

This article was downloaded by: [Monash University Library]  
On: 07 January 2015, At: 16:15  
Publisher: Taylor & Francis  
Informa Ltd Registered in England and Wales Registered Number:  
1072954 Registered office: Mortimer House, 37-41 Mortimer  
Street, London W1T 3JH, UK



## Annals and Magazine of Natural History: Series 9

Publication details, including  
instructions for authors and  
subscription information:

<http://www.tandfonline.com/loi/tnah15>

### II.—Odonata collected in New Caledonia by the late Mr. Paul D. Montague

Herbert Campion

Published online: 02 Sep 2009.

To cite this article: Herbert Campion (1921) II.—Odonata collected in New Caledonia by the late Mr. Paul D. Montague , Annals and Magazine of Natural History: Series 9, 8:43, 33-67, DOI: [10.1080/00222932108632558](https://doi.org/10.1080/00222932108632558)

To link to this article: <http://dx.doi.org/10.1080/00222932108632558>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified

with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

Terms & Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

- Fig. 3. *Parallelia diffusa*, sp. n., ♂.  
 Fig. 4. *Attatha barlowi*, sp. n., ♂.  
 Fig. 5. *Safia hyalina*, sp. n., ♂.  
 Fig. 6. *Zale plumbimargo*, sp. n., ♀.  
 Fig. 7. *Elæodes barnsi*, sp. n., ♂.

PLATE IV.

- Fig. 1. *Plusia ænescens*, sp. n., ♂.  
 Fig. 2. — *rubriflabellata*, sp. n., ♂.  
 Fig. 3. *Hulodes hilaris*, sp. n., ♂.  
 Fig. 4. *Platyja retrahens*, sp. n., ♀.  
 Fig. 5. *Batracharta nigrilogata*, sp. n., ♂.

PLATE V.

- Fig. 1. *Blosyris arpi*, sp. n., ♀.  
 Fig. 2. *Serrodus curvilinea*, sp. n., ♂.  
 Fig. 3. — — —, ♀.  
 Fig. 4. *Rhesalides keiensis*, sp. n., ♀.

PLATE VI.

- Fig. 1. *Arcte papuensis*, Warr.  
 Fig. 2. *Cocytodes cærulea*, Gn.  
 Fig. 3. — *maura*, Holl.  
 Fig. 4. *Achæa ablunaris*, Gn.

PLATE VII.

- Fig. 1. *Minophisma delunaris*, Gn.  
 Fig. 2. *Parallelia conjunctura*, Walk.  
 Fig. 3. — *diffusa*, sp. n.  
 Fig. 4. — *humilis*, Holl.  
 Fig. 5. — *isotima*, Prout.

---

II.—*Odonata collected in New Caledonia by the late  
 Mr. Paul D. Montague.* By HERBERT CAMPION.

[Plates VIII. & IX.]

DESCRIPTIONS of a few of the Dragonflies occurring in New Caledonia and the adjacent Loyalty Islands may be found scattered through the writings of Father Montrouzier (1864), Brauer (1865), De Selys (1871, 1877, and 1885), and McLachlan (1886). In 1915 a special paper on "Libellen (Odonata) von Neu-Caledonien und den Loyalty-Inseln" was published by Dr. F. Ris in 'Sarasin and Roux, Nova Caledonia,' Zool. ii. The collection upon which that paper was based contained 14 species, 5 of which were brought forward as new, whilst 6 more species known to

*Ann. & Mag. N. Hist.* Ser. 9. Vol. viii. 3

occur there were enumerated, although not represented in the collection. *Argiolestes rouxi*, Ris, however, may be synonymous with a species previously described by Montrouzier, while *Rhyothemis graphiptera*, Ramb., has been evidently overlooked (Martin, Mém. Soc. Zool. France, xiv. p. 221, 1901; Ris, Coll. Selys, Libell. p. 934, 1913). The occurrence of *Tramea loewii*, Brauer, doubtfully recorded by De Selys (Mitt. Mus. Dresden, iii. p. 293, 1878), stands in need of verification.

In 1914 large collections of insects were made in New Caledonia by the late Mr. Paul D. Montague, and were subsequently presented to the British Museum (Natural History) by the mother of the collector. These include 18 species of Dragonflies, of which 5 appear to be undescribed. The most important are the representatives of the subfamily Corduliinæ, in which group we find not only the long-lost *Synthemis miranda*, Selys, but three new species of the same genus as well, besides the unexpected occurrence of a new *Metaphya*.

Among the Agrionidæ, the material of *Isosticta* is of the greatest interest, as, in addition to yielding another new species, it completes our knowledge of the two older but imperfectly-known ones.

Of the 26 species definitely known to inhabit New Caledonia, 12 appear to be endemic to that island or the Loyalty group. These are :—

- Argiolestes sarasini*, Ris.
- *ochraceus*, Montrouzier.
- *uniseriæ*, Ris.
- Trineuragrion percostale*, Ris.
- Isosticta spinipes*, Selys.
- *robustior*, Ris.
- *tillyardi*, sp. n.
- Synthemis miranda*, Selys.
- *montaguei*, sp. n.
- *flexicauda*, sp. n.
- *fenella*, sp. n.
- Metaphya elongata*, sp. n.

Of the remaining 14 species, three are both common and peculiar to New Caledonia (with the Loyalty Islands) and the New Hebrides, namely, *Agriocnemis exsudans*, Selys, *Hemicordulia fidelis*, McLach., and *Rhyothemis phyllis apicalis*, Kirby.

The presence of *Synthemini* provides a link with the

fauna of Fiji, which is the only other island in the Pacific whence any member of the tribe has been recorded. At the same time, *Anaciæschna jaspidea*, Burm., and *Diplacodes trivialis*, Ramb., both of which are well known in Fiji, have never been met with in New Caledonia, although they might have been expected to occur there.

In addition to New Caledonia, *Hemicordulia oceanica*, Selys, has been recorded from Tahiti, the Tonga Islands, and doubtfully from New Britain.

*Ischnura heterosticta*, Burm., *Diplacodes bipunctata*, Brauer, and *D. hematodes*, Burm., are essentially Australian and Pacific forms.

*Orthetrum caledonicum*, Brauer, *Agrionoptera insignis allogenes*, Tillyard, and *Rhyothemis graphiptera*, Ramb., are found elsewhere on the Australian continent or in adjacent islands, while *Æschna brevistyla*, Ramb., is common to New Caledonia, Australia, and New Zealand.

*Ischnura aurora*, Brauer, ranges from Ceylon to Tahiti, and *Tramea limbata*, Desj., in its various forms, from Senegal to Samoa. Finally, *Pantala flavescens*, Fabr., has a world-wide distribution.

### Family Agrionidæ.

#### Subfamily MEGAPODAGRIONINÆ.

##### *Argiolestes sarasini*, Ris.

1 ♂, Mt. Nekando, 29. iii. 14; 1 ♀, Mt. Nekando, 27. v. 14; 1 ♂, Houailou R., 3-15. xi. 14.

Length of abdomen:—♂, 41 (Mt. Nekando) to 43 mm. (Houailou R.); ♀, 34 mm.

Length of hind wing:—♂, 34.5 (Houailou R.) to 35 mm. (Mt. Nekando); ♀, 31 mm.

All these specimens are considerably smaller than the types, the dimensions of which are:—Abdomen: ♂ 48, ♀ 43 mm. Hind wing: ♂ 39, ♀ 40 mm.

##### *Argiolestes ochraceus*, Montrouzier.

*Sympetma Ochracea*, Montrouzier, Ann. Soc. Linn. Lyon, xi. p. 247 (1864).

*Argiolestes rouxi*, Ris, Nova Caledonia, Zool. ii. p. 60, figs. 3 & 4 (1915).

1 ♂, Mt. Mou, 20. iii. 14 (727); 1 ♂, Baie Ngo, 25. iv. 14; 2 ♂, Mt. Canala, 13. vi. 14.

There can be no doubt that our species is the same as that described by Ris, and there can be little doubt, either,

that both of them are identical with the insect which Montrouzier erroneously referred to the genus *Sympycna*.

Montrouzier's description is in the following terms:—

"*Sympycma Ochracea* (Montrouzier), Kanala. Long., 0<sup>m</sup>,045–0<sup>m</sup>,050. *Tête* noire. *Corselet* jaune d'ocre avec une ligne médiane et deux de chaque côté, noires. Les 5 premiers *Segments de l'abdomen* jaune d'ocre. *Bout de l'abdomen*, *Pieds*, *Parastigmas*, noirs."

Brief as it is, the description is not free from inaccuracies, for it is really the first six segments of the abdomen, and not the first five merely, which are ochraceous, and only two of the remaining segments are black, the two terminal ones being dull blue. At the same time, the species in question is immediately recognisable, not only because of its large size and striking scheme of coloration, but also by reason of the densely-veined wings and the forcipate anal appendages implied in the original generic reference.

The dimensions of Montague's specimens are:—

Mt. Mou	Abdomen	35.5 mm.	Hind wing	26.5 mm.
	(incl. anal append.).			
Baie Ngo	Abdomen	>40.0 mm.	" "	30.5 "
	(bent in several places).			
Mt. Canala (1)	Abdomen	42.5 mm.	" "	31.5 "
Mt. Canala (2)	"	42.5 "	" "	30.0 "

In total length these specimens vary from 45 mm. to 52 mm., a somewhat greater difference than the range indicated by Montrouzier (45–50 mm.). The measurements given by Ris for the male sex (abdomen 43 mm., hind wing 29 mm.) agree fairly well with those of three of the males in the present collection, but the specimen bearing the earliest date, that from Mt. Mou, is considerably smaller than the others.

In the wings of this species the anal crossing is variable in position, and may be either before, at, or after the level of the first antenodal.

#### Subfamily *PROTONEURINÆ*.

#### Genus *ISOSTICTA*, Selys.

*Isosticta* is typically a New Caledonian group, and both of the two species which have been described from that island were apparently met with by Mr. Montague. In addition, he was fortunate enough to discover a third species,

which is evidently distinct from *I. spinipes*, Selys (the genotype), and *I. robustior*, Ris. This I have pleasure in naming after my friend Dr. R. J. Tillyard, whose visit to London in the summer of 1920 gave me an opportunity of discussing with him several matters of interest arising upon Mr. Montague's collection.

