp. n. (Plate V. fig. 5.)

Length of abdomen 31 mm. Length of hind wing 26 mm.  
Length of pterostigma 2 mm.

*Fore wing.* No basal subcostal nervule. Sectors of the arculus distinct at their origin, then converging, meeting for a short distance, then diverging<sup>1</sup>. 11 antenodals, 10 postnodals. Pterostigma brownish black, thick. Triangles free.

*Hind wing.* 10 antenodals, 10 postnodals.

Reticulation black, membranule almost entirely absent.

General colour dull bronze-brown, lower surfaces of head and thorax greenish yellow. Dorsal surface of *thorax* dark brown, with two lighter submedian somewhat oblique bands diverging from each other from above downwards, each joining a lighter transverse antehumeral mark so as to make a 7 on either side. Sides of thorax lighter bronze.

*Abdomen* almost black, first segment greenish yellow; sides of second segment, a very fine dorsal longitudinal line on the second segment, and the auricles yellow. Segments 1, 2 somewhat dilated, 3 to 7 thin cylindrical, 8 to 10 dilated and progressively shorter.

Appendages black, upper pair of about the same length as the tenth segment, widely diverging from each other, turned up and pointed at their ends, each with a small tooth on the margin at about half its length. Lower pair diverging, rather shorter than upper pair, each terminating in a laterally directed point.

A male and a female were taken at Kwala Aring. The female had only very recently escaped from the larva and is too much withered to describe.

There seems no doubt that this is a true *Gomphus* belonging to Type A of Selys (Mon. Gomph. p. 376). The occurrence of a member of this group in such a locality is remarkable.

ONYCHOGOMPHUS GEOMETRICUS NIGRESCENS, var. n.

One ♀ from Kwala Aring, Kelantan.

Closely allied to *O. geometricus* de Haan.

Head, prothorax, and thorax as in *O. geometricus*.

Posterior surface of first pair of femurs yellow.

*Abdomen* black, marked with yellow as follows:—a dorsal band on the first and second segments, decreasing in size from before backwards, the sides of these segments are yellow. The auricles

<sup>1</sup> This feature is not shown in the figure.

are scarcely visible. Segments 3-7 have an incomplete basal orange ring, occupying in segment 3 about one-fourth of the segment, in 4-6 not more than one-sixth, and in 7 not more than two-fifths of the segment. Remaining three segments black, decreasing successively in size; anal appendages pointed, larger than the tenth segment, yellow.

Differs from the typical race in the smaller extent of the yellow marks on the abdomen. The yellow lozenge-shaped dorsal spot on segment 3 is present, that on 4 is scarcely visible. The great length of the first two cells between the sectors of the arculus is remarkable. The cross nervule enclosing the third cell is beyond the level of origin of the principal sector.

### Legion LINDENIA.

#### GOMPHIDIA PERAKENSIS, sp. n. (Plate VI. figs. 1, 2.)

Total length .....	78 mm.
Length of abdomen (without appendages) .....	54 "
Breadth of head.....	12.5 "
Length of hind wing.....	54 "
" " fore wing .....	54 "
" " pterostigma .....	8 "
Breadth of hind wing .....	14 "
Length of upper anal appendage...	4 "

Colour black with saffron-yellow markings; wings hyaline, reticulation black.

*Fore wing.* 22-23 antenodals, 17-18 postnodals. Internal triangle divided into three cells; discoidal triangle into four. Membranule small, dark brown. Pterostigma long, black.

*Hind wing.* 15-16 antenodals, 20-21 postnodals. Internal triangle divided into three cells; discoidal triangle into four.

*Head.* Labium, mandibles, and labrum black; gena black, with a dull yellow spot. Rhinarium saffron-yellow; nasus black, with a saffron-yellow spot on either side. Anterior surface of frons black, horizontal surface yellow. Vertex and occiput black. The vertex has two conical projections, one on either side as in *G. T-nigrum*, but not so large relatively. *Prothorax* black.

