NEW ORIENTAL DRAGONFLIES (ORDER ODONATA).

By F. C. Fraser, *Lt.-Col.*, *I.M.S.* (*Retd.*), *F.R.E.S.*

Whilst collecting and examining material for the work on Odonata, in the *Fauna of British India* series, I have come upon several new species, some in my own collection, others in material lent to me and in the British Museum collection. The descriptions of these will ultimately appear in the work mentioned but as there is likely to be some delay before the third volume is published, it seems preferable to publish the descriptions without further delay. Some of the species are not found within Indian limits so that they will not find a place in the *Fauna* volumes and their descriptions must therefore be published elsewhere. The following new species are described :—

Cephalaeschna biguttata.
Gynacantha incisura.
Epophthalmia frontalis malabarensis.
Agrion atrocyana.
Rhinocypha vitrinella.
Indophlebia asiatica.
Macromia flavovittata.
Agrion coomani.

The notation used throughout is the revised one of Dr. R. J. Tillyard.

Family AESCHNIDAE.

Cephalaeschna biguttata, sp. nov.

Male. Abdomen 47 mm. Hindwing 42 mm.

Head. Labium pale ochreous ; labrum darker ochreous ; rest of head, including frons, dark reddish brown with two small submedian spots on postclypeus and a diffuse blackish brown stripe on crest of frons ; eyes brownish ; occiput reddish brown. Prothorax pale yellow ; thorax reddish brown, darker on dorsum which is marked with narrow curved apple-green antehumeral stripes, the upper ends of which are truncate and converge on the antealar sinus ; laterally an oval citron yellow spot on centre of mesepimeron and a similar one on the centre of metepimeron. Legs reddish brown, distal end of femora blackish. Wings hyaline, not enfumed ; pterostigma bright ochreous between black nervures, rather long, braced, covering 3-4 cells ; membrane white ; reticulation rather close ; discoidal cell made up of 5 cells ; 4 to 5 median nervures in fore-wing, 3 to 4 in the hind ; 6 to 7 cubical nervures in all wings ; 7 cells in anal-loop ; 5 in anal-triangle ; nodal index— $\frac{14\text{-}21}{18\text{-}17}\Big|\frac{20\text{-}16}{16\text{-}16}$; other venational details as for genus. Abdomen dark reddish brown to black on dorsum, marked with yellow as follows,—segment 1 with a large spot on each side ; segment 2 with a linear steak on middorsal carina extending from base to apex of segment and a pair of narrow apical dorsal lunules ; laterally a broad stripe which involves the oreillets ; segments 3 to 8 with paired dorsal linear postjugal spots and paired apical lunules ;

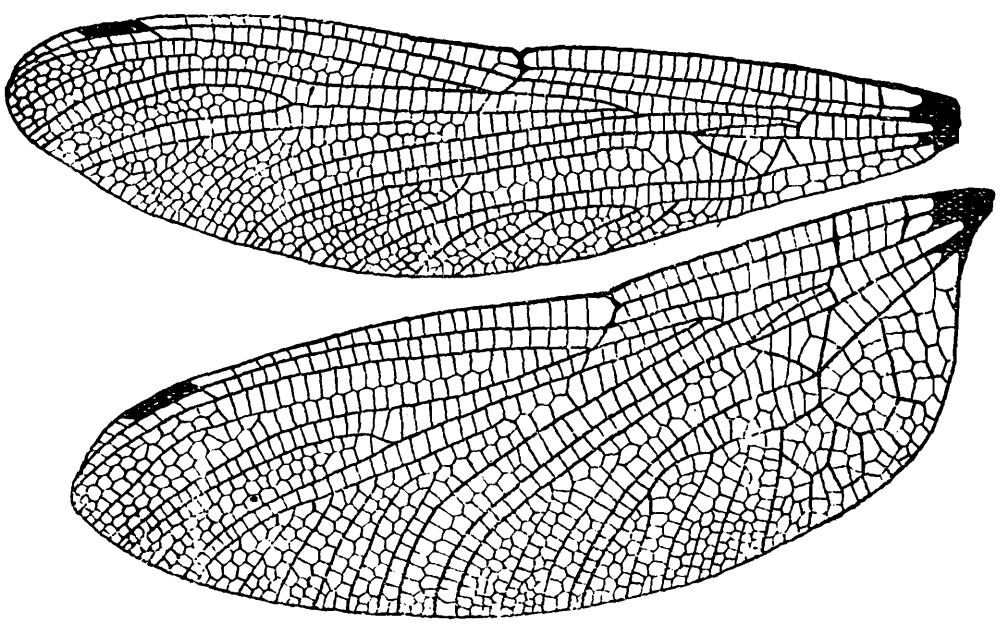
segment 9 with a pair of basodorsal spots ; segment 10 with a pair of subbasal linear spots lying obliquely on segment and converging apically. Anal appendages reddish brown ; superiors twice the length of segment 10, narrow at base and gradually dilated thereafter as far as their middle from which point they are of even width to apex which is obtuse and bears a minute point outwardly ; upper surface coated with long black hairs. Inferior appendage two thirds the length of superiors, narrowly triangular, apex pointed and curled gently upwards.