Although six species are now referred to *Isosticta* in all, I have not seen any of those which occur outside New Caledonia. It is not possible from the literature alone to make a complete comparison between them in respect of the labium, the hind margin of the prothorax, and the tibial armature, but, as will be gathered from the following table, they do not present any great uniformity in certain venational characters of importance. The anal appendages of the male, so far as they are known, are likewise wanting in that general likeness of form which usually characterises the members of a natural genus. Tillyard's description of *I. banksi* was accompanied by some remarks on *I. simplex* and *I. spinipes* (Proc. Linn. Soc. N. S. Wales, xxxvii. pp. 432-3, 1913). After assuming that the genotype, "so closely allied to *I. simplex* in other respects, possessed also appendages of a similar remarkable form," he went on to say that "we may fairly consider the form of the male appendages to be a generic character, which may be stated as follows: 'Both superior and inferior appendages of male somewhat forcipate, the inferior pair prolonged beyond the superior.'" As we have since learned, the inferior appendages of *I. spinipes* are neither forcipate nor prolonged beyond the superior, and consequently the proposed addition to the generic definition cannot be accepted. Indeed, the anal appendages of the two Australian species, *I. simplex* and *I. banksi*, differ in a marked degree from those of the genotype and its congeners from New Caledonia.

As at present constituted, the genus *Isosticta* includes within its limits four groups of not entirely accordant species:—

- (1) Wings with  $M_3$  separating well in advance of the subnodus, and  $Cu_1$  ending 4-8 (usually 5-6) cells beyond the quadrangle; lower anal appendages of the male as long as the upper . . . . . *robustior*, Ris.
- (2) Wings with  $M_3$  separating at or just before the subnodus, and  $Cu_1$  ending 1-2 cells beyond the quadrangle; lower anal appendages of the male conspicuously longer than the upper.  
     Upper appendages of ♂ depressed . . . . . *simplex*, Martin.  
     Upper appendages of ♂ straight . . . . . *banksi*, Tillyard.
- (3) Wings with  $M_3$  separating at or just beyond the

subnodus, and  $Cu_1$  ending 2-3 (usually 2) cells beyond the quadrangle; lower anal appendages of the male as long as the upper.

- Upper appendages of ♂ expanded dorso-ventrally ..... *tillyardi*, sp. n.  
 Upper appendages of ♂ not expanded dorso-ventrally ..... *spinipes*, Selys.  
 (4) Wings with  $M_3$  separating far beyond the subnodus, and  $Cu_1$  ending 1 cell beyond the quadrangle; anal appendages of the male not known ..... *filiformis*, Ris.

*Isosticta tillyardi*, sp. n.

1 ♂ (holotype), Mt. Canala, 13. vi. 14.

Length of abdomen 34 mm.; hind wing 21 mm.

Black, with a low metallic glaze.

Labium yellowish white; the anterior margin of the median lobe produced into a pair of long narrow processes. Labrum and clypeus blue-black, highly metallic. Genæ yellow. Hind margin of prothorax almost straight [apparently well elevated, but the posterior lobe has been split transversely]. Meso-metathorax marked with pale yellow, as follows:—A short broad band on the mesinfraepisternum and the contiguous sclerite as far as the spiracle; a long broad band on the metinfraepisternum and the second lateral suture; a fine line bordering the inferior margin of the metepimeron: the pectus with marginal streaks.

Wings hyaline. Venation black. Pterostigma c. 1 mm. long, dark reddish brown; the anterior margin conspicuously longer than the posterior margin, and the distal margin conspicuously longer and more oblique than the proximal margin.  $M_3$  arising a little beyond the subnodus, Rs a little more remotely.  $Cu_1$  ending two cells beyond the quadrangle. Postnodals  $\frac{14.14}{11.12}$ .

Legs with spines relatively short. Coxæ black and pale yellow; femora of fore and mid legs black, of hind legs chocolate-brown; tibiæ chocolate-brown above, brownish yellow below; tarsi chocolate-brown; claws reddish brown.

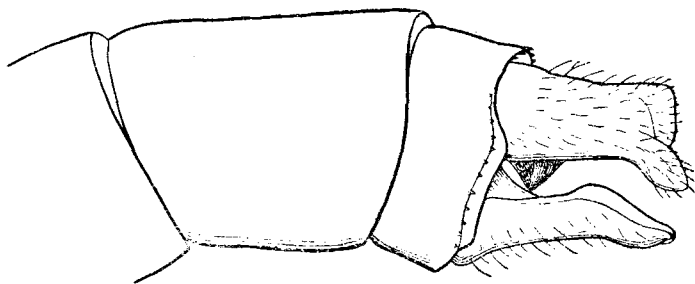
Abdomen long and slender, somewhat inflated at segments 1-2 and 8-10; a tinge of chocolate-brown on some of the segments dorsally; 1 and 2 pale yellow at sides; a pair of lateral pale yellow spots at extreme base of 3-7, coming more or less into dorsal view; on 8 and 9 and on part of 7 the tergites bordered with pale yellow interno-ventrally; 10 wholly pale yellow below; in ventral view the anterior



segments are mainly yellowish, with black at apex, while most of the posterior segments are mainly blackish.

Anal appendages (fig. 1) longer than segment 10, but

Fig. 1.



*Isosticta tillyardi*, sp. n., ♂, holotype. Anal appendages, in left profile view. Figs. 1-11, camera-lucida drawings by P. Hightley.

shorter than segment 9; the superior pair, in dorsal view, curved and convergent, broad at base, bluntly pointed at apex. In profile view, very broad throughout, slightly constricted near the middle, the inferior apical angle with a large ovate process: a large triangular tooth, apparently medio-basal in position, projecting ventrally: the inferior pair little, if at all, longer than the superior ones. In ventral view, expanded horizontally in the basal half, narrow in the apical half, and ending in an inwardly-directed hook.

1 ♀ (allotype), Mt. Canala, 12. vi. 14.

Length of abdomen 32 mm.; hind wing 23.5 mm.

Black, with a low metallic glaze. Clypeus metallic black; anterior margin of frons with a broad border of bright yellow, interrupted in the middle; the second and third joints of antennæ yellowish. Head otherwise as in ♂.

Hind margin of prothorax (fig. 3) not elevated, deeply trifid; the median division quadrangular; the lateral divisions rounded. Meso-metathorax: humeral suture lined with yellow; the whole of the metepimeron and most of the metepisternum yellow; inferior surface wholly yellow.

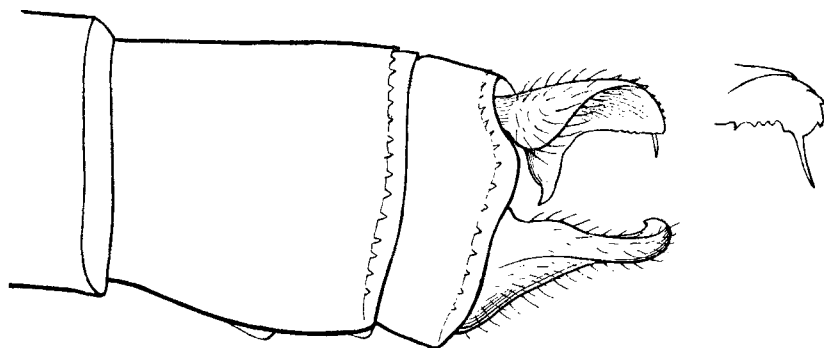
Wings as in ♂, except that  $M_3$  arises at (fore wings) or a trifle before (hind wings) the subnodus, and  $Cu_1$  invades the third cell beyond the quadrangle. Postnodals  $\frac{14.13}{10.11}$ .

Legs largely yellowish; external surface of femora mainly

black ; tibiæ with at least a black median streak externally ; tarsi wholly black ; claws reddish.

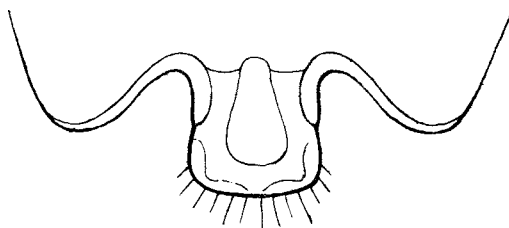
Abdomen considerably stouter than in ♂, slightly inflated at segments 8 and 9 ; sides yellowish, with black rings at most of the sutures ; the yellowish coming into view dorsally, as spots, at the extreme base of 3-6, at least ; ventral surface mainly yellowish.

Fig. 2.



*Isosticta robustior*, Ris, ♂. Anal appendages, in left profile view (Mt. Canala). Detail from Mt. Koghi specimen, showing longer subapical spine on superior appendage.

Fig. 3.



*Isosticta tillyardi*, sp. n., ♀, allotype.  
Hind margin of prothorax, in dorsal view.

Anal appendages shorter than segment 10, directed a little downwards ; in dorsal view, subtriangular, bluntly pointed at apex, slightly convergent.

Ovipositor projecting so far beyond the end of the abdomen as to be conspicuously visible in dorsal view ; anterior processes glossy black ; valves yellowish ; styles black.

Notwithstanding that the female from Mt. Koghi, which I

name *I. spinipes*, agrees well with the holotype male of *I. tillyardi* in its thoracic pattern and in having  $Cu_1$  ending two cells beyond the quadrangle, I am led to associate the Mt. Canala female with the male in question by the under-mentioned points of greater resemblance:—The shorter abdomen and hind wings, the fewer postnodals, the less numerous cells between the origin of  $M_2$  and the origin of  $M_{1a}$ . The agreement in the place and month of capture are also worthy of note.

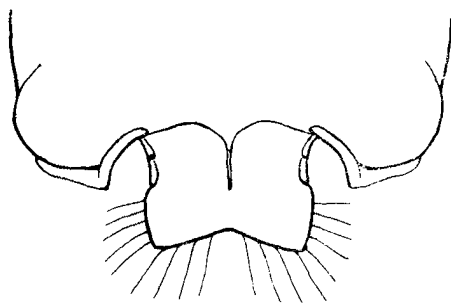
*Isosticta spinipes*, Selys.