*Thorax* black, with the following saffron-yellow marks:—In front dorsally a semicircle broken by the mid-dorsal carina. From the outer ends of the semicircle, but separated widely from them, a short broad band runs on either side to the ante-alar sinus, inclining towards the middle lines. Behind these on either side is a small spot, just below the sinus and immediately in front of the first pair of wings. Laterally are two large bands widely separated. The first pair run obliquely forward from below the first pair of wings; the second pair are rather smaller, and run obliquely forward from below the second pair of wings: neither pair reaches the ventral surface.

Dorsally between the wings there are brown marks and a

citron-yellow spot between the first pair of wings. Ventral surfaces and legs rich black. The legs are robust, rather short; hindmost pair of femurs with stout spines.

*Abdomen* somewhat dilated at its base, then segments 3 to 6 long and cylindrical, segments 7 to 9 compressed laterally, 10 very short. Black, with yellowish marks as follows:—on segment 2 a lateral spot, the auricles, and a very small dorsal lozenge-shaped mark. Segment 3 has a trace of a yellow spot on either side and a very fine mid-dorsal line. The basal third of segment 7 with a large dorsal mark. Anal appendages black, resembling those of *G. T-nigrum* very closely.

Coloration generally remarkably similar to that of a specimen marked *Macrogomphus quadratus* in the British Museum.

A single male from forests at the foot of Gunong Inas. This fine species differs from other members of the genus *Gomphidia* in having its wings of equal length with the abdomen. It appears, moreover, to be the largest known member of the legion *Lindenia*. The internal nervule of the pterostigma can hardly be said to be prolonged, but this character is scarcely of sufficient importance to justify the removal of this species from the genus *Gomphidia*. The form of the anal appendages and the absence of any leaf-like dilatation of the sides of segments 7 or 8, as well as the shape of the vertex, indicate that it must be referred to this genus, of which it may form a new section.

#### Legion GOMPHOIDES.

SIEBOLDIUS GRANDIS Krüger. (Plate VI. figs. 3, 3a, 4.)

*Sieboldius grandis*, Krüger, Stett. ent. Zeit. 1898, p. 311.

I refer to Krüger's species a fine male, which agrees in size, wing-characters, and coloration fairly closely with the females described by him from Sumatra.

Total length .....	83 mm.
Length of abdomen (without appendages) .....	59 "
Length of appendages (upper pair) .....	2 "
Fore wing, length .....	55 "
"      breadth .....	12 "
Hind wing, length.....	52 "
"      breadth .....	15 "
Pterostigma .....	5.5 "
Femur of last pair of legs.....	20 "
Tibia      "      " .....	14 "
Breadth of head.....	11 "

Antenodal cells of fore wing 22–23, postnodal 18–19; of hind wing 16–17 and 17 respectively. Pterostigma lies over six cells. Basal subcostal nerve present in all wings. Triangles of all four wings with one cross nervure. The middle thirds of all the wings



have, when looked at obliquely, a very faint whitish "smoky" appearance.

*Head* small, black save for a yellow transverse band on the 'frons' before the eyes, stopping abruptly at its anterior edge. Eyes distant. Occiput with the two convexities at its hinder margin more pronounced than in *S. japonicus*.

*Prothorax* black; at its hinder margin a transverse yellow band tapering laterally. In front of this is a yellow spot.

The colouring of the *thorax* is just as described by Krüger for the female. On the upperside a yellow band runs from the front margin up to the yellow marking in between the wings; this band is twice as broad in front end as it is at its hinder end. On either side are two fairly broad yellow oblique bands.