Distribution.—Assam. The *type*, a male in my own collection, is from Shillong, Khasi Hills and is the only species of the genus which I have seen from that district. The two yellow spots on sides of thorax, which strongly resemble the markings of *Boyeria vinosa* (an American Aeschnid), will serve to distinguish this species from all others of the genus.

Genus **Indophlebia,** nov.

(Text-fig. 1.)

Aeschnine dragonflies of rather large size coloured dark reddish brown marked with green and citron yellow and with wings more or less tinted and enfumed. Head large, globular ; face narrow, frons elevated steeply into a cone, triangular as seen from the front ; eyes very broadly contiguous ; occiput correspondingly small. Thorax short but robust ; legs moderately long and slim ; hind femora with 2 rows of short, closely-set spines of small size and with 5 or 6 more closely crowded ones at the distal end. Wings relatively short and broad, especially the hind in which the



Text-fig. 1.—Wings of *Indophlebia asiatica*, sp. nov., ♀.

basal or anal field shows a development of several minor loops arranged around the major anal-loop ; arc distal to the distal primary antenodal nervure ; reticulation very close ; *IRiii* forked slightly nearer pterostigma than node and with 2 rows of cells between its branches ; *IRii* well developed, extending to quite near the node ; *Rspl* straight, only a single row of cells between it and *IRiii* ; 2 rows of cells between *Cuii* and *IA*

at origins in hindwing; *subcostal nervure prolonged beyond the level of node in forewing*; all hypertrigones, median and cubital spaces traversed by several nervures; discoidal cells rather long, 5 to 6 celled; a well developed supplementary nervure running through discoidal field from discoidal cell; *IA* in all wings markedly pectinate; pterostigma short, about 2 mm. in length, braced; membrane very short. Abdomen tumid at base, remaining segments compressed and of even thickness except 8 and 9 which are a little dilated, and 10 which is very short and entirely without a dentigerous plate. Anal appendages rather long, slim; ovipositor of great length, extending beyond end of abdomen by at least the length of segment 9. Male unknown. Genotype,—*Indophlebia asiatica* sp. nov.

Distribution.—Sikkim and S. China only. This genus is closely allied to *Cephalaeschna* and only distantly allied to the *Aeschnophlebia* group, the only Asiatic representatives of which are known from Japan. It is distinguished from *Aeschnophlebia* by the median or basal space traversed by nervures, and from *Telephlebia*, from Australia, by the short pterostigma, the subcostal nervure prolonged beyond the node in the forewings only, by the absence of a dentigerous plate on segment 10 and by the enormous length of the ovipositor which is comparable to that of *Cordulegaster*.

Indophlebia asiatica, sp. nov.

