

V A LIST OF THE DRAGONFLIES
RECORDED FROM THE INDIAN EMPIRE
WITH SPECIAL REFERENCE TO
THE COLLECTION OF THE
INDIAN MUSEUM

PART I. THE FAMILY CALOPTERYGIDAE.

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(Plate II).

This is the first part of a series of papers in which I hope to give a full list of the dragonflies of the Indian Empire. The number of species occurring within the limits of the Empire is considerable, as one would expect from the size of the area under consideration, and from the great variety of physical conditions found in different parts of the country.

I hope that these papers will at least serve to show how little is known of this fascinating group of insects, and will stimulate those who are fortunate enough to have opportunities, to add to what is known of them, both of their life-history and of their distribution.

The material used in drawing up the list is as follows:—

Firstly, the large collection of the Indian Museum entrusted to me for revision by Dr. Annandale. The collection contains a very large number of specimens which have been named by the late Baron de Selys. These specimens although unfortunately often dilapidated have an historical value.

Secondly, an extensive collection of several hundreds of specimens sent to me by Mr. H. Stevens from Gopaldhara (Assam).

Thirdly, additions made to the Indian Museum collection in the last two years by members of the Museum staff.

NOTE ON CLASSIFICATION ADOPTED, AND ON NOMENCLATURE.

I follow here Needham in giving family rank to the first of the two great divisions of existing zygopterous dragonflies (Needham, *Proc. U.S. Nat. Mus.*, XXVI, p. 742; 1903).

This procedure is adopted by Ris in the paper quoted below, and in other recent papers; by Muttkowski and others.

Following the example set by Ris and Tillyard, two amongst the foremost entomologists of to-day, I retain for the family the name Calopterygidae, using the term as synonymous with Selys'

Calopteryginae, and equivalent to Kirby's Agrioninae. Further I propose in this series of notes to use the term Agrionidae as equivalent to Kirby's Coenagrioninae. I am aware that this is opposed to the views and practice of authorities on nomenclature. I comfort myself with the reflection that if I sin, it is in good company. Needham (*loc. cit.*) allows three subfamilies for existing Calopterygidae. One of these, Thorinae, is entirely (tropical) American. The second which he calls Vestalinae I prefer with Tillyard to label Calopteryginae; the third is his Epallaginae, less the genera *Rhinocypha*, *Micromerus*, *Libellago* (and *Rhinoneura*). I propose to erect a separate subfamily the Libellaginae to contain these. They form a compact natural group readily distinguished from the Epallaginae their nearest relatives. I admit that they are probably a specialized offset from the Epallagine series, but it is I believe convenient to contrast them with typical members of that series.

In the matter of quotations I give references as a rule only to papers published subsequently to Kirby's Catalogue of Odonata, and to that invaluable work of reference.

The following list of the Calopterygidae recorded from the Indian Empire includes 14 genera, or 66 per cent of the genera found in the Oriental Region, and no less than 35 per cent of all existing genera known; allowing 40 genera for the whole world. And this wealth is the more striking in that Peninsular India and Ceylon are by no means rich in genera or species of the family.

The Indian genera fall into two main categories.

A.—Genera largely confined to the mountain-systems of the North-East, often extending east to China and even Japan.

CALOPTERYGINAE.

Mnais.
Matrona.
Caliphaea.

EPALLAGINAE.

Bayadera.
Anisopleura.
Philoganga.

B.—Genera with wide distribution in Indo-Malaya.

CALOPTERYGINAE.

Neurobasis.
Vestalis.

EPALLAGINAE.

Pseudophaea.

LIBELLAGINAE.

Rhinocypha.
Micromerus.

Lastly, *Echo* extending through Assam and Burma into China, reaches also down the Malay Peninsula into Sumatra.

Group (A) can be reinforced by sections of the genus *Rhinocypha*, viz. *unimaculata* and *trifasciata*.

Group (B) might reasonably include the section *fenestrata* of the same genus.

It will be noticed that Ceylon and Peninsular India have only representatives of group B.

Sub-family <i>CALOPTERYGINAE</i> .		Range.
		All tropical and temperate continental lands except Australia.
Genus	Species	
<i>Echo</i>		Assam, Burma, Malay Peninsula, S. China, Tonkin, Sumatra.
<i>Mnais</i>	<i>margarita</i> , Selys	Assam, Burma.
	<i>andersoni</i> , McLachlan	Burma, Japan, China.
	<i>earnshawi</i> , Williamson	Burma, Yunnan.
<i>Matrona</i>		Burma.
	<i>basilaris</i> , Selys ? race	Burma, Assam, West China, Japan, Tonkin.
	<i>nigripictus</i> , Selys	Himalaya, Moupin, Indo-China, Burma, Assam.
	? sp.	Himalaya.
<i>Neurobasis</i>	<i>chinensis</i> (Linn.)	Oriental Region to N. Guinea.
<i>Vestalis</i>		Oriental, with well-marked races in Celebes, Philippines and N. Guinea.
	<i>gracilis</i> (Ramb.)	Indian Empire, Indo-China, Malay Peninsula and islands to Philippines.
	<i>apicalis</i> , Selys	India, Ceylon, Burma, Assam, Tonkin.
	<i>smaragdina</i> , Selys	Ceylon, S. India.
<i>Caliphæa</i>	<i>confusa</i> , Selys	Burma, S. China.
		Nepal, Assam, S. China.
		Nepal, Assam.