The *abdomen* is ringed with black and yellow; the first segment is yellow with a black mark on either side. These black marks are continued on to the second segment, in which they run a little obliquely up to the dorsal surface, meeting at the hinder end of the segment; a fine black ring runs round its posterior margin. This segment is black below, and the auricles are tipped with black continuous with the lateral stripes. The yellow ring of segments 3-8 occupies the following portion of each segment: the front two-fifths of 3, the front one-third of 4, 5, one-fourth of 6, 7, two-fifths of 8; 9 and 10 are entirely black. There is a very fine mid-dorsal black line in 3; this is present, increasing in breadth as one passes back from 4-7, but absent in 8. The appendages of the tenth segment agree very closely with those figured by de Selys for *S. japonicus* (Selys, Mon. Gomph. pl. xiii. fig. 3 b). The upper pair are rather shorter than the tenth segment, slightly ciliated except at their end, which is sharply pointed and curved upwards; they carry two teeth on their lower side, one at about a third of their length rather blunt, directed downwards and a little outwards, the other at the end of the second third, sharper and curved backwards. The lower pair about half the length of the upper pair, thick and blunt.

The femurs of each leg have a number of short prickly spines on their outer lateral face; the hinder pair have a few delicate hairs on their upper surface. All have short tooth-like spines in regular rows along their lower sides.

A single specimen (♂) was caught at the foot of Gunong Inas (about 1000 feet above sea-level) near a small jungle-pool, in January 1900.

### Family CALOPTERYGIDÆ.

#### Subfamily CALOPTERYGINÆ.

The following is a list of the Calopterygines mentioned in Kirby's Catalogue or elsewhere as known to occur in the Malay Peninsula up to 1890:—

*Neurobasis chinensis* Linn.

*Vestalis amœna* Hagen.



- Euphæa impar* Selys.  
 „ *ochracea* Selys.  
*Dysphæa limbata* Selys.  
*Devadetta argyroides* Selys.  
*Rhinocypha fenestrella* Selys.  
 „ *biforata* Selys.  
 „ *petiolata* Selys.  
*Micromerus aurantiacus* Selys.  
 „ *stigmatizans* Selys.  
 „ *hyalinus* Selys.

Since that date Dohrn has added the following to the list:—

- Micromerus lineatus* Selys.  
 „ *signatus* Krüger.

Our collection contains examples of the species enumerated below:—

- \**Echo modesta* ♀, sp. n.  
 \**Climacobasis lugens* ♂, sp. n.  
*Neurobasis chinensis* ♂ ♀.  
*Vestalis amœna* ♂ ♀.  
*Euphæa impar* ♂.  
 „ *ochracea* ♂ ♀.  
*Dysphæa limbata* ♂.  
*Rhinocypha fenestrella* ♂ ♀.  
 „ *biforata* ♂ ♀.  
 \* „ *inas* ♂ ♀, sp. n.  
 \* „ *karschi* ♂.  
 \**Micromerus affinis* ♂ ♀, sp. n.

[Species marked \* are new to the Peninsula.]

#### Legion CALOPTERYX.

ECHO MODESTA, sp. n. (Plate V. fig. 6.)

1 ♀, Kwala Aring.

Abdomen, length 41 mm. Hind wing, length 37·5 mm.

Fore wing with 33–36 antenodals, circ. 45 postnodals: hind wing, 32 antenodals and circ. 40 postnodals. Basal area with 9–10 cross nerves in fore wing, 8–9 in hind wing. Quadrilateral with 9–10 cross nerves in fore wing, 7 in hind wing.

*Head.* Mouth-parts black; antennæ black, second joint long and thick, third joint longer but much thinner. Rhinarium black, nasus bright metallic green, rest of the head very dark bronze-green.

*Prothorax* dark bronze-green. Thorax the same colour, rather brighter at the sides; underparts brown; legs of the same colour, but the femurs have some irregular black marks on their upper sides; hairs very long and numerous.

Wings hyaline, with a faint brownish tinge at their outer extremities. Pterostigma rather longer than broad, pale brown,

lying over 4-6 cells. Behind the pterostigma are first two rows of cells, then, after about five cells, only one row.