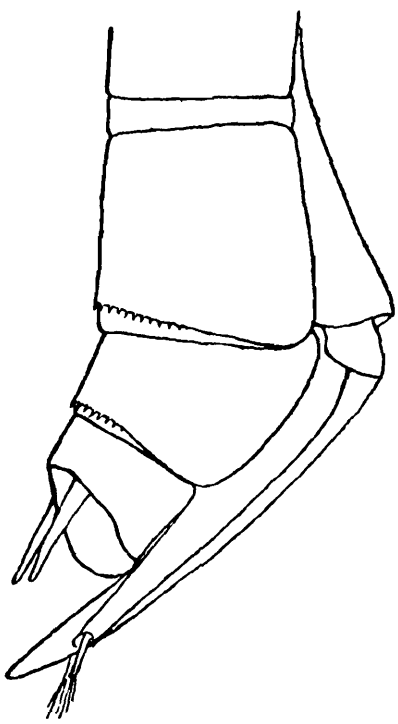
(Text-fig. 2.)

1916. *Caliaeschna (?) acutifrons* Ris, *Suppl. Ent.* No. 5, pp. 55, 56, pl. ii, fig. 5.

Female. Abdomen 50 mm. Hindwing 48 mm. Male unknown.

Head. labium and labrum ferruginous with obscure yellow spots at base of latter; anteclypeus brown; postclypeus olivaceous with two small punctate bright yellow depressions; frons dark ochreous; vesicle, which is very minute, black; occiput dark reddish brown; eyes olivaceous green. Prothorax and thorax dark reddish brown marked with bright citron yellow as follows,—narrow antehumeral stripes extending nearly up to antealar sinus, the upper ends grass green, antealar sinus grass-green, laterally two broad citron-yellow stripes edged narrowly below and behind with black, one on the mesepimeron, the other covering the whole of metepimeron (the upper halves of these stripes grass-green but this may be due to *post-mortem* changes), beneath dull reddish brown. Legs dark reddish brown, distal ends of femora black. Wings hyaline but enfumed smokey brown from apices to base, the central area from discoidal cells to slightly distal of node being almost clear; extreme bases to as far distal as level of arc and the discoidal cells bright amber yellow; pterostigma warm reddish brown, covering 4 cells; membrane dark cinereous; nodal index $\frac{23\text{-}26}{23\text{-}19}\Big|\frac{26\text{-}22}{19\text{-}23}$; 7 cubital nervures in forewing, 7-8 in the hind; 5-6 nervures in median space, of forewing, 5 in the hind; hypertrigones traversed 5-7 times in forewing, 5 in the hind; 5-6 cells in discoidal cells; anal-loop with 13-15 cells and with five other smaller loops arranged around its posterior border. Abdomen blackish brown on dorsum, reddish brown to ochreous on lower part of sides, marked with citron yellow as follows,—segment 1 with a quadrate

greenish yellow spot on each side ; segment 2 with a continuation of this spot as an irregular stripe on each side, a narrow middorsal stripe extending from base to jugal suture and continued very finely from there to apical border ; lastly a pair of narrow apical lunules ; segments 3 to 6 with baso-lateral triangular greenish spots, very narrow paired middorsal spots on jugal suture and a pair of apical lunules ; segment 7 with the apical lunules only ; remaining segments unmarked. Segments 8 to 10



Text-fig. 2.—Genitalia of *Indophlebia asiatica*, sp. nov., ♀, seen from the right side.

strongly tilted upwards by the bulky ovipositor, similar to what is seen in species of the genus *Tanypteryx*.

Distribution.—That of the genus. I have a female from Sikkim, taken at an altitude of 10,000 ft. during September. The prolongation of the subcostal nervure in forewing to beyond node will serve to distinguish this species from any other Indian Aeschnid. Type will be placed in the British Museum.

The far distal situation of the arc, the straight supplements to *IRiii* and *MA* with only a single row of cells intervening and the broad and short discoidal cell of hindwing which approaches that seen in genus *Chlorogomphus*, place this species as one of the most archaic in the subfamily *Aeschnidae*.

Heliaeschna uninervulata Martin.

