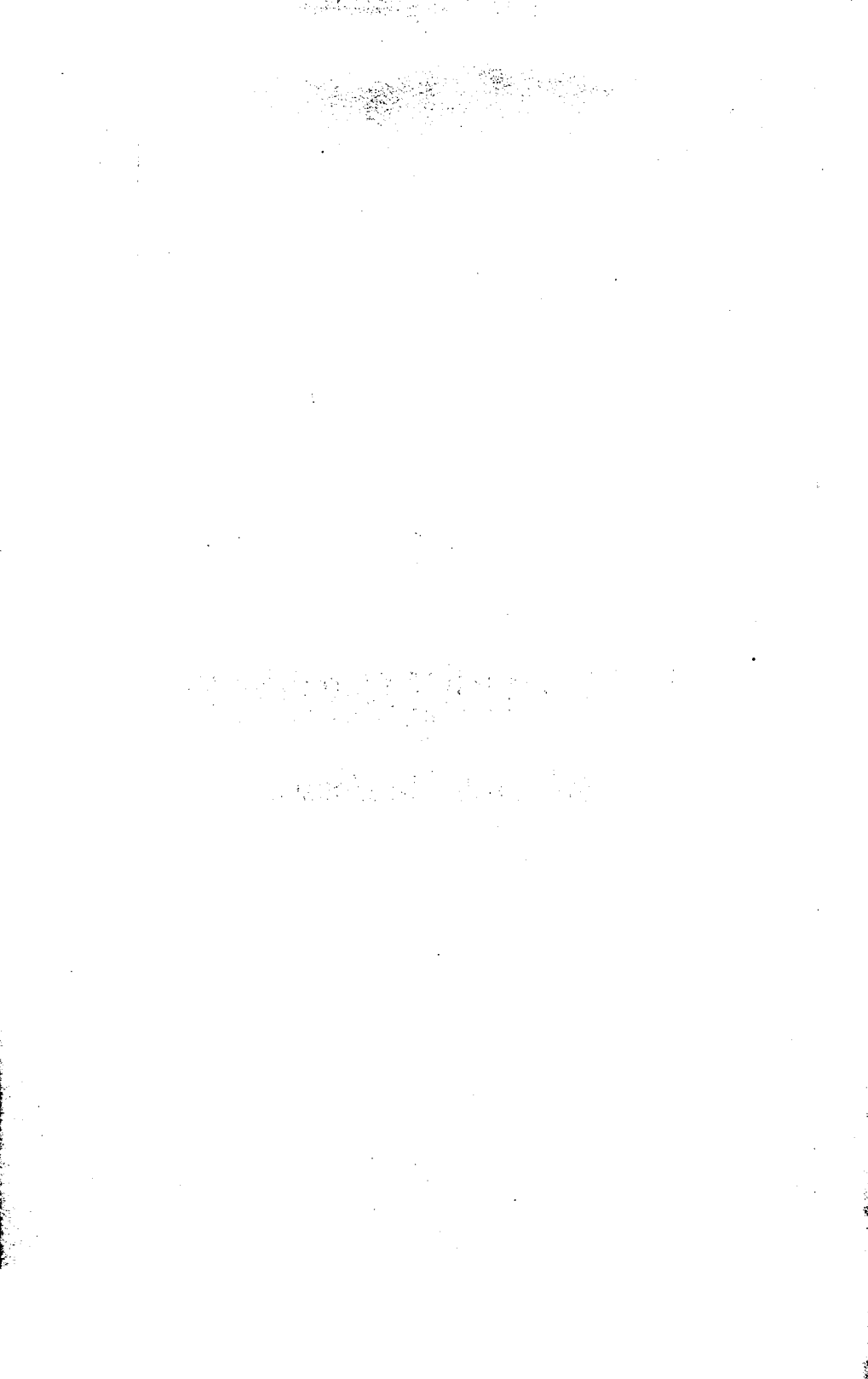


# **The Dragonflies of Sri Lanka**



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**By Terence de Fonseka**



**WHT**

## THE DRAGONFLIES OF SRI LANKA

By Terence de Fonseka

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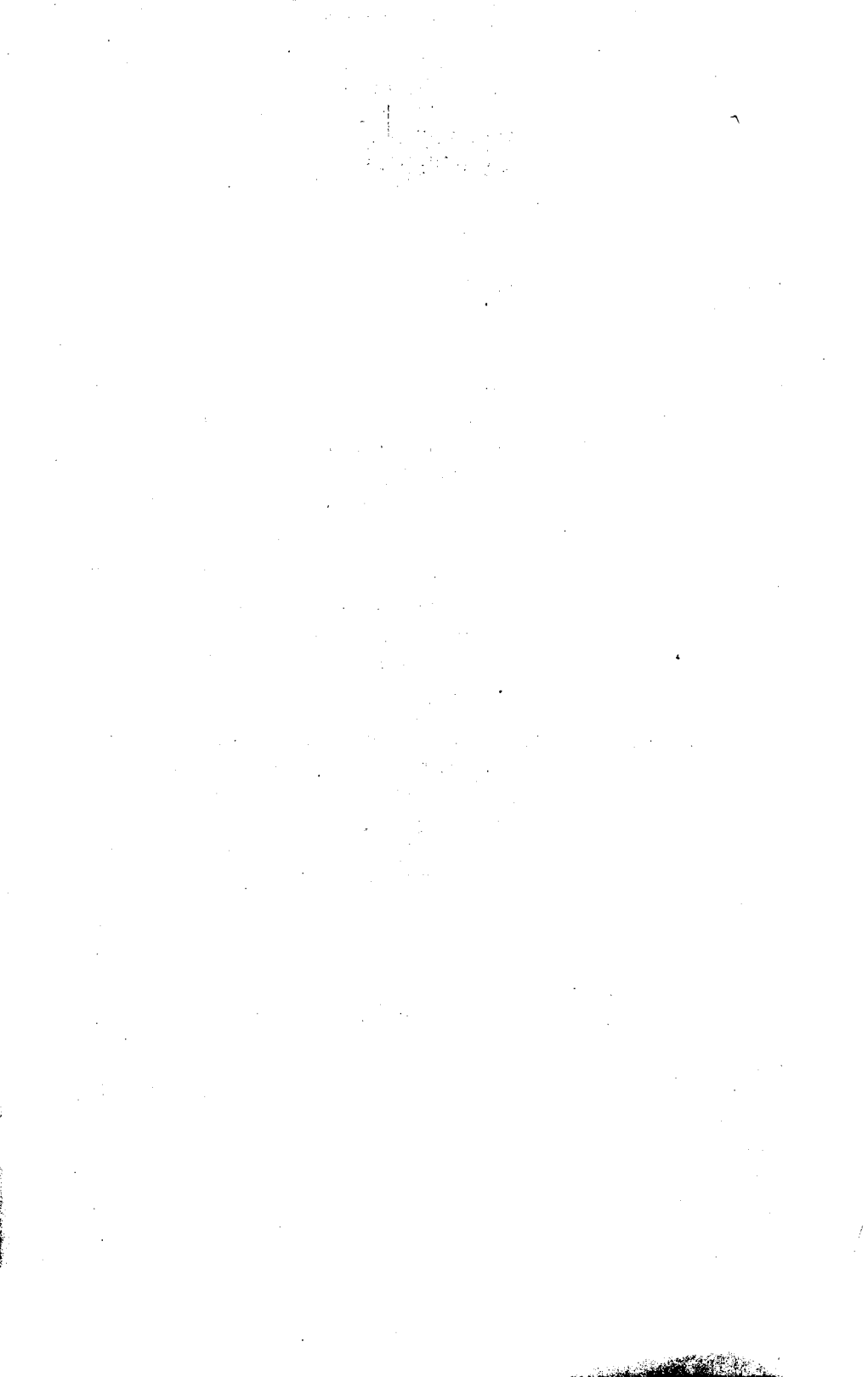
Front cover: *Trithemis aurora*

Back cover top: *Pantala flavescens*;

bottom: *Diplacodes trivialis*.

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## FOREWORD

I have had two main aims in writing this account of the dragonflies of Sri Lanka. The first and I now consider this to be of lesser importance, was to bring together what little is known about them and so provide a reference book or guide for those who may choose to be interested in this moderately attractive Order of insects. But then it became clear to me that making such information available would not of itself lead to an interest in the group. There are two reasons for this. The first, and a trivial one at that, is that the dragonflies, and more so the damselflies, are not for the most part spectacular in their appearance and though fairly common, they are not seen and noticed unless they are being looked for. The second and what I considered a more important reason when I started on this work was that there did not then appear to be any compelling interest in Sri Lanka in the practical study of natural history; leaving aside the smaller, less conspicuous animals, not even in the butterflies, the birds and other vertebrates. There has been a demand for the publications on these groups, but I suspect this has been more for their rarity value in terms of money than for their scientific content. I believe the situation has changed, considerably I hope, since the republication of many of the earlier books on Sri Lankan natural history and the new publications on such subjects sponsored by WHT Publications. Hence, what has assumed the greater importance in what I am putting together. I am doing this primarily for the younger people in the country. This emphasis in direction has been brought about by what I have seen while living in Britain for the last several years. There is a great interest in science among the young. A considerable part of that interest is in natural history. This is created in the schools to a great degree by visits to the museums and by the projects which the children are required to study up and write. Additionally, there are some excellent television programmes on natural history that serve to evoke and nurture an interest in that area.

I myself started to work on the Sri Lankan dragonflies a few years before I left the country. It was only after I came to Britain that I realised the handicaps under which I had been trying to work. There is practically no recent literature, and what there is, is in the Museum library. I had easy access to that library and I expect so will others who want to use it. Problems of time and travel do however exist for those who want to take up the study of this group while in school or in full time employment: access to the library will be more difficult for those outside Colombo. I hope this work will make matters easier for all.

I have relied on the works of the many authors included in the list of references. I have tried to verify the descriptions and to include a few figures of my own where it has been possible to do so. I have written, I hope, with scientific accuracy at a modest technical level. It is my aim to acquaint readers with this

interesting group of insects and to show them that there is much to intrigue them in the study of the group both in the adult and in the larval stages and in their life histories; to make them aware of the group, many members of which can be seen in their own gardens, even in urban areas; a few even entering their homes in the late evenings, either attracted to the lights or following other insects that are so attracted. In urban areas there still may be patches of water where the adults can be observed and if necessary captured for study and identification. These same stretches of water will be the homes of the larvae, many of which can be found in very shallow water, and collected with a home made "dredge" and reared, generally with very little difficulty, until the imago emerges, providing a means of identifying each larva with its final adult. Such identification is not yet available for many of the Sri Lankan species. And here is the encouraging possibility for the enthusiastic worker to write a paper that will almost certainly be accepted for publication by one or another of the scientific journals dealing with this Order in particular or with insects in general.

There will be no attempt to avoid technical terms, which will be used as the need arises; either they will be explained fully at the first time of use or be listed in the glossary. It is necessary to point out that this document deals with the identification and distribution within Sri Lanka of the species found here. Attention is drawn to the need to know more about the life histories and larval stages of these species, which together with behaviour and physiology get greater emphasis today than does systematics, and even in systematics the importance of cytology is growing. Some of these aspects are properly for the academic zoologist or entomologist, but life history, larvae and behaviour are well within the scope of the amateur naturalist.

There is a British Dragonfly Society in Britain. Its members, mostly amateur naturalists, are engaged in the study of British dragonflies in their native environment and contribute to the regularly published journal of the Society. Many similar societies exist in other countries and there is one in India. I hope this work will lead to the formation of one in Sri Lanka.

I must emphasise that there is very little original work here, but I hope that bringing together the available information on the Sri Lankan dragonflies will prove useful. I must acknowledge my indebtedness to the several authors listed, though some of their work has not been directly available to me. I must mention specially Fraser on whose work I have drawn extensively, Kirby, Lieftinck and Laidlaw: these authors have worked and written much on Sri Lankan dragonflies; Fraser's three volumes on the Odonata have been the major source of information and I must thank Taylor & Francis, the original publishers and the Today & Tomorrow Publishers of New Delhi, who have republished the three volumes recently, for their agreement that I could draw extensively from this work. I am indebted to Arun Kumar's work on the larvae of Indian



dragonflies that has provided me with much of the information and many of the figures for the section on larvae. I have also to acknowledge the assistance given by the Director of the Colombo Museum, Dr (Mrs) Thelma Goonewardene since retired, the Museum's Curator in Entomology, Lakshman Weeratunge, Dr. Priyantha Wijesinghe of New York who encouraged, criticised and provided most of the information on the early study of dragonflies in Sri Lanka and Matjaz Bedjanic of Slovenia whose criticism of my drafts has corrected many errors. Any remaining errors are mine. Dr Matti Hämäläinen of Finland has helped to identify the specimens on some of the colour photocopies.

I have also to record my indebtedness to those who provided me with the colour slides from which the colour plates in the Guide have been made. They are C.A. and P.M. Allen, Matjaz Bedjanic, Hanns-Dieter Mitzka and Marion Mönig, and Lakshman Weeratunga. They are named in the List of Plates.

I must make special mention of Rohan Pethiyagoda of WHT Publications of Sri Lanka whose insistence on revisions has made a book out of my draft.

Finally, it is necessary to draw attention to the danger to the Island's fauna (and flora) caused by the clearing of large extents of jungle and the filling up of lowlands for development. Some larger forests are protected now, but many smaller areas are disappearing or their supplies of water are diverted and no longer available. There is an environmental protection agency and I hope it will extend its protection to the smaller areas also. Additionally, the Island appears to be having an influx of collectors, posing as bona fide tourists, collecting and taking away with them, insects and other small animals for sale abroad. Sri Lanka is not the only country afflicted in this way. A recent article (New Scientist, 27 August 1994) refers to the detection at an Indian airport of a collection of small animals, some of them protected species, valued at several thousands of rupees. The Sri Lankan authorities are aware of this and have taken steps to guard against it happening here. However, in the interests of science provision should be made for bone fide workers, whether amateurs or professionals to obtain licences to enter reserves and/or to make specified collections.

Terence de Fonseka  
December, 1999.



## Systematic list of Sri Lanka species

(Species marked \* are confined to Sri Lanka).

### Zygoptera - the damselflies

#### Superfamily Calopterygoidea

#### Family Calopterygidae

1. *Neurobasis chinensis chinensis* (Linne, 1758)
2. \* *Vestalis apicalis nigrescens* Fraser, 1929

#### Family Chlorocyphidae (Libellaginidae).

3. \* *Libellago adami* Fraser, 1939
4. \* *Libellago finalis* (Selys, 1869)
5. \* *Libellago greeni* (Laidlaw, 1924)
6. *Libellago indica* (Fraser, 1928)

#### Family Euphaeidae (Epallagidae).

7. \* *Euphaea splendens* Selys, 1853

#### Superfamily Lestoidea (Lestidoidea).

#### Family Lestidae

8. *Lestes praemorsus decipiens* Kirby, 1893
9. *Lestes elatus* Selys, 1862
10. *Lestes malabarica* Fraser, 1929
11. \* *Sinhalestes orientalis* (Hagen, 1859)
12. \* *Indolestes divisus* (Selys, 1862)
13. \* *Indolestes gracilis gracilis* (Selys, 1862)

#### Superfamily Coenagrionoidea

#### Family Coenagrionidae

(Coenagriidae, Agrionidae).

14. *Agriocnemis femina femina* (Brauer, 1868)
15. *Agriocnemis pygmaea pygmaea* (Rambur, 1842)
16. \* *Mortonagrion ceylonicum* Lieftinck, 1971
17. *Onychargia atrocyana* Selys, 1865
18. *Cercion malayanum* (Selys, 1876)
19. *Enallagma parvum* Selys, 1876
20. *Aciagrion occidentale* Laidlaw, 1919
- *Aciagrion hisopa* (Selys, 1876)
21. *Ischnura aurora aurora* (Brauer, 1865)

22. *Ischnura senegalensis* (Rambur, 1842)
23. *Ceriagrion cerinorubellum* (Brauer, 1866)
24. *Ceriagrion coromandelianum* (Fabricius, 1798)
- *Pseudagrion decorum* (Rambur, 1842)
25. *Pseudagrion malabaricum* Fraser, 1924
26. *Pseudagrion microcephalum* (Rambur, 1842)
27. \* *Pseudagrion rubriceps ceylonicum* (Kirby, 1891)

#### Family Platycnemididae

28. *Copera marginipes* (Rambur, 1842)

#### Family Platystictidae

29. \* *Drepanosticta adami* (Fraser, 1933)
30. \* *Drepanosticta austeni* Lieftinck, 1940
31. \* *Drepanosticta brincki* Lieftinck, 1971
32. \* *Drepanosticta digna* (Selys, 1860)
33. \* *Drepanosticta fraseri* Lieftinck, 1955
34. \* *Drepanosticta hilaris* (Selys, 1860)
35. \* *Drepanosticta lankanensis* (Fraser, 1931)
36. \* *Drepanosticta montana* (Selys, 1860)
37. \* *Drepanosticta nietneri* (Fraser, 1931)
38. \* *Drepanosticta sinhalensis* Lieftinck, 1971
39. \* *Drepanosticta starmuhlneri* St. Quentin, 1972
40. \* *Drepanosticta submontana* (Fraser, 1933)
41. \* *Drepanosticta subtropica* (Fraser, 1933)
42. \* *Drepanosticta tropica* (Selys, 1860)
43. \* *Drepanosticta walli* (Fraser, 1931)
44. \* *Platysticta apicalis* Kirby, 1893
45. \* *Platysticta maculata* Selys, 1860

#### Family Protoneuridae

46. \* *Disparoneura ramajana* Lieftinck, 1971
47. \* *Elattoneura bigemmata* Lieftinck, 1971
48. \* *Elattoneura caesia* (Selys, 1860)
49. \* *Elattoneura centralis* (Selys, 1860)
50. \* *Elattoneura leucostigma* (Fraser, 1933)
51. \* *Elattoneura tenax* (Selys, 1860)
52. \* *Prodasineura sita* (Kirby, 1893)

Anisoptera — the dragonflies

Superfamily Aeshnoidea

Family Gomphidae

- 53. \* *Anisogomphus solitaris* Lieftinck, 1971
- 54. \* *Burmagomphus pyramidalis sinuatus* Fraser, 1933
- 55. \* *Cyclogomphus gynostylus* Fraser, 1925
- *Cyclogomphus heterostylus* Selys, 1854
- 56. \* *Megalogomphus ceylonicus* (Laidlaw, 1922)
- 57. \* *Paragomphus henryi* (Campion & Laidlaw, 1928)
- 58. \* *Helilogomphus ceylonicus* (Selys, 1878)
- 59. \* *Helilogomphus lyratus* Fraser, 1933
- 60. \* *Helilogomphus nietneri* (Selys, 1878)
- 61. \* *Helilogomphus walli* Fraser, 1925
- 62. \* *Macrogomphus lankanensis* Fraser, 1933
- 63. \* *Macrogomphus annulatus keiseri* Lieftinck, 1955
- 64. \* *Microgomphus wijaya* Lieftinck, 1940
- 65. \* *Gomphidia pearsoni* Fraser 1933
- 66. *Ictinogomphus rapax* (Rambur, 1842)

Family Aeshnidae

- 67. *Anax guttatus* (Burmeister, 1839)
- 68. *Anax immaculifrons* Rambur, 1842
- 69. *Anax indicus* Lieftinck, 1942
- 70. *Hemianax ephippiger* (Burmeister, 1839)
- 71. *Gynacantha* sp. indet.
- 72. *Anaciaeschna donaldi* Fraser, 1922

Superfamily Libelluloidea

Family Corduliidae

- 73. \* *Epophthalmia vittata cyanocephala* Hagen, 1866
- 74. \* *Macromia flinti* Lieftinck, 1977
- 75. \* *Macromia zeylanica* Fraser, 1927
- *Hemicordulia asiatica* Selys, 1878

Family Libellulidae

- 76. *Hylaeothemis fruhstorferi* (Karsch, 1889)
- 77. \* *Tetrathemis yerburyi* Kirby, 1893
- 78. *Brachydiplax sobrina* (Rambur, 1842)
- 79. *Cratilla lineata calverti* Förster, 1903
- 80. *Lathrecista asiatica asiatica* (Fabricius, 1798)
- 81. *Orthetrum chrysis* (Selys, 1891)
- 82. *Orthetrum glaucum* (Brauer, 1865)

83. *Orthetrum luzonicum* (Brauer, 1868)
84. *Orthetrum pruinosum neglectum* (Rambur, 1842)
85. *Orthetrum sabina sabina* (Drury, 1770)
86. *Orthetrum triangulare triangulare* (Selys, 1878)
87. *Potamarcha congener* (Rambur, 1842)
88. *Acisoma panorpoides panorpoides* Rambur, 1842
89. *Brachythemis contaminata* (Fabricius, 1793)
90. *Bradinopyga geminata* (Rambur, 1842)
91. *Crocothemis servilia* (Drury, 1770)
92. *Diplacodes nebulosa* (Fabricius, 1793)
93. *Diplacodes trivialis* (Rambur, 1842)
94. *Indothemis carnatica* (Fabricius, 1798)
95. *Indothemis limbata sita* Campion, 1923
- *Neurothemis fulvia* (Drury, 1773)
96. *Neurothemis intermedia intermedia* (Rambur, 1842)
97. *Neurothemis tullia tullia* (Drury, 1773)
98. *Rhodothemis rufa* (Rambur, 1842)
99. *Sympetrum fonscolombi* (Selys, 1840)
100. *Trithemis aurora* (Burmeister, 1839)
101. *Trithemis festiva* (Rambur, 1842)
102. *Trithemis kirbyi kirbyi* Selys, 1891
103. *Trithemis pallidinervis* (Kirby, 1889)
104. *Onychothemis tonkinensis ceylanica* Ris, 1912
105. *Palpopleura sexmaculata sexmaculata* (Fabricius, 1787)
106. *Rhyothemis triangularis* Kirby, 1889
107. *Rhyothemis variegata variegata* (Linnaeus, 1763)
108. *Hydrobasileus croceus* (Brauer, 1867)
109. *Pantala flavescens* (Fabricius, 1798)
110. *Tramea basilaris burmeisteri* (Kirby, 1889)
111. *Tramea limbata* (Desjardins, 1832)
112. *Tholymis tillarga* (Fabricius, 1798)
113. *Zyxomma petiolatum* Rambur, 1842
114. *Aethriamanta brevipennis* (Rambur, 1842)
115. *Macrodiplax cora* (Brauer, 1867)
116. *Urothemis signata signata* (Rambur, 1842)
117. \* *Zygonyx iris ceylonicus* (Kirby, 1905)

N.b. Five species have been included in this list without a number because they have not been recorded here yet but are likely to be found. These species are *Aciaagrion hisopa*, *Pseudagrion decorum*, *Cyclogomphus heterostylus*, *Neurothemis fulvia* and *Hemicordulia asiatica*.