*Abdomen* dark brown, with a green iridescence in some lights on the first three and last three segments. Tenth segment very short, not half as long as the ninth, ninth longer than the eighth. Appendages shorter than the tenth, black, conical, and sharply pointed.

This species differs from *E. uniformis* Selys (? = *E. tricolor* Krüger) in having a smaller number of postnodal cells (it possesses 45 as against 60-65), in its rather smaller size, and in the colouring of the wings, which are described by Krüger as being in the female yellow all over, especially at the base and anterior margin, whereas in *E. modesta* the base of the wings is perfectly transparent (Krüger, Stett. ent. Zeit. 1893, p. 72; Selys, Bull. Ac. Belg. (2) xlvii. p. 357, id. Ann. Soc. Ent. Belg.).

There is a female in the British Museum from Mr. Ridley, collected in Penang, belonging to this species. It has 37 antenodals and 48 postnodals in the fore wings. Its abdomen is of a dull dark red-brown colour.

#### CLIMACOBASIS, gen. nov.

Basal area of wings reticulated. Pterostigma long; quadrilateral long, rectangular; arculus bent, sectors starting at the same point just below its middle. Principal and subnodal sectors rise at about the same level from the reticulum, between the upper sector of the arculus and the median nerve.

The nervule closing the lower basal cell runs from the lower sector of the arculus straight down to the lower extremity of the lower basal cell.

#### CLIMACOBASIS LUGENS, sp. n. (Plate VI. fig. 5.)

(Last three segments of the abdomen missing.)

Length of abdomen (segments 1-7) 42 mm. Length of hind wing 47 mm. Breadth of hind wing 10 mm.

Fore wing with 37 antenodals, 45 postnodal nerves. Pterostigma covering 8-9 cells, about 2.5 mm. in length, very black. Basal area with 8 cross nerves.

*Hind wing.* 34 antenodals, 37 postnodals. Pterostigma as in fore wing, basal area with 8 cross nerves.

*Head.* Lower lip, base of the mandibles, and upper lip black. Between the eyes, running forward as far as the epistome, is a remarkable square milky-white patch of considerable size, taking up in fact the greater part of the vertex. Along its hinder margin it is notched in the middle by the anterior ocellus, which is surrounded by a very small black ring which is continuous with a rectangular black patch, in which lie the two posterior ocelli; the rest of the head is of a very dark bronze-green colour.

*Prothorax* dark green, almost black.

*Thorax.* Dark metallic green above, with all the sutures and

the interalar space black; under surface and legs sooty black with long hairs. Wings hyaline. Legs brownish black, with very long hairs.

*Abdomen* (first 7 segments only) dull brownish black.

There can be, I think, no doubt that this species has as its nearest known ally *Archineura*. I believe, however, the differences between them are of generic rank, the chief of these being the much smaller number of accessory nervures running to the hinder margin of the wings, the mode of origin of the principal and subnodal sectors, and the character of the nerve running to the lower basal cell.

The only specimen taken has unfortunately been rather badly knocked about and has lost the last segments of the abdomen. It was caught in September in jungle at Kwala Aring. Its habits were similar to those of *Vestalis amena*, for which at first I mistook it.

Foerster, in discussing the affinities of the genus *Matronoides*, has proposed the following arrangement of the genera belonging to the legion *Calopteryx* (Foerster, Ann. Soc. Ent. Belg. p. 66, 1899):—

Basilar space free.....	{	No pterostigma .....	{	<i>Sylphis.</i> <i>Calopteryx.</i> <i>Phaon.</i> <i>Vestalis.</i>
		Pterostigma present ...	{	<i>Umma.</i> <i>Sapho.</i> <i>Mnais.</i> <i>Psolodesmus.</i>
Basilar space with cross nervules.	{	No pterostigma .....	<i>Neurobasis.</i>	{ <i>Matrona.</i> <i>Matronoides.</i> <i>Neurobasis.</i>
		A pterostigma present.	{ <i>Echo.</i> <i>Archineura.</i>	