In the *Journ. Bombay Nat. Hist. Soc.*, Vol. XXVIII, pp. 901, 902 (1922), I described *Amphiaeschna beesoni* as a new species. I find now that this is a race of Martin's *Heliaeschna uninervulata*, differing only in the size and the shape of the superior anal appendages which are broader after the incision, the latter being more cordate than oval. The occiput is olivaceous instead of black and lastly some details of the wing venation differ as follows,—only 3 rows of cells between *IRiii* and *Rspl* instead of

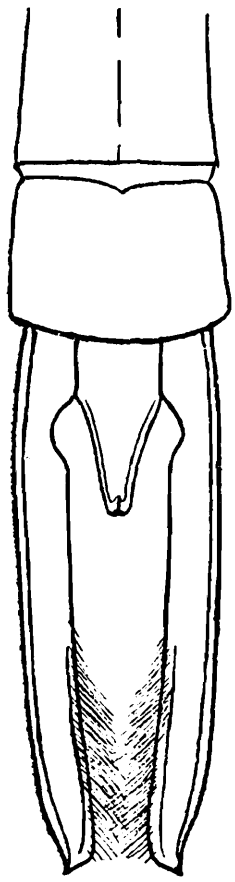
5; only 5-6 cells in discoidal triangles instead of 7; nodal index lower, $\frac{17\text{-}25}{20\text{-}17} \mid \frac{27\text{-}18}{17\text{-}20}$. There is a male in the Williamson collection from Burma, these two specimens being the only ones so far taken within Indian limits.

Gynacantha incisura, sp. nov.

(Text-fig. 3.)

Male. Abdomen 47 mm. Anal appendages 6·5 mm. Hindwing 45 mm.

Head.—Labium bright reddish brown; labrum and face ochreous, olivaceous laterally; a black T-shaped marking on superior surface of frons; eyes olivaceous green; occiput yellow. Prothorax ochreous; thorax olivaceous green with a linear spot of bright yellow on upper part of metepimeron on each side; legs pale reddish or rich ochreous; wings hyaline, untinted but with a narrow edging of brown at all apices; pterostigma ochreous between dark nervures, covering $3\frac{1}{2}$ cells; mem-



TEXT-FIG. 3.—Anal appendages of *Gynacantha incisura*, sp. nov., ♂.

brane cinereous; nodal index, $\frac{17\text{-}19}{18\text{-}17} \mid \frac{20\text{-}17}{14\text{-}19}$; 8 to 9 cells in anal-loop; only 5 cells in all discoidal cells; 6 to 8 cubital nervures in all wings; nervures in hypertrigones variable; only 4 rows of cells between forking of *IRiii*. Abdomen tumid at base, markedly constricted at segment 3; dark reddish brown on segments 1 to 3, black for remaining segments; some obscure apical lunules on segments 2 and 3 but markings largely lost through *post-mortem* changes. Anal appendages: superiors

black, inferior bright ochreous; shaped as shown in fig. 3, the superiors characterized by a deep incision near the base which follows after a dilatation somewhat like that seen in *G. dohrni*, but the apical portion very different from what is found in that species. Female unknown.

Distribution.—Loimwe, S. Shan States, 5,600 ft. Easily determined from all other Indian species by the shape of the superior anal appendages and by the discoidal cells with only 5 cells, which is most unusual in the genus. Type in my own collection will eventually be lodged in the British Museum.

Family LIBELLULIDAE.