1 ♀ (allotype), Mt. Koghi, 10. iv. 14 (874) (♀ hitherto unknown).

Length of abdomen 32.5 mm. ; hind wing 24.5 mm.

This specimen is almost identical in coloration with the

Fig. 4.



*Isosticta spinipes*, Selys, ♀, allotype.  
Hind margin of prothorax, in dorsal view.

female from Mt. Canala which I have attributed to *I. tillyardi*, but the metepisternum is entirely black behind the metastigma, as in the male of the new species. I do not attach any great importance to the length of the metastigmatic colour-line, as in one of the females of *I. robustior* in the present collection the line terminates at the metastigma, while in the other it is prolonged far beyond it. The two females are readily distinguished from one another by structural characters. In what I regard as *I. spinipes* the hind margin of the prothorax (fig. 4) has a shorter and broader median projection ; the abdomen is slenderer ; the ovipositor is shorter, little more than the styles being visible in dorsal view ; the postnodals are more numerous  $\left( \begin{smallmatrix} 16. 16 \\ 12. 12 \end{smallmatrix} \right)$  ;

and  $Cu_1$  ends exactly two cells beyond the quadrangle, or at most barely enters the third cell.

It is a far more difficult matter correctly to associate these females with their respective males, but the one from Mt. Koghi agrees better with the two existing descriptions of the male of *I. spinipes* in its larger size, the more numerous postnodals, and the greater number of cells  $\frac{(3.4)}{(4.4)}$  between the origin of  $M_2$  and the origin of  $M_{1a}$ .

*Isosticta robustior*, Ris.

1 ♂, Mt. Koghi, 10. iv. 14 (872); 1 ♂, Mt. Canala, 14. vi. 14.

The species being founded upon two males lacking the terminal segments of the abdomen, a description of the entire insect is now given.

Length of abdomen 37 (Canala) to 37.5 (Koghi) mm.; hind wing 24 mm.

Black, with a low metallic glaze. Labium yellowish white; the anterior margin of the median lobe produced into a pair of long narrow processes. Labrum and clypeus highly metallic. Genæ yellowish or greenish.

Hind margin of prothorax entire, elevated, rounded. Meso-metathorax marked with yellow or yellowish white as follows:—A very fine line at the humeral suture; a short, rather broad band anterior to and ending at the metastigma; a rather broad band on the metepimeron, bordering the second lateral suture, connected with which anteriorly is a fine line following the inferior margin; a stripe along the inferior margin of the metinfraepisternum: the pectus with a longitudinal median line, dilated and bifid posteriorly.

Wings hyaline. Venation black. Pterostigma c. 1.5 mm. long, dark brown, pale round the edges; the anterior margin conspicuously longer than the posterior margin, and the distal margin conspicuously longer and more oblique than the proximal margin. Rs arising at the subnodus,  $M_2$  well in advance of it.  $Cu_1$  long, extending in all eight wings about  $5\frac{1}{2}$  cells beyond the quadrangle. Postnodals in fore wings 14–17 (Canala) or 15 (Koghi); in hind wings 12 (13 in one wing, Koghi).

Legs black; the coxæ and femora pale brown inferiorly.

Abdomen very long and slender, somewhat inflated at segments 1–2 and 8–10; the dorsum entirely destitute of any pale markings; pale brown beneath.

Anal appendages (fig. 2) longer than segment 10, but shorter than segment 9. The superior pair, in dorsal view, straight, very broad near the base, somewhat acutely pointed

at apex; on the inferior surface a long pointed tooth near the base directed downwards, and a similarly-directed spine or bristle, variable in length, near the apex. The inferior pair little, if at all, longer than the superior; seen from above, convergent, very broad, concave, rounded at tip. In profile view, very broad basally, slender and somewhat upcurved apically.

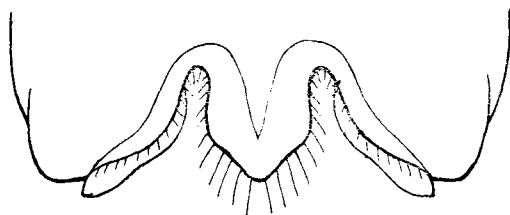
1 ♀ (allotype), Mt. Canala, 12. vi. 14 (♀ hitherto unknown).

Length of abdomen 33 mm.; hind wing 25 mm.

Coloured like the ♂, except where otherwise stated.

Prothorax with a pair of longitudinal reddish bands, in line with the antehumeral bands on the meso-metathorax, hind margin (fig. 5) deeply trifid; the divisions obtusely

Fig. 5.



*Isosticta robustior*, Ris, ♀, allotype.  
Hind margin of prothorax, in dorsal view.

pointed, not elevated. Meso-metathorax with a pair of short reddish antehumeral bands, continuing the similar bands on the prothorax; the band on the metepisternum prolonged backwards far beyond the metastigma and nearly reaching the base of the thorax.

Wings as in ♂, except that in the hind wings  $Cu_1$  extends only five cells beyond the quadrangle, or even less. Post-nodals in fore wings 15-16; in hind wings 12-13.

Legs mainly black or blackish; coxæ entirely, and femora largely, pale brown; spines on femora longer than those on tibiæ.

Abdomen shorter and stouter than in ♂, and of equal thickness throughout its length.

Anal appendages very short, hardly, if at all, longer than segment 10, straight, directed a little downwards; in dorsal view, subtriangular, bluntly pointed at apex.

Ovipositor projecting a little beyond the end of the abdomen ; anterior processes translucent, dark reddish brown ; valves pale yellowish proximally, mostly blackish distally ; styles black, with a pale hair projecting from the apex.

A second female, from Mt. Koghi, 10. iv. 14 (873), has a longer abdomen (34.5 mm.) than the allotype, and fewer postnodal cross-veins (14 in the fore wings and 12 in the hind). In only one wing is  $Cu_1$  of the same length as in the males ; in both forewings it is fully six cells long, while in the remaining hind wing, which is also abnormal in other respects, it reaches the distal boundary of the eighth cell.

It may be pointed out that *I. robustior* has interesting relationships with several Australian members of the Protoneurinae. In respect of venation, Ris has already pointed out that it might well go into the genus *Neosticta*, but for the more proximal position of the anal crossing in our species. The upper anal appendages, including the inferior tooth, are not very unlike those of *Nososticta solida*, Selys, although the lower appendages are quite different.

#### Subfamily AGRIONINÆ.

##### *Ischnura heterosticta*, Burm.

1 ♀, Houailou R., 23. xi. 14.

This specimen, which lacks four segments of the abdomen, has been seen by Dr. Tillyard, and identified by him as an andromorphic female.

##### *Agriocnemis exsudans*, Selys.

3 ♂, Mt. Canala, 14. vi. 14 ; 1 ♂, Up. Houailou, 3. xii. 14.

This species was described from a unique male from New Caledonia, and appears to be the Oceanic representative of *A. argentea*, Tillyard, from Queensland. It is also known to occur in the New Hebrides, and the anal appendages have been figured by Tillyard from males received from that archipelago (Proc. Linn. Soc. N. S. Wales, xxxvii. p. 461, pl. xlviii. figs. 13, 14, 1913). The superior appendages, however, are shown with "a large basal black patch," whereas the two unbroken specimens from Mt. Canala have the upper appendages unicolorous reddish brown. In this respect our material agrees with the type, and the New Hebrides form has evidently taken on a local character. De Selys compared his very adult type of *A. exsudans* with what he considered to be *A. pygmæa*, Ramb., although he

failed to notice the difference in the form of the posterior lobe of the prothorax, which is more quadrangular in *exsudans* than in the other insect. But for this and the wholly different anal appendages, it would be difficult to distinguish our specimens of *exsudans* from material of the so-called *pygmæa* from Seychelles with which I have confronted them\*.

The resemblance between the two species, which is at all times very close, is accentuated by the present comparison, for all four males of *exsudans* are free from the pruinosity on head, thorax, and femora which characterises the type-specimen, and one of the two which retain the last three segments of the abdomen have them coloured reddish brown, as in *pygmæa*.

### Family Libellulidæ.

#### Subfamily CORDULINÆ.

#### *Hemicordulia oceanica*, Selys.

1 ♂, Plaine des Lacs, 18. ii. 14 (264).

This species was originally described from Tahiti, and the British Museum possesses a male collected in that island during the visit of H.M.S. 'Challenger' in 1875. The fact, however, was not mentioned in Kirby's paper on the Neuroptera of the 'Challenger' Expedition (Ann. & Mag. Nat. Hist. (5) xiii. pp. 453-6, 1884).

1 ♀, Baie Ngo, 25. iv. 14.

Martin refers to a "♀ incomplète" in the De Selys Collection (Coll. Selys, Cord. p. 12, 1906), but the only description of that sex which seems to be available is that given by Ris of an individual from New Britain doubtfully referred to *H. oceanica* (Nova Guinea, ix., Zool. p. 503, 1913). As our specimen from New Caledonia is in good condition, and is doubtless to be associated with the male in the same collection, a brief account of it is subjoined.

Length of abdomen 37 mm.; hind wing 34.5 mm.; pterostima 2 mm.

Labium yellow; labrum yellow to brownish yellow; clypeus greenish yellow; frons hairy, orange anteriorly, metallic green above. Vertex orange, partially overlaid with metallic green. Occipital triangle orange, very hairy. Antennæ black.

\* Males of this species from Seychelles do not seem to show any essential points of difference from males of *A. hyacinthus*, Tillyard, from Queensland, which Dr. Tillyard has been kind enough to send me.

Meso-metathorax very hairy, both above and at sides pale green, with a rather low metallic glaze; pale brown beneath.

Wings uniformly tinged with brown; venation, including the costa, black; pterostigma dark reddish brown; membranule cinereous. Antenodals  $\frac{7.7}{5.5}$ . Postnodals  $\frac{6.6}{8.7}$ .

Legs black; femora of fore legs largely pale brown, of mid-legs reddish brown below.