Sub-family <i>EPALLAGINAE</i> .		Tropical continental lands (except Africa and Madagascar), S. E. Europe, Asia Minor.
Genus	Species	
<i>Bayadera</i>	<i>indica</i> (Selys)	Himalaya, Indo-China, S. China.
	<i>hyalina</i> , Selys	Darjiling, Assam.
<i>Epallage</i>	<i>fatima</i> (Charp.)	Khasia Hills, Kurseong, Formosa.
<i>Anisopleura</i>		Greece, Asia Minor, Persia, Kashmir.
	<i>comes</i> , Hagen	As genus.
	<i>lestoides</i> , Selys	Himalayas to Burma.
	<i>furcata</i> , Selys	Himalayas to Assam.
<i>Pseudophaea</i>		Himalaya, Tonkin.
	<i>dispar</i> (Ramb.)	Burma.
	<i>ochracea</i> (Selys)	Indian Empire, Indo-China, S. China, Malaya to Philippines.
	<i>brunnea</i> (Selys)	Nilghiri Hills.
	<i>masoni</i> (Selys)	Burma to Malay Peninsula, Indo-China (Borneo?).
	<i>splendens</i> (Selys)	Burma to Indo-China.
	<i>carissima</i> , Kirby	Burma, Indo-China.
<i>Philoganga</i>	<i>montana</i> , Selys	Ceylon.
		Ceylon.
		Himalaya, S. China.
		Darjiling.

Sub-family <i>LIBELLAGINAE</i>		Old-world Tropics.
Genus	Species	
<i>Rhinocypha</i>		India (excl. Ceylon), Assam, Burma, Oriental Region to N. Australia and Solomon Is.
group <i>tri-fasciata</i>	<i>trifasciata</i> , Selys	Darjiling and westward.
	<i>bifasciata</i> , Selys	Assam.
	<i>immaculata</i> , Selys	Assam, Khasia Hills.

group <i>fenestrella</i>	{ <i>cuneata</i> , Selys <i>fenestrella spuria</i> , Selys " <i>quadrinaculata</i> , Selys	Darjiling to Assam. Khasia Hills, Burma.
group <i>trimaiculata</i>	{ <i>t. imaculata</i> , Selys <i>unimaculata</i> , Selys <i>ignipennis</i> , Selys	Himalayas to Burma. Assam. Himalaya, Darjiling to Assam. Assam.
group <i>fenestrata</i>	{ <i>iridea</i> , Selys <i>bisignata</i> , Selys <i>perforata</i> (Perch.) <i>biforata</i> , Selys <i>whiteheadi</i> , Kirby	Burma. Deccan. Burma, Siam, Malay Pen., Hainan. Burma, Siam, Malay Peninsula. Assam, Tonkin, Hainan.
<i>Micromerus</i>		India, Ceylon, Indo-China, Malaya. Philippine Is., Celebes.
	<i>lineatus</i> (Burm.)	India, Ceylon, Assam, Burma, Malaya.
<i>Libellago</i>	<i>finalis</i> , Selys	Ceylon. Tropical Africa, Burma to Philippine Is.
	<i>asiatica</i> , Selys	Burma, Tonkin, Philippine Is.

The accompanying diagram will serve to show at a glance the distribution of Indian genera so far as it is known to me. Genera occurring in neighbouring subregions which do not extend into the limits of India are named in brackets. Dotted lines between districts are intended to show that the faunistic relations of such districts are very close. I should add that the diagram was suggested to me by those in Mr. Beddard's book on Zoogeography.

Genus *Echo*, Selys.

I. *Echo margarita*, Selys.

Echo margarita, Kirby, *Cat. Odonata*, p. 101 (1890).

" " Laidlaw in *Fascic. Malayenses* (Zoology), pt. I, p. 192 (1903).

I ♂. Cherrapunji, Assam. ($\frac{8201}{20}$), x-14 (S. W. Kemp).

Type locality of the species.

When I defined the genus *Climacobasis* for a male specimen of the species which I then called *C. lugens*, I had not seen a male example of this species, or indeed of any species of the genus *Echo*. The present example differs from the female in having an elongate pterostigma, exactly like that of my *Climacobasis*. The only character then separating *Climacobasis* from *Echo* falls to the ground and *Climacobasis* must be regarded as a synonym of *Echo*.

The following list of the species of the genus may be useful:—

Echo margarita, Selys.

Echo margarita, Kirby, *Cat. Odonata*, p. 101 (1890). Loc. Assam.

Race *tripartita*, Kirby, *Cat. Odonata*, p. 101 (1890). Khasia Hills.

Echo uniformis, Selys.

Echo? uniformis, Kirby, *Cat. Odonata*, p. 101 (1890). Sumatra.

Echo uniformis, Kruger, *Stettin Entomol. Zeit.*, 1898, p. 72.

Echo iricolor? Kruger, *loc. cit.*, p. 72.

Echo incarnata, Karsch.

S. China.

Echo incarnata, Karsch, *Berlin. Ent. Zeitschr.*, XXXVI, p. 455 (1891).

" " *id.*, *Entomol. Nachr.*, XX, p. 84.

PALAEARCTIC REGION.