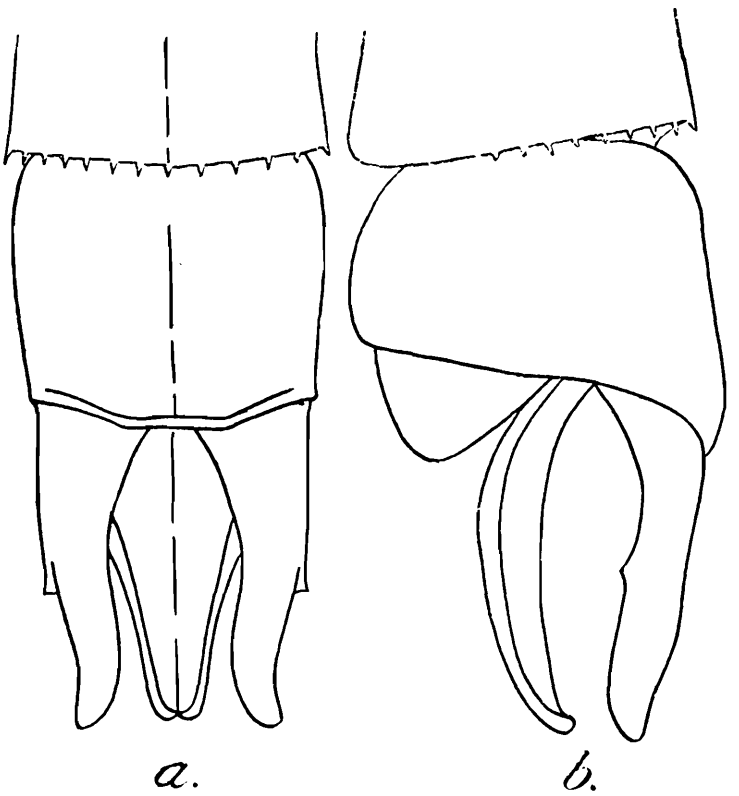
Macromia flavovittata, sp. nov.

(Text-figs. 4 & 5.)

Male. Abdomen 48 mm. Hindwing 41 mm.

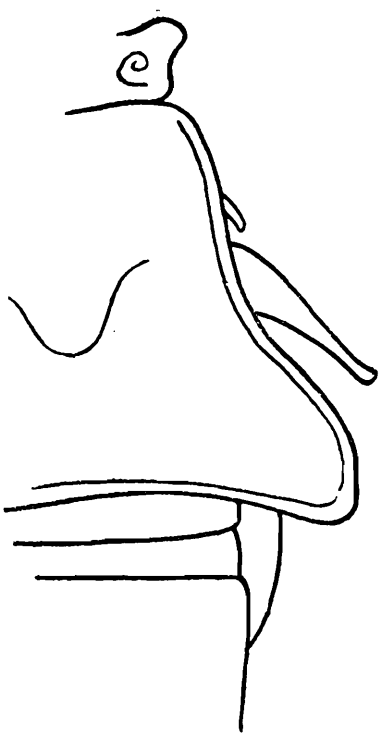
Head.—Labium with midlobe and bases of lateral lobes citron yellow, border of latter broadly brown; labrum bright ochreous very finely bordered with dark reddish brown; anteclypeus dark brown; postclypeus entirely bright citron yellow forming a conspicuous transverse band across face; frons citron yellow with the floor of sulcus above and the front aspect blackish brown; vesicle dark brown with the two points surmounting it bright yellow posteriorly; occiput black; eyes emerald green during life, glossy black behind. Prothorax and thorax dark reddish brown, the latter with a dark blue metallic reflex and marked with citron yellow as follows,—the antealar sinus, a rather narrow humeral stripe not quite attaining upper limit of dorsum, and laterally, an oblique stripe traversing mesepimeron and meeting its fellow on the opposite side by crossing tergum between the roots of wings; beneath two divergent yellow stripes on a reddish background. Legs black, tibial keels conspicuously yellow. Wings hyaline stippled with brown, apices enfumed rather more deeply than rest of wing; costa finely yellow to distal of pterostigma which latter is short, blackish brown and covers about 2 cells; membrane greyish white; nodal index $\frac{10\text{-}16}{10\text{-}10} \mid \frac{16\text{-}10}{11\text{-}12}$; anal-loop 7 celled; 5 cubital nervures in forewing, 3 in the hind; hypertrigones traversed 3 times in forewing, once in the hind; discoidal field beginning with 2 cells and continued as a single row for a distance of 5 cells; anal-triangle 2 celled. Abdomen black, ringed and spotted with citron yellow as follows,—segment 2 with a complete submedian ring occupying nearly half the length of segment and but slightly separated from base dorsally; segments 3 to 6 with paired basodorsal spots, triangular in shape with base resting on jugum and the apex nearly attaining to apex of segments; segment 7 with a broad basal annule deeply indented on middorsum posteriorly and occupying the basal two thirds of segment; segment 8 with a similar annule but shorter and broader; segment 9 with a linear basal dorsal spot; segment 10 unmarked, its dorsum flat and with but a feebly marked carina. Anal appendages dark reddish brown; superiors as long as segment 9, inner border concave but turning out apically, outer border convex near base, concave

near apex and bearing a very small spine at its maximum convexity; apex turned strongly out and very obtuse at end; seen in profile, directed