If this grouping be accepted, and it is very convenient, the last division may now stand as follows:—

Pterostigma present.	{	Short rhomboidal pterostigma...	<i>Echo.</i>
		Pterostigma at least three times as long as broad.	{ <i>Archineura.</i> <i>Climacobasis.</i>

#### NEUROBASIS CHINENSIS (Linn.).

*Neurobasis chinensis*, Kirby, Cat. Odonata, p. 102; Selys, Odon. de Sumatra, Ann. Mus. Genova (2) vii. p. 189; Selys, Odon. de Birmanie, loc. cit. (2) x. 1890-1, p. 487; Selys, *Neurobasis chinensis* et ses races locales, Ann. Soc. Ent. Belg. 1896; Karsch, Ent. Nachr. xvii. no. 16, p. 243.

Five males, three females, from the Aring River in Kelantan.

This species appears to travel further down the rivers than any other *Calopterygine*, at least so far as my observations went. It is very widely spread in Tropical Asia.

VESTALIS AMÆNA Hagen.

*Vestalis amæna*, Kirby, Cat. Odonata, p. 103; Karsch, Ent. Nachr. xvii. 1891, no. 16, p. 242; Krüger, Stett. ent. Zeit. 1898, p. 75.

Several males and females from Kwala Aring and from the foot of Gunong Inas.

This species occurs also in Borneo, Java, and Sumatra.

*Note*.—Two females from Kwala Aring differ rather markedly from the rest of our specimens. The general colour of the body is dark bronze-green rather than emerald-green of the other specimens. Further, the wings have a distinct brownish tinge. In respect to the markings on the head, the yellow is brighter than in the other specimen. One male shows a tendency to have the wings tinged and is also of a more bronze-green shade than the other males. These three specimens are perhaps much more adult than the others.

Legion EUPHÆA.

Genus EUPHÆA Ramb.

*Euphæa* Ramb. Ins. Névr. p. 228 (1842); Selys, Syn. Cat., Bull. Ac. Belg. 1853, p. 50; id. Mon. Cal., l. c. 1854, p. 167.

*Pseudophæa* Kirby, Cat. Odonata, p. 109.

*Euphæa* Selys, Ann. Soc. Ent. Belg. p. 338 (1891).

EUPHÆA IMPAR Selys.

*Pseudophæa impar*, Kirby, Cat. Odonata, p. 109.

Four males from the Aring River above Kwala Aring.

This species differs greatly from the following, not merely in the colouring of the wing but also in the wings being much broader proportionately and with very rounded tips.

EUPHÆA OCHRACEA Selys.

*Pseudophæa ochracea*, Kirby, Cat. Odonata, p. 109.

*Euphæa ochracea*, Selys, Ann. Mus. Genova, (2) x. p. 489.

Four ♂, one ♀: two males from the Aring River in Kelantan, the other three individuals from the Selama River at the foot of Gunong Inas.

The male is a very beautiful insect, and when alive his wings seem to be almost crimson in colour as he hovers over the surface of the stream. The wings of the female specimen have hardly a trace of yellow tinge (*cf.* Selys, *loc. cit.*), and the pterostigma is brown, those of the wings of the male being rich velvety black. The rich red markings of the thorax of the male are dull brown in the female, and the whole body is duller.

Length of abdomen without	♂.	♀.
appendages .....	36 mm.	30 mm.
Length of hind wing .....	29 "	29 "
" fore wing .....	31 "	30.5 "

Known also from Burmah and Borneo.

*DYSPHÆA LIMBATA* Selys.

*Dysphæa limbata*, Kirby, Cat. Odonata, p. 110.

Seven males from the Aring River some way above Kwala Aring. Known also from Borneo.

This species is regarded by Selys as a local race of *D. dimidiata* Selys, described from Borneo. In all my specimens the black mark at the base of the fore wing extends just beyond the level of the nodus and its margin is straight, at right angles to the anterior margin of the wing. On the hinder wing the black basal mark reaches halfway between the nodus and pterostigma and its outer margin slopes inwards a little.