The classification used in the above list of species is based on Davies & Tobin (1984, 1985).

## NOTES

### Nomenclature

Animals and plants are given Latin names by which they can be referred to. Those that are very closely related are given a common generic name e.g. *Zygonyx*. This is followed by a specific name. Within a genus there may be members who differ from each other; each of these will bear a different specific name, e.g. the different species of the genus *Orthetrum*. Some species can be further divided into subspecies by distinct, but minor differences, e.g. *Zygonyx iris ceylonicus*. Names are completed by the addition of the name of the author who first described the species (not necessarily both sexes) and the year of that description. For a variety of reasons prescribed by strict rules of nomenclature, the name now given to an animal or plant may not be the name given by the author who first described it. In such a case the name of that author and the date are enclosed in brackets.

### Using the keys

As some amateur naturalists may not be familiar with the keys as set out in this Guide, this short note will explain how to use the keys.

There are two columns of numbers on each page of a key. In between will be text and sometimes the name of a family or genus or species. If you have a specimen before you and know nothing at all about it, you would start on page 31. If your specimen is an Anisopteran, it would satisfy the qualifying text that follows the number 1a in the left hand column. On the right as part of the text you will see "Anisoptera page 103". If you turn to page 103 you will see the beginning of the key to the Anisoptera. Similarly, if your specimen is a Zygopteran, it would satisfy the qualifying text that follows the number 1b in the left hand column. On the right, as part of the text you will see "Zygoptera", but this time instead of being directed to a page, is the number 2. This means that you should go to 2 in the left hand column, in this case 2a, 2b and 2c, and see which of the text descriptions following 2a, 2b or 2c your specimen satisfies. You should proceed in this way until you have identified your specimen.

Whatever information could be collected on the distribution of each species has been included together with any available information on the habitat relevant to each record. Within brackets is a figure giving the month of the record and m, f, l (for larva), a (for adult, t (for teneral), j (for juvenile) to indicate what was collected or recorded.

The synonymy includes only such names as may be met with by a worker on Sri Lankan dragonflies.





## GENERAL

The Insects are the largest group of animals, comprising about 70% of known species. Over 800, 000 species have been described and one author estimates that this may be less than a fifth of existing species. The Odonata is one of the smaller Orders in this group with about 5, 000 species in about 500 genera. In size, the extinct *Meganeura monyi* had a wing span of 700 mm; living species are very much smaller. The largest Order of the Insecta is the Coleoptera—the beetles—with over 300, 000 species described.

The number of species of Odonata presently recorded in Sri Lanka is 117 in 67 genera. Much of the early work on Sri Lankan dragonflies was based on collections sent to specialist entomologists in Europe. More recently a small number of dedicated odonatologists have visited Sri Lanka and added a great deal to our knowledge of Sri Lankan Odonata. It is sad to mention that no native Sri Lankan has contributed to this knowledge.

### History

Dr. Robert Templeton (1802–1892) an Irish medical officer with the Royal Artillery was stationed in Sri Lanka between 1839 and 1848. He collected and studied insects and other animals extensively during this period and much of his collection has been deposited at the British Museum of Natural History. He himself published very little, but descriptions based on these collections have been published by Francis Walker (1809–1874) of that Museum and by John Obadiah Westwood (1805–1893).

John Nietner was a German who owned a coffee plantation in Punduloya. He collected insects and other land invertebrates in Sri Lanka in the 1850's and 1860's, and sent specimens to various specialists in Europe and Russia for study and description, among them H. A. Hagen to whom he sent specimens of Sri Lankan "Neuroptera," (a group which then included the Odonata). Nietner's interest was mainly in beetles on which he published several papers. He also published a book in 1861 on the enemies of the coffee plant, thus being one of the earliest writers on applied entomology in Sri Lanka. The collections made by Templeton and Nietner led to the discovery of many new species and laid the foundations of systematic entomology in Sri Lanka.

Hermann August Hagen (1817–1893), was a German entomologist in Königsberg to whom Nietner sent "Neuroptera" from Sri Lanka. Hagen published two papers in 1858 and 1859 which contained descriptions and records of Odonata from Sri Lanka. He collaborated with Baron de Selys-Longchamps in the latter's monographic revision of the Odonata; this would account for some original descriptions being attributed to Hagen-Selys. He moved to America in 1867 and became the curator of insects of the Museum of Comparative

Zoology, Harvard University in Cambridge, Massachusetts where his collections (including types) are deposited.

Baron Michel Edmond de Selys-Longchamps (1813–1900), usually referred to simply as Selys, was the most important figure in the systematic study of the Odonata and often called the "father of odonatology." He was also a senior Belgian politician. In the course of his studies on the Odonata he built up a large collection which included important older collections such those of Latreille, Rambur, Audinet-Serville and Guérin-Meneville. He worked closely with and published from Hagen's manuscripts based on Nietner's collections.

Lieut.-Col. John William Yerbury of the Royal Artillery (1847–1927) also collected insects and other invertebrates while stationed in Sri Lanka at Trincomalee in the 1880's. His specimens are deposited in the British Museum of Natural History. Kirby's 1894 paper on Sri Lankan Odonata is based on material collected by Yerbury.

William Forsell Kirby (1844–1912) was one of the most famous systematic entomologists of his time, working on many different groups of insects. From 1879 he was based at the British Museum where he worked on many different orders of insects, including the Odonata. His papers on Sri Lankan Odonata in 1891 and 1905 were based on collections made by Green and that in 1894 on a collection made by Yerbury.

Edward Ernest Green (1861–1949) was the son of a coffee planter in Sri Lanka who took up planting himself. Like others before him he was interested in insects and other land arthropods. He did valuable work on the insects attacking tea and coffee and his publications such as : *Insects Pests of Tea* "were widely recognised. In 1899 he was appointed "Government Entomologist" with an office at the Botanic Gardens, Peradeniya; he was one of the founders of the Ceylon Natural History Society. Green left Sri Lanka in 1931, settled in England and became President of the Royal Entomological Society of London in 1923–1924. Some important works on Sri Lankan insects which appeared in the 1890's and early 1900's were based on Green's collections. (Kirby 1891 and 1905 and Laidlaw, 1924.) He was an accomplished artist and all his scientific papers were illustrated by him.

Frank Fortescue Laidlaw (1876–1963) a zoologist, was an authority on free-living flatworms (Turbellaria) as well as on dragonflies. He based his important 1924 paper on Sri Lankan dragonflies on material provided by Green. He also published a zoogeographical account of Sri Lanka's odonate fauna in 1951. He was a contemporary of F. C. Fraser; both men died in 1963.

Dr. Frederick Charles Fraser (1880–1963) held a number of posts in the Indian Medical Service, including that of Professor and Lecturer in Obstetrics and Gynaecology at Madras University Medical School. While working in India he studied dragonflies and collected in many parts of India and Sri Lanka. He is

the author of the three volumes on Odonata (1933, 1934, 1936) in the Fauna of British India series. He returned to England in 1933 and became interested in a number of entomological and natural history societies. He soon became a recognised authority on the Odonata to whom specimens were referred for identification. He has a considerable number of publications to his credit. He was an accomplished artist and illustrated his scientific publications himself. His large collection of Odonata was gifted to the British Natural History Museum while his library has been deposited at the Manchester University Museum.

Dr. Maurits Anne Lieftinck (1904–1985) was a Dutch entomologist who became an authority on the Odonata as well as on solitary bees. He was head of the Buitenzorg Museum in Java from 1929 to 1954 and was a P. O. W. during the Japanese invasion of the Dutch East Indies. Later he became a curator at the Museum of Natural History in Leiden, reorganising the Odonata collection there. He collected in Sri Lanka and published three important papers on Sri Lankan Odonata in 1940, 1955 and 1971, the latest one being based on material collected by the Lund University (Sweden) Ceylon Expedition of 1962. He ranks with Laidlaw and Fraser as one of the main contributors to our knowledge of Sri Lankan dragonflies this century.

### Natural history

The Odonata are predacious insects, the adults with two pairs of equal or nearly equal, elongate, membraneous wings traversed with nervures forming in some genera a very close and in other genera a quite open network. The main nervures or veins can be referred to a generalised pattern. The manner in which these veins are disposed and the detailed venation are of considerable importance in identifying genera and species. Like all other insects the Odonata breathe through a system of branching tubes or tracheae that carry air to all parts of the body and open to the exterior at spiracles. The larvae or nymphs are, with a few exceptions that can tolerate damp, terrestrial conditions, aquatic, crawling out of the water to emerge as adults. They can be found in the sediment of still or slow-moving water and amid the stones and vegetation in the fastest streams, even at the foot of waterfalls. Dragonflies can be found in the hottest and coldest, and in the driest and wettest regions of the world, provided the conditions exist for them to live out their life cycle; sometimes interrupting this life cycle by a state of dormancy to survive a difficult season of the year such as winter. Overwintering is of course, in the temperate regions. In the tropical regions, similar behaviour gets over the driest part of the year. Much has yet to be learned about the life cycle of the dragonflies in the drier parts of Sri Lanka where for some months of the year even the rivers are dry and pools of water are non-existent.

The Odonata are subdivided into three suborders. The two larger suborders, Zygoptera and Anisoptera are represented in Sri Lanka but the very much smaller Anisozygoptera is not. The Zygoptera have widely separated

eyes, the fore and hind wings are similar in shape and almost all of them (the exception being some of the Lestinae) rest with their wings folded together. In the Anisoptera, except in the Gomphidae, the eyes meet to varying degrees, the hind wings are broader at the base than the forewings and at rest the wings are spread out away from the body.

The body of the dragonfly like those of other Insects is divided into three main parts, head, thorax and abdomen. The description that follows is confined to what is considered necessary for the purposes of this document. Readers wishing to know more about the morphology should refer to a textbook on entomology or to a general book on the Dragonflies, such as that by Tillyard. Working with specimens of the small number of recorded species in Sri Lanka, presently 117, it is not always necessary to go into detail to identify the species to which a specimen belongs. In very many cases broad characters such as the colour of the body and wings will suffice; in other cases detail will be necessary. Detail may also be needed to verify whether a specimen belongs to a known and already described Sri Lankan species. Enough detail has therefore been included to satisfy these possible needs.

### **The adult or imago**

The head is dominated by the very large multifaceted, compound eyes. In the Zygoptera these eyes are widely separated, while in the Anisoptera, except in the Gomphidae and some Cordulegasteridae, they meet in the middle line to varying degrees. The number of facets in each eye will vary from 10, 000 to three times as many depending on the size of the eye. The eyes of some species are differently coloured above and below. On the slightly flattened vertex of the head between the eyes are three single-faceted subsidiary simple eyes—the ocelli, of which the anterior in the middle line is slightly larger than the two lateral. In many Anisoptera this triangular area is raised up to form a tubercle or vesicle. The simple eyes are used for very near vision, may be up to 2 to 3 centimetres, while the compound eyes cover from there on to several metres, appreciating form, and many more metres further in noticing any movement such as could reveal predators or prey. The details of the head, structure and colour are used to separate the species, but this detail is not generally necessary to identify the Sri Lankan species. The parts of the head are shown in Figs. A1 and A2 for each of the two suborders. The more obvious features useful for identification in the field are the general colour, the colour pattern and the colour of the eyes.

The thorax (Fig. A3) consists of three segments each of which bears a pair of legs. The first segment or prothorax is made up of anterior, middle and posterior lobes, the last of which often has an upward projection functionally involved in the process of mating and useful for purposes of identification. The second and third segments are fused together to form a synthorax (or more

strictly a pterothorax, as only two of the three thoracic segments are involved in the fusion) which looked at from the side is very oblique. Looked at from above, in front is a false dorsum, usually referred to simply as the dorsum in descriptions, followed by the true dorsum from the sides of which arise the two pairs of wings. The (false) dorsum has a mid-dorsal keel or carina and often two pairs of lateral stripes, the ante-humeral and the humeral, used when they occur, in identification. On the side of the thorax, roughly halfway from the front and about two-thirds way down from the top can be seen the thoracic spiracle. Markings on the thorax are usually described with reference to their location on morphologically identifiable areas of the thorax which are shown in Fig. A3 or explained in the glossary.

When the insect is at rest the wings are held closely together over the body in the Zygoptera, except in some of the Lestinae where they are held partially open. In the Anisoptera the wings are held out from the body, usually horizontally, but quite often upwards or forwards and downwards so as to moderate the heating effects of the sun or in preparation for sudden flight (Figs. A5–A7). The wings can be hyaline (clear) or coloured, either entirely or patterned. Colouration is usually restricted to the males, the wings of the females being hyaline or much less coloured. The males appear to use their wings in display to attract females and also to warn intruders off their territory. The venation in the Zygoptera is quite open, except among the Calopterygidae (Agriidae) where the wings are densely reticulated. The space between the main veins is fairly well filled in the Anisoptera, but the reticulation is not dense. The typical venation in the two suborders is shown in Fig. A10, with the main veins labelled. Wings of the Calopterygidae are shown in Figs. B3 and B4. An important feature of the wings, absent only in a few Zygoptera, is the pterostigma (or stigma) lying between the two main veins on the anterior border in the distal third of each wing. In length it covers a variable number of the cells lying below it; its borders may be thickened, the space within these borders may be clear or opaque and coloured and it may be diamond shaped or rectangular: all of these features are used in identification.

The leg is made up of five segments (Fig. A4). Starting basally they are the coxa, trochanter, femur, tibia and tarsus. The coxa is short and conical; the trochanter also short is divided into two; the femur is a long segment with two rows of spines, though this varies with the species and often with the sex; the tibia is slender with bristles on the sides and may be the longest segment. The tarsus is itself made up of three segments, the distal being the longest and ending in two claws, each of which may be provided with a spinous hook. The coxa is attached to that part of each thoracic segment called the infraepisternum. Because of the backward slant of the thoracic segments the three pairs of legs tend to point forwards, forming a basket in which the insect holds its prey while feeding on it.

The abdomen (Fig. A11) consists of ten easily counted complete segments; generally tapering from base to apex, but characteristically swollen basally in some species such as *Orthetrum sabina*. In addition there are parts of an eleventh segment and a final segment or telson can be recognised. Segments 1 to 8 bear a spiracle on each side. Segment 2 in some of the male Anisoptera bears a pair of lateral processes, the auricles or oreillets, (Fig. A11), which serve to guide the end of the female abdomen to the location of the male accessory genitalia, which are on the ventral surface of segments 2 and 3. The male genital pore or gonopore itself is situated on the ventral surface of segment 9. The male accessory genitalia consist of a three-segmented penis lying in a deep fossa and, one in the Aeshnoidea, or two, pairs of hooks or hamules the anterior of which is the larger (Fig. A8). These link up with the genitalia of the female, which are situated on the ventral surface of segments 8 and 9. The fossa is bounded in front by the anterior lamina and behind by the posterior lamina. The base of the penis is the swollen vesicle believed to play a part in the erection of the penis, which is a blind organ serving to transfer sperm capsules to the female from the fossa where the male has deposited them earlier. It also serves to clear out sperm capsules deposited in the female genital tract from a previous mating before the male introduces his own sperm. A well developed ovipositor (Fig. A13) produced from ventral processes of segments 8 and 9 is present in all the Zygoptera and in the Aeshnidae among the Anisoptera and serves to insert the eggs into plant tissues where they hatch. The rest of the Anisoptera do not have ovipositors and merely drop their eggs into the water or dip the tip of the abdomen into the water and wash the eggs off.

The paired superior anal appendages lie behind the tenth segment in both suborders, well developed in the male but much reduced in the female. Paired inferior anal appendages produced from the sternite of segment 11 are present in male Zygoptera alone and lie below the anus (Fig. A12). The male Anisoptera alone have a single median inferior anal appendage which lies above the anus and is developed from the tergite of the eleventh segment (Fig. A9). Both superior and inferior anal appendages have a great variety of shapes and are of importance in the identification of species. They are used to clasp the female by the prothorax or the head in the process of mating. They are quite closely matched with the female of their own species and it is not usual to see a male clasping a female of another species though this does happen.

Some while before copulation and usually in flight the male curls its abdomen downwards so as to bring its genital pore into contact with, and transfers sperm into, the accessory genitalia on segments 2 and 3 of the abdomen (Fig. A21). It then seeks and hopefully finds a female to mate with, which it clasps quite firmly with its anal appendages (Fig. A22). A male damselfly clasps the front of the female prothorax; the male dragonfly clasps the female's head. The pair then fly together in what is known as the tandem position (Fig. A15). In

the next stage the female bends its abdomen round and forwards to bring its genital pore into contact with the male genitalia to form what is called the wheel position, (Fig. A14). Copulation may last from a few seconds to many hours. Studies in several species have shown that in these species, in the first phase of copulation the male penis clears the female reproductive tract of sperm from any earlier mating, or pushes such sperm into a position where it can no longer serve any purpose. This initial phase may take the greater part of the duration of copulation. This process which ensures that the current mating male's sperm fertilises the female's eggs can also account for the quite common practice, usually described as guarding the female, of a male remaining in tandem for long periods after copulation and often even while oviposition is taking place.

The number of eggs laid by an ovipositing female varies from a few hundreds to several thousands, usually laid in batches as the eggs mature in the ovaries and at repeated visits to the ovipositing site. All the eggs may be fertilised by the sperm of a single mating or of several. Eggs of endophytic species are generally elongate, those of exophytic species broad and elliptical; the eggs of some endophytic species have a blade-like cone at their anterior end believed to assist the egg to work its way out of the plant tissue when ready to hatch. The eggs of some exophytic species develop a sticky coating which serves to anchor them to stones or weeds as they fall through the water; a few others have more elaborate structures that serve this purpose (Fig. A24). The eggs hatch out after a variable period, from a few days to maybe several months depending on the species, temperature and whether overwintering takes place. Some eggs of *Pantala flavescens* have hatched out in 3 days, but other eggs of the same batch have needed more time. The hatching of the eggs of some species is delayed by diapause. Little is known as to what stimulates hatching in tropical species that lay their eggs in damp or drying locations or in vegetation overhanging pools of water which maybe of a seasonal nature. The predatory larvae, after a variable number of moults, climb out of the water and attach themselves onto stems or stones. In a short time the skin splits dorsally and the adult or imago emerges, soon expands and dries its wings and flies. The newly emerged insect is usually paler and shows less colour than the fully mature adult and is known and described as the teneral form. The teneral male thus often resembles the less colourful female. Both male and female take some time to become sexually active.

### The larva or nymph

The egg hatches out into the first larval instar, usually referred to as the prolarva or pronymph. This is legless, the non-functional appendages lying closely applied to the ventral surface, and lasts for a very short time; from as little as a few seconds to practically as long as is necessary in some species which lay their eggs in stems and leaves overhanging water for the prolarva to wriggle or jump its

way to water if it does not fall directly into it. The prolarvae of different species are very similar to each other. In the second instar it is nearly always possible to distinguish families, genera and sometimes even species; more easily in the Anisoptera than in the Zygoptera. This instar appears to have generally a undivided tarsus, three segments in the antennae and just one seta on the palpus of the labium at the base of the movable hook. As studies on the larval stages continue, more common features are likely to be identified. It may not be necessary for this instar to feed as the yolk sac still is evident in the midgut.

There are several larval instars before the final instar which leads to emergence, the number varying from species to species from nine to sixteen, usually about twelve. At emergence the larva leaves the water and, depending on the species, either climbing directly up the stems of water plants, or crawling up the bank to stems of plants or other suitable objects bordering the water, attaches itself to this support by its legs. Here, after a short period of perhaps an hour, the larval skin splits starting from between the wing cases and extending up towards the head. The head, thorax, legs and wings are then drawn out from the larval skin and fall over backwards towards the abdomen which is still within the larval skin. After a short time the emerging insect bends up and grasps the support with its legs and draws out the rest of its body from the larval skin (Fig. A16). The wings expand fairly quickly and once they are dry the imago flies away. Needless to say, the period of emergence leaves the insect very exposed to attack by birds, lizards and other predators. Emergence is generally in the very early hours of the morning before dawn when the danger from these hazards is least. The empty larval skin is known as the exuviae (spelt so even though singular) and often remains attached to the support for some time. The exuviae usually provides enough characters to enable the species to be identified.

The larvae of the Zygoptera are slim and elongate and provided with three terminal caudal gills or lamellae, two lateral called paraprocts and one medial called an epiproct (Fig. A20). The larvae of some species of Zygoptera have in addition lateral abdominal gills. Some species use their caudal lamellae for display to establish territorial rights against would be intruders. The larvae of the Anisoptera do not have caudal gills, are much stouter and many of the bottom living, mud loving larvae are flattened and may be covered with hairs which collect fine debris - a device which serves to hide the larvae from enemies and from the prey that is being stalked. The larvae of both suborders are often marked so that their outline is broken, and can also vary their colour so as to merge with the background. The smallest larvae feed on Protozoa, small Crustacea (Daphnia, Cyclops) and such like. As they grow they progressively take larger and larger prey, even tadpoles, small fish and other larvae, even of their own species.