Abdomen inflated at segment 2, slightly constricted at 3; dorsum with a low metallic glaze, chocolate-brown proximally, passing into black at 4; 10 apparently greenish brown, both dorsally and laterally: some ill-defined pale brown markings at sides of segments 1-5; sides of 6-8 with a better-defined, broad, longitudinal, pale brown stripe, apparently ceasing before the apical margin of each segment; sides of 9 with a triangular, basal, pale brown spot. Supra-anal tubercle of moderate size, black. Anal appendages about as long as segment 9, black, straight, fusiform, convergent. Vulvar lamina not projecting conspicuously, about a quarter as long as segment 9; deeply bifid, each lobe triangular.

*Hemicordulia fidelis*, MacLachlan.

1 ♂, Mt. Canala, 12. vi. 14.

Length of abdomen 33.5 mm.; hind wing 32 mm.; pterostigma < 2 mm.

Antenodals  $\frac{7.7}{5.5}$ . Postnodals  $\frac{6.5}{8.6}$ .

Originally described from the Loyalty Islands, and subsequently recorded from New Caledonia, *Hemicordulia fidelis* also occurs in the New Hebrides. In the British Museum Collection there are two males from the island of Tanna, in the last-named archipelago, collected in April 1875, and presented by W. Wykeham Perry, of H.M.S. 'Pearl.' In one of them the hind wing measures 31.5 mm. and in the other 33 mm.

1 ♀, Noumea, 24. i. 14 (No. 106).

Length of abdomen 37 mm.; hind wing 35 mm.; pterostigma 2 mm.

Antenodals  $\frac{8.8}{5.5}$ . Postnodals  $\frac{7.7}{8.8}$ .

Particulars of the female sex were first given by Martin, from material in his own collection (Coll. Selys, Cord. p. 12, 1906), and his description applies better to the specimen before us than does the later account furnished by Ris. As regards coloration, some of the discrepancies observed may be due to the teneral condition of our specimen; and the



shrivelled state of the abdomen, likewise due to immaturity, precludes the proper examination of the vulvar lamina and the supra-anal tubercle. The abdomen is conspicuously longer (37 mm.) than that of Ris's insect (31 mm.), but the measurement given by Martin (34 mm.) is just mid-way between them. In respect of the length of the hind wing, however, our specimen agrees exactly with Ris's (35 mm.), whereas Martin's measurement (31.5 mm.) is considerably less. The brown cloud in the fore wings, lying between the nodus and the apex, is a very characteristic feature of the female of *H. fidelis*, and is not observable in the same sex of *H. oceanica*, the only other representative of the genus known to occur in New Caledonia.

#### Genus *SYNTHEMIS*, Selys.

So far, the only species of *Synthemis* or any allied genus known from New Caledonia has been the large and beautiful one named by De Selys *Synthemis miranda*. The discovery of the unique specimen, a broken female lacking segments 6-10 of the abdomen, was due to Father Montrouzier, who is chiefly remembered by entomologists for his contributions to our knowledge of the Coleoptera and Rhynchota of New Caledonia and Woodlark Island. The original description, published in 1871, has been supplemented by M. René Martin, who has given us a photograph of the wing-venation and a coloured figure of the entire specimen (Coll. Selys, Cord. p. 82, pl. iii. fig. 19, 1906). In two respects, however, the coloured figure is at variance with De Selys's description, inasmuch as it represents the lateral thoracic stripes as green, instead of yellow, and the ground-colour of the abdomen as brown, instead of steely black. The only other collector to obtain the species has been Mr. Montague, whose researches have not only completed our knowledge of it in both its sexes, but have also revealed the co-existence of three additional and undescribed species of the same genus. The re-discovery of *Synthemis miranda* in New Caledonia is an event of considerable interest, and incidentally sets at rest doubts which have been entertained in some quarters concerning the true habitat of the species. Those doubts were the outcome of a tradition to the effect that the type was found by De Selys in a milliner's shop in Paris, where it was adorning a lady's hat. It is not easy to understand how such a tradition could ever have arisen, or gained any measure of credence, when it is remembered that De Selys himself expressly declared that he received the specimen through Father Montrouzier from New Caledonia.

*Synthemis miranda* was placed by De Selys in a separate "groupe" of the genus, by reason of its possessing broad, extensively-coloured wings, in which the triangles and fore-wing subtriangle are divided into two or three cells. The fresh material which has now come to hand shows that the venational character is the only one of systematic importance, the great width of the wings being proper to the female sex in this and allied species. The suffusion with yellowish and brown of the basal half of each wing is merely an individual character of the type, for in the three new specimens the deep coloration never extends outwards beyond the level of the arculus.

The section of the genus of which *S. miranda* is the typical species appears to be peculiar to New Caledonia, and will include, in addition to itself, two new species to be described herein, namely, *S. montaguei* and *S. flexicauda*. It comprises species of large size, characterised by their densely reticulated wings, by the fore wings having the triangle regularly divided into two cells and the subtriangle into three cells, and by the males having white tips to their upper anal appendages.

In respect of the reticulation of their fore-wing triangles, the three large species from New Caledonia are the most archaic members of the Synthemini. In other species of that tribe it is not unusual for cross-veins to occur in the triangles, and I have received from Dr. Tillyard a female of *Eusynthemis guttata aurolineata*, Till., in which the triangles of the fore wings exactly reproduce the conditions obtaining in the Oceanic forms. But such individual cases are evidently due to the accidental reappearance of an ancestral character, whereas their presence is quite constant in the ten specimens from New Caledonia which are now known to us.

The position of the hind-wing triangle in relation to the arculus is very variable in the Synthemini. In none of the New Caledonian species is the base of the triangle removed quite as far as the middle of the supertriangle, while in *S. flexicauda* it is retracted to about a third of the supertriangle's length.

The antenodal cross-veins in these and other Synthemini exhibit two characters which one would expect to find associated with the *Æschnidæ*, rather than the *Libellulidæ*. One is the presence in all wings of an incomplete antenodal at the extreme base of the subcostal space, proximal to the first of the regular antenodals. In the second place, the antenodals of the first series do not always coincide with those of the second series; but exact coincidence, accompanied

by decided hypertrophy, frequently occurs in the case of the first and third of them. Both the basal subcostal cross-vein and the hypertrophied antenodals occur in all the four species from New Caledonia, not even excepting the small, open-veined one, *S. fenella*.

Those two characters emphasise the close relationship subsisting between the *Synthemini* and the *Æschnidæ*. Indeed, *S. miranda*, *S. montaguei*, and *S. flexicauda* may be regarded as the most archaic *Corduliinæ* yet discovered, and the nearest to the ancestral *Æschnid* or *Æschnid*-like stock. In the presence of cross-veins in the median space, they remind one more particularly of the *Chlorogomphinæ*, and the wings in that subfamily exhibit the same kind of sexual dimorphism as in *Synthemis* in respect of the complexity of the anal loop, as well as the width of the wings. Furthermore, the males of *Chlorogomphinæ* possess the peculiar tibial keel which is found alone in themselves and the *Corduliinæ*. It was characteristic of De Selys that his unerring instinct immediately led him to compare *Synthemis miranda* with *Chlorogomphus magnificus*. Tillyard has drawn attention to the close similarity which the nymph of *Synthemis* bears to that of *Cordulegaster*, but it would not be surprising to find that it will present at least an equally great resemblance to *Chlorogomphus* or *Orogomphus*, whenever a nymph of one of those genera becomes known.

*Synthemis regina* \* is the true representative in the Australian fauna of *S. miranda* and its New Caledonian allies. For one thing, it is the nearest to them in point of size. Then, the anal loop in its hind wings consists of two enclosures in the male and three enclosures in the female sex, as in *S. miranda*. Furthermore, the resemblance to that species extends to important abdominal characters, such as the anal appendages and dorsal spine of the male and the ovipositor of the female. The existence of such a clear link between the three species before us and the more typical members of *Synthemis* seems to render it inadvisable to

\* *Synthemis regina*, in both its sexes, was described by De Selys from "Queensland" material in the "Musée brit. et collect. MacLachlan." The well-preserved male in the National Collection, ticketed "N.S.W.," and carrying De Selys's identification-label, I regard as the holotype, and have marked it accordingly. I have done this, notwithstanding the discrepancy in the locality, and the presence in the MacLachlan Collection of an incomplete male labelled "Queensland" (on white paper) and (in De Selys's handwriting) "*Synthemis regina* de Selys ♂" (on pink paper). The allotype is undoubtedly the female in the same private collection, carrying white and pink labels inscribed in the same way (except for the changed sex symbol) as the paratype male.

erect any new genus to receive the Oceanic forms. Another reason against generic separation may be found in the fact that *S. fenella*, notwithstanding its apparent distinctness, is evidently closely related to its larger congeners in the same island, for in all four species the hamule is of the same characteristic form. Viewed in profile, that organ is more or less definitely sickle-shaped, and projects conspicuously from the second abdominal segment, a condition of things which has no parallel in any other Synthemini I have been able to examine.

It may not be without significance that all the extra-Australian species of the *Synthemis* group which have been made known belong to the genus *Synthemis*, as restricted by the latest reviser. These are *S. primigenia*, Förster, and *S. wollastoni*, Campion, from New Guinea; *S. macrostigma*, Selys, from Fiji; and *S. miranda*, with the three new species to be brought forward herein, from New Caledonia. The remaining genera, *Eusynthemis*, *Choristhemis*, and *Synthemio-opsis*, appear to occur only in continental Australia or the dependent island of Tasmania. It may be also worthy of notice that, while the genus *Synthemis* itself contains all the largest insects included in the group Synthemini, the species of greatest dimensions within the genus have an extra-Australian distribution. Even *S. macrostigma*, although only of moderate size, has its biggest representatives in Fiji and its smallest in S.W. Australia.

*Synthemis miranda*, Selys.

♂ (allotype), Mt. Mou, 9. iii. 14 (No. 464).

Length of abdomen 51 mm.; hind wing 39 mm.