Selys has remarked on the scarcity of the females of this group (Bull. Ac. Belg. (2) xxxv. p. 487). From my own experience I am sure that this scarcity in collections is not due to their being overlooked by collectors. I can safely say that I never saw a female of this species or of *Euphæa impar*, whilst the males were at times abundant.

## Legion LIBELLAGO.

*RHINOCYPHA FENESTRELLA* Ramb.

*Rhinocypha fenestrella*, Kirby, Cat. Odonata, p. 113; Selys, Ann. Mus. Genov. (2) p. 491 (1891).

This species, which is closely allied to *R. quadrimaculata* of India and *R. spuria* of the Khasia Hills, ranges from Burmah as far south as Penang. It is fairly common on the Kelantan River, and Mr. Evans took some specimens in Patalung. There are two specimens in the British Museum from Province Wellesley, taken by Mr. Ridley.

*RHINOCYPHA BIFORATA* Selys.

*Rhinocypha biforata*, Kirby, Cat. Odonata, p. 113.

This species occurs rather more abundantly than the last on the Kelantan River. I also found it fairly common near the foot of Gunong Inas.

*RHINOCYPHA INAS*, sp. n. (Plate VI. fig. 6.)

Length of abdomen ♂ 19 mm. Length of hind wing ♂ 23 mm.  
Length of abdomen ♀ 18 mm. Length of hind wing ♀ 24 mm.

♂. Black. *Head* with five yellow spots, two in front on either side of the ocelli, three in a transverse row behind these, the median spot transversely elongated.

*Prothorax* with two small anterior and two larger lateral blue marks. Posterior lobe orange with black margin.

*Thorax* with a short blue mesothoracic triangle rose-colour, on either side of this lies a blue triangular humeral mark not extending higher than the apex of the mesothoracic triangle. Sides of thorax blue with two black marks on either side, the anterior running from below the first pair of wings does not extend all the way down to the legs. The second stripe, which is



broader above, runs from below the hinder pair of wings to behind the third pair of legs. The blue sides are margined postero-ventrally with a black line. Lower surface black, with two broad blue marks behind the legs.

*Abdomen* black. Segments 1-9 with triangular blue spots on either side, their bases resting on the hinder margin of each segment. Those in 2-3 extend the whole length of their segments, that in 4 for half the length of that segment, the rest are small.

*Anal appendages* black. Legs black. The two hinder pairs of femurs and tibiae are white on their inner surface.

*Wings* tinged with yellow, blackish in the costal area from the fifth postnodal cross nerve; from about three-fifths the distance between the nodus and the black pterostigma the apical portion of the fore wing is purplish brown to the tip, except along its lower margin, where it is dusky grey shot with iridescent green. The purple mark commences suddenly and its inner margin slopes outwards from in front.

The outer half of the lower wing is also marked with brownish purple, the extreme apex and the posterior margin excepted, these are greyish brown. The inner border of the purple mark is straight, and the mark is crossed by two rows of iridescent hyaline spots. The inner row consists of three spots. The upper of these, consisting of one row of cells, lies above the nodal sector; the second, consisting first of one and later of two rows, lies between the subnodal and median sector; and the third, above the upper sector of the triangle, consists of a single row of cells. The upper spot is nearest to the base of the wings, the lowest is furthest from the base.

The first row lies at a level of about half of the distance between the nodus and pterostigma. The second row consists also of three spots. The upper is the largest and its distal end just overlaps the pterostigma. It consists of two, followed by three or four rows of cells, and is placed in series with the upper spot of the first row. The lowest spot of the outer series is placed serially with the middle spot of the inner series, whilst the middle spot of the outer series, consisting of a single row of cells, lies between the two others.

There is also a hyaline spot just at the middle of the hind wing consisting of a single row of cells, this impinges on the inner margin of the brown spot.