As in the adult the body of the larva is divided into three main parts, namely the head, thorax and abdomen. The head is broad and more or less triangular with the vertex pointing forwards. The eyes project at the sides of the head, are very small and never meet. A distinctive feature of the larva is the labium - the so-called mask, because it hides the mouth parts (Fig. A23). It is two jointed, a basal postmentum (or submentum) and a distal prementum (or mentum), the two being of roughly equal length. Distally the prementum bears two lateral palps, each of which in turn carries a movable hook on its outer side. At rest the postmentum lies between the bases of the legs with the prementum folded beneath it. The details of the labium are much used for purposes of identification. The labium is shot out at great speed to catch prey within its movable palps and hooks. This rapid extension of the labium is effected by an increase of hydraulic pressure brought about by compression of the body spaces. The prey is then brought to the mouth to be eaten. Some larvae stalk their prey, others lie in wait for their prey to come within striking distance; the stimulus is generally believed to be movement of the prey.

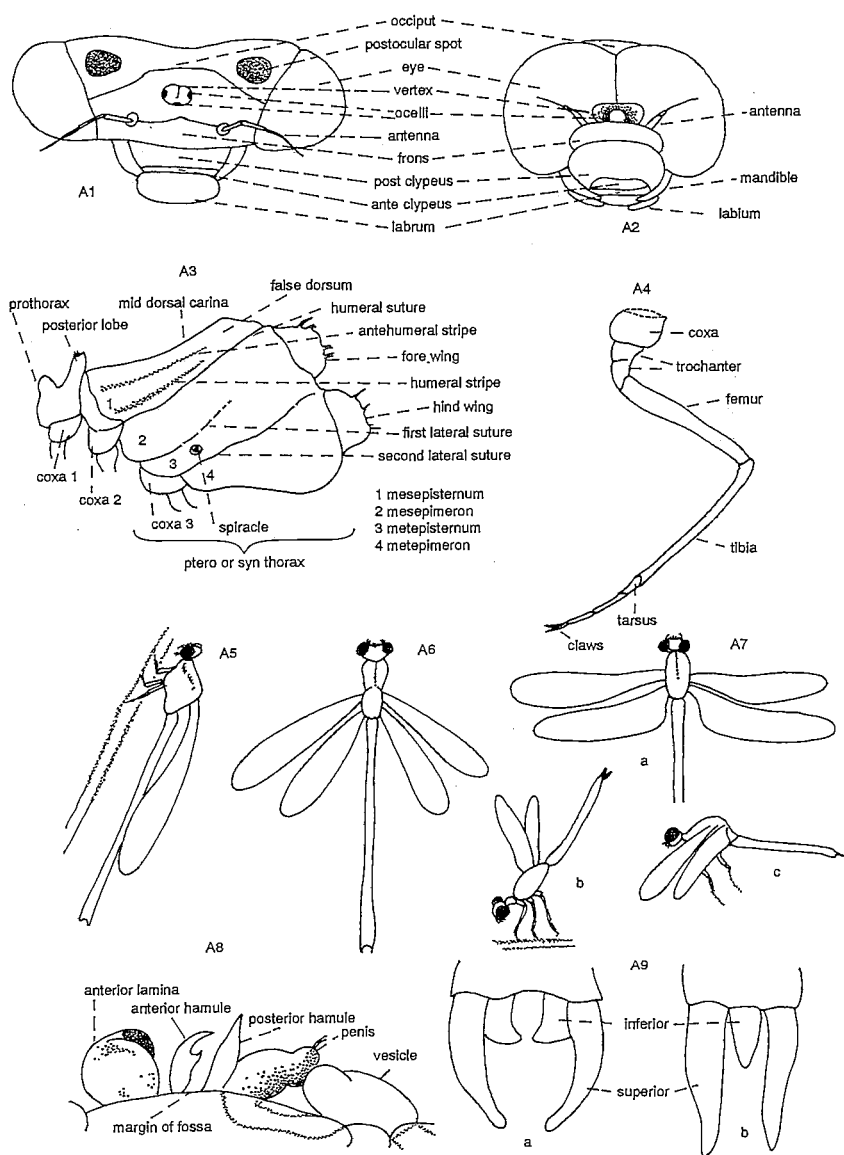
The thorax bears the three pairs of legs, much longer than those of the adult. Between the trochanter and the femur is a breaking joint, at which point the leg can break off if, for instance, the leg is held by a predator. This process of autotomy as it is called, enables the larva to escape. As the larva passes through its several larval instars any lost limbs regenerate and the wing buds appear and grow longer and longer until in the last stages they cover many of the abdominal segments.

As in the adult, there are ten abdominal segments and an eleventh segment modified differently in the two suborders. In the *Zygoptera* it produces the dorsal median gill or epiproct and the two lateral gills or paraprocts; all that remains of the epiproct in the imago is a rudiment of the eleventh tergite, while the paraprocts give rise to the inferior appendages in the male, or disappear in the female leaving only a rudiment of the eleventh sternite. Their homologues in the *Anisoptera* are the dorsal median epiproct, also known as the appendix dorsalis, and the two latero-ventral paraprocts or lateral cerci; a small process, or more often only a swelling at the base, is evident above the appendix dorsalis in the male which eventually develops into the inferior anal appendage of the imago; there is no similar development in the female, all that remains is a rudiment of the eleventh tergite; the cerci disappear in both sexes leaving only a rudiment of the eleventh sternite. In both suborders, from about the fourth or fifth instar, a pair of small, pointed appendages, the cercoids, develop on either side of the appendix dorsalis above the cerci. They give rise to the superior appendages of the male or the anal appendages of the female (Figs. A17-19).

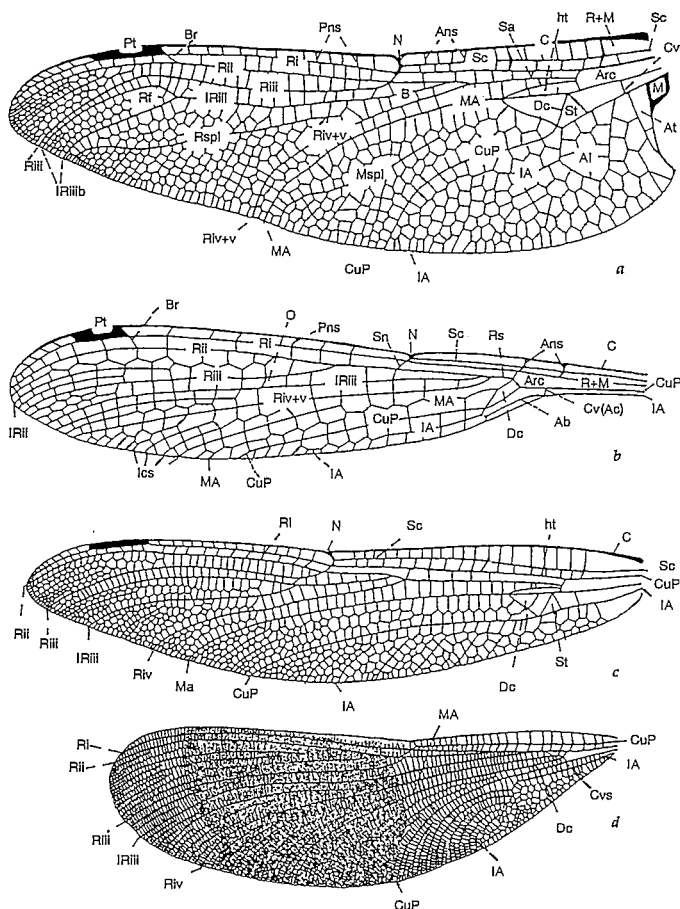
In the *Zygoptera* the respiratory organs are the caudal gills, the form and pigmentation of which are used for identification of species. In the youngest stages these gills are mere filaments but soon fill up and take a triquetral section.

Still later in most cases they either become swollen (saccoid) or flattened (lamellate) (Fig. 20). Some Zygoptera have abdominal gills in addition, but their respiratory function has been questioned. It is possible that the Zygopterid larvae also use the rectum as an accessory respiratory organ, though the rectum in this suborder is not as elaborate a structure as it is in the other suborder. The Anisoptera have elaborate rectal gills forming a structure called the branchial basket. Water is taken into and discharged from the rectum rhythmically thus keeping the gills aerated. Their functioning can be observed easily in the living larva.

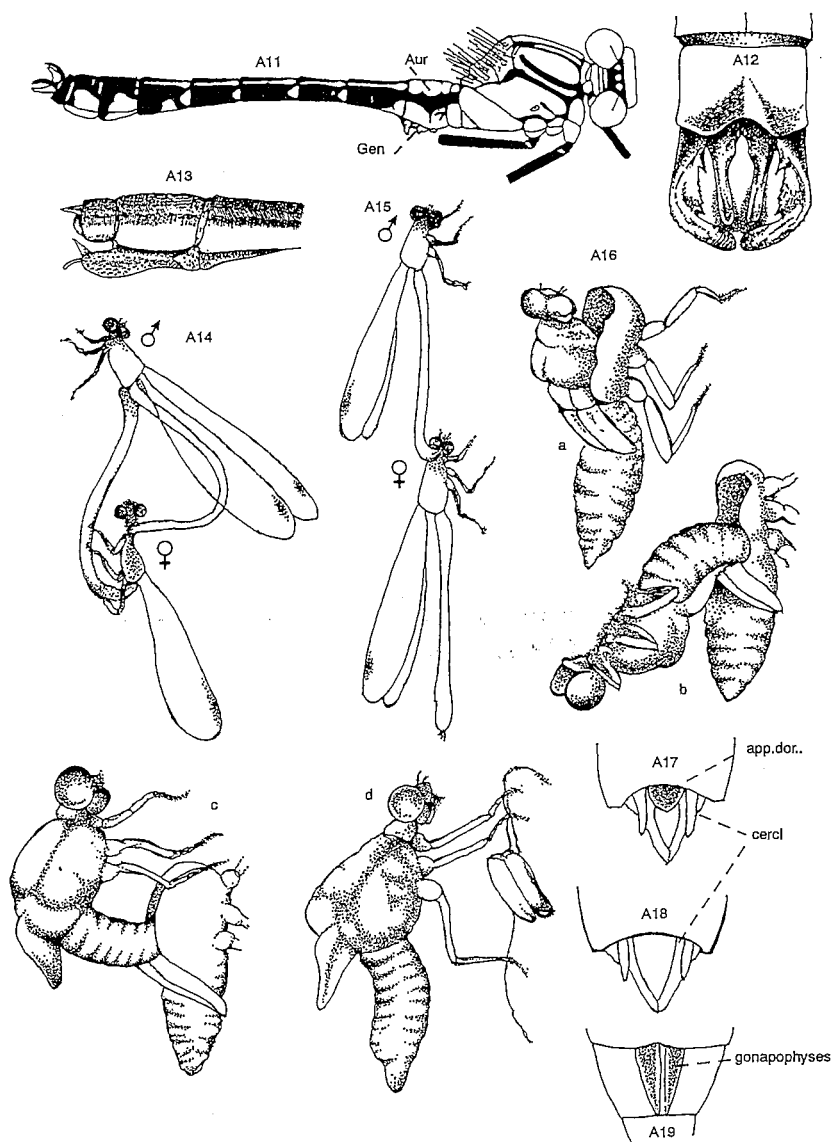
The sex of the larva is easily determined. In the Zygoptera the male gonapophyses are a small pair of triangular processes on the ventral surface of segment 9 of the abdomen; the female gonapophyses are conspicuous processes covering segments 9 and 10. In the Anisoptera the female gonapophyses (Fig. A19) are conspicuous in the Cordulegasteridae and Aeshnidae, but generally inconspicuous in the remaining families; all male Anisopteran larvae, in addition to the male gonapophyses on segment 9, show a "male projection", sometimes only a slight swelling at the base of the appendix dorsalis, which in the imago becomes the inferior appendage (Figs. A17-19) (Variation in larval structures can be seen in figures of the C-series).



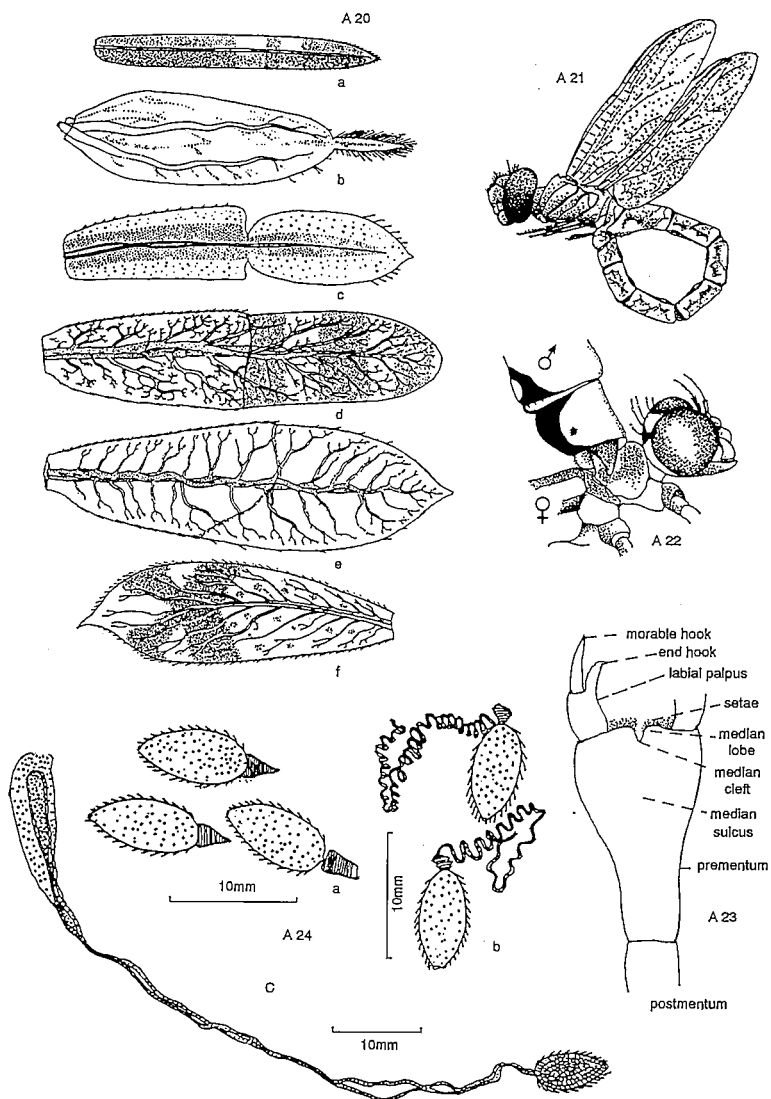
A1: head of zygopteran. A2: head of anisopteran. A3: thorax. A4: leg. A5: zygopteran at rest. A6: *Lestes* sp. at rest. A7: anisopteran at rest: (a) usual appearance; (b) ready to take off; (c) reducing the effect of a hot sun. A8: male segments 2/3 and male genitalia. A9: male anal appendages: (a) zygopteran and (b) anisopteran.



A10: (a) anisopteran hind wing (*Aeshna*). (b) zygopteran wing (*Lestes*). (c) anisopteran fore wing (*Cordulegaster*). (d) zygopteran hind wing (*Agrion*). *Cvs*, cubital veins; *Ab*, anal bridge; *Arc*, arcus; *Sa*, sectors of arcus; *Al*, anal-loop (hind wing only); *At*, anal triangle (hind wing only); *Ans*, antenodal cross-veins (note the 2 thickened primary antenodals); *Pns*, postnodal cross-veins; *C*, costa or anterior border of wing; *Sc*, subcostal vein; *R + M*, radius and medius combined at base of wing; *Rii* and *Riii*, 2nd and 3rd branches of radius; *Riv + v*, 4th and 5th branches of radius (combined to form a single branch in the Odonata); *IRii*, *IRiii* and *Ics*, intercalated branches of radius and medius; *Rf*, radial fork; *IRiib*, branches of the radial fork (found only in some anisopteran wings and mainly *Aeshnas*); *Rspl* and *Mspl*, radial and medial supplementary veins; *MA*, medius or anterior median vein; *CuP*, cubitus or posterior cubital vein; *IA*, anal or first anal vein; *Dc*, discoidal cell or triangle; *St*, subtrigone or subtriangle; *ht*, hypertrigone; *Cv*, cubital vein (*Ac* or *Cuq*); *M*, membradule; *N*, nodus; *Sn*, subnodus; *Pt*, Pterostigma; *Br*, brace of pterostigma; *B*, bridge; *O*, oblique cross-vein (occurs in *Lestes* only). (From Fraser, 1949).



A11: *Gomphus* sp. male showing abdomen, genitalia and auricles. A12: *Lestes* sp. - male anal appendages. A13: *Lestes* sp. - female showing ovipositor. A14: wheel position. A15: tandem position. A16: a-c - stages in emergence. A17-19 - anisopteran larvac: A17: anal appendages of male showing appendix dorsalis. A18: anal appendages of female. A19: ventral view of female showing gonapophyses. (A11-A13 from Fraser, 1949).



A20: Types of zygopteran caudal gills: (a) triquetral. (b) constricted saccoid. (c) constricted lamella. (d) nodate lamella. (e) subnodate lamella. (f) denodate lamella. A21: male transferring sperm capsules to the accessory genitalia whilst in flight. A22: showing male anal appendage gripping posterior lobe of female prothorax. (A20-22 from Gardner, 1954/55). A23: labelled typical labium. A24: eggs of *Ictinogomphus rapax*: (a) before contact with water, filaments tightly coiled around posterior pole. (b) after contact with water, filaments partially uncoiled. (c) filaments completely uncoiled. (from Kumar, 1985).

# KEY TO THE ODONATA OF SRI LANKA and descriptions of the species

- 1a    Wings held fully open or depressed at rest: head not widened across: eyes more or less confluent in middle line except in the *Gomphidae* (Figs. A2, 7).
 

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- 1b    Wings held folded together over abdomen when at rest, (except some species of *Lestes* and *Sinhalestes*): head widened across: eyes not meeting in middle line (Figs. A1, 5, 6).
 

Zygoptera 2
- 2a    Antenodals and postnodals very numerous; antenodals 20 or more, postnodals 25 or more.
 

3
- 2b    Antenodals more than 4 and less than 10; clypeus extends forwards to form a distinct snout or proboscis (Fig. B6).
 

Chlorocyphidae 8
- 2c    Only 2 antenodals.
 

Lestoidea and Coenagrionoidea 13
- 3a    Many abdominal segments metallic green; pterostigma absent or creamy white; postnodals 50 or more.
 

Calopterygidae 5
- 3b    Abdominal segments mainly black, without any metallic green; pterostigma black or dark brown; postnodals about 40 or less.
 

Euphaeidae 7
- 4a    Abdomen much longer than wings, metallic green, except terminal segments; parts of head blue; legs very long and thin; pterostigma absent in male wings; forewings much longer than hind.
 

5
- 4b    Abdomen much longer than wings, segments 1–5 in males and 1–3 in females metallic green; pterostigma absent.
 

6

## Calopterygidae

### 5 *Neurobasis chinensis chinensis*

- 5a Dominant colour metallic green, parts of head blue, thorax with blackish-brown humeral and antehumeral stripes; forewings hyaline, pale yellowish-green, especially along costa and at apex; nervures brilliant green, node thickened and narrowly shaded brown; hind wings opaque except for some basal hyaline cells, basal two-thirds metallic green or blue, apical third distinct and blackish-brown with violaceous reflections and green metallic nervures; beneath hind wings blackish-brown with coppery reflections. Pterostigma absent in all wings. Legs very long and thin. Abdominal segments 9 and 10 whitish. Anal appendages black; superiors longer than 10, base green; inferiors shorter, base white. Abdomen 44–50mm; hind wing 32–38mm ( Figs. B1, 2).

*Neurobasis chinensis chinensis*, male

- 5b Somewhat similar to the male above in colour. Wings not metallic, yellow palely enfumed brown especially at apices and in forewings along costa from base to node; hind wings darker; all wings with an opaque creamy patch at node; pterostigma reduced or absent in forewings, creamy white, covering 7–14 cells in hind wings. Abdomen marked on the sides with stripe lined above and below in black, obscure on segments 5 to 7 but conspicuous on 9 and 10; all segments with a transverse subapical black mark; 8 to 10 with the dorsal carina yellow which expands progressively to end of 10, which ends in a distinct keel and a fine apical spine and a small tubercle on each side with minute teeth above each. Anal appendages short, conical, dark brown; vulvar scale greenish-yellow. Abdomen 44–50mm; hind wing 36–40mm (Fig. B3).

*Neurobasis chinensis chinensis*, female

*Neurobasis chinensis chinensis* is a moderately large damselfly with very long slender legs, the male being a strikingly beautiful insect while the female is more quietly coloured. Males can be seen flitting up and down stream very close to the surface of the water, so close that they rise and fall with the level of disturbed water, flashing with brilliant colour and using the hind wings as planes and the forewings to propel themselves.



Both sexes can be seen together flying slowly along the banks of montane and submontane streams or resting with closed wings on shrubs along the banks. Populations possibly are very local. Lieftinck says this species is often found together with *Vestalis apicalis nigrescens*. Oviposition is endophytic into submerged vegetation, the female sometimes submerging the entire abdomen or more and apparently guarded by the male who may also be partially submerged. Period of emergence in Sri Lanka is not known, but in India the species is definitely bivoltine, with oviposition taking place quite soon after emergence in February, March and October. Breeds in the streams which the adults frequent, the larvae clinging to submerged vegetation. Sri Lankan collections were generally in water less than 10m wide and 1m deep.