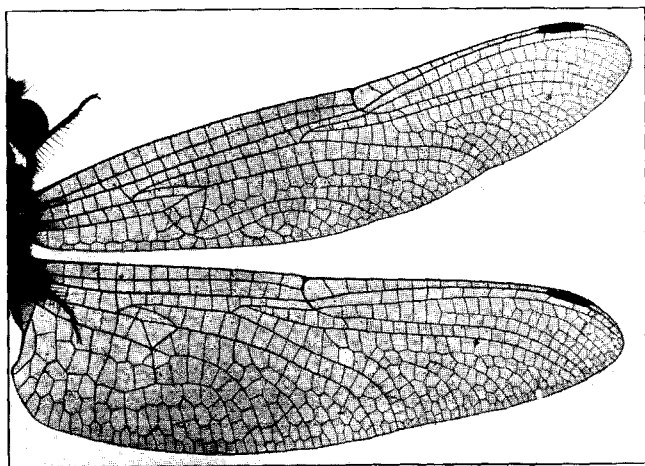
Head very hairy. Labium metallic black. Labrum metallic black, with a pair of large round golden spots near the middle. Clypeus whitish. Frons metallic blue-black, with a large whitish spot on each side, in the angle formed by the clypeus and the eye. Vertex metallic blue-black. Antennæ metallic black; the tip whitish. Occipital triangle metallic blue-black.

Prothorax black.

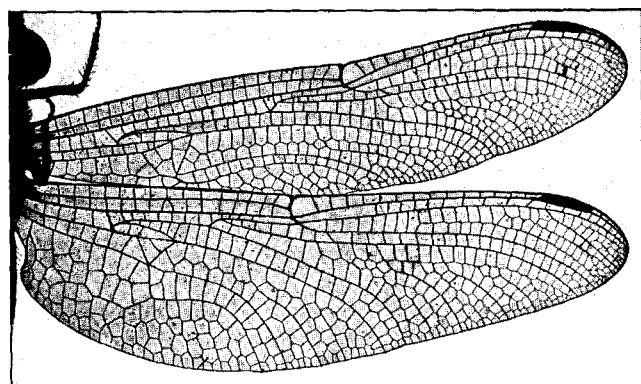
Meso-metathorax chocolate-brown above; below the humeral suture metallic black, with green and purple reflections; on each side an uninterrupted white stripe, of moderate width, enclosing the metastigma; a broader white stripe crossing the metepimeron.

Wings (Pl. VIII. fig. 12) hyaline, with a trace of yellow at the base, especially of the hind wing. Costa black, with

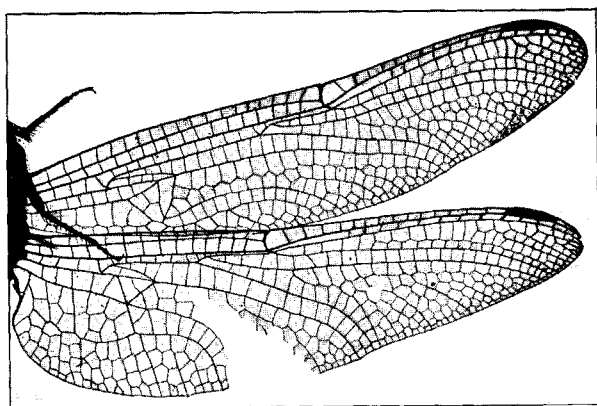
12.



13.



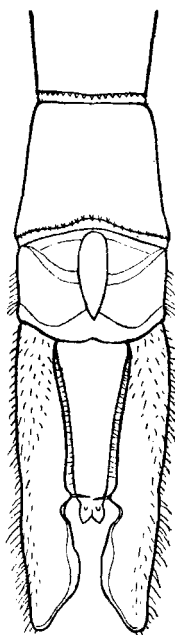
14.



CORDULIINE DRAGONFLIES FROM NEW CALEDONIA.

a white dorsal spot at base; other veins also black. Pterostigma 3 mm. long, dark reddish brown, unbraced. Membranule of hind wing nearly as long as the anal triangle, smoky. Antenodals of the costal series  $\frac{18.17}{12.12}$ . Postnodals  $\frac{10.11}{13.13}$ . Cross-veins in median space  $\frac{5.5}{4.4}$ ; in cubito-anal space  $\frac{8.8}{6.7}$ ; in supertriangle  $\frac{2.2}{1.1}$ ; and in bridge space  $\frac{7.6}{6.6}$ . Arculus straight or nearly so, arising between the third and fourth antenodals.

Fig. 6.



*Synthemis miranda*, Selys, ♂, allotype.  
Anal appendages, in dorsal view.

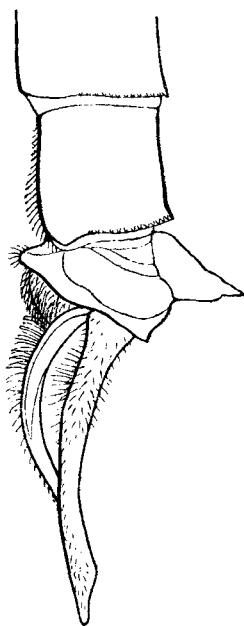
Discoidal area in fore wings commencing with three cells, followed by two rows of cells as far as the level of base of bridge. Discoidal area in hind wings beginning with four or five large single cells. Anal loop in hind wings double, the distal enclosure containing eight cells, and the proximal enclosure four cells.

Legs black; tibial keel and femur of fore legs posteriorly whitish.

Abdomen very slender, a little constricted at segment 3

and between segments 8 and 9. Black, with yellow markings on segments 2-7 as follows :—On 2 a pair of transverse lines, rising upwards from the auricles, but not meeting at the mid-dorsal carina, and a pair of transverse linear spots placed immediately behind them on the dorsum ; on 3-7 a pair of large round or oval dorsal spots near the middle of the segment, supplemented on 3 and 4 by a pair of smaller rounded spots at the base. Auricles yellow. A large, erect, pointed, black spine on the dorsum of 10.

Fig. 7.



*Synthemis miranda*, Selys, ♂, allotype.  
Anal appendages, in left profile view.

Upper anal appendages (figs. 6 & 7) 4 mm. long ; in dorsal view, broad, almost straight, with an acute internal black spine at about mid-length, followed first by an emargination, and then by a dilatation ; black as far as the emargination, pale yellowish beyond. Lower anal appendage about two-thirds as long as the upper, curving upwards to the level of the superior appendages, ending in a pair of

lateral tubercles, metallic dark reddish brown above, black below.

♂, Mt. Mou, 20. iii. 14 (724).

Differs from the description of the allotype in respect of the characters mentioned hereunder:—

Length of hind wing 38 mm.

A pair of round golden spots on the anterior surface of the frons. (Similar spots are dimly discernible in the allotype, but are not visible at all in any of the female specimens.) Antenodals of the costal series  $\frac{18 \cdot 16}{13 \cdot 12}$ . Postnodals  $\frac{11 \cdot 12}{15 \cdot 13}$ . Cross-veins in median space  $\frac{4 \cdot 4}{4 \cdot 3}$ ; in cubito-anal space  $\frac{6 \cdot 7}{6 \cdot 6}$ ; in supertriangle  $\frac{1 \cdot 2}{1 \cdot 1}$ ; and in bridge space  $\frac{5 \cdot 6}{6 \cdot 5}$ . In the discoidal area of the fore wings the undivided cells continue almost to the level of the origin of  $M_3$ . Discoidal area in hind wings beginning with 5 or 6 large single cells. Distal enclosure of anal loop in hind wings containing 7 cells.

The superior anal appendages of *S. miranda* are much like those of *S. regina*, but they may be distinguished from them and the appendages of all other Synthemini by the presence of the slender internal spine upon each of them.

3 ♀, Mt. Mou, 10–20. iii. 14.

Head and thorax as in male.

Wings tinged with brown; bases suffused with saffron, which is especially dense in the subcostal space, as far as the third or fourth antenodal in the fore wings and the second or third in the hind wings. Costa black, with a white dorsal spot at base; other veins also black. Pterostigma 3·5 long, dark reddish brown, unbraced. Membranule of hind wing long, smoky. Arculus arising between the third and fourth antenodals. Discoidal area in fore wings commencing with three cells, followed by two rows of cells about as far as the level of base of bridge. Discoidal area in hind wings mostly filled with double cells as far as the level of the origin of the bridge. Anal loop in hind wing in three divisions.

Legs black; coxa and femur of fore legs largely whitish.

Abdomen tapering from segment 1 to segment 6, inflated from 7 to 10: metallic black, with yellowish markings on 2–7, as follows:—On 2 a large longitudinal spot on each side, sending up from its distal end a rather narrow line towards, but not reaching, the mid-dorsal line; on 3–7 a



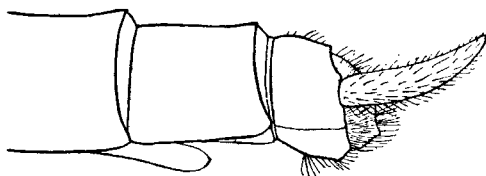
pair of rounded spots, separated by the mid-dorsal carina, placed more or less centrally, supplemented on 3-5 by a pair of spots, forming more or less of a basal ring, interrupted mid-dorsally.

Anal appendages subcylindrical, obtusely pointed, slightly convergent, and upturned, pale yellow, black at base.

Ovipositor (fig. 8) black, not reaching beyond the middle of segment 9, straight, and not projecting very far below the abdomen; the anterior processes ovate; the median processes linear, shorter than the anterior ones, and more or less fused with them.

One of the females, dated 20th March, is evidently immature, and has possibly been kept in spirit. The abdomen is much shrunken and greatly compressed laterally, and the wings, save for the basal suffusion, are entirely hyaline. The other female of the same date is fully adult,

Fig. 8.



*Synthemis miranda*, Selys, ♀. Terminal segments of abdomen, in left profile view, showing ovipositor.

like the third specimen. All three females differ from the type, in respect that the coloured area in the wings in no case extends beyond the level of the arculus, instead of reaching to and even beyond the nodus.

In De Selys's type the hind wing is 44 mm. long, and it will be observed that, as determined by this criterion, two of Mr. Montague's specimens are smaller than the type, while the third (the one dated 10th March) is a trifle larger.