<p>KASHMIR</p> <p><i>Epallage</i> 1 (? <i>Calopteryx</i>)</p>	<p>HIMALAYA</p> <p>*<i>Rhinocypha</i> 2</p> <p><i>Matrona</i> 1 <i>Bayadera</i> 2 <i>Neurobasis</i> 1 <i>Anisopleura</i> 2 <i>Caliphaea</i> 1 <i>Philoganga</i> 1 *<i>Rhinocypha</i> 3</p>	<p>ASSAM</p> <p><i>Echo</i> 1 { <i>Bayadera</i> 2 <i>Matrona</i> 1 { <i>Anisopleura</i> 2 <i>Neurobasis</i> 1 <i>Vestalis</i> 1 { *<i>Rhinocypha</i> 4 <i>Caliphaea</i> 1 { <i>Micromerus</i> 1</p>	<p>INDO-CHINA</p> <p>{ <i>Psolodesmus</i> <i>Calopteryx</i> <i>Dysphaea</i> <i>Tetraneura</i> }</p>
<p>IRANIA</p>	<p>CENTRAL INDIA</p> <p><i>Neurobasis</i> 1 <i>Micromerus</i> 1 <i>Vestalis</i> 1 ?</p>	<p>BURMA</p> <p>{ <i>Echo</i> 1 { <i>Bayadera</i> 2 <i>Matrona</i> 1 { <i>Anisopleura</i> 2 <i>Mnais</i> 2 { <i>Pseudophaea</i> 6 <i>Neurobasis</i> 1 { *<i>Rhinocypha</i> 4 <i>Vestalis</i> 2 { <i>Micromerus</i> 2 <i>Libellago</i> 1</p>	
	<p>W. DECCAN E.</p> <p><i>Neurobasis</i> 1 <i>Pseudophaea</i> 1 <i>Neurobasis</i> 1 <i>Vestalis</i> 2 <i>Rhinocypha</i> 1 <i>Vestalis</i> 2 (?) <i>Micromerus</i> 1 <i>Rhinocypha</i> 1 ? <i>Micromerus</i> 1 <i>Micromerus</i> 1 ?</p>	<p>MALAYA</p> <p>{ <i>Dysphaea</i> } { <i>Tetraneura</i> }</p>	
	<p>CEYLON</p> <p><i>Neurobasis</i> 1 <i>Pseudophaea</i> 2 <i>Vestalis</i> 2 <i>Micromerus</i> 2</p>		

* Numbers after *Rhinocypha* refer to groups not species.

Archineura basilactea, Kirby, *Ann. Mag. Nat. Hist.* (6) XIII, pp. 84-86, text figs. (1894).

" " *id.*, *op. cit.*, pp. 455-456.
Archineura incarnata, McLachlan, *Ann. Mag. Nat. Hist.* (6) XVII, p. 370 (1896).

Echo modesta (Laidlaw).

Malay Peninsula.

Echo modesta, Laidlaw, *Proc. Zool. Soc. London*, 1902 (1), p. 84, pl. vi fig. 6.

Echo (Climacobasis) modesta, Laidlaw in *Fascic. Malayenses* (Zoology), pt. I, p. 191 (1903).

Climacobasis modesta, Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 186, fig. 17 (1904).

Climacobasis lugens, Laidlaw, *Proc. Zool. Soc. London*, 1902 (1), p. 85, pl. vi, fig. 5.

Echo maxmia, Martin.

Tonkin.

Echo maxmia, Martin, *Mission Pavie*, Neuroptères (sep.), pp. 16-17.

The confusion which has arisen in the synonymy of this interesting genus appears to me to be due to the fact that de Selys founded the genus on a female specimen of *E. margarita* the wings of which he figured.

The females of all the species of the genus so far as is known have very small trapezoidal pterostigmata. When attempting to find a place for the male of *E. modesta* I was struck by the considerable length of the pterostigmata which contrast markedly with the small corresponding structure of the female (see Williamson's photographic figures, *loc. cit.*).

When Selys described the male *E. margarita* he did not call attention to this difference in the sexes, and I was not aware of its existence.

The male of *E. uniformis*, however, appears from Kruger's account to have a small pterostigma like the female.

The same peculiarity evidently largely induced Kirby to erect the genus *Archineura* for the large *E. incarnata*, but he had a further justification in the dense reticulation of the anal area in that species. I do not know the female of this species, nor have I seen an example of Martin's *E. maxmia*, but I am now of the opinion that all these species may properly be referred to the Selysian genus.

Genus *Matrona*, Selys.

2. *Matrona basilaris*, Selys.

Matrona basilaris, Kirby, *Cat. Odonata*, p. 100 (1890).

" " McLachlan, *Ann. Mag. Nat. Hist.* (6) XVII, p. 370 (1896).

" " Martin, *Mission Pavie*, Neuroptères (sep.), p. 15 (1904).

Matrona nigripectus, Kirby, *loc. cit.*, p. 100.

" " Martin, *loc. cit.*, p. 15.

Matrona basilaris race *nigripectus*, Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), p. 52 (1891).

See also Foerster, *Ann. Soc. Ent. de Belgique*, XLI, p. 206 (1897).

I have before me eight examples of the genus representing probably two distinct races, and have examined the material in the

British Museum. The former include 1 ♀ "Upper Assam." Length of hind-wing 49 mm.; breadth of hind-wing 17 mm. Neuration especially at base of wings more complicated than in other specimens ($\frac{1.6.2.3}{9}$).

2 ♂ ♂ 2 ♀ ♀ Cherrapunji, Assam, alt. 4,000 ft., taken by S. W. Kemp.