Though adults have been found in many locations in Sri Lanka spread out over the year and larvae only in November/December, no records are available of emergence or oviposition. The early larval stages have been taken but not described. Rearing from egg to adult would be useful. However, as each population could be very local and the insect has not been reported as very common, collection of adults and larvae should be kept to a minimum. The adult larva has been figured by Fraser and the larval stages described by Kumar (Figs. B 1-3, C 5-10).

**References:**-Ali Khan, 1974; Fraser, 1924: 428, 479; 1929b: 577, 578; 1934: 121-124; Kirby, 1893: 545, 558; Kumar, 1973: 96, 97; 1976: 42; 1977: 506-510; Kumar & Prasad, 1981: 46; Laidlaw, 1924: 355; Lieftinck, 1940: 82; 1955: 65; 1971: 189; St. Quentin, 1973: 115; Costa & Starmuhlner, 1972; Bedjanić 1996. The type has been lost.

**Synonymy:**- *Libellula chinensis* Linn., 1758; *Agrion nobilitata* Fabricius, 1776; *Agrion chinensis* Guérin, 1829-44 *Calopteryx chinensis* Rambur, 1842; *Calopteryx disparilis* Rambur, 1842; *Calopteryx sinensis* Walker, 1853; *Neurobasis chinensis* Kirby, 1890.

**Distribution:**- Belihuloya, 650m, (12, larvae, nr. R. H.); Dickoya, 1200m, (12, larvae, no shade, Hatton Maskeliya road); Galagedera, (6mf); Ginigathhena, (Haloya), 650m, (12ml); Gonagama, (10m); Haldummulla, (6); Hanguranketa, 575m, (3); Haragama, (5f, 7m, 8mf, 9mf, 11mf, 12mf); Kandy, 700m, (1mf, stream nr. Citadel Hotel, (2, 5mf, 7m, 11mf); Kitulgala, (Bibiliya), 80m, (12, larvae, part shade); Kurunegala, (1f); Maskeliya, 1300m, (11, larvae found in fast-running water, no shade, Adam's Peak Estate); Peradeniya, (10mf); Udawela (Kandy), 450m, (3); Ratnapura, 400m, (We-ganga, nr. Balangoda, 12l); Wellawaya, (7); Deniyaya, (-mf); Gurulupotha, (9mf); Sooriyakanda, (4mf); Diyuluma Falls, 500m, (1mf); Seetha Gangula, Dalhousie, (1ml).

6 *Vestalis apicalis nigrescens*

- 6a Basal two-thirds of wings clear, apical third black; thorax and abdominal segments 1-5 dark metallic green, remaining segments matt black, base of 1 pruinose white, 10 with a marked apical keel, a spine on dorsum and one on each side. Anal appendages black, superiors curving inwards, inferiors sinuous. Abdomen 45-50mm; hind wing 35-38mm (Fig. B4).

*Vestalis apicalis nigrescens*, male

- 6b Wings enfumed without apical black; abdominal segments 1 and 2 and base of 3 metallic green; 10 with a strong dorsal keel and lateral apical spines. Anal appendages short, conical, black; ovipositor dark yellow. Abdomen 43mm; hind wing 38mm.

*Vestalis apicalis nigrescens*, female

*Vestalis apicalis nigrescens* which is confined to Sri Lanka is a moderately large damselfly of about the same size as *Neurobasis chinensis chinensis*. Wings hyaline, marked black apically in males. Pterostigma absent in both wings.

Often found together with *Neurobasis*, but keeping to the undergrowth overhanging the water or near a stream, resting with the head down and the abdomen held stiffly outwards. In Sri Lanka adults have been found throughout the year but at different sites. It possibly is multivoltine. Larvae have been found in November. More than this has not been reported for the species in Sri Lanka, but the genus has been described as returning to the streams for mating, and oviposition in blades of grass or soft stems overhanging and maybe several feet above the water; the newly hatched larvae drop down into the water. In Sri Lanka (St. Quentin, 1973) most larvae were collected on "banks" and nearby from stony bottoms at elevations below 700m and in water not cooler than 21°C. The species has been described as gregarious, often forming large colonies breeding in montane and submontane streams.

Little is known about the habits of this Sri Lankan species. The larva has been described (St. Quentin) but not in the detail needed for comparison with the larvae of other species of the genus, particularly the Indian species (Figs. B4, C 11, 12).

References:- Fraser, 1924: 428, 479; 1929b: 584, 585; 1934a: 124, 125, 131, 132, Fig. 37; Kirby, 1891: 204, pl.20; 1894: 558, 559; 1905: 272; Laidlaw, 1924: 355, 356;

St. Quentin, 1973: 115; Costa & Starmuhlner, 1972; Bedjanić 1996. While Fraser says the type was in the BMNH, it is not listed in Kimmins 1966.

**Synonymy:-** *Vestalis nigrescens* Fraser, 1929

**Distribution:-** Balangoda, 570m, (4m); Belihuloya, 660m, (5m, 6m); Haragama, 500m, (7m); Kandy, 700m, (1m, 7m, 9, 10f, 11mf, 12), stream nr. Citadel Hotel (1m); Nr. Mailapitiya, tributary of Mahaweli, 500m, (9, juvenile, mf); Nalanda, (9); Peradeniya, 530m, (9, juvenile, m, 10, 12f); Ratnapura, (10m); Nr. Carney Estate, tributary of Kalu-ganga, very shady, adults from banks, (11a); Keriwel Dola, by tea factory, Enselwatte Group (Ginganga, Deniyaya), 700m, no shade, (11 l); Thanipitiya Dola, (Nilwala Ganga), 600m, part shade, fast stream, (11 l); Ira hande pana Dola, (Kalu Ganga, Ratnapura area), no shade, fast stream, 100m, (11 l); Veli Oya, Belihuloya area, 700m, no shade, fast stream, (11 l); Kuda Oya, (Menik Ganga, nr. Buttala), 150m, very shady, (11 l); Bibili Oya, (Kelani Ganga, nr. Kitulgala), 80m, shady, (11 l); nr. Kitulgala R.H. (Kelani Ganga), 60m, (11 l); Hal Oya, nr. Ginigathhena, Kelani Ganga, 650m, no shade, fast stream, (11 l); Kottawa, (4mf); Matale, (3.); nr. Yakkala, 150m, (1); Hemmeliya, nr. Baddegama, 100m. small stream in wet ravine, (1, ); 6 mi. NW of Hulandawa, 20 mi. NE of Galle, 30m, small, stony, shaded stream, (1); Andapolakande, 3mi. NE of Melsiripura, 225m, small, fast, shaded stream, (2); Bopathella Falls, 9 mi. Ratnapura, 40m, rocky pools below falls, (2); 5 mi. NW of Balangoda, 725m, fast stream in forest, tea estate, (2); Kahawatte, 15 mi. SE of Ratnapura, 150m, very small stream, (3); Heda Oya, 29 mi. SE of Bibile, 100m, slow flowing river, gravel, slight shade, (3, ); Moneragala Mountain, 25 mi. E of Badulla, 150m, slow and fast streams with stony and gravel bottoms, vegetation slight shade, (3, ); Rambukkan Oya, 25mi. NE of Bibile, shallow river with sandy bottom, grassy banks, (3); Udawala, 8 mi. E of Kandy, 450m, mainly paddy fields, open stream, pools, (3); Kitulgala, 60-150m, gravel, sand, (3, ) and in some nearby hills to the south, 150m, (3); Rambukpath Oya, 10 miles NW of Hatton, stream in plantation, (3, ); Radapola Oya, Wellawaya, 175-200m, large stream in dry area, dense vegetation and shade, (3, ); Peradeniya (2mf); Ratnapura, (6mf); Ella, (9mf); Balangoda, (9mf); Diyuluma Falls, 500m, (1m); 5 mi. SE of Gallella, Ratnapura, at right tributary of Kaluganga (1mf).

## Euphaeidae

### 7 *Euphaea splendens*

- 7a Dominant colour black with traces of yellowish-brown markings. Basal part of forewings up to midway to node hyaline tinted brown rest opaque black fading to paler brown from proximal level of pterostigma, hind wings opaque to apices except for a small basal region; brilliant metallic blue or green from base to a straight line across wing from midway between node and apex of wing, the underside of this area glossy metallic blue, pterostigma black, very long and covering 12-14 cells; wing membrane clearly pleated. Abdomen black; a tuft of black hairs of unknown function on the sides of 9 ventrally. Anal appendages black, inferiors very short.

Abdomen 35–41mm; hind wing 27–35mm (Fig. B5).

*Euphaea splendens*, male

- 7b Dominant colour black with yellow markings on prothorax, thorax and segments 1 to 5 of abdomen; in older specimens thoracic markings pruinose white. Wings hyaline, tinted pale greenish brown; in older specimens forewings are clear and hind wings enfumed brown, darker beyond pterostigma; apices of forewings occasionally enfumed; pterostigma brown within black nervures, covering 10 cells. Anal appendages black, half as long again as segment 10. Abdomen 31–38mm; hind wing 29–37mm.

*Euphaea splendens*, female

*Euphaea splendens* is confined to Sri Lanka. It is a medium sized damselfly; the male has been described as "one of the most beautiful in Asia" probably because of its habit of using the forewings as propellers while keeping the hind wings fully spread out as planes. The female is on average slightly larger than the male.

The species can be seen on most montane streams where the males fly slowly up and down the stream or perch on vegetation overhanging the water. The females can be found in the neighbouring jungle and are rarely seen over the water. Fraser says he has not seen them *in cop* or ovipositing. The larvae inhabit the pools of the streams, generally hiding in the debris at the bottom; they are characterised by pairs of S-shaped abdominal gills arising from the ventral surface of the first seven abdominal segments; the last pair tends to be straight. These structures may serve as anchors in the fast-moving waters the larvae inhabit; the three bladder-like caudal gills lie flush on the surface where the larvae lie. St. Quentin collected about 100 larvae of various sizes, many on the undersides of stones in fast flowing water where the bottom was stony or rocky; they were not found where the bottom was sandy or gravelly and not in water more than 10m wide or deeper than 1m. The larva has been described by Fraser (1929) (Figs. B5, C1–4).

References:- Selys, 1853: 52; Kirby, 1891: 204; Fraser, 1929: 301, Pl. IV; 1934: 100–102; Laidlaw, 1924: 356; Lieftinck, 1971: 189; St. Quentin, 1973: 113–114, Figs. 1–4; Bedjanic 1996. Type in the Selys collection.

**Synonymy:-** *Euphaea splendens* Selys, 1853; *Pseudophaea splendens* Kirby, 1890; *Pseudophaea carissima* Kirby, 1893

**Distribution:-** Deniyaya, 1000m, (Meda Dola, Ginganga, Sinharajah Forest, shady, torrent, larvae under stones; Hoda Dola, 700m, Ginganga, cascading torrent, no shade, larvae under stones in stronger currents, adults in borders with *Neurobasis*; Kiriwel Dola, 700m, Ginganga, nr. Enselwatte tea factory, no shade, larvae, (11); Deniyaya, (Nilwalaganga, Thanipita Dola, 600m, torrent in part shade, larvae under stones in stronger currents; adults with *Trithemis festiva* and *Zygonyx iris ceylonicus*; Nagaketa Dola, 500m, torrent in part shade, larvae under stones in stronger currents, adults with *Neurobasis* and *Libellago greeni*); Galagedera, (1m); Gonagama, (10m); Haragama, (4m, 7mf); Hatton, (5mf); Kandy, (1m, 5m, 8m, 12f); Kurunegala, (1m); Punduloya, (11mf); Ratnapura, Kaluganga, Bodathpitiya Ela, 500m, torrent from waterfalls, larvae under stones near banks and in pools; Katugas Ela, 450m, torrent with waterfalls, very shady, larvae on stones near banks and in areas with slight currents; Rajanawa Dola, 250m, torrent with waterfalls, shady, larvae under stones near bank and on rocks in the cascades; adults with *Elattonneura*, (11); Upper reaches of Kaluganga on south flank of Adam's peak nr. Carney Estate, 800m, very shady primary forest, adults with *Neurobasis*, *Vestalis*, *L. finalis* and *Elattonneura*, (11); Maskeliya, 1850m, Gartmore Estate Dola, Maskeliya, small torrent from primary rain forest, above water-fall, larvae under stones near bank, neither larvae nor adults found below waterfall, nor nr. Superintendent's bungalow, nor in Maskeliya, (11); Dickoya along Hatton-Maskeliya road, 1200m, running by plantations and small forest, adults with *Trithemis festiva* and *Libellago sp.* (11); Belihuloya, Kirikatu Oya coming from Horton Plains, 700m, torrent, no shade, adults, (11); nr. Buttala, Kudaoya, Menik ganga, 150m, forest, very shady, adults with *L. greeni*, (11); Hal oya, 650m, nr. Ginigathena, Kitulgala, Kelani Ganga, torrent, no shade, larvae under stones near bank, adults, (11); Rambukpoth oya, nr. Pitawela, 625m, Kitulgala, Kelani ganga, larvae under stones near banks, but neither identified larvae nor adults near R.H. (11); Kottawa, (4mf); Yakkala, 25m, (1a); Alawala, 10 miles ENE of Yakkala, 150m, (1a); Labugama, 100-150m, (1a); Bopathella Falls, Ratnapura, 40m, above and below falls, (2a); Malwala, Ratnapura, 90m, fast running stream in ravine, (2a); Mountain ravine 5 miles NNW of Balangoda, 725m, (2a); Hatherleigh, Rakwana, 500m, cascading stream, (2a); Belihuloya, 575m, stony fast river bordered by bush, trees and paddy fields, (3a, 9a); Udawela, Kandy, 450m, open slow flowing stream in cultivated area with some pools, (3a); Fairly fast running stream in bush and thin forest 20 miles E of Kandy, 250m, (3a); Ury Estate, 6 miles SE of Badulla 1100-1200m, exposed stream in tea and primary forest, (3); Kunundu Oya, 11 miles NE of Nuwara Eliya, 900m shaded torrent in ravine in tea estate, parts wet, (3a); Rambukpoth Oya, 10 miles NW of Hatton, 250m, stream in ravine, bush, tea and rubber, (3a); Wellawaya, Radapola Oya, 200m, large stream in plantations, (3a, 7a); Labugama, (4mf); Diyaluma, 5mf); Sooriyakanda, (6mf); right tributary of Seetha-gangula 1km upstream of Dalhousie village, (11); Diyaluma Falls, 500m, (1mmf+cop+ex); right tributary of Kaluganga, 5km from Gallella, Ratnapura, (1m); several males by Belihuloya RH, by Citadel Hotel, Kandy and Pinnewala Elephant Orphanage, all fast flowing waters 12.97.

## Chlorocyphidae

- 8 The genus *Libellago* (Sri Lankan species only).
- 8a Forewings tipped with black and lacking a pterostigma—  
males 9a, 10a, 11a, 12a
- 8b Forewings not so tipped and with a pterostigma—  
females 9b, 10b, 11b, 12b

Note: The four species of *Libellago* found in Sri Lanka need to be more carefully described, preferably from live or fresh specimens, paying particular attention to colour and markings. Their habits and larvae need to be studied. The larvae of the four Sri Lankan species have not been described, but that of the Indian *L. indica* has been described by Fraser and is included here (Fig. C13).

### Sri Lankan species of *Libellago*

- 9 *Libellago greeni*
- 9a Abdomen black marked with bright citron-yellow and blood red; segment 1 with a yellow apical ring, 2 with yellow orange markings, 3 with orange-reddish and 4 to 10 with blood red markings. Head black with bright yellow-ochre markings on frons and a round postocular spot of the same colour. Prothorax black marked with citron-yellow, particularly a large spot on posterior lobe shaped like the ace of clubs. Thorax black marked in yellow, humeral stripe only a tiny upper linear spot. Legs black, pulverulent white on tibiae, pulverulent yellow on femurs. Wings hyaline, bases tinted with pale yellow, hind wings slightly enfumed, apices cloudy black at extreme border, forewings tipped with black at apices for about 3mm; this part with a metallic lustre; pterostigma black, present only in hind wing, covering  $3\frac{1}{2}$  cells; costa proximal to node and nervures posterior to it bright blood red, less so in the hind wing; 6 antenodals in all wings, 10–12 postnodals in hind wing. Abdomen 14mm; hind wing 17–19 mm (Fig. B11).
- Libellago greeni*, male
- 9b Abdomen: black marked with citron yellow, tinged greenish on basal segments, a lateral quadrate spot on 1, carina on 2 to 8 marked finely, lateral stripes on 2 to 8 which on 2 to 5 are

constricted apically, and tapered on 6 and 7, reduced to a spot on the others and in fully matured specimens, absent on 9 and 10, less often on 8, rarely present on 10. Head: labrum black with a pair of rounded yellow spots, anteclypeus poorly metallic; postocular spots rounded; transverse marking on occiput fine, with maybe a trace of a central forward projection; frons with a single pair of spots, rarely a minute second pair. Thorax: antealar triangle with two green spots; antehumeral stripe narrow and ragged; humeral stripe greatly reduced to an upper linear spot. Wings hyaline, not enfumed or tinted; 5-6 antenodals, 10-12 postnodals; discoidal cell traversed once; pterostigma white, framed in black and clouded proximally. Anal appendages blackish-brown, pointed, tapered, widely divaricate, rather longer than 10; vulvar scales robust with a large spot of yellow laterally. Abdomen 12-13mm, hind wing 19-20mm.

*Libellago greeni*, female

*Libellago greeni* is confined to Sri Lanka. It is a small damselfly of about the same size as *L. adami*. Very little has been recorded about the habits of this insect. Costa & Starmuhlner have found it with *Neurobasis* and *Euphaea* at elevations of 150m and 500m in very shady to little shaded locations. The larva has not been described (Fig. B11).

References:- Fraser, 1928: 689, 690, pl.1, Fig. 1; 1934: 68-70, Fig. 21a; Laidlaw, 1924: 352-354, Fig. 5; Lieftinck, 1940: : 83; 1955: 68; 1971: 189; Costa & Starmuhlner, 1972: 52, 53, 63, 64; Bedjanić 1996. Fraser says the type is in BMNH, but it is not listed in Kimmins 1966.

Synonymy:- *Micromerus greeni* Laidlaw, 1924.

Distribution:-Bibile, (-); nr. Buttala, 150m, Kuda oya, Menikganga, very shady forest, found with *Euphaea*, (12a); Deniyaya, 500m, Nagakete Dola, Nilwala Ganga, torrent running through forest and plantations part shadow, on banks with *Neurobasis* and *Euphaea*, (11a); Haragama, nr. Mailapitiya, 500m, (6m, 8m, 9mf); Kandy, (11m, 12m); Nalanda, 3000m, (9, 10); Peradeniya, (6m, 7m); Pitakande, Kandy, (6m); fast stream 20 miles E of Kandy, 250m (3mf); slow stream in shallow ravine, coconut plantation, 3 miles NW of Hanguranketa and 10 miles SW of Kandy, (3mf); Ratnapura, 500m, Bodathpitiya Ela, Kaluganga, torrent from Bodathpitiya Falls from forest running through plantations, from banks with *Prodasinoura sita*, (11a); Wellawaya, (-mf); Panamure, (4mf); Gurulupotha, (10mf); tributary of Walawe, 500m SE of Embilipitiya; Kudawaganga under bridge 500m SE from base camp, Sinharaja Forest, Kudawa, 380m.

10     *Libellago adami*

- 10a     Abdomen velvety black with grass green markings dorsally and golden yellow markings on sides of 1 to 7 and usually of 8; segments 9 and 10 unmarked; ventral surfaces of 3 to 5 or 6 greenish-yellow with black spots. Head black marked with green; among other colours, a pair of large rectangular spots on frons and a large oval spot on each side of the occiput separated from a stripe which runs between them, from the centre of which a small forward point arises as in *L. indica*. Antehumeral stripe about a third the width dorsally than below anteriorly and tapering posteriorly; humeral stripe very long, about two-thirds the length of suture; antealar triangles fully green. Black dorsal prolongation from green band on second lateral suture small and angular (cf. *L. finalis*). Thorax pale brown ventrally with black sutures. Wings hyaline, bases amber tinted, apices of forewings tipped with black for about 2 to 2½ mm with a steely reflex; pterostigma only in hind wing, black, covering 2½ to 3 cells, 5–6 antenodals in forewing, 10–12 post-nodals in hind. Abdomen 14–15mm; hind wing 18–19mm (Fig. B6, 8).

*Libellago adami*, male

- 10b     Abdomen black marked with dull greenish-yellow; a roundish spot on the side of 1; dorsal carina on 2 to 9 which are yellow on sides with large anteapical black sides whose middle portions are prolonged forwards to join, or almost join the narrow apical black rings; lateral portions of these side-marks shorter and only on the postero-lateral third of each segment; these comma shaped marks increase in size and on 6 to 8 are so wide as to include pale bands; sides of 9 and 10 with a small round yellow spot. Head: labrum and anteclypeus orange marked with black; postclypeus black with a round yellow spot on each side; frons with two pairs of yellow spots, the anterior pair large and subrectangular; postocular spots rounded; transverse stripe on occiput with a central forward projection. Thorax: antealar triangle fully green; antehumeral stripe broadens abruptly below; humeral stripe long but incomplete above and below; black dorsal offshoot from band along second lateral suture small and angular. Wings hyaline; tinted/enfumed; 5 antenodals in all wings, postnodals 10; pterostigma narrow, covering 2–2½ cells, white, in all wings,



its proximal fourth obscured. Anal appendages black, twice as long as segment 10, narrow and acutely pointed; vulvar scales black tipped with yellow. Abdomen with appendages 13–14mm; hind wing 29–21mm.