TEXT-FIG. 4.—Anal appendages of *Macromia flavovittata*, sp. nov., ♂. *a*. Dorsal view. *b*. Seen from the left side.

straight back; inferior of the same length, narrowly triangular, apex turned up somewhat and minutely emarginate.



TEXT-FIG. 5.—Genitalia of *Macromia flavovittata*, sp. nov., ♂.

Distribution.—Darjeeling District, Bengal. Type a male in my own collection from Mungpu, above the Teesta Valley, taken in May.

This species is closely allied to *M. flavicincta* and differs from it by the following points,—discoidal field in forewing with only a single row of cells at beginning, labrum not bordered broadly with black, no yellow spot behind eyes, abdominal segments 3 to 6 with paired dorsal spots instead of annules and lastly, by the different shape of the superior anal appendages which are rounded at apex. It agrees with *M. flavicincta* by the very rare feature of a yellow spot behind the vesicle. (This spot is however absent in my specimens of the latter species from Poona). The same features will serve to separate it from *M. cingulata.*

Epophthalmia frontalis malabarensis, subsp. nov.

1931. *Azuma frontalis* Fraser, *Rec. Ind. Mus.* XXXIII, pp. 447, 452.

Male. Abdomen 50-53 mm. Hindwing 44-46 mm.

Head similar to that of *E. frontalis frontalis* except that the colour is a much darker brownish red almost deepening to black, and the frons and vesicle are very dark metallic blue. Thorax dark blue metallic changing to dark reddish brown on lower parts of dorsum and on metepimeron; markings restricted, the antealar sinus bordered finely with yellow posteriorly, the antehumeral stripes very narrow and pointed above, the oblique stripe on sides very narrow and bordered before and behind with black. Wings hyaline, apices clear, tornus palely tinted with amber yellow in hindwing; nodal index, $\frac{8\text{-}17}{10\text{-}12}\left|\frac{16\text{-}8}{12\text{-}9}\right.$; hypertrigones traversed 3-4 times in forewing, twice in the hind; 4-5 cubital nervures in forewing, 3 in the hind; anal-loop 10-12 celled; pterostigma blackish brown, covering 2 cells; membrane grey with a blackish outer border. Abdomen black marked with bright citron yellow as follows,—segment 2 with a narrow annule similar to that seen in *E. frontalis* but narrower; segment 3 with a narrow annule filling the apical half of space lying between base of segment and jugal suture and broadly interrupted so that it appears as two spots viewed from above; segments 4 to 6 with small paired isolated subbasal spots (in teneral specimens, these spots may be continued laterally and basally to base of segment); segment 7 with a basal annule occupying basal fourth of segment; segment 8 with an annule of half this breadth and sometimes obsolete; segment 9 unmarked; segment 10 with a large rounded dorsal spot confluent or not with a smaller basodorsal spot. (This marking very variable and often more extensive.) Anal appendages blackish brown deepening to black at sides and apices; superiors but slightly longer than segment 10, of similar shape to *E. frontalis* but the lateral spine more prominent and the teeth following it more robust. Inferior appendage variable in length, much longer than superiors in most specimens but of the same length in a few, narrowly triangular with apex curled strongly upwards and minutely emarginate.

Female. Abdomen 55 mm. Hindwing 50 mm.