Length of hind-wing, ♂	37.5 mm.
" " " ♀	37 "
Breadth " " ♂	12 "
" " " ♀	12 "

2 ♂ ♂ 1 ♀ Shillong, Khasia Hills ($\frac{6.3.0.6-6.3.0.7}{2.0}$).

Length of hind-wing, ♂	41 mm.
" " " ♀	44 "
Breadth " " ♂	14 "
" " " ♀	14.5 "

The males agree in colouring with the race '*nigripectus*.' It is evident that more material is required here to estimate specific values.

Genus *Mnais*, Selys.

3. *Mnais andersoni*, McLachl.

- Mnais andersoni*, Kirby, *Cat. Odonata*, p. 101 (1890).
 " " Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), p. 485
 (1891) (*partim*).
 " " Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 185
 (1904).

The Museum collection contains a single adult male of this species, in poor condition. It is from Leito in Burma, and bears a label written by de Selys. ($\frac{3.9.2.0}{1.3.0}$).

4. *Mnais earnshawi*, Williamson.

- Mnais earnshawi*, Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 185,
 fig. 16 (1904).
 " " Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), p. 485
 (1891) (*partim*).

Not in the Museum collection. I have not seen an example of this species.

Known only from Burma. Distinguished from *M. andersoni*, so far as the males are concerned, by the venation of the wings being yellowish red, in *andersoni* it is black.

Genus *Vestalis*, Selys.

5. *Vestalis smaragdina*, Selys.

- Vestalis smaragdina*, Kirby, *Cat. Odonata*, p. 103 (1890).
 " " Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX),
 p. 488 (1891).
 " " subsp. *velata*, Ris, *Supplementa Entomologica*,
 No. I, p. 56, t. iv, fig. 2 (1912).

2 ♀ ♀ 1 ♂ Cherrapunji, Assam, 4,400 ft., 2—8-x-14 (S. W Kemp) ($\frac{8.18.9}{2.0}$).

Recorded from Khasia Hills; Meteles (Burma) by de Selys; Moupin (M'Lachlan); Tsa-Yin-San (Kwang-Tung) by Ris as sub-species *velata*.

6. *Vestalis gracilis* (Ramb.).

- Vestalis gracilis*, Kirby, *Cat. Odonata*, p. 102.
 ,, ,, Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), p. 55 (1891).
 ,, ,, Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 183, fig. 15 (1904).
 ,, ,, Martin, *Mission Pavie*, Neuroptères (sep.), p. 15.
 ,, ,, Laidlaw, *Rec. Ind. Mus.*, VIII, p. 340.

The limits of the range of this species are not sufficiently known. Williamson records it for Burma and Lower Siam. The Abor Expedition obtained examples in Assam, and I have specimens from Gopaldhara taken by Mr. Stevens. The Museum has specimens from Sibsagar ($\frac{6.30.3}{2.0}$). Also the Museum collection includes spirit specimens from Cochin State, 5 ♂ 4 ♀, which are certainly *gracilis*. They differ from the Assam-Burmese specimens in one respect, the metallic colouring of the body is coppery in hue, that of the eastern and northern specimens is brilliant emerald green.

I have not seen specimens from the great river-valleys; nor yet from the hills west of Assam, but the collection contains a damaged female specimen from Cutch ($\frac{2.9.3}{4}$).

7. *Vestalis apicalis*, Selys.

- Vestalis apicalis*, Kirby, *Cat. Odonata*, p. 102.
Neurobasis apicalis, id., *Proc. Zool. Soc. London* 1891, p. 204, pl. xx, fig. 2.
Vestalis apicalis, id., *Journ. Linn. Soc. (Zool.)* XXIV, pp. 558-559 (1893).

A characteristic species of Ceylon and apparently also of Southern India. I found one specimen a female in a tube with three examples of *V gracilis*, taken apparently at the same time and in the same place with them in Cochin State ($\frac{8.2.5}{2.0}$).

The collection includes also an imperfect male ($\frac{3.9.1.8}{1.3}$) and an immature female ($\frac{3.9.1.8}{1.3}$), both from Ceylon. I have also seen examples from Kadur district (Mysore) in the British Museum.

Genus *Caliphaea*, Selys.

8. *Caliphaea confusa*, Selys.

(Pl. II, fig. 1).

- Caliphaea confusa*, Kirby, *Cat. Odonata*, p. 108.
Notholestes elwesii, McLachlan, *Ent. Mon. Mag.*, XXIV, p. 31 (1887).
 ,, ,, Kirby, *Cat. Odonata*, p. 111.
 See also McLachlan, *Ann. Mag. Nat. Hist.* (6) XVII, p. 371 (1896).

The position of the genus is obscure. Features of the neuration worthy of remark are: the petiolation of the wings, the posi-

tion of the nodus at one-third of the wing length from the wing base, and the characters of the sectors of the quadrilateral. These points I think all suggest specialization. The metallic body-colour and the shape of the anal appendages of the male may indicate a relationship to the Calopteryginae, rather than to the Epallaginae. I am inclined to regard *Caliphaea* as an early offshoot from the main Calopterygine stem which has undergone specialization along lines of its own. I am indebted to Mr. Stevens for specimens and to Messrs. H. and F. E. Champion for the photograph showing the wings of a male.

Genus *Anisopleura*, Selys.

9. *Anisopleura lestoides*, Selys.

Anisopleura lestoides, Kirby, *Cat. Odonata*, p. 108.

" " Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), p. 489.

I have examined specimens of this form from the neighbourhood of Darjiling, and from Mr. Stevens's collection from Gopaldhará, where the species appears to be abundant.

10. *Anisopleura comes*, Hagen.

Anisopleura comes, Kirby, *Cat. Odonata*, p. 108.

" " Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), p. 459.

This, the largest species of the genus, is common near Darjiling, and I have seen specimens from Kurseong (*N. Annandale*) as well as many from Gopaldhara in Assam (*H. Stevens*). The latter are distinctly smaller than those from further west. I have also seen specimens from the Forestry Research Museum taken near Bhowali, Kumaon.

11. *Anisopleura furcata*, Selys.

Anisopleura furcata, Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), p. 488 (1891).

" " Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 181, fig. 13.

Recorded by Selys from Puepoli in Burma (*loc. cit.*), where it was collected by Fea.

Genus *Bayadera*, Selys.

12. *Bayadera indica* (Selys).

Bayadera indica, Kirby, *Cat. Odonata*, p. 108 (1890).

" " Martin, *Mission Pavie*, Neuroptères (sep.), p. 15.

" " Ris, *Supplementa Entomologica*, No. I, p. 49 (1912).

Specimens are in the Museum collection from Lord Carmichael's collection, taken in May in the Darjiling district at an altitude of from 1,000-3,000 ft. above the sea. (C.C. 1163, etc.).

13. *Bayadera hyalina*, Selys.

Bayadera hyalina, Kirby, *Cat. Odonata*, p. 108.

" " Ris, *Supplementa Entomologica*, No. I, pp. 50-52, text-fig. 3, taf. iv, fig. 1 (1912).

Recorded from the Khasia Hills by Selys. A single damaged and very mature male collected by Mr. Stevens probably belongs to this species. It has the wings evenly tinged with yellow, so that at first sight it resembles somewhat *Euphaea ochracea*.

Genus *Pseudophaea*, Kirby.

14. *Pseudophaea dispar* (Ramb.).

Pseudophaea dispar, Kirby, *Cat. Odonata*, p. 109 (1890).

Not in the Museum collection. Known from Southern India only.

15. *Pseudophaea splendens* (Selys).

Pseudophaea splendens, Kirby, *Cat. Odonata*, p. 110 (1890).

" " *id.*, *Four. Linn. Soc. London (Zool.)* XXIV, p. 560 (1893).

2 ♂ ♂ Nalanda, Ceylon. ($\frac{3899}{13}$).

This fine species is I think a local development of the stock to which also *P. variegata* (Ramb.) belongs.

16. *Pseudophaea carissima*, Kirby.

Pseudophaea carissima, Kirby, *Fourn. Linn. Soc. London (Zool.)*, XXIV, pp. 559-560 (1893).

" " var. *viridissima*, *id.*, *loc. cit.*

Evidently closely allied to *P. splendens*.

Not in the Museum collection. I have examined the type and other specimens in the British Museum.

17. *Pseudophaea masoni* (Selys).

Pseudophaea masoni, Kirby, *Cat. Odonata*, p. 110.

" " *id.*, *Ann. Mag. Nat. Hist.* (6) XIV, p. 113 (1894).

Euphaea masoni, Laidlaw, *Fascic. Malayenses (Zool.)*, Pt. I, p. 194.

" " Martin, *Mission Pavie*, Neuroptères (sep.), p. 15 (1904).

" " Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 182 (1904).

Not in the Museum collection.

In addition Martin (*loc. cit.*) gives *Pseudophaea bocki*, McLachlan as a species from 'India.' This is a Sumatran species which he records also from Tonkin. As he does not give a more precise localization I only make note of it here and hope that I shall be able to get fuller information from Mr. Martin later.

18. *Pseudophaea ochracea* (Selys).

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

Euphaea ochracea, Selys, *Ann. Mus. Civ. Genova*, (2) X, pp. 56-57 (1891).

" " Laidlaw, *Proc. Zool. Soc. London* 1902 (i), p. 87.

" " Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 181, fig. 14 (1904).

" " Martin, *Mission Pavie*, Neuroptères (sep.), p. 15 (1904).

The Museum collection contains only a single damaged male of this species. It is fairly common in the Malay Peninsula. The Museum specimen is from Puepoli, Burma.

19. *Pseudophaea brunnea* (Selys).

Pseudophaea brunnea, Kirby, *Cat. Odonata*, p. 109.

Euphaea brunnea, Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), p. 57.

" " Martin, *Mission Pavie*, Neuroptères (sep.), p. 15 (1904).

This is a large form closely allied to the smaller *P. ochracea*. A very similar large species or subspecies from Lombok has been named *Euphaea lava* by Foerster, but I am not able to find the reference.

P. brunnea is not in the Museum collection.

Genus *Philoganga*, Kirby.

= *Anisoneura*, Selys (nom. praeocc.).

20. *Philoganga montana* (Selys).

Philoganga montana, Kirby, *Cat. Odonata*, p. 111.

See also Ris, *Supplementa Entomologica*, 1912, No. 1, pp. 44-48, fig. 1.

The position of this remarkable genus in the subfamily Epalaginae is doubtful. Other genera included by Selys in the legion *Amphipteryx*, which do not concern us here, though not necessarily allied to *Amphipteryx* will also probably require to be removed from the subfamily.

Genus *Rhinocypha*, Ramb.