*Libellago adami*, female

*Libellago adami* is confined to Sri Lanka. It is a small damselfly first described by Fraser in 1939 as *L. adami* from a single male; in 1940 Lieftinck described both sexes under the name of *L. miae*.

Fraser collected his single male perched together with *L. greeni* and *L. finalis* on twigs overhanging a stream. Lieftinck found females ovipositing on a sunken log on a wildly flowing part of the Mahaweli river; he also found them common over a stream; females were scarce but both sexes of *L. greeni* were abundant. Later he found the species by a stream feeding paddy fields, a shallow river and by a stream polluted by a settlement at elevations ranging from 25m to 300m. The larva of this species has not been described (Figs. B6–8).

**References:-** Fraser, 1934: 2–4; 1939: 23, 24, Fig. 1; Lieftinck, 1940: 83–88, Fig. 1; 1955: : 68; 1971: 189, Bedjanić 1996. The location of the type is not known.

**Synonymy:-** *Libellago miae* Lieftinck, 1940

**Distribution:-** Deduru Oya, open shallow river, 5 miles NE of Kurunegala, 150m, (2a); Haragama, (5m, 9mf, banks of Mahaweli); Kandy, 700m, (8mf), stream nr. Citadel Hotel, (1mf); Manikwela Ela, stream in tea plantation, 4 miles NW of Hatton, 250m, (3a); Nalanda, 300m, (10m); Peradeniya, 300m, (12m), polluted stream in open valley, (3a); Weeragantota, (9f); Yakkala, 25m, wet ground near stream to paddy fields, 18 miles NE of Colombo, (1a); Yala, (10f); Gampola, (9mf); tributary of Walawe, 500m SE of Embilipitiya (1mf); rice fields, 500m S of Gonapinuwela, Galle, (5, m).

11 *Libellago finalis*

- 11a Abdomen black marked with citron yellow on sides, changing to green or bluish-green on dorsum; 8 to 10 unmarked; the black on segments 2 to 5 looked at from above form a T, the arms of which drop laterally to enclose the markings. Latero-ventral surfaces of abdominal segments black. Head black marked with yellow, post-erior transverse stripe on occiput without a forward projection, frontal spots small and widely separated. Prothorax black marked with yellow as in *L. indica*. Thorax black, marked with yellow or yellowish-green, black

ventrally with tiny pale brown spots; ante-humeral stripe not twice as broad below as dorsally; humeral stripe very short; black dorsal projection from green band on second lateral suture rounded and almost reaching the black dorsally, anteclear sinus with green spots. Wings hyaline, bases amber tinted, apices of forewings tipped with black for about 3mm; pterostigma only in hind wings, covering 3 cells; 6-7 antenodals in all wings, 10 postnodals in hind wings. Anal appendages black. Abdomen 16mm; hind wing 21mm (Figs. B7, 9, 10).

*Libellago finalis*, male

- 11b Abdomen black marked with bright citron or greenish yellow; on carina from 2 to 8; base of 1 narrowly and sides broadly black; 2 to 8 with broad lateral stripes constricted sub-apically, markedly so on 2 and 3, less so on 4 to 6, tapered apically on 7, broadening apically on 8; a large round spot on 9; a smaller spot on 10, absent in very old specimens, broad yellow spots all along ventrally. Head: labrum and anteclypeus black with yellow markings which are much reduced in old specimens; anteclypeus dull metallic blue-black; two pairs of very small, pale frontal spots; postocular spots much reduced; transverse stripe on occiput without central forward projection. Thorax: anteclear triangles with small yellow / green spots; antehumeral stripe broadens slightly below; humeral stripe, very short; black dorsal offshoot from band along second lateral suture, semicircular and large. Wings palely tinted and enfumed, hind pair occasionally tipped, narrowly and diffusely with blackish-brown; pterostigma creamy white, framed in black and clouded in black proximally; discoidal cells traversed once or twice; 7 antenodals in all wings; 11-13 postnodals. Anal appendages black, conical, pointed at apices, twice length of 10; vulvar scales robust. Abdomen 6mm; hind wing 25mm.

*Libellago finalis*, female

*Libellago finalis* is confined to Sri Lanka. It is a small damselfly slightly larger than *L. adami*. Confined to the montane and submontane zones of Sri Lanka and often taken with *L. adami* and *L. greeni*. The larva has not been described (Figs. B7-10).

References:- Fraser, 1934: 67, 68, Fig. 21; Kirby, 1891: 204; 1894: 560; 1905: 272; Laidlaw, 1924: 351, 352; Lieftinck, 1940: 83; 1955: 68; 1971: 189; Costa & Starmuhlner, 1972: 56; Bedjanić 1996. Type in the Selys collection.

**Synonymy:**- *Micromerus finalis* Selys, 1869.

**Distribution:**- Bandarawela, (10a); Belihuloya, 600m, (5mf); Diyatalawa, (8a); Haragama, nr. Mailapitiya, 500m, (9m); Hindagala, C. P. (10m); Kandy, (10a, 11a); 20 miles E of Kandy, 250m, fast running stream in bush and thin secondary forest, (3a); upper reaches of Kaluganga nr. Carney Estate, 800m, very shady deep ravine in rain forest, on the banks with *Vestalis*, *Euphaea* and *Elattoneura*, no larvae reported here, (11a); Malwala, 3 miles NE of Ratnapura, 90m, fast running stream in exposed ravine in tea plantation, (2a); Nalanda, (11a); Nawalapitiya, (11a); Punduloya, (-); Udawela, 8 miles E of Kandy, 450m, exposed, slow stream with pools, in cultivated area, (3a); Welimada, (9mf); Demodera, (7mf); Diyaluma Falls, 500m (1m); tributary of Walawe, 500m SE of Embilipitiya (1f).

12     *Libellago indica*

12a     Abdomen black marked with bright citron/canary yellow, more extensive than in *finalis*, green to golden green dorsally; segments 2 to 6 with mid-dorsal black stripes which join basal black rings; 9 and 10 black, 8 almost so except for a small subdorsal wedge of colour. Head black, marked with yellow; posterior transverse mark on occiput with a forward point; eyes brown, with a trace of metallic blue. Prothorax black marked with a yellow or greenish-yellow narrow antehumeral stripe and a narrow posthumeral stripe; antealar sinus filled in greenish yellow. Wings hyaline, bases amber tinted, apices of forewings tipped black for about 3mm; pterostigma only in hind wing, black, covering 2 to 2½ cells, 5-6 antenodals in forewings, 10-14 postnodals in hind. Anal appendages black, superiors twice as long as 10, apices converging; inferiors half length of superiors, closely apposed at bases and enclosing a minute foramen. Abdomen 14-16mm; hind wing 15-18mm (Fig. B12).

*Libellago indica*, male.

12b     Abdomen largely yellow with black markings; large quadrate spot on dorsum of 1, base narrowly and lateral apical border black; dorsum of 2 to 8 broadly black; carina yellow up to 9; lateral stripes broadening subapically, not reaching bases; thin stripe on 9 expands broadly and joins dorsal black to enclose a large, round yellow spot; 10 black with two elongate subdorsal yellow spots. Head: labrum yellow with a median basal tongue of black; anteclypeus yellow, edged finely in black behind; postocular spots connected to transverse stripe which has a central forward projection; frons with two large quadrate,

citron yellow spots separated by a central black stripe which joins anterior and posterior black marks. Thorax black marked with citron yellow; antealar triangle fully so; antehumeral stripe narrow, ragged and incomplete above with a small spot; humeral stripe narrow and incomplete below; nearly the whole mesepimeron except for a narrow, black part in its middle, and an invasion of black above; the whole metepimeron except anterior sutural line and narrow ventral border. Wings hyaline, pale with amber tint; pterostigma in all wings, creamy white, framed in black, expands somewhat proximally over 2 cells; 6-7 antenodals, 9-10 postnodals; discoidal cell traversed once in all wings. Anal appendages blackish-brown, pointed, tapered, widely divaricate, rather longer than 10; vulvar scales robust with a large spot of yellow laterally. Abdomen 13-17mm, hind wing 17-20mm.

*Libellago indica*, female

*Libellago indica* is another small damselfly made conspicuous by its brilliant canary yellow colour. A single male was taken in Sri Lanka in 1910. The Colombo Museum has a single specimen taken in February 1933 in Opanayake.

Fraser, basing his opinion on a South Indian location, believes the species to be bivoltine as it has been found throughout the year: it possibly is multivoltine. The larva of this species has been described as *Micromerus lineatus* by Fraser (1919). The larvae are always found at great depths in fast running streams, clinging to roots etc., seldom on stems or reeds. They are covered with debris on the hairs of abdomen and legs and are difficult to find. The exuviae are usually found on tree trunks about two feet up, some as high up as seven (Figs. B12, C 13).

References:- Kirby, 1894: 560; Fraser, 1919: 197, 198, pl. xxiii; 1924: 428, 483; 1928: 683-691, pl. III; 1933: 9, Fig. 1d; 1934: 59-64, Figs. 20, 21; Laidlaw, 1924: 354, 355, Fig. 6; Lieftinck, 1940: 88; 1955: 68. Type and paratype in BMNH.

Synonymy:- *Micromerus lineatus* Fraser, 1919; *Micromerus lineatus indica* Fraser, 1928

Distribution:-Haragama, (7m); Kantalai, (3, 7, 8, ); Kottawa, (3); Nawalpitiya, (-); Opanayake, (2).

Unidentified *Libellago* species at Mahaweli by Citadel Hotel, Kandy and at Pinnewela Elephant Orphanage, by MahaOya, both fast flowing rivers, 12.97.

13 Wings with only two antenodals: **Lestoidea** and **Coenagrion-oidea**

13a Petiolation begins at **ac**; **ac** and **ab** meet at posterior margin of wing; discoidal cell very acutely angled distally; an oblique vein always present between **Riii** and **iRiii** at about midway between node and pterostigma; pterostigma at least twice as long as wide (except in *Platylestes*); intercalated sectors usually present at end of wings; no post-cubital cross veins, wings usually held partly open when at rest.

**Lestidae 14**

13b Petiolation begins well distal to level of **ac**; the nervure **IA** absent or very much reduced; **Cu<sub>ii</sub>** very much reduced being of 6 to 9 cells; discoidal cell very much longer than broad, its ends squared; pterostigma more or less quadrate, its proximal side oblique, costal side shorter than posterior; no intercalated sectors; an accessory basal post-cubital cross vein always present; sectors of arc arise from lower end of arc and are separate or fused for a short distance at origin; cells mostly four-sided; vulvar scales robust, a dorsal spine-like process before the apex; wings closed over abdomen at rest. Abdomen long and slender.

**Platystictidae 16**

13c Petiolation begins slightly proximal to level of **ac**; the nervure **IA** absent or very much reduced; **Cu<sub>ii</sub>** also reduced to 5 or fewer cells in forewings, 7 or fewer in hind; discoidal cell very much longer than broad, its ends more or less squared; pterostigma diamond shaped, costal and proximal sides equal; no intercalated sectors; no basal post-cubital vein; sectors of arc arise from lower end of arc and are separate from origins; cells mostly four-sided; wings closed over abdomen at rest.

**Protoneuridae 19**

13d Petiolation begins slightly proximal to **ac**; **IA** well developed and is a continuation of **ab** which is always present; **Cu<sub>ii</sub>** extends beyond middle of wings; discoidal cell elongate, distal side slightly oblique; pterostigma slightly longer than broad, both proximal and distal sides oblique; no intercalated sectors; no basal post-cubital cross veins; sectors of arc separate from

origins; cells mostly four-sided, wings folded over abdomen when at rest.

Platycnemididae 15

- 13e Petiolation begins at or a little proximal to level of ac; IA and ab always present; Cuii of variable length; discoidal cell elongate, distal end very acute, costal side much shorter than posterior; pterostigma usually somewhat diamond shaped, variable sometimes in the sexes and in the fore- and hind wings of the male; no intercalated sectors; no basal post-cubital veins, sectors of arc separate from origins, cells mostly five-sided; wings folded over abdomen when at rest.

Coenagrionidae 23

- 14 Lestidae with three genera here, *Lestes*, *Sinhalestes* and *Indolestes*.

Six members of this family are found in Sri Lanka, one with only a single record: four belonging to the subfamily *Lestinae* (genera *Lestes* and *Sinhalestes*) rest with their wings nearly wide open; the other two belonging to the subfamily *Symplocmatinae*, (genus *Indolestes*) rest with their wings folded together over the abdomen. All six share the following characters of the genus:- There are only two antenodal nervures and petiolation begins about midway between the two; ac and ab meet at the hinder border of the wing; the discoidal cell in the four species that rest with partly open wings, is similar in the two wings, very strongly angulated distally and its basal side two-thirds the length of the costal; in the other two species the discoidal cell is narrow and very acutely pointed and in the forewing the posterior side is nearly four times as long as the basal while in the hind wing the former is nearly five times as long as the latter; sectors of the arc arise from its middle: Ri<sub>iii</sub> arises from Ri<sub>ii</sub> well distal to the node: Cu<sub>ii</sub> not or only slightly arched at its origin: Riv+v and IR<sub>iii</sub> arise much nearer arc than node and far proximal to subnode: IR<sub>iii</sub> only slightly zigzagged; an oblique vein (not always easy to identify) always present between Ri<sub>iii</sub> and IR<sub>iii</sub> about midway between node and pterostigma, which is at least twice as long as broad; intercalated sectors usually present apically; anal bridge, ab always well developed; anal field small; anal appendages of

male forcipate and spined on the outside (Figs. A10b, B13-18). None of the larvae of the Sri Lankan Lestidae has been described; a description by Arun Kumar of the larva of the Indian *Lestes praemorsus praemorsus* is included here.

*Sinhalestes orientalis*

- 14a Rest with wings partly open. Head coppery bronze or metallic green; eyes brown; prothorax and thorax metallic green, with pale yellow antehumeral stripes; wings hyaline, pterostigma dark yellow framed in black: IRiii not zigzagged; 18-20 postnodals in forewings: male appendages black, superiors curving towards each other; abdomen metallic green on dorsum and sides; segment 10 of female brown, anal appendages conical, pointed; vulvar scale yellow: male abdomen 52mm; hind wing 38mm: female 49mm and 40mm respectively.

*Sinhalestes orientalis*, both sexes

*Sinhalestes orientalis* is confined to Sri Lanka. Apart from the record of location nothing is known about the habits of this species which has not been taken since the original collection in 1858 in Ramboda Pass. Fraser (1933a) comments that it must be very local or very rare.

References:-Kirby, 1893: 566; Laidlaw, 1924: 357; Lieftinck, 1955: 69; Fraser, 1933a: 48, 49. Type in the Hagen collection.

Synonymy:- *Lestes orientalis* Hagen, 1859.

Distribution:-Ramboda Pass.

- 14b *Lestes praemorsus decipiens*

Rest with wings partly open. Head matt black pruinose below; labrum, anteclypeus genae and a line on postclypeus turquoise-blue; eyes deep sapphire blue. Prothorax black with pruinose yellow markings; thorax black on dorsum, sides black, usually heavily pruinose and violaceous (in less heavily pruinose specimens, several irregular spots may be seen); beneath black, heavily pruinose; antehumeral stripe dark metallic green, deeply along outer margin, (sides in the species itself are blue or pale, greenish yellow); legs black with a thin bluish green stripe. Wings palely enfumed in older specimens; ac nearer level of basal antenodal in forewing, about midway

between the two antenodals in the hind; 10-12 postnodals; pterostigma yellowish to dark reddish or blackish brown, covering 2 cells: Abdomen pale blue, metallic bronzy green on dorsum, matt black on apical segments; 2 to 8 with apical and basal blue rings; 8 may have a large blue spot; 9 with a large and 10 with a small blue spot on the sides; terminal segments black: anal appendages of male pale yellow/brown, base and apex black, superiors robust, as long as 9, curving inwards; inferiors black, tipped with white hairs. Female more greenish-yellow than blue; teneral almost fully yellowish; thorax yellowish or pale greenish-blue, sides and beneath pruinosed chalky white; pterostigma yellowish, anal appendages yellowish, as long as 10. Male abdomen 33mm; hind wing 21mm: female 31mm and 20mm respectively (Fig. B13).

*Lestes praemorsus decipiens*, both sexes

*Lestes praemorsus decipiens*. Nothing is known about the habits of this subspecies in Sri Lanka. There is some doubt as to whether "*decipiens*" should be recognised as a subspecies or whether it is a "heavily pruinosed adult" of the species (Fraser, 1924b). In India the species has been recorded as ovipositing in June/August and emerging in September/November after the monsoon from seasonal monsoon ponds, the adults staying in sheltered sites for 7-8 months (Kumar, 1976). Fraser (loc.cit.) says it is found throughout the year at elevations below 4,000'.

The adults should be studied to see whether the subspecific rank is justified (Figs. B 13, C 14).

References:- Selys, 1862; Kirby, 1893: 56, 56; Fraser, 1924: 418, 484, 486; 1933a: 30-33, Figs. 10-12; Laidlaw, 1924: 357; Kumar, 1972a; 1976: 42. The type of *praemorsus* is in the Selys collection.

Synonymy:- *Lestes praemorsu* Kirby, 1893; *Lestes decipiens* Kirby, 1893.

Distribution:- Kandy (5); Mahagany, Trinco., (9, 12); Nilaveli (11, 12).

#### 14c *Lestes elatus*

Rest with wings partly open. Male: abdomen, pale bluish-green sides, pale yellow in teneral; dorsally, 1 brownish, unmarked in teneral; 2 to 6 with a metallic bronzy green stripe expanding basally but leaving pale blue rings, while



apically encircling the segments leaving narrow black rings; remaining segments black, dark brown in teneral, with broad apical ring, blue in adults, yellow in teneral; in very old adults all the terminal segments are black and half of 9 and all of 10 pruinose white and very conspicuous in flight. Head: labium white; labrum, bases of mandibles, anteclypeus and genae blue, frons and postclypeus olivaceous, the latter marked in reddish brown and framed in black; rest of head olivaceous yellow, light brown, bronze and black; eyes blue; in old specimens most of the head is black. Prothorax olivaceous, marked with black and brown; thorax dark reddish brown to black, pruinose white on the sides and beneath; antehumeral stripe bright metallic green; dorsum brown in teneral, olivaceous and yellow on sides and white beneath; black spots on mes- and met-epimeron and a glossy olivaceous stripe on mesepimeron do not get pruinose; legs pale yellow with black marks; wings hyaline, pterostigma reddish brown to black, paler in teneral, covering 2 cells. Anal appendages: superiors black, apices tipped with yellow hairs; inferiors very short, conical. Abdomen 34–36mm; hind wing 23–24mm.

Female less black than male; ground colour pale brown; stronger metallic markings on head: thorax with a spot on the lateral suture, three on the mesepimeron and two ventrally on metepimeron, very conspicuous from below: abdominal markings brown and non-metallic in teneral, bronzy reddish-brown in adults; this dorsal band short of apex on 9; apex of 9 and all of 10 bluish in adults, yellowish in teneral: anal appendages black, creamy in teneral, short, conical; vulvar scale dark brown. Female abdomen 34mm; hind wing 24mm (Fig. B14). Distinguished from the other species by the thoracic metallic stripes with only an upper dilation instead of two as in the *praemorsus* group.

*Lestes elatus*, both sexes

*Lestes elatus*. Apart from recorded locations nothing is known about this species in Sri Lanka. Fraser (1933a, 1924) writing about the species in India says it is the commonest of the genus, being present throughout the year in southern districts around ponds during the monsoon months and hiding in scrub jungle in the drier season; not usually found above 2,500'. The

flight is short, the male when settled has the habit of swaying its abdomen. Females are rare over water unless *in cop* or ovipositing, often in rice stems at about 6" above water level. Variations due to age are common. The wet season brood has a very short larval existence of about 10 weeks, emerging in September from eggs laid in the previous June. The larva has not been described (Fig. B 14).

References:- Kirby, 1891: 203; 1893: 565; Laidlaw, 1924: 357; Fraser, 1924: 428, 484; 1933a: 37-40, Figs. 14, 15. Type is in the Selys collection.

Synonymy:- *Lestes elata* Hagen, 1858; *Lestes elatus* Kirby, 1891, 1893; *Lestes elata elata* Fraser, 1929.

Distribution:- Alutnuwara, (3); Kandy (9f, 11f); Mankulam, (2); Punduloya, (11m); Puttalam, (1m); Ramboda; Trincomalee, (1, 10, 12); Marichchikkaddi, (3m).

#### 14d *Lestes malabarica*

Rest with the wings partly open. Differs from the above in the following characters:- frons and vertex black; thorax bright metallic green dorsally in younger specimens; mid-dorsal carina and an antehumeral stripe bright reddish-brown, (it could be that the antehumeral stripe is metallic green and not expanded in its upper part as it is in *elatus*); mesepimeron blackish brown in teneral, rest of thorax and beneath creamy-white, adults almost entirely black, except for some light brown; the black becomes heavily pruinosed except for an anterior ventro-lateral black spot on each side; the posterior spots found in *elatus* are absent; sides of abdomen sky-blue, dorsum dull metallic green even apically on segment 1; superior anal appendages bent sharply inwards distally and without the apical tuft of hairs seen in *elatus*; inferiors elongated distally and not rounded. Abdomen 24-25mm; hind wing 21mm (Fig. B15).

The female has not been recorded here; very similar to the male; abdomen with dorsum bright metallic green in teneral, dull cupreous to 6 and then black in adults; in teneral apical half of 8, sides of 9 and all of 10 yellow, which changes to black through blue. Abdomen 32-33mm; hind wing 22-23mm.

*Lestes malabarica*, both sexes

*Lestes malabarica*. Though Fraser (1933a) does not give Sri Lanka as a location for this species, a single male collected in Jaffna in December 1932 is in the collection of the Colombo Museum.