Closely resembles the male in all but sexual characters. Wings with apices tinted with amber as far proximal as node in forewing and for

nearly that distance in the hind (Adults lose this colouring largely as it appears to fade with age); a dark blackish brown ray in costal, subcostal and basal spaces of hindwing; nodal index higher but other details of venation as for male. The basal annule on segment 3 narrower, segment 9 with a narrow basal annule; segment 10 entirely yellow. Anal appendages shortly conical, yellow. In teneral specimens, less often in adults the yellow spots on frons much reduced, and those of the superior surface of same structure often entirely absent as in *E. vittata cyanocephala.*

Distribution.—Confined to the Western Ghats of India; Malabar and Coimbatore districts. I have taken specimens at Tamaracherry and Calicut and found it not uncommon in the Walayar Forest, on the Coimbatore-Malabar frontier. In the latter place it was in company with *E. vittata vittata* which species outnumbered it in the proportion of 20 to 1. It is easily distinguished from all others occurring within Indian limits except *E. vittata cyanocephala*, from Ceylon, by its extreme melanism and by the paired dorsal spots on abdomen instead of stripes or rings. The yellow spots on upper surface of frons will serve to distinguish it from the Ceylon species. Type and allotype in my own collection; cotypes deposited in the British Museum.

Family AGRIONIDAE.

Genus **Archineura** Kirby.

Mr. J. Cowley informs me that the name *Leucopteryx* which I had adopted for my new genus, the genotype of which is *L. hetaerinoides*, is preoccupied and so calls for a new name. However recently I have had an opportunity of comparing the species mentioned above with *Echo incarnata* Karsch and as a result I have no hesitation in placing them in the same genus. Both *incarnata* and *hetaerinoides* have little in common with the characters of genus *Echo* and undoubtedly deserve generic rank, and as Kirby's *Archineura basilactea* is a teneral specimen of the former species, it seems best to place both in genus *Archineura* with *A. incarnata* (Karsch) as genotype.

In addition to the six males in Mr. Morton's collection, one of which he has kindly given me, I have been able to examine an adult male and female of *A. incarnata* in the MacLachlan collection, as well as the type of *A. basilactea* Kirby in the British Museum. In this latter, the opaque white area at the base of the wings has a distinct pinkish tinge similar to that seen in species of teneral *Hetaerina* which have a similar red basal marking in the adult stage. Moreover the venation is similar to the specimens of *A. incarnata* so that there can be no doubt as to the identification of this specimen.

A. incarnata differs from *A. hetaerinoides* by having the opaque coloured basal wing spots in both fore- and hind-wings and also by having the neuration in this spot of a very close nature. The females of both species however are without the basal wing markings and the basal neuration is of an open character in both, so that the differential characters exist in one sex only. Both sexes have an extremely elongate pterostigma and this in itself is sufficient to remove them from genus *Echo.*

The female in the MacLachlan collection is in a fine state of preservation, as well as fully adult. Head and thorax are similar to the male but more robust; the abdomen is of very heavy build and dark brown with a coppery metallic reflex on the proximal segments, whilst segments 8 to 10 have a pale brownish yellow middorsal stripe continuous from segment to segment. The wings are very long and broad and are evenly tinted with pale brownish yellow, this deepening in the costal and subcostal spaces and between the costa and radius distal to node; venation bright ochreous throughout; pterostigma as elongate as in the male, pale creamy yellow framed darkly in thick nervures. Basal neuration more open than in the male.

Agrion atrocyana, sp. nov.

In the British Museum collection are three specimens of a very large Agrion which some time ago I had provisionally named *Pseudomatrona atrocyana.* A further examination has convinced me that save for the extraordinary shape of the wings, this species cannot be separated from genus *Agrion.* I am further convinced of this by comparing it with *Agrion atrata* which has the wings similarly broadly rounded at the apices although not nearly so broad as in *atrocyana.* A future revision of the genus *Agrion* may call for a separation of these two species which differ so strongly from the rest of the genus. The following is a description of the new species :—

Male. Abdomen 55 mm. Hindwing 47 mm.