This is the most characteristic genus of dragonflies of tropical Asia, striking both in respect of the great beauty and brilliance of its members and of the abundance of species. In the whole Oriental Region the island of Ceylon and the great valleys of N. India alone are lacking in representatives.

The arrangement I have adopted in the following list differs a little from that hitherto used, especially in the grouping together of *R. unimaculata* and *R. trimaculata*. I believe these species to form a natural group within the genus. I hope that students who have the good fortune to be able to study these fascinating and exquisite insects in the field will soon furnish us with information as to their life-history and habits.

Mesothoracic triangle reaching the antealar sinus.

Triangle very large, rather rounded at apex ... Group *trifasciata*.

Wings of male opalescent, hind-wings with opaque bands ... spp. *trifasciata*, *bifasciata*.

Wings colourless in both sexes... sp. *immaculata*.

Triangle large, pointed at apex; in the female in some cases not reaching the antealar sinus.

Wings of males broad, with brilliant amethyst iridescence and rich purple opacities ... Group *fenestrella*.

Mesothoracic triangle not extending one-half the length of the mid-dorsal carina. Wings of males

narrow, with amethyst iridescence and purple opacities ... Group *fenestrata*.
 No mesothoracic triangle; wings of males with rich coppery iridescence. Tibias and femurs of females with light marks on anterior surfaces ... Group *unimaculata*.

The males of the groups *immaculata*, *fenestrella* and *fenestrata* all have the anterior surfaces of the hinder pairs of tibias of a beautiful chalky white colour, which, as Annandale has remarked, are shown conspicuously by them when mating. Of the group *unimaculata*, the species *unimaculata* has this surface of the tibias of a yellowish colour, *trimaculata* is said by Selys to have them "probably whitish" (Selys, *Monograph. Calopt.*, p. 212); *ignipennis* seems to be without this character. In passing it may be remarked that the males of the Bornean species *R. cucullata*, Selys, have the anterior surface of the two hinder pairs of tibias not white but of a vivid chalky blue.

Group IMMACULATA.

21. *Rhinocypha trifasciata*, Selys.

(Pl. II, fig. 2).

R. trifasciata, Kirby, *Cat. Odonata*, p. 113 (1890).

5 ♂ ♂. Kailana, N.-W. Provinces (*J. C. Moulton*).

It seems likely that this form has a westernly distribution, whilst the next, *viz.* *R. bifasciata*, Selys, is its representative in Burma and Assam.

22. *Rhinocypha bifasciata*, Selys.

R. bifasciata, Kirby, *Cat. Odonata*, p. 113.

3 ♂ ♂. Gopaldhara (*H. Stevens*).

This form is so closely allied to the preceding that it may be treated as a local race; or, by reason of its differences from *R. trifasciata* being constant, as a distinct species according to the views held by the list maker. I prefer to treat it as distinct as a matter of convenience.

1 ♀ (?). Gopaldhara, 4-x-14 (*H. Stevens*).

The mesothoracic triangle is continued up to the antearlar sinus, the outer two-thirds of the pterostigma is of a bright-yellow colour. The mesothoracic triangle is not by any means as broad as in the female of *R. immaculata*, where it equals in size that of the male. Antero-lateral bands and postero-lateral spots are present on segments 2, 3, 4 of the abdomen. The specimen is fully adult.

23. *Rhinocypha immaculata*, Selys.

R. unimaculata, Kirby, *Cat. Odonata*, p. 113 (misprint).

R. immaculata, *id.*, *ibid.*, p. 186.

2 ♂ ♂ 3 ♀ ♀ ($\frac{82}{20}$), Cherrapunji, Assam, 4,400 ft., 2—8-x-14 (*S. W. Kemp*).

The female differs from the male in colour, mainly in that the markings on the head and dorsum of the thorax are of a yellowish green colour instead of being bright blue. The large mesothoracic triangle, so conspicuous in the male, is outlined in colour but its central part is black. The abdomen has an antero-lateral stripe on segments 2, 3, as well as a postero-lateral spot of yellow colour on the same segments. The latter mark only is present in the male, at least when adult. The rest of the abdomen in both sexes is black.

The anterior surface of the two posterior pairs of tibiae of the male is white and the curious exudation, referred to by de Selys (*loc. cit.*), is well seen in the spirit specimens.

Group UNIMACULATA.

24. *Rhinocypha unimaculata*, Selys.

(Pl. II, fig. 3).

R. unimaculata, Kirby, *Cat. Odonata*, p. 113 (1890).

This is the largest of all Indian species of the genus. It is abundant from Darjiling to Assam, but the limits of its range are not known.

The dimensions of a male specimen are:—

Length of hind-wing	31 mm.
„ „ abdomen	24 „

25. *Rhinocypha trimaculata*, Selys.

R. trimaculata, Kirby, *Cat. Odonata*, p. 113.

The locality 'Thibet' given for this species by Selys should almost certainly be rather Assam. I have not seen an example of this, one of the smallest and probably one of the rarest of the *Rhinocyphas*; it is closely allied to *R. ignipennis*.

26. *Rhinocypha ignipennis*, Selys.

R. ignipennis, Kirby, *Cat. Odonata*, p. 113.

„ „ Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, pp. 179-181.

2 ♂♂ ($\frac{8.202}{20}$), Cherrapunji, Assam. 1 ♂, 1 ♀ ($\frac{8.283}{20}$), Shillong, Assam, 4,900 ft.