De Selys's description of the "lèvre supérieure" as "jaunâtre, largement bordée et traversée de noir" scarcely applies to any of the five specimens before us, whether male or female, since all of them have the labrum wholly back, save only for two golden spots.

As far as size and venational characters are concerned, the principal points of difference between the three females of

*Synthemis miranda* obtained by Mr. Montague can be stated in tabular form, as hereunder :—

	♀ No. 1 (10. iii. 14).	♀ No. 2 (724) (20. iii. 14).	♀ No. 3 (726) (20. iii. 14).
Length of abdomen . . . . .	51.0+2.5	47.5+2.0	47.5+2.0
Length of hind wing . . . .	44.5	42.0	42.0
Antenodals (costal series) . .	$\frac{20.21}{14.14}$	$\frac{17.17}{11.11}$	$\frac{17.17}{11.11}$
Postnodals . . . . .	$\frac{12.11}{13.13}$	$\frac{11.10}{11.13}$	$\frac{11.10}{13.13}$
Cross-veins in median space.	$\frac{5.5}{4.5}$	$\frac{4.4}{4.4}$	$\frac{5.5}{4.4}$
Cubito-anal cross-veins . . .	$\frac{9.8}{8.8}$	$\frac{7.8}{7.7}$	$\frac{7.7}{7.7}$
Cross-veins in supertriangle.	$\frac{3.3}{3.2}$	$\frac{3.2}{2.2}$	$\frac{3.3}{2.2}$
Bridge veins . . . . .	$\frac{6.6}{6.6}$	$\frac{5.5}{5.6}$	$\frac{5.5}{5.6}$
Anal loop in hind wing :—			
Distal enclosure . . . . .	21.23	12.12	16.18
Middle enclosure . . . .	10.10	7.6	10.8
Proximal enclosure . . .	8.9	5.4	6.6

*Synthemis montaguei*, sp. n.

1 ♂, holotype, Mt. Mou, 10. iii. 14 (No. 488).

Length of abdomen 51 mm. ; hind wing 43 mm.

Labium pale reddish brown ; labrum pale reddish brown, the inferior margin broadly edged with black ; anteclypeus pale yellow ; postclypeus yellowish brown, at each side a large yellowish-white spot, edged with black below. Frons yellowish brown in front ; anterior third of summit yellowish brown, posterior two-thirds metallic blue-black ; hairy. Vertex dark steely blue, very hairy. Antennæ black. Occipital triangle metallic black.

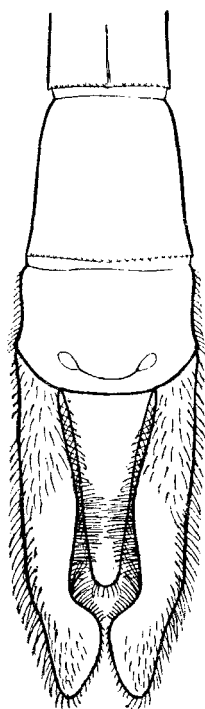
[Prothorax not visible.]

Meso-metathorax without spots or stripes, dark metallic brown, with chocolate reflections on dorsum and green reflections at sides.

Wings (Pl. VIII. fig. 13) hyaline, with a trace of brown at the base of the subcostal space. Costa golden anteriorly, with a pale dorsal spot at the base ; other veins black. Pterostigma nearly 4 mm. long, dark reddish brown, weakly braced. Membranule of hind wing not quite as long as the anal triangle, smoky white. Venation dense. A basal subcostal cross-vein in each wing. Antenodals of the costal series  $\frac{23.24}{15.15}$ . Postnodals  $\frac{12.11}{15.14}$ . Cross-veins in median space

$\frac{5.5}{4.4}$ ; in cubito-anal space  $\frac{10.10}{8.7}$ ; in supertriangle  $\frac{3.3}{3.2}$ ; and in bridge space  $\frac{7.8}{6.7}$ . Arculus in the fore wing very oblique, in the hind wing more vertical; in all the wings straight, and placed at or near the level of the fourth antenodal of the first series. Triangle of the fore wings two-celled, subtriangle three-celled. Triangles of the hind wings with one curved cross-vein in each; the convex side of the cross-vein

Fig. 9.



*Synthemis montaguei*, sp. n., ♂, holotype.  
Anal appendages, in dorsal view.

directed postero-basally. Discoidal area in the fore wings commencing with three cells, followed by double cells to a point between the level of the separation of  $M_{1+2}$  and the level of the nodus. Discoidal area in the hind wings with at first two rows of cells, giving place to increasingly dense rows of cells before the level of the nodus. Anal loop in the hind wing consisting of two enclosures, the primary (distal)

loop containing eight cells, and the secondary (proximal) loop from four to six cells.

Legs dark reddish brown; coxæ and tibial keels pale brown.

Abdomen a little constricted at segment 3 and between segments 8 and 9. Dorsum of segment 1 and basal third of segment 2, auricles, and lateral and ventral aspects of all the segments dark reddish brown. Dorsum of the distal two-thirds of segment 2 and segments 3-10 black, with yellow markings on 2-8 as follows:—On 2 a pair of transverse lines followed immediately by a pair of subquadrate spots, both pairs interrupted mid-dorsally; on 3 and 4 a pair of basal spots, forming more or less part of a ring, and a pair of central spots somewhat rounded and almost touching one another mid-dorsally; on 5, 6, and 7 a pair of rounded spots, similar to those on 3 and 4, but placed rather more proximally and separated more decidedly by the mid-dorsal carina; on 8 a pair of large elongated spots.

Upper anal appendages (fig. 9) about 4 mm. long; in dorsal view wavy, dilated internally before the middle, then emarginate, and dilated again just before the apex, which is rather obtuse; fuscous as far as the central dilatation, whitish beyond, the apex edged with fuscous: in lateral view curving gently downwards and then upwards again, stout, rather slender at base. Lower appendage about two-thirds as long as the upper appendages, curving gently upwards, triangular in dorsal view, very dark reddish brown, glossy.

I have the honour of dedicating this very fine species to the memory of its discoverer, who afterwards gave his life in the cause of freedom on the battlefields of Macedonia. It is immediately recognised from all other *Synthemini* by the absence from the meso-metathorax of any pale spots or stripes.

*Synthemis flexicauda*, sp. n.

♂ (holotype), Mt. Nekando, 24. v. 14.

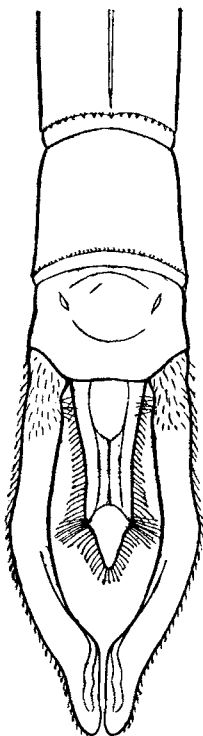
Length of abdomen 45.5 mm.; hind wing 37 mm.

Labrum creamy, crossed vertically by three dark bands. Labrum glossy black. Clypeus creamy, with a pair of black spots, elongated transversely, near the frons. Frons hairy, glossy black, with a pair of large, reniform, creamy spots occupying the greater part of the anterior surface. Vertex hairy, glossy black. Base of antennæ black [the bristle missing]. Occipital triangle hairy, glossy black.

Prothorax chocolate-brown, widely bordered with yellow anteriorly.

Meso-metathorax metallic chocolate-brown, with some greenish reflections laterally; mid-dorsal carina yellow; on each side a broad, uninterrupted, creamy stripe, enclosing the metastigma; another broad creamy stripe crossing the metepimeron.

Fig. 10.



*Synthemis flexicauda*, sp. n., ♂, holotype.  
Anal appendages, in dorsal view.

Wings (Pl. VIII. fig. 14) slightly tinged with brown. Costa yellow anteriorly, without any pale dorsal spot at base; other veins black. Pterostigma 3.5 mm. long, dark reddish brown, weakly braced. Membranule of hind wing as long as the anal triangle, brownish. Antenodals of the costal series  $\frac{18}{13} \cdot \frac{19}{13}$ . Postnodals  $\frac{11}{13} \cdot \frac{12}{14}$ . Cross-veins in median

space  $\frac{4.4}{3.3}$ ; in cubito-anal space  $\frac{7.7}{6.6}$ ; in supertriangle  $\frac{3.3}{1.1}$ ; and in bridge space  $\frac{6.7}{6.5}$ . Arculus slightly bowed towards base of wing, arising between third and fourth antenodals. Discoidal area in fore wings commencing with four cells, followed by two rows of cells as far as the level of base of bridge. Discoidal area in hind wings first with two large cells and then with about four double cells before the multiplied rows of cells begin. Anal loop in hind wing double, the primary (distal) enclosure containing eight to nine cells and the secondary (proximal) enclosure four cells.

Legs dark reddish brown; coxæ, femora internally, and tibial keels creamy [hind legs missing].

Abdomen somewhat fusiform; a little constricted at segment 3 and between segments 8 and 9. Auricles and segment 1 dark reddish brown. Segments 2-10 black, with creamy or yellow markings as follows:—On 2 a pair of rounded spots, almost central in position; on 3-8 a pair of basal spots, forming more or less of a ring, except on 8, where they are much reduced and wider apart, and a pair of somewhat rounded spots near the middle, becoming progressively smaller, more transversely linear, more widely separated, and more retracted towards the base of the segment.

Upper anal appendages (fig. 10) a little over 5 mm. long; in dorsal view slightly divergent in the basal half, then more sharply convergent, and ending by the tips becoming dilated, parallel, and almost in contact with one another; fuscous in the first three-fifths and whitish beyond: in lateral view depressed and dilated ventrally in the middle. Lower appendage about half as long as the upper appendages, almost straight, pointed, abruptly reduced in thickness, dorso-ventrally, towards the apex, glossy black.

♀ (allotype), Mt. Nekando, 23. v. 14.

Length of abdomen 44 mm.; hind wing 38 mm.

Labium: lateral lobes blackish, with the outer margins yellow; median lobe yellowish. Labrum glossy black, with a transversely elongated yellowish spot opposite the clypeus. Clypeus yellow, with some black markings in the central area of the postclypeus. Frons hairy, glossy black, with a pair of large rounded yellow spots. Vertex hairy, glossy black. Antennæ black, with the articulations pale brown. Occipital triangle hairy, glossy black.