Head.—Labium black; labrum and rest of head metallic peacock blue with green reflex in certain lights. Prothorax and thorax peacock blue, black beneath. Abdomen brilliant metallic emerald green, black beneath. Anal appendages one third longer than segment 10, forcipate, slim at base, expanded and compressed in apical half and with 3 robust spines on outer border; inferior slightly shorter, tapering to apex which is obtuse. Legs slim, of great length, black. Wings of great breadth, far more so than in *Matrona,* markedly rounded at apex, basal space entire, arc fractured, discoidal cell as long as median space, traversed 12 to 13 times; *IA* bifurcated, proximal limb running straight to base of wing; opaque black throughout with a steely blue reflex above and below; pterostigma absent in both sexes.

Female. Abdomen 47 mm. Hindwing 45 mm.

Similar to male in all respects save sexual characters.

One of the males is teneral and a beautiful metallic violet throughout.

Distribution.—Two males and a female from Tonkin, in the British Museum collection. I found these three specimens mixed up with those of *Matrona* which they so greatly resembled that the mistake perhaps was justifiable. The enormously dilated wings attracted my attention and it is this feature which is so remarkable and differentiates them from all others of the genus *Agrion.*

Agrion coomani, sp. nov.

Male. Abdomen 60 mm. Hindwing 46 mm.

Head.—Labium pale yellow; labrum glossy black marked with two bright chrome yellow pyriform spots; anteclypeus black; postclypeus brilliant emerald green metallic; rest of head a dull metallic green with an oval reddish brown spot on the outer side of each lateral ocellus; base of penultimate segment of antennae dull ochreous. eyes brown. *Prothorax* and *thorax* a beautiful metallic green on dorsum and sides, carneous beneath, this extending on to sides of thorax as a black bordered stripe on the postero-lateral suture and a second stripe on the posterior border of metepimeron. *Legs* black, coxae and trochanters paler; *wings* long and broad, out of proportion to the small head, body and slender abdomen; forewings hyaline bordered very narrowly with black, this border beginning as a dark costal ray broadening towards the node, then narrowing to apex which is rather broadly tipped with opaque black the inner edge gradually vignetted and not sharply limited as in *A. melli.* Posteriorly the narrow bordering is continued to as far as the level of discoidal cell. The neuration of the whole wing black and the nervures irrorated with this, giving a very coarse appearance to the neuration. Hindwings opaque black with a steely sheen from the apex to within 2 to 3 cells of the discoidal cell, proximal to which the neuration is coarsely black like the forewing, with the cell middles hyaline. Pterostigma absent. *Abdomen* brilliant metallic green throughout on dorsum, segments 8 to 10 black along the ventral borders, yellow beneath. *Anal appendages* black, of the usual generic shape.

Habitat.—Tonkin. The *type* is a male in the Paris Museum and there is another male in my own collection. This species is closely related to *A. melli* (*Ris*), agreeing with it in the colour of the body and labial marking. It differs from that species however by the apex of forewing less broadly black and this marking less sharply defined and by having the whole of the hindwing except base opaque black instead of only the apex as in *A. melli.* The possibility of this insect being the male of *A. grandaeva* (Selys) has not been overlooked but it seems more probable that the male described by Dr. Ris (*Suppl. Ent.* No. 1, p. 54 (1912), which is also from Tonkin, is more likely to be the true male as its neuration formulae agree very closely with the type female of *A. grandaeva,* whereas those of *A. coomani* differ widely. From *A. cornelia* and *laosica,* which belong to the same group, the new species is distinguished by its wings black instead of rich reddish brown.

Agrion laosica, Fraser.

Since I described this fine new species from Laos, Siam [*J. Siam Soc. Nat. Hist.* Suppl., Vol. IX, p. 128 (1933)], I have been able to compare it with *A. cornelia* which I collected in large numbers this year in Japan. I find that the new species is even nearer *cornelia* than I had at first suspected. I now note the following differences,—Labrum with a large yellow spot on each side as in *A. coomani* and *melli,* absent in *cornelia*; postclypeus brilliant metallic green, dull coppery bronze in *cornelia*; wings: distal fourth of forewing paler than the rest of wing