♀. *Head* as in the male, with the following additional marks yellow:—four spots on the dorsal surface of the 'snout' and the second joint of the antennæ, the upper half of the epistome. The genæ are marked with greenish blue in the male and yellow in the female. Prothorax black, with lateral yellow and a fine mid-dorsal yellow spot.

*Thorax* black, mesothoracic carina orange; a fine orange line running to the base of the first pair of wings between the carina and the humeral suture on either side, this latter is also yellow;

under surface yellow, the yellow extends for a short way on to the sides. *Abdomen* black, mid-dorsal carina orange, a yellow spot on either side of first segment. Segments 2-4 have on either side a yellow line followed by a yellow dot. Wings hyaline.

Antenodals 11-14.

This species is closely allied to *R. perforata*, but differs from that species and its other allies in the greater extent of the purple mark on the fore wings of the male. The marks of the hind wing resemble most closely those of *R. whiteheadi* Kirby.

Seven males, four females, Gunong Inas.

*RHINOCYPHA KARSCHI* Krüger, Stett. ent. Zeit. 1898, p. 33.

Three males from the Aring River near Kwala Aring.

Abdomen, length without appendages ..... 14.15 mm.

Hind wings ..... 20 „

A single row of postcostal cells. Fore wings yellowish hyaline, hind wings with a blackish-brown mark covering their outer extremities starting about halfway between the nodus and pterostigma, its inner margin convex. No vitreous spots on the wings. The abdomen has on its dorsal side a brick-red spot on segments 2-6; that on segment 2 is small and oval, from 3-6 the spots are large and rectangular, the sides of the rectangle are longer than the ends. On segment 7 are two long red lines divided by a fine mid-dorsal black line, and on segment 8 two very small red spots similarly divided. In one case the spot on segment 6 is also divided by a black line. The sides of segments 1-8 have each a yellow comma-shaped mark.

Krüger points out that this species belongs to a group intermediate in character between *R. heterostigma* and *R. tincta* of de Selys. Described by Krüger from specimens from Sumatra.

*MICROMERUS AFFINIS*, sp. n. (Plate VI. fig. 7.)

Two males, one female, Kwala Aring.

♂. *Head* black, rhinarium dark metallic blue. A small reddish-yellow spot on either side of the ocelli, behind these three others of the same colour, viz. a transversely elongated median spot on the top of the occiput and two lateral spots.

*Prothorax* black, with two small lateral spots, two anterior dorsal spots, and a single posterior dorsal spot of the same yellow colour as the head-spots. There is also a fine yellow line running along the dorsal posterior margin, ending laterally in a spot of the same colour just above the base of the first pair of legs.

*Thorax* black, a small antehumeral stripe on either side not reaching to the top of the mesothorax, and a fine line on the upper half of the humeral suture also yellow. At the sides are two large oblique yellow bars; the anterior of these is divided into two halves by a black mark projecting into it from its hinder

margin. In the upper half is a large black spot, and at the bottom of the lower half is a smaller spot also black.

*Wings* hyaline. Outer two-sevenths of fore wings (which are without pterostigma) opaque dark brown. Five antenodals (six in one case). Lower wings with a slight brownish opacity at the margin. Postnodals 11-13.

Length of hind wing 17 mm.

*Abdomen* black, with the following yellow marks:—On segments 2-6 a dorsal spot divided longitudinally into two by the mid-dorsal black carina. On segments 4-5 these marks have an anterior lateral prolongation, giving them the appearance of two figure 7's lying back to back; in segment 6 the lower limb of the 7, so to speak, has disappeared, leaving merely two anterior marginal lines. A large lateral spot on segment 1. On either side of segments 2-3 are two spots in the form of a '!', the 'dash' being anterior. On 4-5 only the 'dash' is present and is very small on 5. Anal appendages black, upper pair two-thirds length of the 9th segment.