Prothorax chocolate-brown, widely bordered with yellow anteriorly.

Meso-metathorax metallic chocolate-brown, with some greenish reflections laterally; the mid-dorsal carina yellow; on each side a broad, uninterrupted, creamy stripe, enclosing the metastigma; another broad creamy stripe crossing the metepimeron.

Wings (Pl. IX. fig. 15) strongly tinged with brown, especially at the tips. Costa black anteriorly, with traces of pale dorsal spot at base; other veins likewise black. Pterostigma 4 mm. long, dark reddish brown, weakly braced. Membranule of hind wing long, brownish. Antenodals of the costal series  $\frac{20.19}{12.12}$ . Postnodals  $\frac{12.11}{13.15}$ . Cross-veins in median space  $\frac{4.4}{3.3}$ ; in cubito-anal space  $\frac{8.8}{6.7}$ ; in supertriangle  $\frac{3.2}{1.1}$ ; and in bridge space  $\frac{6.6}{7.7}$ . Arculus slightly bowed towards base of wing, arising between third and fourth antenodals. Discoidal area in fore wings commencing with three or four cells, followed by two rows of cells as far as the level of base of bridge. Discoidal area in hind wings first with one or two large cells, and then with about four double cells, before the multiplied rows of cells begin. Anal loop in hind wing double; the primary (distal) enclosure containing nine cells, and the secondary (proximal) enclosure four to six cells.

Legs black; femora of fore legs creamy below.

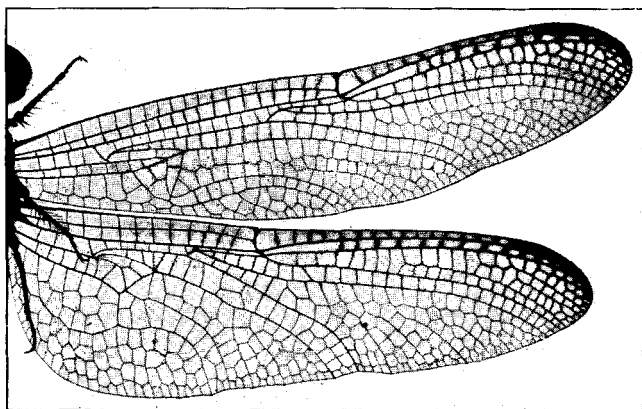
Abdomen a little dilated at segments 5 and 6, black, with segments 2-7 with dark yellow markings as follows:—On 2 a narrow basal edging, connected laterally with a pair of oblique lines, broad below, and ending in an acute point before reaching the mid-dorsal carina near the middle; on 3-7 a pair of basal spots, forming more or less of a ring, and a pair of somewhat rounded spots near the middle, becoming progressively smaller, more transversely linear, and more retracted towards the base of the segment.

Anal appendages nearly 4 mm. long, sublancoate, yellowish, except at the base, where they are black.

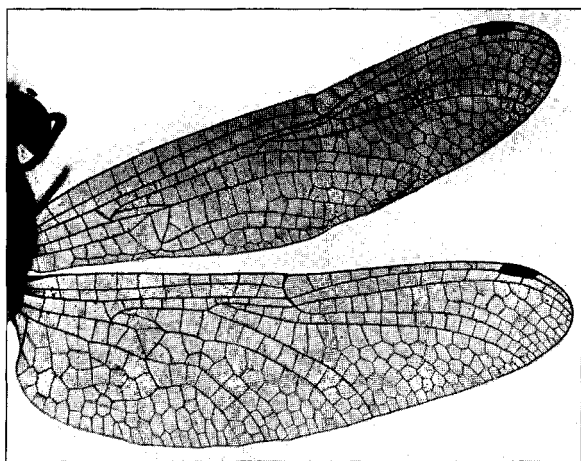
[Ovipositor eaten away, apparently by mites.]

An example of the "freak"-venation which is rife in *Synthemis* and its allies occurs in the right hind wing. Not only are the sectors of the arculus widely separated at their origin, but the triangle is an exaggeration of what occurs normally in, e.g., *Sympetrum*. That is to say, the cross-vein which closes the triangle above takes a downward course, and attaches itself to the distal cross-vein at about two-thirds of the height of the latter, instead of at its summit. A corresponding aberration in the fore wing has been

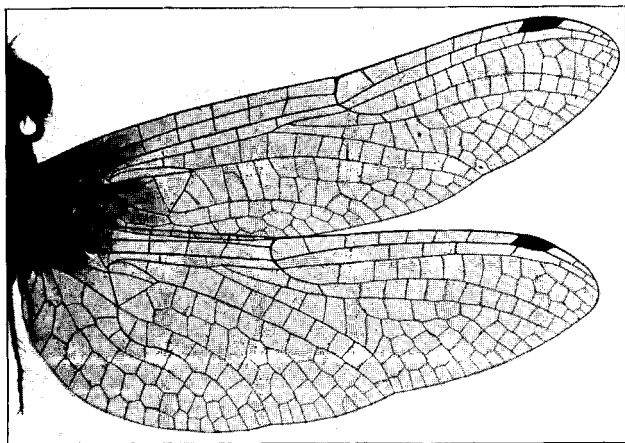
15.



16.



17.



CORDULINE DRAGONFLIES FROM NEW CALEDONIA.



figured for *Synthemis leachii*, Selys, *S. cyanitincta*, Tillyard, and *Pentathemis membranulata*, Karsch.

In the distribution of pale spots upon the abdomen, *S. flexicauda* reminds one of *S. leachii* from South Western Australia, but the new species is the only member of the Synthemini in which the superior anal appendages of the male are parallel and contiguous for any portion of their length.

*Synthemis fenella*, sp. n.

1 ♂ (holotype), Mt. Mou, 20. iii. 14 (725).

Length of abdomen 29 mm.; hind wing 25.5 mm.

Labium metallic black; median lobe bright yellow. Labrum metallic black. Anteclypeus greyish white. Postclypeus metallic black, with a large cuneiform bright yellow spot on each side. Frons metallic black; a very large, somewhat lunulate, bright yellow spot on each side of the median furrow. Vertex and occipital triangle metallic black.

Prothorax metallic black; the anterior border broadly edged with bright yellow.

Meso-metathorax dull black dorsally; metallic black, with bluish or greenish reflections at sides; three broad bright yellow stripes on each side; the first, antehumeral in position, deeply excavated externally in its posterior third; the second enclosing the metastigma; and the third lying upon the metepimeron.

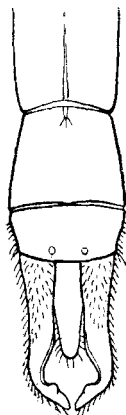
Wings (Pl. IX. fig. 16) entirely hyaline, save for a very slight trace of yellowish brown at the base. Costa yellow, with a yellow basal spot; other veins black. Pterostigma 1.5 mm. long, very broad, dark reddish brown, unbraced. Membranule cinereous. A basal subcostal cross-vein present in each wing. Most of the antenodals in the costal space exactly coincident with the subcostal antenodals;  $\frac{12}{10}, \frac{12}{10}$ . Postnodals  $\frac{7}{10}, \frac{9}{9}$ . Cross-veins in median space  $\frac{3}{3}, \frac{3}{3}$ ; in cubito-anal space  $\frac{5}{6}, \frac{6}{6}$ ; in supertriangle  $\frac{1}{1}, \frac{1}{1}$ ; and in bridge space  $\frac{6}{5}, \frac{6}{5}$ . Arculus arising before the third antenodal in the fore wings, and after the third antenodal in the hind wings. All triangles and subtriangles free. Discoidal area in fore and hind wings for the most part filled with single cells to about the level of the origin of  $M_{1+2}$ . Anal loop in hind wing in two portions, the distal enclosure containing 8-10 cells, and the proximal enclosure 4-6 cells.

Legs black; coxa and femur of fore legs mainly yellow; tibial keels also yellow.

Abdomen a little constricted at segment 3, and somewhat dilated at segments 6-10, with another slight constriction between 8 and 9. Black, with bright yellow markings on 2-8, as follows :—On 2 an oblique line rising upwards and backwards from the auricle on each side, and ending, without reaching the mid-dorsal line, by confluence with a large wedge-shaped spot lying on its distal side; on 3-8 a pair of moderately large rounded spots, lying centrally and close together on 3, but becoming progressively more proximal, wider apart, and more elongated transversely on succeeding segments, supplemented on 3-5 by a pair of smaller rounded spots at the base.

Anal appendages (fig. 11) black. The upper pair as long

Fig. 11.



*Synthemis fenella*, sp. n., ♂, holotype.  
Anal appendages, in dorsal view.

as segments 9 and 10 taken together, almost straight for about two-thirds of their length, then becoming deeply excavated internally, and finally giving rise to an internal prominence and bending sharply inwards towards one another. The lower appendage about two-thirds as long as the upper ones, broad, upcurved, and ending in a rounded point.

In venation and coloration *Synthemis fenella* bears a close general resemblance to *S. claviculata*, Till., from North Queensland. It is immediately distinguished from that species by its smaller size, it being, indeed, the smallest known member of the genus.

Nymph of *Synthemis* sp.

New Caledonia, 1914 (exact data not preserved).

The divergent wing-cases and general form of this nymph proclaim it to be a member of the *Synthemini*, the first of its kind to be found in New Caledonia. Most probably it belongs to one of the large species of *Synthemis* which have just been considered, although it is not possible to associate it with any particular one of them. Unfortunately, a preparation of the rudimentary wings, made by my friend Mr. James Waterston, reveals nothing beyond the fact that the venation is in too undeveloped a condition to afford any guide to specific identification.

While the imagines of the three large species from New Caledonia are most nearly allied to *Synthemis regina*, the single Oceanic nymph is like that of *Eusynthemis guttata* in having the median lobe of the labium produced anteriorly and a conspicuous semicircular plate projecting from the frons. In other ways, however, our specimen fails to agree with that or any other known nymph of the *Synthemini*, for the body is relatively smooth, instead of being distinctly hairy, and the long setæ on the lateral lobes of the mask are exceptionally few in number.