He adds that it breeds in great numbers in South Malabar and Cochin which abound in suitable tanks and ponds, almost completely displacing *L. praemorsus* and *L. elatus*, but that while an annual migration takes place northwards to North Malabar just previous to the South West monsoon, there is no evidence that the species establishes there as there are no suitable breeding places after the paddy lands have dried up. The situation in Jaffna would be similar to that in North Malabar and could account for there not being any record of this species after 1932: the single specimen collected could easily have been blown over from India.

Collectors should, however, look out for this species, not only in Jaffna and the peninsula but also in the paddy growing areas further south on the mainland (Fig. B15).

References:- Fraser, 1933a: 40-43, Fig. 16. Type and paratype in BMNH.  
Distribution:- Jaffna, (12m in 1932).

**Note:** All the species that follow rest with their wings folded over the abdomen. This includes the remaining two species of the Lestidae which can be distinguished by the presence of an oblique vein between *Riii* and *IRiii* and of intercalated sectors (Fig. A10b).

14e *Indolestes divisus*

14e1 Abdomen black dorsally, sides blue; 1 with a broad black basal spot; 2 with a narrow dorsal stripe, black apically, rest of stripe dark metallic green; 3 to 8 black dorsally, expanding apically and narrowing basally to leave a ring of blue; basal half of 9 black, this black not forked distally, rest of 9 and all of 10 blue. Head bronzed black with turquoise blue on labrum, genae, bases of mandibles, anteclypeus and postclypeus; eyes olivaceous. Prothorax blackish brown with pale blue sides; a broad dorsal metallic green band on thorax almost to humeral suture and two spots behind and a small black spot at upper end with another at upper end of postero-lateral suture and a third at base of ochreous legs. Wings hyaline, pterostigma black, short, covering 2 cells, discoidal cell very narrow with distal angle extremely acute. Anal appendages ochreous, apices black; superiors longer than 10 and inner dilation begins gradually, not abruptly as in *I. gracilis*; inferiors half length of superiors, conical and tumid. Abdomen 33mm; hind wing 19–21mm (Figs. B16, 17).

Laidlaw (1924) gives the following as distinguishing this species from *I. gracilis gracilis* :- the dark dorsal mark on the first segment of the abdomen metallic green from end to end of the segment, the dark basal mark on segment 9 is not forked; in the female the whole segment is dark; superior anal appendages yellow at their middle, apex stouter, rounded, not lancet-shaped, without a tubercle below, pterostigma slightly shorter.

*Indolestes divisus*, male

- 14e2 Very similar to the male above except that the ground colour is greenish or pale olivaceous. Anal appendages brown, short, conical; vulvar scales dark brown, short, finely serrate along lower border unlike in *I. gracilis gracilis*. Abdomen 31mm; hind wing 21mm. The description of this female should be checked.

*Indolestes divisus*, female

*Indolestes divisus* is confined to Sri Lanka. Lieftinck (1955) describes the species as confined to the hilly areas but a scarce and local insect. Nothing more is known of its habits. Larvae have not been described (Figs. B16, 17).

References:- Kirby, 1893: 566; Laidlaw, 1924: 358, 359, Figs. 8a, 8b; Fraser, 1933a: 65-67, Fig. 29. Lieftinck, 1955: 69; 1971: 190. Type in the Hagen collection.

Synonymy:- *Ceylonolestes divisa* Hagen-Selys, 1862; *Lestes divisus* Kirby, 1893 *Ceylonolestes divisa*, Fraser, 1930.

Distribution:- Haputale, (3f); Horton Plains, (3); Kandy, (5mf, 7m.); Ramboda.

#### 14f *Indolestes gracilis gracilis*

Male: Abdomen sky blue, bronzed black dorsally; 1 with a small black, basal, quadrate spot; 2 with a broad black band, carina and apical ring blue; 3 to 8 with narrow blue basal rings, carina yellow; on 9 the black ends before apical border in two divergent points, apical area blue; 10 blue with a basal black spot on each side. Head: labium yellowish; labrum, genae and bases of mandibles blue; rest of head coppery black; eyes dark blue above, paler below. Prothorax blue on sides, marked brownish black dorsally. Thorax blue, paler on sides and below with a coppery black band dorsally, humeral suture black above with three black spots behind and other black spots and two small blackish areas behind. Legs ochreous and black

with longish spines. Wings hyaline, pterostigma dark reddish brown, covering two cells, discoidal cell very narrow, extremely acute distally. Anal appendages black, superiors very long and sinuous with a small pointed tubercle near the middle, apices meeting in a rounded point; inferiors shorter, apposed to each other. Abdomen 30–33mm; hind wing 20–22mm.

Female ground colour greenish blue, otherwise like the male; in some specimens segments 2 to 5 or 6 are metallic green with the carina ochreous up to 7. Anal appendages brown, apices black, conical; vulvar scales yellow/brown, lower edges black and not serrate. Abdomen 29–30mm; hind wing 23mm (Fig. B18).

*Indolestes gracilis gracilis*, both sexes

*Indolestes gracilis gracilis* is confined to Sri Lanka. Lieftinck (1940) says this species is very common in ponds, lakes and marshes near Nuwara Eliya and the Botanic Gardens, Hakgala; males greatly outnumbered females and markings are very variable. Kirby (1891) refers to a pair from Punduloya that had no blue colouring. Larvae have not been described (Fig. B18).

References:- Kirby, 1891: 206, 1893: 566; Laidlaw, 1924: 358, Fig. 7a, 7b; Fraser, 1933a: 64, 65. Fig. 28; Lieftinck, 1940: 88, 1955: 69, 1971: 190; Bedjanić 1996. Type in the Hagen collection.

Synonymy:- *Lestes gracilis* Hagen, 1858; *Lestes gracilis gracilis* Ris, 1916; *Ceylonolestes gracilis* Fraser, 1930.

Distribution:- Hakgala Gardens 1800m, (8mf, 10mf); Hewaheta, (3m); Horton Plains, (3); Katumana, Nuwara Eliya, (3); Maskeliya, (4m); Nanu Oya,; Nuwara Eliya, 2000m, (9mf); Punduloya; Ramboda; Pattipola, (3mf); right tributary of Seetha-gangula 1km downstream of Dalhousie village, (1m); swampy area 500m NE of World, s End, 2000m, (1mf).

- 15 The family *Platycnemididae* with a single genus and species here. Legs bright brick red; in the Sri Lankan genus the two hind pairs of tibiae dilated only in the males.

15a *Copera marginipes*

- 15a1 Abdomen bronzed black to middle of segment 8, marked as follows:- apical border and sides of 1 pale greenish-white, side with a short dark stripe; a pale narrow, greenish-white mid-dorsal stripe on 2, bordered with black on each side and with

an apical black line; 3 to 8 black dorsally, 3 to 7 with pale blue basal rings; apical border and an apical diamond shape on 8, pale blue; 9 and 10 very pale blue to creamy white. Head mainly black, the broad band on the occiput divided transversely by a greenish-white stripe, genae and anteclypeus greenish-yellow. Eyes black above, the rest greenish white with a narrow, black equatorial band. Prothorax bronzed black marked with yellow and greenish-yellow. Thorax bronzed black on dorsum for about half way to humeral suture, carina and antearlar sinus finely lined in yellow, humeral stripe is pale yellow, upper part of post-humeral stripe broken into spots. Wings hyaline, pterostigma black, framed in yellow with thick black nervures. Anal appendages: superiors very pale blue tipped with black, inferiors about four times as long. Abdomen 34mm; hind wing 18mm (Fig. B38).

*Copera marginipes*, male

- 15a2 Abdomen dark brown dorsally, 2 with U-shaped apical markings 3 to 7 with broad apical rings, apical half of 8 and all of 9 and 10 creamy white. Head mainly pale brown with some black spots, labium and bases of mandibles bright yellow. Eyes dark greenish or olivaceous brown above. Prothorax violaceous brown as is the thorax dorsally, blacker on mid-dorsum, sides pale brown, markings reduced to an upper humeral spot and a zigzag post-humeral stripe. Legs brownish, tibiae not dilated. Wings hyaline, pterostigma pale blackish-brown. Anal appendages creamy white, conical; vulvar scales brown, short. Abdomen 30mm; hind wing 18.5mm.

*Copera marginipes*, female

*Copera marginipes*. Apart from records of collection in the low country and up to Kandy, nothing is known about the habits in Sri Lanka. In India the species is described as breeding in standing water with reeds and marshy vegetation, the adults being most active in the forenoon in the undergrowth, the white teneral being very conspicuous. The larvae, when not disturbed, stand well out with the abdomen curled over the back and the large caudal gills waving freely; when disturbed they crouch closely on the twig on which they were resting. The larva has been described by Kumar (1973a) (Figs. B38, C22).

References:- Kirby, 1893: 560; Laidlaw, 1924: 364; Fraser, 1933a: 192-197, Figs. 86, 87; Kumar, 1973a; Lieftinck, 1955: 73; 1971: 195; St.Quentin, 1973: 116, 117; Bedjanic, 1996. Fraser believes type is in Selys collection.

Synonymy:- *Platycnemis marginipes* Ramb., 1842; *Psilocnemis marginipes* Selys, 1863; *Platycnemis lacteola* Selys, 1863; *Psilocnemis striatipes* Selys, 1863; *Copera marginipes* Kirby, 1890; *Copera acutimargo* Krug., 1898

Distribution:-Alawala, Yakkala, streams in cultivated area, (1, 3); Ambalangoda, Polhunnawa forest reserve, (1); Andankulam, (10); Avissawella, (10m); Baddegama, Hemmeliya, small forest stream, (1); Bibile, Heda Oya slow flowing river, gravel, (3); Hanguranketa slow flowing stream, (3); Haragama, stream near Mailapitiya 550m, (9m); Hiniduma, (4); Kahawatta, Ratnapura wet valley with a trickle of water, (3); Kandy, (1m, 5f, 6m, 7mf, 8, 9f, 11m, ); Kandy, muddy water reservoir, (1); Kandy, Uduwela paddy fields, pools, (3); Kantalai tank, (2); Kuda Oya, Menik Ganga near Buttala, (12l); Laxapathiya, (8); Mankulam, Per Aru river in dry forest, (2); Minneriya small stream, (2); Moneragala mountain slow flowing stream, gravel, (3); Peradeniya, (7f, ); Puttalam marsh, (2); Ritigala reserve forest, (2); Trincomalee, (7, 8, 9, 10, 11, 12f); Trincomalee hot wells, (2); Yakkala paddy fields and swamp, (1); Vavuniya, Paraiyanalankulam small stream in secondary forest, (2); Wellawaya, Radapola Oya, (3, 6); Cheddikulam, (5mf, 6mf); Kotmale, (-); pond in Udawattekelle Sanctuary, Kandy, 600m, (1mf); stream nr. Citadel Hotel, Kandy, 700m, (1mf+cop); tributary of Walawe 500mi SE of Embilipitiya, (1m); right tributary of Kaluganga 5km SE from Gallella, Ratnapura, (1m).

16 The family Platystictidae with 2 genera and 17 species.

16a The genus *Drepanosticta*. — Fraser (1933b) has given a careful description of 10 of the Sri Lankan species, the other 5 were described by other authors later. Fraser used the generic name *Ceylonosticta* in his paper, but later authors consider there are insufficient grounds for the erection of a new genus. Wings not tipped with black; sectors of arc fused for a short distance from origin; IR<sub>iii</sub> and MA not zigzagged from near origin.

No larvae of the Sri Lankan species of *Drepanosticta* have been described; that of the Javan *D.sundana* has been included here (Fig. C24).

16b The genus *Platysticta*. Wings tipped with black; sectors of arc arise separately from their origins; IR<sub>iii</sub> and MA zigzagged from near origins

18

17 Genus *Drepanosticta*. Fraser (1933b) has divided the Sri Lankan species into two groups:- Group (I) in which the vein R<sub>iv</sub>+v arises proximal to the vein descending from the node, and Group (II) in which R<sub>iv</sub>+v arises at or a little distal to that vein. Where the literature or an examination of specimens has

made it possible, species described after 1933 have been included in one of these two groups; a new Group III includes those species for which this has not been possible.

*Drepanosticta* - Group I. Riv+v arises proximal to vein descending from node.

17a *Drepanosticta tropica*

Anterior lobe of prothorax with long stalked processes. Abdomen dark bronzed brown, darkening on the apical ends of segments; sides and base of 1 yellow; 2 broadly yellow on the sides; 3 to 7 with a pair of basal whitish or yellow marks; 8 entirely blackish brown; 9 and 10 sky blue on dorsum and subdorsum, black on sides, 10 bordered apically with brown. Labium pale brown, labrum, bases of mandibles and anteclypeus pale blue, labrum may have a pale brown border (compare with *D. subtropica*). Eyes blue with an equatorial brown band. Prothorax dark reddish brown, posterior lobe bronzed blackish brown, anterior lobe with characteristic clubbed yellow processes as in *subtropica* below; thorax bronzed blackish brown on dorsum and sides as far as the posterior border of mesepimeron up to a pale blue stripe, yellow in teneralis; metepimeron and beneath yellow. Wings pale yellow, enfumed, pterostigma dark brown framed in yellow, covering one cell, proximal side very oblique. Male anal appendages: superiors dark brown, twice as long as 10, inferiors conical, markedly attenuated apically. Male abdomen 41–42mm, hind wing 26mm; female 40mm and 30mm respectively and similar to the male; anal appendages dark brown, short, conical; vulvar scales robust (Fig. B52).

*Drepanosticta tropica*, both sexes

Both sexes of *Drepanosticta tropica* have been described from Nuwara Eliya, Hakgala and surrounding slopes at 5000 to 6000 feet during May and June.

References:- Fraser, 1933a: 132–134, Fig. 62; 1933b: 207–209, Fig. 3, 4; Laidlaw, 1924: 362. Location of type unknown.

Synonymy:- *Platysticta tropica* Selys, 1860; *Drepanosticta tropica* Laidlaw, 1924; *Ceylonosticta tropica* Fraser, 1931.

Distribution:- Hakgala, (3, 4, 5f); Kandy (11); Nuwara Eliya, (6); Passara, (6); Haycock Hill, (5–8); Ohiya, (9–).



17b *Drepanosticta subtropica*

Anterior lobe of prothorax with long stalked processes. Abdomen reddish brown, marked with yellow and blue; 1 yellow, apical annule brown; 2 with an elongate spot on two thirds of the basal sides; 3 with a narrow basal annule; 4 to 7 with a darker ground colour and broader basal annules; 8 blackish with apical end blue; 9 and 10 sky blue dorsally, black on sides. Head bronzed black, labrum, bases of mandibles and anteclypeus blue, labrum bordered in glossy black unlike in *D. tropica*. Eyes blue with a broad equatorial band of dark brown. Prothorax pale blue, posterior lobe dark brown, anterior lobe yellowish with a small median projection on each side of which is a long stalked yellow process, clubbed at the end, similar to that in *D. tropica*. Thorax bronzed black up to the humeral region which is dark reddish brown up to the antero-lateral suture which in turn is bordered in front with bronzed black and behind by a pale blue stripe; behind and beneath yellow. Wings hyaline, pterostigma dark reddish brown framed in pale whitish yellow, covering one cell. Anal appendages: superiors brown twice as long as 10, inferiors shorter, conical at base and then almost hair-like to apex. Male abdomen 40mm; hind wing 25mm (Fig. B53).

Female similar to male, wings palely enfumed. Anal appendages dark brown, short, conical; vulvar scales robust. Female abdomen 36mm; hind wing 20mm.

*Drepanosticta subtropica*, both sexes

Both sexes of *Drepanosticta subtropica* have been described from collections made in Balangoda and Pettigalla during May and June.

References:- Fraser, 1933b: 209-211, Fig. 5. Type in BMNH.

Distribution:- Balangoda (4m, 5mf, 6mf); Pettigalla (5mf, 6mf).

17c *Drepanosticta adami*

Abdomen bronzed blackish brown. 1 broadly blue at base and sides, 2 broadly blue at sides, 3 to 8 with creamy white basal rings, 8 with blue intersegmental joint and maybe an apical triangular blue spot on a third of the segment, 9 and 10 blue dorsally. Head mainly matt black, labrum, bases of mandibles and anteclypeus glossy white palely tinted blue.

Prothorax with middle lobe pale blue, rest black. Thorax bronzed black dorsally up to antero-lateral suture beyond which the sides are pale blue; a bronzed black stripe on mesepimeron. Wings hyaline, pterostigma dark reddish-brown framed in paler brown, covering one cell. Anal appendages: superiors black, twice as long as 10, without a spine on upper border; inferiors as long as superiors, pale brown, with a very broad squarish plate at base for about a third of its length, with a broad spine at inner angle, then abruptly attenuated and sinuous, to end in a small spoon-like lobe, which serves to distinguish this species from others of the genus, as will also the blue middle lobe of the prothorax. Abdomen 33.5–35.5mm; hind wing 21–22.5mm (Fig. B48).

The female is stouter and differs in that only the apical joint of 8 is blue; on 9 the blue diffuses into black at base and the entire dorsum of 10 is blue. Anal appendages black, short, conical; vulvar scales robust. Abdomen 31mm; hind wing 23.5mm (Fig. B48).

*Drepanosticta adami*, both sexes

*Drepanosticta adami* has been described as a new species from one female and seven males taken in May at Madugoda near Urugalla in a seepage in dense jungle in maiden hair fern where it was so gloomy that the males could only be seen because of the blue at the ends of the abdomen; the single female was taken at the roadside here.

References:- Fraser, 1933b: 211–213, Fig. 6. Type in the BMNH.

Distribution:- Madugoda nr. Urugalla (5mf, small trickle, thick maiden hair fern, thick, dense jungle, very little light).

17d *Drepanosticta montana*

Abdomen black, sides of 1 and 2 yellowish or pale blue, 3 with a basal white spot on each side, 4 to 7 with narrow white basal annules, 8 with only the intersegmental joint blue and maybe a small, triangular, blue spot on dorsum, 9 and 10 blue on dorsum, sides black. Head mainly bronzed black with a reddish brown quadrate area on vertex and front of occiput and blue on labrum, bases of mandibles and anteclypeus. Eyes blue, with a bright brick red or reddish brown equatorial band. Prothorax dark brown. Thorax bronzed black on dorsum and

sides except a narrow blue stripe on mesepimeron; metepimeron and beneath yellow. Wings hyaline, palely enfumed; pterostigma brown framed paler or in white, covering one cell. Anal appendages blackish brown; inferiors nearly as long as superiors which are twice as long as 10 and have an obtuse spine on upper border. Abdomen 41–43mm; hind wing 26–28mm (Fig. B47).

The female is stouter, basal annules on 4 to 7 sky blue, without markings on 8, greater part of 9 blue, all of 10 blue. Anal appendages pale brown, very short, conical; vulvar scales dark brown, very robust. Abdomen 37–40mm; hind wing 26–28mm. This species differs from *tropica* by the simple shape of the lobes of the prothorax, from *hilaris* by the labrum without a black border and by the tumid sides of the inferior appendages, and from *digna* by the absence of a middle inner spine on the inferior appendages, these three being of similar size.

*Drepanosticta montana*, both sexes

*Drepanosticta montana*. Fraser found a colony of this species, probably in June, in a small mountain stream in dense jungle and tree fern hardly penetrated by the sun. He took specimens of both sexes but they were just emerging, soft and teneral and useless as specimens.

References:- Fraser, 1933a: 130–132, Fig. 61; 1933b: 213, 214, Fig. 7; Laidlaw, 1924: 362; Kirby, 1893: 363. Location of type not known.

Synonymy:- *Platysticta montana* Selys, 1860; *Drepanosticta montana* Laidlaw, 1924; *Ceylonosticta montana* Fraser, 1901

Distribution:- Haputale (short distance below, on Ratnapura road), (5mf).

17e *Drepanosticta submontana*

Abdomen blackish brown marked with yellow and blue; 1 with a small and 2 with a short, oval, yellow spot basolaterally; 3 with a very narrow, blue or pale yellow, basal annule; 4 to 7 with much broader basal blue annules; 8 black with an apical blue, triangular spot dorsally; 9 and 10 entirely blue on dorsum, sides black. Head mainly bronzed black, rear of vertex band adjoining part of occiput, warm reddish-brown centrally, labium, bases of mandibles and anteclypeus pale blue, labrum broadly bordered in glossy black, unlike in *D. montana*. Eyes blue with a broad equatorial band of dark brown. Prothorax

dark brown, anterior lobe without stalked processes. Thorax bronzed black dorsally, dark brown on sides as far as antero-lateral suture, a broad, pale blue oblique stripe on anterior half of mesepimeron, posterior half dark brown, metepimeron violaceous brown. Wings hyaline, palely enfumed brown; pterostigma dark reddish brown framed in ochre, covering one cell. Anal appendages: superiors twice as long as 10 and with an obtuse spine on upper border; shape of inferiors distinguish this species from *D. montana*, being very broad, conical at base with an inner spine, then rapidly tapered, sinuous, attenuated and ending in a tiny inturned hook. Abdomen 40–42 mm; hind wing 24–26mm (Fig. B51).

The female is very similar but stouter. Anal appendages very short, conical, dark brown; vulvar scales very robust, dark brown. Abdomen 38mm; hind wing 27mm.

*Drepanosticta submontana*, both sexes

*Drepanosticta submontana* was described from a single pair taken in Kandy (2,000m) in September 1926.

References:- Fraser, 1933b: 214–216, Fig. 8). Type in BMNH.

Distribution:- Kandy (9mf).

*Drepanosticta* - Group II. Riv+v arises at or a little distal to vein descending from node (Fig. B39).