The female specimen has the anterior surface of the femurs marked with white.

Group FENESTRELLA.

This group is restricted entirely to the mainland of Asia ranging from the Himalayas to the extremity of the Malay Peninsula. The species or races present marked individual variation, and in view of this I think it well to treat some of the species as local races, a course already suggested by de Selys in his paper on

the Dragonflies of Burma (*Ann. Mus. Civ. Genova*, (2) X (XXX), p. 491, 1890) for *spuria* and *quadrимaculata*. I have not seen an example of Foerster's *R. adamantina*, but I think it will be found to be a race of *cuneata*.

The members of this group are I think the most brilliantly coloured and beautiful of all the genus.

- A. Apical spot on hind-wing always approaching to within two cell-rows of anterior wing margin (post-nodal costal and post-nodal radial rows).
Large species (hind-wing 26 mm. long or more).
Range: Himalaya, Darjiling eastwards ... *R. cuneata*, Selys.
- B. Apical spot on hind-wing never less than 4 cell-rows from anterior wing margin ... *R. fenestrella*, Ramb.
- a. Large form, hind-wings 25 mm. or more in length.
Range: Khasia Hills race *spuria*, Selys.
- b. Smaller form (hind-wings 23 mm. or less in length).
Northern race.
Range: Himalaya (Darjiling) to Burma race *quadrимaculata*, Selys.
Southern race.
Range: Burma; Siam to Singapore ... race *fenestrella*, Ramb.

27. *Rhinocypha cuneata*, Selys.

(Pl. II, fig. 4).

R. cuneata, Kirby, *Cat. Odonata*, p. 113.

„ „ Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 173.

Specimens examined from Darjiling District and Gopaldhara, 16 ♂♂, 2 ♀♀

Scarcely two of the males are alike in detail, though the general resemblance is close. Variation consists chiefly in differences in size of the apical hyaline spot of the hinder wing, and in the extent of subdivision of the median series of spots; in the example figured (from Gopaldhara) this series is broken into three areas, more usually it consists of two only; one specimen shows three on one side and two on the other. The average length of the hind-wing of the male is about 27.5 mm., extreme measurements are 26.5 mm. and 28 mm.

28. *Rhinocypha fenestrella quadrимaculata*, Selys.

R. quadrимaculata, Kirby, *Cat. Odonata*, p. 112.

„ „ Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 176, fig. 8.

„ „ Martin, *Mission Pavie*, Neuroptères (sep.), p. 17.

Specimens examined from Darjiling District, Sikkim, Gopaldhara, Narbong Valley, Tenasserim.

Average length of hind-wing (22 specimens) 22.5 mm., extremes 21.5—23 mm.

Williamson (*loc. cit.*) has pointed out that *quadrимaculata* may be distinguished from *fenestrella* by having the anterior of the

median row of spots decidedly nearer the nodus, and the middle spot of the row about half the length of the anterior and posterior spots; in *fenestrella* the three are more often sub-equal (see his figures 8-11, *loc. cit.*). Specimens of *quadrifasciata* from Darjiling have occasionally all the spots of the median row quite small though there is marked individual variation both in these and in the size of the apical spot.

On the whole, however, it is correct to say that the specimen figured by Williamson, which is from Burma, is less easy to distinguish from *fenestrella* than the average specimen from Darjiling so far as my experience goes.

29. *Rhinocypha fenestrella spuria*, Selys.

R. spuria, Kirby, *Cat. Odonata*, p. 113.

„ „ Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), p. 59.

2 ♂♂, Khasia Hills, old Museum collection.

Labelled by de Selys *R. quadrifasciata*.

Length of hind-wing 28 mm.

These specimens from their size and their locality are evidently examples of the race described as *R. spuria* by de Selys. Except on account of their large size I believe they cannot be distinguished from typical *quadrifasciata*.

De Selys gives the length of the hind-wing of his examples as 26-27 mm.

There are two males in the British Museum collection which I believe belong to this race. They are labelled from the Chin Hills, Burma.

30. *Rhinocypha iridea*, Selys.

(Pl. II, fig. 5).

R. iridea, Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), pp. 492-494 (1891).

This beautiful species is not represented in the Museum collection. There are several examples in the British Museum.

It occupies a position somewhat isolated in the group to which it belongs. Its wings are distinctly wider than in other species of the *fenestrata* series, and the colour pattern is to some extent, I think, intermediate between the typical *fenestrata* forms and the *quadrifasciata* group. I am inclined to regard it as an annectant species between the two groups. In its own group its nearest ally would appear to be *R. fenestrata* (Ramb.) of Java. The present species is probably confined to Burma.

31. *Rhinocypha biforata*, Selys.

R. biforata, Kirby, *Cat. Odonata*, p. 114.

„ „ Laidlaw, *Proc. Zool. Soc. London*, 1902 (i), p. 88.

„ „ Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 179, fig. 12 (1904).

Ranges from the Malay Peninsula to Burma. Not in the Museum collection.

32. *Rhinocypha bisignata*, Selys.

(Pl. II, fig. 6).

R. bisignata, Kirby, *Cat. Odonata*, p. 114.

3 ♂♂, Parambikulam, Cochin State, 1700—3200 ft. ($\frac{8\frac{2}{2}6\frac{3}{3}}$).

Resembles *R. biforata* in general in the colour pattern of the wings, and is probably closely allied to that species, "representing" it in S. India. It differs from other species of the section to which it belongs in the body-colours, the markings being of an orange red here whilst other species have them lilac or blue.