The presence of a frontal plate in nymphs of *Eusynthemis* is one of the principal characters employed by Tillyard for distinguishing that genus from *Synthemis*, and the occurrence of such a plate in an undoubted *Synthemis* nymph would show that the character cannot be used for generic separation in the manner proposed by that author. Indeed, the characters of the genera *Synthemis* and *Eusynthemis* tend to overlap, not only in the nymphs, but in the imagines as well. For example, *Eusynthemis nigra* is a *Synthemis*, if judged by the shape of the abdomen, while *Synthemis spinigera* is a *Eusynthemis*, in respect of the armature of the superior anal appendages. Two characters which remain valid for *Synthemis* are the long anal appendages of the male and the retention of the ovipositor in the female.

*Description* :—

Length, excluding antennæ, 28 mm.

Not conspicuously hairy.

Mask yellowish brown; in position of rest, reaching backwards to a point between the bases of the mid and hind legs; terminal hooks fully exposed; median lobe advanced to a distinctly protruding point; distal border of lateral lobes with 5 distinct teeth on right side and 6 on left side; primary mental setæ, 7 on right side and 8 on left; secondary

setæ, 4 on each side; lateral setæ, 4 on right and 3 on left. Antennæ 3 mm. long, carrying a few fine hairs; the two basal joints dark reddish brown, swollen, the second larger than the first; joints 3-7 light brown; the third joint longer than the fourth and fifth taken together. A conspicuous, dark reddish-brown plate, with a semi-circular anterior border, fringed with coarse yellow hairs, projecting forward from the frons, between the antennæ. Eyes pale brown, rather prominent (considerably larger than in *S. eustalacta*). Greatest width of head 7 mm. The occiput ornamented with a well-marked bilaterally symmetrical pattern, altogether more complex than that figured by Tillyard for *S. eustalacta*, composed of dark reddish-brown markings upon a light brown surface.

Prothorax short and broad; each lateral margin carrying a tuft of long hairs. Wing-cases 8.5 mm. long, light brown, flat, smooth, strongly divergent, reaching backwards to about the level of the middle of the fifth abdominal segment. Legs moderately robust, dark reddish brown.

Abdomen 16 mm. long; unicolorous dark reddish brown; elongate-oval; well-arched above; nearly flat below; smooth, except for a few hairs on the lateral margins of the more anterior segments; segments 2-9 with a posterolateral spine on each side, curved and rather large on the three more proximal segments, straighter and smaller on the five more distal segments. The two lateral anal appendages but slightly curved, the other three more decidedly so.

*Metaphya elongata*, sp. n.

1 ♀ (holotype), Baie Ngo, 10. ii. 14 (201).

In studying this insect I have had before me the unique male and female of *Metaphya micans*, Laidlaw, the type of the genus, from Borneo\*, and the description and figures of *M. tillyardi*, Ris, ♀, from New Guinea†. It agrees with the genotype in the following characters:—Absence of cross-veins in the median space, the cubital space (apart from the anal crossing), the triangles, and the subtriangle of the fore wing; small pterostigma; fore wing with discoidal area beginning with one row of cells, and with  $M_4$  and  $Cu_1$  diverging towards the margin of the wing; coincidence with the arculus of the proximal side of the hind-wing triangle; elongated anal loop, divided longitudinally and cut off

\* Sarawak Mus. Journ. i. no. 2 (1912), ♂; Proc. Zool. Soc. London, 1913, p. 65, ♀.

† Nova Guinea, ix., Zool. p. 497 (1913).

straight at the end; and development of the vulvar lamina into a large spoon-shaped structure. It differs chiefly in having the postanal cell divided, the discoidal area in the hind wing beginning with two rows of cells, and the hind wings relatively narrower and conspicuously shorter than the abdomen. In some of these particulars *M. elongata* agrees with its nearer geographical neighbour, *M. tillyardi*, such as the division of the postanal cell in the fore wing and the doubling of the discoidal cells in the hind wing. In the circumstances, it seems to be advisable to refer this interesting species to the genus *Metaphya*, the range of which is thus greatly extended in an easterly direction.

The following comparison will show that *Metaphya elongata* differs from both its congeners in having the abdomen longer than the hind wing:—

	<i>Metaphya micans</i> , ♀.	<i>tillyardi</i> , ♀.	<i>elongata</i> , ♀.
Abdomen . . . . .	20 mm.	27 mm.	33 mm.
Hind wing . . . . .	23 mm.	31 mm.	28 mm.

It also differs from both of them in respect that the gonapophyses of segment 8 do not project beyond the apex of segment 10. It is possible, however, that this structure has become displaced in our specimen. Another difference between *M. elongata* and *M. micans*, at all events, is to be found in the apical plates of the gonapophyses, which are separate in the genotype, but fused together in the species from New Caledonia.

♀.—Length of abdomen 33 mm.; hind wing 28 mm.

Labium smoky brown. Labrum, clypeus, and frons metallic blue-black. Antennæ black. Median eye-line long. Occipital triangle small, metallic blue-black.

Prothorax pale brown. Meso-metathorax unicolorous dark metallic green, except for a large brownish area in the angle formed by the anterior margin and the humeral suture.

Wings (Pl. IX. fig. 17) hyaline, with basal saffron suffusion, reaching to the triangle in the fore wing and to the second antenodal in the hind wing, where it does not extend posteriorly much below the anal vein. Venation black. Pterostigma 2 mm. long, dark brown. Membranule of hind wing smoky white. Antenodals  $\frac{8.7}{5.5}$ . Postnodals  $\frac{5.5}{6.6}$ . Arculus in both wings nearer the second antenodal than the first. Base of hind-wing triangle slightly proximal to the arculus; the anterior cross-vein joining distally, not  $M_4$ , but the posterior cross-vein. Anal loop containing 12 or 13 cells.

*Ann. & Mag. N. Hist.* Ser. 9. Vol. viii.

5

Legs black, with pale areas at base.

Abdomen somewhat crushed and distorted beyond segment 4; segments 1 and 2 inflated; 3 sharply constricted; 4 and 5 enlarged and cylindrical; 6 and 7 apparently compressed laterally; 8, 9, and 10 rather broad: metallic black, without any pale markings, beyond a moderately broad brownish-yellow ring at the junction of segments 2 and 3. Anal appendages cylindrical, black. Gonapophyses of segment 8 metallic black, not quite reaching the end of the abdomen, rounded at apex, and convex ventrally; the two apical plates fused together into a single piece, weakly carinated mid-ventrally.

Subfamily *LIBELLULINÆ*.

*Orthetrum caledonicum*, Brauer.

1 ♀, Plaine des Lacs, 24. ii. 14 (No. 346); 1 ♂, 2 ♀, Mt. Mou, 9. iii. 14 (465-467); 1 ♀, Mt. Mou, 10. iii. 14 (487).

The single male is olive-brown, like the females, it not yet having acquired the pale blue pruinosity proper to the adult stage of its sex.

*Diplacodes hamatodes*, Burm.

2 ♂, Mt. Canala, 12 & 14. vi. 14.

The individual of later date has an extraordinary amount of saffron suffusion in the wings, and especially in the hind pair, where the coloured area extends beyond the anal loop posteriorly, and touches the nodus anteriorly. In the fore wings the suffusion ceases at about the level of the triangle.

*Diplacodes bipunctata*, Brauer.

2 ♂, Noumea, 24. i. 14 (Nos. 104, 105); 1 ♂, Plaine des Lacs, 18. ii. 14 (No. 265).

These specimens are remarkable for the amount of saffron suffusion at the base of the wings, the colour reaching outwards to about the level of the first antenodal in both pairs of wings. They evidently correspond with the two females from the same island mentioned by Ris (Coll. Selys, Libell. p. 472, 1911), and also with the females from New Zealand to which McLachlan applied the varietal name *novæ-zealandiæ* (Ent. Mo. Mag. xxx. p. 271, 1894). The species itself was originally described from Tahiti and New Caledonia, and it would be interesting to know how far the material before us agrees with Brauer's types.

*Pantala flavescens*, Fabr.

1 ♂ (203), Baie Ngo, 10. ii. 14 ; 1 ♂ (249), 1 ♀ (248),  
 Plaine des Lacs, 17. ii. 14 ; 3 ♂ (349, 350, 352), 1 ♀ (351),  
 Plaine des Lacs, 25. ii. 14 ; 1 ♂, Mt. Nekando, 25. v. 14 ;  
 2 ♀, Canala, 23. vi. 14.

2 nymphs, Mt. Canala, 12. vi. 14.

## EXPLANATION OF THE PLATES.

Wing-photographs by F. W. Campion.

## PLATE VIII.

Fig. 12. *Synthemis miranda*, Selys, ♂, allotype.

Fig. 13. *Synthemis montaguei*, sp. n., ♂, holotype.

Fig. 14. *Synthemis flexicauda*, sp. n., ♂, holotype.

## PLATE IX.

Fig. 15. *Synthemis flexicauda*, sp. n., ♀, allotype.

Fig. 16. *Synthemis fenella*, sp. n., ♂, holotype.

Fig. 17. *Metaphya elongata*, sp. n., ♀, holotype.

III.—*The Old-World Species of Eriocera in the British Museum Collection (Diptera, Tipulidæ).* By F. W. EDWARDS.

(Published by permission of the Trustees of the British Museum.)

[Plate X. figs. 1–12.]

THE genus *Eriocera* \* has long been familiar to students of Nematocerous Diptera, many representatives having been met with and described by the early workers on the order—Wiedemann, Macquart, and Walker ; these were discussed and their number added to by Osten-Sacken ; more recently a considerable number of species have been described by Alexander, Brunetti, Enderlein, and de Meijere, so that at the present time the number of known species is very considerable. Having regard to this fact, and also to the conspicuous and varied ornamentation of many of the species, it is not surprising that attempts have been made to dismember the genus. The first of these (apart from generic

\* With a strict application of the rule of priority, the name *Caloptera*, Guérin, should be used for this genus, since it was published with a recognizable figure (though without verbal description) eight years before *Eriocera*.