#### 17f *Drepanosticta digna*

Abdomen blackish-brown with only blue markings, darkening into broad, black, apical rings on segments 2 to 6 and on the whole dorsum of 7, except the base; the apical third of 8 has a triangular blue spot dorsally, while the entire dorsum of 9 and 10 is sky blue. In the female the rings on 3 to 7 are much longer and broader and only the apical part of 8 is blue. Head mainly bronzed black, anteclypeus blue; eyes blue with a broad equatorial band of brick-red. Prothorax pale blue, lower part of sides pale yellow. Thorax brick-red with a mid-dorsal stripe of blue extending into the antealar sinus, and another brick red oblique stripe across the middle of the mesepimeron. Wings hyaline; pterostigma dark olive-brown, framed in creamy white, narrow. Anal appendages: male, superiors twice as long as 10, black, pale at apices, inferiors with a very strong spine at

the middle of the inner border directed inwards; female, dark brown, conical; vulvar scales brown, very robust. Male abdomen 35–37mm; hind wing 23–27mm; female abdomen 31–34mm; hind wing 21–24mm (Fig. B43).

*Drepanosticta digna*, both sexes

Fraser found a large colony of *Drepanosticta digna* in the "rather dry scrub" over-shadowed by large trees in the bed of the river near Urugalla; most specimens were found near the borders of a small stream flowing down the steep hillside and in which he thought they probably bred.

References:- (Fraser, 1933a: 134–136, Fig. 63; 1933b: 218–220, Fig. 11; Laidlaw, 1924: 361, 362, Fig. 9; Kirby, 1893: 362). Type in the Selysian collection.

Synonymy:- *Agrion digna* Hagen, 1858; *Disparoneura digna* Hagen, 1859; *Platysticta digna* Selys, 1860; *Ceylonosticta digna* Fraser., 1931

Distribution:- Haragama, (5mf, 8f); Ramboda; Urugalla, stream, near bridge, 1000m (5mf, 9mf).

17g *Drepanosticta nietneri*

Abdomen dark reddish brown or brick red, changing sharply to blackish brown at apical ends of segments, with white basal rings spotted with blue; 1 yellow on sides and beneath; 8 with a dorsal triangle extending from apical end to about middle of segment; 9 and 10 fully blue dorsally, black ventrally. Head mainly bronzed black, labrum pale blue bordered reddish brown, bases of mandibles and antedypeus pale blue, occiput with a scale-like projection overlapping anterior lobe of prothorax. Eyes blue with an equatorial band of dark brown. Prothorax flesh coloured, posterior lobe and parts of the middle lobe blue. Thorax bright brick red, carina pale sky blue, oblique stripe of blue on mesepimeron ending in a pale spot below; behind this stripe sides pale red; beneath flesh coloured. Wings hyaline, very palely enfumed; pterostigma blackish brown, framed in creamy white with thick black nervures, nearly square. Anal appendages blackish brown, inferiors paler, superiors and inferiors twice length of 10; apex of inferiors expanded into three angles like a duck's foot. This serves to distinguish the species from the two other smaller species of the genus, *lankanensis* and *walli*. Abdomen 31–36mm; hind wing 20–22mm (Fig. B48).

Female: Abdomen dark reddish brown; 3 to 7 with broad basal sky blue rings, interrupted dorsally on 7; 8 dark reddish brown, with only the apical ring blue; 9 and 10 sky blue dorsally, sides reddish brown. Posterior lobe of prothorax rounded, unlike in *walli*. Anal appendages brown, small, differ in shape from those of *digna*; vulvar scales brown, robust. Abdomen 30–31mm; hind wing 22mm. In other respects similar to the male.

*Drepanosticta nietneri*, both sexes

*Drepanosticta nietneri*. Fraser found this species in Kandy in October and in Belihul-oja in May in the area in which he collected *D. lankansensis* at the same time.

References:- Fraser, 1933a: 136–137, Fig. 64; 1933b: 217, 218, Fig. 10. Type in the BMNH.

Synonymy:- *Ceylonosticta nietneri* Fraser, 1931

Distribution:- Hindagala, (10m); Ratnapura, (10m); Carney Estate, (10m); Belihuloya, (5mf, 9mf); Opanayaka, (10mf).

#### 17h *Drepanosticta walli*

Abdomen black with narrow basal blue rings on 1 to 7; 8 blue dorsally nearly to base, broadest apically, tapering to a point towards base; 9 and 10 blue dorsally. Head mainly black; labrum, base of mandibles and anteclypeus blue; eyes blue with a very broad, dark brown equatorial band. Prothorax dark blackish-brown, dorsum and sides of middle lobe, blue. Thorax dark metallic green to beyond humeral region; rest purplish-black, with an oblique, pale blue stripe on each side. Wings hyaline; pterostigma dark reddish-brown framed in pale yellow, almost square, covering one cell. Anal appendages black, superiors more than twice as long as 10. Abdomen 35–38mm; hind wing 22–23mm (Fig. B54).

Female: Abdomen reddish brown, marked only with blue; narrow blue ring on segment 2, this interrupted dorsally on 3 and broader basal rings on 4 to 7, on 7 the ring covers the basal third; 8 blackish-brown, its apical joint pale blue; 9 and 10 blue dorsally, lower part of sides blackish-brown. Prothorax with middle lobe blue. Thorax with a large triangular blue spot on lower part of dorsum near coxae, sides pale blue after

humeral region. Anal appendages dark brown, very short, conical; vulvar scales blackish brown, robust. Similar to the male in other respects. Abdomen 31–32mm; hind wing 22mm.

*Drepanosticta walli*, both sexes

*Drepanosticta walli*. Fraser found a small colony in May on the slopes of Kadugannawa Ghat hiding in thick maidenhair fern growing on the sides of the numerous streams. The male was described from this collection, the female having been described earlier from a specimen taken in Kandy in September.

References:- Fraser, 1933a: 139, 140, Fig. 66; 1933b: 222–224, Fig. 13. Neotype in BMNH.

Synonymy:- *Ceylonosticta walli* Fraser, 1931.

Distribution:- Kadugannawa, (5mf); Kandy, (9f); Kandy, (5m); Labugama, (9m).

171 *Drepanosticta lankanensis*

Abdomen reddish brown, black at apical ends of segments; 1 yellow on sides; 3 to 7 with narrow basal yellow rings; 8 with a blue apical ring or only a dorsal triangle; 9 and 10 blue dorsally, black ventrally. Head blackish brown, antedypeus and bases of mandibles blue. Eyes blue with a very broad equatorial band of blackish brown. Prothorax entirely dark bronzed brown. Thorax dark bronzed brown dorsally, dark reddish brown in humeral region and sides with a narrow sky blue oblique stripe on mesepimeron; metepimeron and beneath yellow. Wings hyaline, palely enfumed, pterostigma blackish/dark reddish brown, framed in white with thick black nervures, *Riv+v* in some cases arising slightly proximal to vein descending from node. Anal appendages blackish brown, superiors more than twice as long as 10, inferiors shorter. Abdomen 29–38mm; hind wing 20–24mm (Fig. B46).

Female very similar to the male. Abdomen 30mm; hind wing 21mm.

*Drepanosticta lankanensis*, both sexes

*Drepanosticta lankanensis* has been taken in various montane regions from April to June. Fraser found a fairly large colony in the bed of a stream four miles above Belihul-oya during May and June. The insects were among tree fern and scrub on the steep wet bank of the river in which they probably bred. Here he found a wide range in the dimensions of abdomen

(29 to 38mm) and wings (20 to 22mm).

References:- Fraser, 1933a: 138, 139, Fig. 65; 1933b: 220-222, Fig. 12; Kirby, 1893: 562. Type in the BMNH.

Synonymy:- *Platysticta montana* Kirby, 1893 *Ceylonosticta lankānensis* Fraser, . 1931

Distribution:- Balangoda, (4); Belihul-oja, (5, 6mf); Galle, Haycock Mt.325m.fast running stream in ravine, dense shade, (1m); Haldummulla, (6); Kitulgala, (2-4-); Kottawa, (4m); Pettiagala, (4); Opanayaka, (4-).

17j *Drepanosticta hilaris*

Abdomen bronzed brown; 1 and 2 yellow on sides, 3 with a narrow basal ring; basal blue rings on 4 to 7; blue dorsal apical blue spot on 8; 9 and 10 sky blue dorsally, black on sides. Head mainly bronzed black with some reddish brown around ocelli; labrum, anteclypeus and bases of mandibles blue; occiput with a scale-like projection overlapping anterior lobe of prothorax. Eyes blue with an equatorial band of dark brown. Prothorax blue, posterior lobe bronzed blackish brown. Thorax bronzed black up to antero-lateral suture; anterior half of mesepimeron pale blue, rest bronzed brown, metepimeron pale blue or yellow. Wings hyaline, enfumed pale yellow; pterostigma dark reddish brown, framed in yellow, covering one cell, elongated; R<sub>iv</sub>+v arises in continuation of vein descending from node. Anal appendages blackish brown, inferiors nearly as long as superiors, which are twice as long as 10. Abdomen 40-43mm; hind wing 25-27mm (Fig. B45).

Female very similar to the male, but basal rings blue in older specimens, yellow in others, 8 with only the apical joint blue, 9 with a subdorsal, apical spot on each side, 10 blue dorsally. Anal appendages reddish brown, short, conical; vulvar scales very robust. Abdomen 32-36mm; hind wing 24-25mm.

*Drepanosticta hilaris*, both sexes

*Drepanosticta hilaris*. Fraser collected a female in scrub jungle beside a major stream at Ramboda and a male at Balangoda, both in May. He believes this species occurs in widely scattered colonies.

References:-Fraser, 1933a: 128-130, Fig. 60; 1933b: 216, 217, Fig. 9; Laidlaw, 1924: 362, 364. Type appears to be lost.

Synonymy:- *Agriion hilare* Hagen, 1858; *Disparoneura hilaris* Hagen, 1859; *Platysticta hilaris* Selys, 1860; *Drepanosticta hilaris* Laidlaw, 1924; *Ceylonosticta hilaris* Fraser, 1931.



Distribution:- Balangoda, (4m); Kandy, (6, 7mf); Ramboda, (5mf).

17k *Drepanosticta austeni*

Abdomen brown with yellow markings; poorly marked apical rings on 3 to 6; sides of 1 and 2 and basal rings on 3 to 7; 8 blackish brown; dorsum of 9 and 10 sky blue. Head black mainly; labrum, bases of mandibles and anteclypeus pale bluish green. Eyes dark brown above, pale glaucous below. Prothorax pale ochreous, middle and posterior lobes light bluish brown. Thorax rusty brown to between humeral and second lateral suture; rest of a similar colour or bluish or greenish brown with a broad blue band across spiracle. Wings hyaline, pterostigma dark olivaceous brown framed in creamy white. Anal appendages black. Abdomen 33–35mm; hind wing 21–22mm (Fig. B41). This male differs from that of *digna* in the distinct blue thoracic band, the posterior lobe of the prothorax is thickened but not noticeably upturned and the inferior anal appendages are nearly as long as the superiors.

Female: Abdomen light brown, darkening to blackish brown on 2 to 7 to form dark apical rings; apical rings on 3 to 7 progressively wider, pale blue; 8 black with a distinct, yellow ventro-basal spot; 9 and 10 blue dorsally, lower sides black. Posterior lobe of prothorax simple, hind border evenly convex, unlike in *digna* where the lobe is trapezoidal, almost depressed and prolonged apically into another trapezoidal plate directed upwards and backwards; dorsum of thorax unicolorous, pale olive brown. Anal appendages and vulvar scales black. Similar to the male in other characters. Abdomen 31mm; hind wing 23mm.

*Drepanosticta austeni*, both sexes

*Drepanosticta austeni* was described as a new species from one female and seven males taken in September 1938 at Passara from a patch of heavy forest on the slopes of the hills above the laboratory of the Tea Research Institute; the location was a cleft in the hillside, in dense jungle and deep gloom.

References:- Lieftinck, 1940: 80, 89–91, Fig. 2). Type should be in Leiden Museum.

Distribution:- Passara 1250m, (9mf).

17l *Drepanosticta brincki*

Abdomen brown with darker brown apical rings on 3 to 7; base of 1 yellowish; basal yellow spots on sides of 2; pale latero-basal spots on 3 to 7 tapering posteriorly, smaller on 6 and 7; 8 to 10 brownish black, apical third of dorsum of 8 and all the dorsum of 9 and 10 sky blue, the two colours quite well separated. Head mainly black, labrum, bases of mandibles and anteclypeus light blue, anterior border of labrum orangish. Prothorax pale ochreous, dark brown anterior lobe, blue pronotum and posterior lobe, the sides of latter slightly yellowish. Thorax rusty brown to a little beyond the second lateral suture; sides with a broad band of light blue for about three fifths of metepisternum, fading ventrally beyond the spiracle. Wings hyaline, pterostigma dark olivaceous brown framed in pale yellow. Anal appendages dark brown, tips lighter, inferiors slightly shorter than superiors. Abdomen 28mm; hind wing 19mm (Fig. B42).

The female has been described only briefly as being similar to the male. Abdomen 28mm; hind wing 20mm.

*Drepanosticta brincki*, both sexes

*Drepanosticta brincki* was described as a new species from one female and four males, all subadult or immature taken at Deerwood, Kuruwita in a ravine in dense vegetation at 350m and a male (in bad condition) taken at Malwala in a fairly exposed, fast-running stream at 90m. All were taken in February. 1962

References:- Lieftinck, 1971: 190-191, Fig. 2). Type should be in the Zoological Institute, University of Lund.

Distribution:- Deerwood, Kuruwita, slopes, 350m, off Botiyagala, 910m, (2mf-dense vegetation in deep ravine, bordering stream); Malwala, 90m, 3 mi. NE of Ratnapura, (2m-small fast-running stream in fairly exposed ravine).

#### 17m *Drepanosticta sinhalensis*

Abdomen bronzed black; 1 unmarked, 2 with a comma shaped spot on either side, 3 with a vestige of yellow on lower side basally, 4 to 7 with light yellow basal rings, widest ventrally, 8 black with a small mid-dorsal blue spot near apex, 9 and 10 black with entire dorsum sky blue. Head mainly black, labrum, anteclypeus and a spot on base of mandibles bright greenish blue, postclypeus with a row of 8 very strong, yellow bristles along its margin. Eyes brown. Prothorax velvety black with a

trace of reddish; anterior lobe is a thin raised anterior collar and a large swollen, bilobate posterior part lying over the pronotum, which itself bears a pair of rounded tubercles separated from the anterior lobe by a deep sulcus; posterior lobe large, directed backwards, rounded, hind margin not swollen, sides not projecting. Thorax velvety black with some dark reddish brown colouring on sides, which have a well defined sky blue band on metepisternites changing to bright yellow ventrally. Legs pale ochreous. Wings hyaline, pterostigma almost black, framed in light brown, squarish. Anal appendages black, inferiors much shorter than superiors. Abdomen 36mm; hind wing 22mm (The colours given here should be checked against specimens) (Fig. B49). Differs from *walli* in that the thoracic blue band is broader and not indented above the middle, legs are pale ochreous, not blackish brown and segments 2 and 8 are less extensively blue. Differs from *fraseri* which also has a black prothorax and pale-coloured legs, in the dark metepimeron and ventral surface of thorax and in the structure of the prothorax.

Female not known.

*Drepanosticta sinhalensis*, male

*Drepanosticta sinhalensis* was described from a single male taken in March 1962 at Deerwood, Kuruwita in a ravine in dense vegetation at 350m.

References:- Liefstinck, 1971: 191, 192, Fig. 1. Type should be in the Zoological Institute, University of Lund.

Distribution:- Deerwood, Kuruwita, slopes, 350m, (f); Botiyagala, 910m, in broad ravine, dense vegetation bordering stream, (3m).

#### 17n *Drepanosticta fraseri*

Abdomen long and very slender, the posterior segments noticeably expanded; 1 bronze black, lower sides yellowish; 2 is similar with an incomplete yellowish ventral stripe; 3 to 7 very dark brown, nearly black with light ochreous basal rings, progressively larger; 8 to 10 black, 8 with a quadrate blue mark on apical third of dorsum, inter-segmental membranes and dorsum of 9 and 10 blue. Head mainly black, metallic at rear; some light blue on genae, labrum and anteclypeus which are creamy yellow. Eyes:- colour has to be checked. Prothorax brownish black; pronotum raised to form a pair of robust,

rounded tubercles, anterior and posterior lobes rounded and simple. Thorax dull bronzed black with a metallic green lustre; a blue band from first lateral suture to spiracle, where the colour merges into dull ochreous below. Legs pale brownish yellow. Wings brownish, pterostigma dark brown in black nervures. Anal appendages: superiors dark brown, inferiors lighter. Abdomen 42-43mm; hind wing 26m (Fig. B44).

Female not known.

*Drepanosticta fraseri*, male

*Drepanosticta fraseri* was described as a new species from two males in poor condition collected in October and November 1953 at Deiyannawela, Kandy. No other information has been given about the location. The female is unknown.

References:- Liefstinck, 1955: 70-72, Fig. 1. Type should be in the Naturhistorisches Museum Basle, Switzerland.

Distribution:- Deiyannawela, Kandy, (10m, 11m).

### *Drepanosticta* - Group III.

#### 170 *Drepanosticta starmuhlneri*

Abdomen long and very slender: brownish with rings of light ochre; 8 to 10 black. Head mainly black, frons dark brown, labrum pale blue bordered black, anteclypeus blue. Prothorax blackish brown, anterior lobe elevated, posterior simple, rounded; thorax black changing to brown and then to yellow beneath; a narrow blue stripe between lateral sutures. Wings hyaline, nervures dark brown, pterostigma brownish black with black nervures and a fine yellow border,  $R_{IV}+v$  arising a little proximal to sub-nodus. Anal appendages black, superiors twice as long as 10, inferiors shorter than superiors. Abdomen 39mm; hind wing 24mm (Fig. B50).

Female not known.

*Drepanosticta starmuhlneri*, male

*Drepanosticta starmuhlneri* was described from a single male taken in November 1970 in the bungalow of Camden Hill, Deniyaya.

References:- St. Quentin, 1972: 137-139. Holotype in Natural History Museum, Wien.

Distribution:- Deniyaya, bungalow of Campden Hill, (11m).

In addition to the species of *Drepanosticta* listed above two other records have to be mentioned.

*Drepanosticta* sp.

Right tributary of Kaluganga 5km SE from Gallella, Ratnapura, (1mj); stream 500m SW of Sinharaja Field Research Station, Kudawa, 530m, (2m).

*Ceylonosticta gracilis*

Hakgala, (3f, 5f) (Museum specimen- A doubtful identification).

- 18 The genus *Platysticta* with 2 species (Fig. B55).

Note: The two species of *Platysticta* which follow are quite difficult to distinguish from each other. However the inferior anal appendages are quite different, as are the markings on segment 9 in the female. (These must be checked with specimens.)

18a *Platysticta apicalis*

Abdomen black dorsally, yellow on sides and beneath except for last four segments, 8 to 10 sky blue on dorsum, 8 with a narrow basal black ring with a mid-dorsal backwardly pointing projection. Head velvety black with a blue reflex, labrum, bases of mandibles and clypeus blue. Eyes black above, dark brown below. Prothorax pale blue, posterior lobe black. Thorax black with a blue reflex, a narrow blue stripe on mesepimeron, lower part of mesepimeron and beneath blue to yellow. Legs black, coxae, trochanters and bases of femurs pale yellow. Wings hyaline tipped with blackish brown to pterostigma which is dark reddish or blackish brown framed in ochreous, elongated, covering 1 to 2 cells Anal appendages black, inferiors end in a robust staple-like hoop and are shorter than superiors which are longer than 10. Abdomen 52–58mm; hind wing 37–42mm (Fig. B56).

Female similar to the male, but wings in adults tipped with yellow enfumed brown, segment 8 fully black, 9 with a broad black mid-dorsal stripe and 10 greenish blue or yellow on dorsum. Anal appendages blackish brown very short; vulvar scales brown, robust. Abdomen 37–40mm; hind wing 45–46mm.

*Platysticta apicalis*, both sexes

*Platysticta apicalis*. Fraser found this species very common in Belihul-oya during May and June in the same streams where he found *Drepanosticta nietneri* and *D. lankanensis*. In early May the specimens were teneral and the wings showed no trace of the black apical markings which started to appear a few days later; by June these markings could be seen on almost all the specimens. Their flight is weak, but specimens have been seen resting as high up as fifteen feet. Larvae of this genus have not been described (Figs. B 55, 56).

References:- Kirby, 1893: 561, Pl. 42, Fig. 1; Laidlaw, 1924: 361; Fraser, 1933a: 123, 124, Fig. 58; 1933b: 206, 207, Fig. 2; Lieftinck, 1955: 69, 70. Location of type unknown.

Distribution:- Belihul-oya, (5, 6); Diyagama Falls, Koslanda, (9m); Haldummulla, (5mf, 6mf); Madulsima, (8); Rakwana, (mf, 6mf).

18b. *Platysticta maculata*

Abdomen steely black above and on sides except ventral border which is narrowly yellow; 1 and 2 broadly bluish on sides; 3 to 7 with narrow yellow basal rings, almost absent in adults; 8 dorsum blue which tapers towards but does not reach the base; 9 and 10 sky blue on dorsum. Head black, mainly velvety; blue on labrum and anteclypeus. Eyes dark brown to black above and dark olive-brown below. Prothorax pale blue except posterior lobe and parts of the anterior lobe, which are black. Thorax steely velvety blue-black up to antero-lateral suture; pale blue oblique stripe on anterior half of mesepimeron, posterior half steely blue-black; metepimeron pale blue, beneath yellow. Legs blackish-brown, trochanters and coxae pale blue, femurs pale brown proximally. Wings hyaline, tipped in adults with blackish-brown to end of pterostigma, which is dark reddish-brown, framed in ochreous, with thick, black nervures, usually covering two cells. Anal appendages black, apices paler; superiors twice as long as 10; inferiors much shorter. Abdomen 47-51mm; hind wing 32-36mm (Fig. B57).