So far as is known this is the only representative of the genus found in Peninsular India, and it does not reach Ceylon. Compare the distribution of another equally characteristic Indo-Malayan genus *Draco*.

See note under *R. perforata*, the next species.

33. *Rhinocypha perforata perforata* (Percheron).

R. perforata, Kirby, *Cat. Odonata*, p. 114 (1890).

" " Martin, *Mission Pavie*, Neuroptères (sep.), p. 17.

" *inas*, Laidlaw, *Proc. Zool. Soc. London*, 1902, pp. 88-90, pl. vi, fig. 6.

" *apicalis*, Laidlaw in *Fascic. Malayenses* (Zoology), part I, p. 196.

" " Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 174.

Not in the Museum collection. The species *inas* from Perak is at best a local race of this species; I am not able to compare series from different localities, but I am inclined to think that the name cannot stand, whereas *whiteheadi*, Kirby, is tolerably well marked, and has been accepted as distinct by Martin. Of the value of Selys variety *limbata* (Kirby, *loc. cit.*) I cannot speak with any certainty, again for lack of material. Kruger (*Stettin Entomol. Zeitung*, 1898, p. 79) has named a species from Sumatra as *R. bisignata*, Hagen? = *apicalis*, sp. n. Foerster (*in litt.*) has identified therewith my species *inas* which would then become a synonym of *R. apicalis*, Kruger. One may say with conviction that the species *bisignata*, Hagen, does not occur in Sumatra. Kruger's account of *apicalis* is totally inadequate, but Williamson has accepted the species and says (*loc. cit.*) that he cannot separate *inas* and *whiteheadi* therefrom. But as *inas* is I think beyond question a synonym of *perforata* it follows that *apicalis* must take the same place.

34. *Rhinocypha perforata whiteheadi*, Kirby.

(Pl. II, fig. 7).

R. whiteheadi, Kirby, *Ann. Mag. Nat. Hist.* (7) V, p. 536, pl. xii, fig. 4.

" " Martin, *Mission Pavie*, Neuroptères (sep.), p. 17.

A single male from Sibsagar, collected by S. E. Peal ($\frac{6\frac{3}{2}1\frac{0}{0}}$).

This is the most northerly record that I know of for any species of the *fenestrata* group of the genus.

R. whiteheadi would seem to be the northern race of the *perforata* series. It is distinguishable from the typical *perforata* by the following characters :—

- (a) Absence of the backward prolongation along the costal margin of the fore-wing of the dark colouring.
- (b) Absence of the hyaline border which lies along the anal margin of the coloured parts of both wings.

Genus *Micromerus*, Ramb.

35. *Micromerus lineatus*, Burm.

- M. obscurus*, Kirby, *Cat. Odonata*, p. 115.
 „ *lineatus*, *id.*, *loc. cit.*
 „ „ Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), p. 62 (1891).
 „ „ Laidlaw in *Fascic. Malayenses* (Zoology), pt. I. p. 107 (1903).
 „ „ Williamson, *Proc. U.S. Nat. Mus.*, XXVIII, p. 171. figs. 5, 6 (1904).

I think that *M. obscurus*, Kirby, is a young specimen of *M. lineatus*. It is at any rate so immature that no determination from a single specimen can be satisfactory. The species ranges from Ceylon through India to Assam and down the Malay Peninsula.

One of the smallest of all the Calopterygidae, it has a more extensive range than any, save a very few.

I have seen a specimen from Gopaldhara, Assam, taken by Mr. Stevens, with the note, 'undoubtedly rare.'

I believe that Martin regards the Ceylon species as worth subspecific rank, and refers to the same subspecies examples from the Andaman Islands.

36. *Micromerus finalis*, Selys.

M. finalis, Kirby, *Cat. Odonata*, p. 115.

A species apparently peculiar to Ceylon.

Micromerus blandus, Selys, from the Nicobar Islands is no doubt a local race of *M. lineatus* and is probably the same as that from Ceylon which Martin regards as subspecifically distinct. I have seen in the British Museum examples labelled by Mr. Martin from Ceylon and from the Andamans, with a varietal name. This name has not been published and is not likely to be for some time. As I do not wish to anticipate Mr. Martin, I will do no more than refer to the matter here.

Genus *Libellago*, Selys.

37. *Libellago asiatica*, Selys.

- Libellago asiatica*. Kirby, *Cat. Odonata*, p. 112.
 „ „ Selys, *Ann. Mus. Civ. Genova*, (2) X (XXX), pp. 58-59.
 „ „ Martin, *Mission Pavie*, Neuroptères (sep.), p. 17.

I have not seen an example of this species. Williamson (*Proc. U.S. Nat. Mus.*, XXVIII, p. 173) records without reference *L. vittata*, Selys, evidently referring to Selys's report of the species from Burma. I cannot find a reference to *vittata* but Selys (*loc. cit.*) comments on differences between the Burmese specimens and typical examples from the Philippine Islands.

Genus **Epallage**, Charp.

38. **Epallage fatima** (Charp.).

E. fatima, Kirby, *Cat. Odonata*, p. 108.

„ „ Morton, *Trans. Entomol. Soc. London*, 1907, p. 305.

The inclusion of this Mediterranean species serves only to emphasize the strongly Palaearctic character of the Odonate fauna of Kashmir.