♀. *Head* as in the male, with black less velvety, yellow marks lighter, and the following additional yellow markings:—Basal parts of lower lip and of labrum, epistome with a yellow spot on either side. Frons with four spots arranged in the form of a square, the anterior pair larger than the posterior. Genal region yellow.

*Prothorax* and *thorax* as in the male, but the thorax has a median dorsal yellow stripe. *Abdomen* dull black, with a fine mid-dorsal yellowish line on each segment, not continuous at the margins from segments 2-9. In 9 it occupies only the posterior half of the segment. Segments 1-9 each with a conspicuous lateral yellow mark running nearly the whole length of the segment, narrowest at the middle except in 9, where it is reduced to a spot at the hind end of the segment, which is larger than the eighth, as large as the seventh. Tenth very small. Length of abdomen 13 mm.

*Wings* hyaline, pterostigmata pale brown. Length of hind wing 19 mm.

Differs from *M. semiopacus* in having the apex of the hinder wing opaque, in the possession of markings on the head, and in the spots on segment 6 of the abdomen. The brown mark of the front wings is also rather less extensive,  $5\frac{1}{4}$  mm.; 6 in *M. semiopacus*. From *M. martinae* Karsch it differs in having only three yellow spots at the back of the head, in the markings at the sides of the thorax, and in having the dorsal abdominal markings broader in front; also in the rather smaller number of antenodal nerves on the fore wing.

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*Description of a new Species of the Genus Lestes.*

LESTES RIDLEYI, sp. n.

♂. Length of abdomen (without appendages) 48 mm., of hind wing 31 mm., pterostigma 2.75 to 3 mm.

General colour dull bronze-green. *Wings* hyaline, iridescent, slightly tinged with brown at the tip. Two supplementary sectors between the subnodal and median sector, 18-19 post-nodals. The nodal sector begins in the seventh cell after the nodus in the fore wings, and in the sixth in the hind wings. Reticulation and pterostigma black.

*Head.* Lower lip dull yellowish brown, upper lip brown, rest of the upper part of the head bronze-coloured.

*Prothorax* dull brown, with a small bronze transverse mark along its posterior margin, which is not indented.

*Thorax.* Upper surface dark bronze-green, with an obscure paler line following the humeral suture. Sides and lower surface yellowish brown.

*Abdomen.* First segment yellowish brown. The segments 2-7 have a roughened dorsal surface, which is brown-green with a fine yellowish-green basal ring; ventral surface bluish green, the bronze extends laterally; segments 8-10 smooth, bluish, pruinose. Anal appendages lost, but, if I remember rightly, these were also of a bluish colour.

The male was taken in the same locality as the specimen of *Pericnemis*, at the foot of Gunong Inas. There is stated to be a female belonging to the same species, which I have not examined, in the British Museum collection, taken by Mr. Ridley in Singapore.

*L. ridleyi* is closely allied to *L. orientalis* Hagen, from Ceylon, and *L. udeana* Krüger, from Sumatra. It is sufficiently distinguished from both by its size, being intermediate in this respect.

## EXPLANATION OF THE PLATES.

## PLATE V.

- Fig. 1. *Neurocena ida* ♀, p. 72.
2. *Onychothemis testacea* ♂, p. 75.
3. *Tetrathemis pulchra* ♂, p. 71.
4. *Idionyx dohrni* ♀, p. 78.
5. *Gomphus consobrinus* ♂, p. 80.
6. *Echo modesta* ♀, p. 84.

## PLATE VI.

- Fig. 1. *Gomphidia perakensis* ♂, p. 81.
2. End of abdomen of ditto.
3. *Sieboldius grandis* ♂, p. 82.
- 3a. End of abdomen of ditto.
4. Side view of thorax of ditto ( $\times 1\frac{1}{2}$ ).
5. *Climacobasis lugens*, fore wing, p. 85.
6. *Rhinocypha inas* ♂, p. 88.
7. *Micromerus affinis* ♂ ( $\times 1\frac{1}{2}$ ), p. 90.