The female is very similar, but stouter and the wings of adults are amber enfumed brown. Abdomen 36-45mm; hind wing 29-34mm.

*Platysticta maculata*, both sexes

*Platysticta maculata* is confined like the previous species to the hilly tracts at 3000 to 4000 feet. The larva has not been described.

References:- Kirby, 1891: 204, Pl. 20, Fig. 3, 3a; 1893: 561; Laidlaw, 1924: 361; Fraser, 1933a: 121-123, Fig. 57; 1933b: 204-206, Fig. 1; Liefertinck, 1955: 70; 1971: 189. Location of type unknown.

Synonymy:- *Disparoneura maculata* Hagen, 1859; *Platysticta maculata* Selys, 1860; *Platysticta greeni* Kirby, 1891.

Distribution:- Haycock Hill, (4); Kitulgala (4); Madulsima (8); Punduloya (8); Ramboda, (5); Urugala, (4m).

19 The family *Protoneuridae* with 3 genera and 7 species.

19a The genus *Disparoneura* with a single species here.

Sectors of arc divergent from origins; *ac* situated about midway between level of antenodal veins; 14 to 17 postnodals in forewings, 12 to 16 in hind; *ab* always present and complete; *IA* absent; *Cu<sub>ii</sub>* reduced, 6 cells in forewing, 8 in hind; *Riv+v* arising proximal to vein descending from node, *IR<sub>iii</sub>* at that level; posterior lobe of prothorax of female armed with specialised hooks. Wings of male tipped or barred with black

20

19b The genus *Elattonneura* with 5 species.

Sectors of arc divergent from origins; *ac* situated about midway between level of antenodal veins; 10-21 postnodals in forewings, 9-19 in hind; *ab* always present and complete; *IA* absent; *Cu<sub>ii</sub>* reduced, rarely more than 4 cells in length; *Riv+v* arising proximal to vein descending from node, *IR<sub>iii</sub>* at that level; posterior lobe of prothorax of female armed with specialised hooks. Wings hyaline, unmarked.

21

19c The genus *Prodasineura* with one species here.

Sectors of arc divergent from origins; *ac* situated about midway between level of antenodal veins; 12-18 postnodals in forewings, 11-15 in hind; *ab* absent or reduced to a strong arch met at its top by *ac*; *Cu<sub>ii</sub>* reduced to 1-4 cells in length; *Riv+v* arising proximal to vein descending from node, *IR<sub>iii</sub>* at that level or very slightly distal to it; posterior lobe of prothorax of female armed with specialised hooks.

22

20 The genus *Disparoneura*

*Disparoneura ramajana*

- 20 Abdomen brownish black, sparingly marked with yellow; 3 to 7 with traces only at extreme base and somewhat larger spots before black apical rings; 8 to 10 obscurely marked. Head mainly black with yellow markings on frons and a cream band between the eyes, long bristles on labrum. Prothorax black with a few yellow marks, simple. Thorax black with yellowish antehumeral stripes, sides with a broad chrome yellow metepisternal band. Wings hyaline, slightly tinged yellow, **1A** of 6 cells in forewing, 8 in hind. Anal appendages short, superiors probably pale blue, inferiors black. Abdomen 28mm; hind wing 22mm (Based on a single immature, rather damaged specimen) (Fig. B58).

According to Cowley (1936) the wings of the males of this genus are tipped or barred with black.

Female not known.

*Disparoneura ramajana*, male

*Disparoneura ramajana* was described as a new species from a single immature, freshly emerged male taken in March 1962 at Horton Plains (7000 feet) in wet, dense low forest. Kumar (1973) has described the larva of *D. campioni*; this has been included here (Fig. B 58, C25).

References:- Lieftinck, 1971: 193, Figs. 3, 4. Type should be in the Zoological Institute, University of Lund.

Distribution:- Horton Plains, wet and dense, low forest, (3).

21 The genus *Elattoneura*

21a *Elattoneura bigemmata*

Abdomen black marked with chrome yellow as follows:- 1 and 2 broadly on sides; 3 in addition with narrow baso-dorsal spots interrupted in the middle line; 4 to 6 similar to 3, but the lateral markings expanding more apically; 7 to 10 black with flesh-coloured (ochreous) intersegmental rings. Head mainly velvety black, face and frons bright chrome yellow; a very conspicuous, quadrate, greenish-yellow spot on each side



between ocelli and eyes. Prothorax black, anterior and posterior lobes with a large orange spot on either side, pronotum largely orange on sides, posterior lobe rounded. Thorax mainly black, antehumeral stripe greenish-yellow, a thick black stripe on second lateral suture on an otherwise yellow background. Legs ochreous with chrome coxae. Wings hyaline; pterostigma blackish-brown, oblique, *ab* ends on vein descending from distal end of discoidal cell very near wing margin, *Cu<sub>1</sub>* of 4 cells in forewing, 2 in hind, postnodals 16 in forewings, 14 in hind. Anal appendages black marked with yellow. Abdomen 35mm; hind wing 20.7mm (Fig. B59).

Female not known.

*Elattoneura bigemmata*, male

*Elattoneura bigemmata* was described by Liefstinck as a new species from a single adult male taken in March 1962 in the Labugama forest reserve.

References:- Liefstinck, 1971: 193–195, Fig. 6; Bedjanić, 1996. Type should be in the Zoological Institute, University of Lund.

Distribution:- Labugama reservoir, forest reserve, (3m); right tributary of Kaluganga 5km SE from Gallella, Ratnapura, (1mf); stream 500m SW of Sinharaja Field Research Station, Kudawa, 530m, (2m + tandem).

21b. *Elattoneura caesia*

Abdomen black with a steely reflex, unmarked. Head mainly black without a purple reflex; eyes black above, olivaceous brown below. Prothorax and thorax black, densely pruinose dorsally, one yellow stripe, mostly obscured on mesepimeron and a second more evident on metepimeron, beneath yellow. Legs black. Wings hyaline, palely enfumed; pterostigma black, finely framed in yellow, nervures thick black, covering nearly one cell, 17–20 post-nodals in forewings, 17–18 in hind, *Cu<sub>1</sub>* 3–4 cells long in fore-wings, 6–7 in hind, *ab* ends on vein descending from distal end of discoidal cell near margin of wing. Anal appendages black, superiors with a long, then slightly sinuous ventral spine, inferiors with the ends curved strongly inwards. Abdomen 35–36mm; hind wing 22–23mm (Fig. B61).

Female not known

*Elattoneura caesia*, male

*Elattoneura caesia* is confined to Sri Lanka. Recorded from submontane areas in wet conditions with very dense vegetation. The larva has not been described.

**References:-** Kirby, 1890: 133; 1893: 562; 1905: 272; Laidlaw, 1924: 365, Fig. 13; Fraser, 1933a: 240; Lieftinck, 1955: 73; 1971: 195; Bedjanić, 1996. Type in Hagen collection.

**Synonymy:-** *Alloneura caesia* Selys, 1860; *Disparoneura caesia* Selys, 1886.

**Distribution:-** Deerwood, Kuruwita, dense vegetation and fast running streams, (2m); Roseneath, Kandy, (7m); Passara, roadside brook in heavy jungle, (9m); Ella, (6m); stream 500m SW of Sinharaja Field Research Station, Kudawa, 530m, (2m).

21c *Elattoneura centralis*

21c1 Abdomen velvety black with a purplish reflex which is present also on head and thorax. Head mainly velvety black; eyes black with a purplish reflex. Prothorax and thorax black with a distinctive purple reflex and with vestigial pale lateral bands in teneral and subadults, absent in adults. Legs black. Wings hyaline, pterostigma black with a fine yellow border, and covering one cell, 17–19 postnodals in forewings, 14–16 in hind, *Cuii* 4–5 cells long in forewings, 5–6, rarely 7, in hind, ab ends on vein descending from distal end of discoidal cell near margin of wing, or rarely, on the margin itself. Anal appendages black, superiors longer than 10, ventral spine not bifid; inferiors the longer, apices turned slightly inwards. Abdomen 30–33mm; hind wing 20–24mm.

*Elattoneura centralis*, male

21c2 Abdomen black marked only with creamy white: a spot on each side of 1, a pair of parallel stripes on each side of 2, small basodorsal spots on each side of 3 to 6, ventral borders of 7 to 9 finely and a small dorsal spot on 9 and 10. Head steely black, with parts pale yellow. Eyes dark brown capped black. Prothorax black, posterior lobe with two hooks directed backwards; thorax black with yellow stripes - a narrow antehumeral, a broad postero-lateral and a third on the metepimeron. Legs black. Wings hyaline, pterostigma pale brown framed in yellow with thick black nervures, 15–16 postnodals in forewings, 14 in hind; *Cuii* 4 cells in forewings, 5–6 in hind. Anal appendages very short, conical, black. Abdomen 31–32mm; hind wing 21–22mm.

*Elattoneura centralis*, female

*Elattoneura centralis*, confined to Sri Lanka, is a fairly common species recorded from submontane and some lower elevations, mostly over fast-running streams.

**References:-** Kirby, 1893: 562; Laidlaw, 1924: 365, 366, Fig. 13; Lieftinck, 1940: 92; 1971: 195; Fraser, 1933a: 238–240, (sub. *Disparoneura*); Bedjanić, 1996. Type in the Hagen collection.

**Synonymy:-** *Disparoneura centralis* Hagen, 1859; *Alloneura centralis* Selys, 1860; *Disparoneura oculata* Kirby, 1894; *Caconeura mackwoodi* Fraser, 1919 *Disparoneura caesia* Laidlaw (*centralis*, nec *caesia*), 1924.

**Distribution:-** Alawala, Yakkala, (1m, 3m); Deerwood, Kuruwita, dense vegetation and fast running streams, (2); Gilimale, Ratnapura, stony stream in rubber area, (2f); Hanguranketa, slow flowing stream in coconut area, (3m); Haragama, (9); Hatherleigh, Rakwana, sheltered cascading stream in tea/rubber area, (2m); Kandy, (7m, 12m); stream 20 miles E of Kandy, fast running stream in bush/thin forest, (3m); Peradeniya (5mf); Malwala, Ratnapura, fast running stream in exposed ravine (2m); Urugalla (9); Abbey, Bibile, streams, sheltered by trees, (3m); Diyaluma Falls, 500m, (1m); right tributary of Kaluganga 5km SE of Gallella, Ratnapura, (1m).

## 21d *Elattoneura leucostigma*

21d1 Abdomen black, 1 pruinose dorsally. Head black except for bright ochreous genae; eyes black. Prothorax and thorax dull black, with one ochreous spot on former, and two lateral stripes on latter. Legs black. Wings hyaline, tinted dark brown; pterostigma pale creamy white framed in thick black nervures, diamond shaped and very oblique, 18–19 postnodals in forewings, 17 in hind, as much nearer distal antenodal. Anal appendages black, superiors as long as 10, almost quadrate in profile, inner borders apposed, outer very sinuous, inferiors longer. Penis with a fine dorsal spine, apex bifid into two curling branches over stem of organ. Subadult males may have a stripe on vertex, and a narrow antehumeral stripe. Abdomen 30mm; hind wing 24mm.

*Elattoneura leucostigma*, male

21d2 Abdomen black, with narrowly ochreous ventral borders, more marked on segment 8. Head black, except for bright ochreous genae, a narrow bright ochreous stripe across the face and a narrow transverse reddish stripe at the level of the anterior ocellus; eyes with a thick equatorial black line and ochreous above and below it. Prothorax black, with a large bright ochreous spot on each side. Thorax black, with well

defined ochreous, oblique stripes and a narrow, brick-red antehumeral stripe on each side. Wings hyaline, but only palely enfumed; pterostigma pale, opaque creamy white, very oblique, diamond-shaped and with thick, black nervures, 18 postnodals in forewing, 16 in hind. Anal appendages black, short, conical; vulvar scales black, very robust. Abdomen 29mm; hind wing 24mm.

*Elattoneura leucostigma*, female

*Elattoneura leucostigma* was described as a new species from several specimens taken in May 1927 in Nuwara Eliya on the borders of a small stream in thick jungle. The species is distinct from all others of the genus by its white pterostigma and deeply enfumed wings.

References:- Fraser, 1933c: 225, 226, (sub. *Disparoneura*); Bedjanić, 1996. Type and paratype were to be deposited in the BNMH from Colombo Museum, but this does not appear to have been done, but a pair of paratypes are in the BNMH. A type is in the Colombo Museum as *Disparoneura leucostigma*.

Synonymy:- *Disparoneura leucostigma* Fraser, 1933.

Distribution:- Nuwara Eliya, small stream in deep jungle, (5mf); Diyaluma Falls, 500m, (1m); right tributary of Kalu-ganga 5km SE of Gallella, Ratnapura, (1f).

21e *Elattoneura tenax*

21e1 Abdomen black marked with chrome yellow as follows:- a small triangular spot on each side of 1; a dorsal stripe on 2 expanding apically, laterally a small apical spot and a narrow stripe on ventral border; small baso-dorsal spots on 3 to 6; remaining segments black. Head mainly velvety black, labrum and postclypeus bright reddish-orange as is a stripe on occiput from eye to eye; eyes reddish, paler above. Prothorax velvety black, with an orange stripe on each side. Thorax velvety black, antehumeral stripe brick red, yellow stripes on mesepimeron and metepimeron, that on the latter tinted red. Wings hyaline, slightly enfumed in adults; pterostigma blackish-brown, framed in red and with thick black nervures, covering a little more than one cell, 18–21 post-nodals in forewings 18–19 in hind, Cuii 7 cells long in forewing, 9 in hind, ab ends on vein descending from discoidal cell near margin of wing. Anal appendages black, apices of superiors curling out and divaricate, inferiors with apices curling strongly inward. Abdomen 35–39mm; hind wing 25–26mm (Fig. B60).

*Elattoneura tenax*, male

21e2 Abdomen black marked with chrome yellow as follows:- a triangular spot on each side of 1 (larger than in the male); a basal spot and a small apical spot on sides of 2 with a narrow stripe on ventral border; an ochreous stripe on each side of 3, this stripe vestigial on 4; a narrow ventral stripe on 8 and 9, not reaching base of segments; a diamond shaped spot on 9. Head mainly velvety black: postclypeus black; transverse yellow stripe on occiput between eyes; eyes reddish, paler above. Prothorax velvety black, a yellow stripe on each side; posterior lobe with a pair of very robust, horn-like processes, projecting obliquely forwards, and a smaller pair between directed backwards. Thorax velvety black, antehumeral stripe yellow, yellow stripes on mesepimeron and metepimeron. Wings hyaline, slightly enfumed; pterostigma blackish-brown framed in reddish with thick black nervures, covering a little over one cell. Anal appendages black, conical, very short; vulvar scales black, tipped with yellow, very robust. Abdomen 35mm; hind wing 26-27mm.

*Elattonneura tenax*, female

*Elattonneura tenax*, confined to Sri Lanka, is a submontane species so far only recorded in dense vegetation over fast running streams.

References:- Kirby, 1893: 562, Pl. 41.Fig. 2; Laidlaw, 1924: 365; Fraser, 1933a: 241, 242; Lieftinck, 1955: 73; 1971: 195; Bedjanić, 1996. Location of type unknown.

Synonymy:- *Agrion tenax* Hagen, 1858; *Alloneura tenax* Selys, 1860; *Disparoneura tenax* Selys, 1886.

Distribution:- Deerwood, Kuruwita, dense vegetation and fast running streams, (2mf); Diyatalawa, (7m); Madugoda (C.P), (9m); right tributary of Seetha-gangula 1km downstream of Dalhousie village, (1m); stream 500m SW of Sinharaja Field Research Station, Kudawa, 530m, (2m).

## 22 *Prodasineura sita*

Abdomen black marked with yellow on sides: 1 with a large spot, 2 finely on carina and broadly on sides, 3 to 6 with small paired baso-dorsal bluish white spots and large diffuse, subapical pale brown spots, remaining segments unmarked. Head mainly black, labrum and anteclypeus brown, genae bluish, an interrupted bluish stripe between the eyes which are dark olivaceous brown capped black, paler below and

with a dark brown equatorial band. Prothorax black with a narrow pale blue stripe on each side. Thorax bronzed black dorsally, pale blue laterally; a broad black stripe on postero-lateral suture, pale blue antehumeral stripes tapering towards antealar sinus, beneath whitish. Legs pale ochreous. Wings hyaline, pterostigma dark brown framed in pale brown or yellow and with thick black nervures, covering 1 or 2 cells, 13–14 postnodals in forewings, 12 in hind, Cuii of 4 cells in forewing, 5 in hind, ab vestigial, a tiny arc from the top of which ac springs. Anal appendages: superiors longer than inferiors, creamy white dorsally, inferiors white or yellow, short, obtuse. Teneral males similar to females in colour and markings. Abdomen 29mm; hind wing 19mm (Fig. B62).

Females similar to males but with broader markings: 1 with a cordate spot; ochreous carina extends from 2 to 2 or 3 segments further; 2 with a broad lateral stripe angulated upwards apically; baso-dorsal bluish-white spots on 3 to 6 confluent laterally with a broad yellow stripe running the length of the segments; 8 and 9 yellow ventrally with a fine yellow carinal line which broadens into a large triangle on 10. Anal appendages pale yellow, very short; vulvar scales black, yellow above, robust. Abdomen 30–32mm; hind wing 19mm.

*Prodasineura sita*, both sexes

*Prodasineura sita* confined to Sri Lanka, is a common species, but not recorded from montane regions (Fig. B 62).

References:- Kirby, 1893: 563; Laidlaw, 1924: 367, Fig. 14 a, b; Fraser, 1933a: 221–223; Lieftinck, 1940: 91; 1955: 73; 1971: 195, Fig. 7; Bedjanic, 1996. Fraser says the type is in the BMNH, but it is not listed in Kimmins 1966.

Synonymy:- *Disparoneura sita* Kirby, 1894; *Caconeura sita* Laidlaw, 1917; *Caconeura canningi* Fraser, 1919.

Distribution:- Hemmeliya, Baddegama, hill with small streams, tea/paddy area, (1mf); Haragama, (9mf); Edurugala, Horana, isolated forest with bamboo in rubber area, meadows/pool, (2mf); Kandy, (7m); Uduwela, Kandy, exposed slow flowing stream in paddy area, (3mf); Opanayake, (9mf); Peradeniya, polluted stream in settlement, (3mf); Puttalam, open country, marsh, dense vegetation, at light, (2mf); Trincomalee, (12m); Wellawaya, Radapola-oya, large stream in dry area, (3mf); Alawala, Yakkala, (1mf, 3mf); Yakkala, (1mf, 3mf); Hassalake, (mf, 5, 6, 10); Udawattekele, (); Cheddikulam, (-); stream in Citadel Hotel, Kandy, 700m, (1fjm); tributary of Walawe 500 m SE of Embilipitiya, (1mj); right tributary of Kaluganga 5km SE from Gallela, Ratnapura, (1m); stream in rice fields 500 m S of Gonapinuwela, 50m, (2m).

23	The family <i>Coenagrionidae</i> with 9 genera and 14 species.	
—	Without postocular spots	24
—	With postocular spots	25
24a	Head with a well defined frontal ridge; claw hooks not placed at the end of claws which do not appear bifid; <i>ab</i> arising at the point where <i>ac</i> meets posterior border of wing, or in the hind wings slightly proximal to that point.	
	The genus <i>Ceriagrion</i>	40
24b	Head without a frontal ridge; claw hooks placed at end of claws making the claws appear bifid; <i>ab</i> arising far proximal to the level of <i>ac</i> , even far proximal to level of first antenodal.	
	The genus <i>Onychargia</i>	34
25	Arc situated distal to level of second antenodal	26
—	Arc situated at level of second antenodal	27
26a	Junction of <i>ab</i> and <i>IA</i> (medio-anal link) markedly angulated. The genus <i>Agriocnemis</i>	31
26b	Junction of <i>ab</i> and <i>IA</i> not angulated; the two nervures are in the same straight line.	
	The genus <i>Mortonagrion</i>	33
27	<i>ab</i> arising at the point where <i>ac</i> meets posterior border of wing.	28
—	<i>ab</i> arising more or less proximal to the point where <i>ac</i> meets posterior border of wing.	29
28a	Pterostigma in forewing much longer than that in hind; female with an apical ventral spine on segment 8.	
	The genus <i>Aciagrion</i>	37
28b	Pterostigma of the same size in fore- and hind wings; female without an apical ventral spine on segment 8.	

The genus *Pseudagrion*

42

- 29a Pterostigma differing in shape and size in fore- and hind wings of male; segment 10 of male with a pair of dorsal apical tubercles which are closely apposed.

The genus *Ischnura*

38

- 29b Pterostigma of the same shape and colour in fore- and hind wings of male; segment 10 of male without dorsal apical tubercles.

30

- 30a 7 postnodals in forewing, 6 in hind, eyes sky-blue, paler below; abdomen: 17mm, hind wing 11mm.

The genus *Enallagma*

36

- 30b 7-8 postnodals in forewing, 6-7 in hind, eyes olivaceous, paler below; abdomen: male 22mm, female 20mm; hind wing 15mm.

The genus *Cercion*

35

*Note:* The Sri Lankan species, one each, of the last two genera, are likely to prove difficult to distinguish without reference to the more detailed descriptions that follow.

- 31 The genus *Agriocnemis* with two species here.

31 *Agriocnemis femina femina*

- 31a Abdomen: segments 1 to 6 blue or pale green, 7 to 10 bright yellow; marked in black, except 9 and 10 which are not marked; black dorsal markings: on 1 a broad spot, on 2 an elongated spot which joins an apical ring, on 3 to 7 broad stripes not quite up to the bases, expanding subapically and then narrowing to join apical rings, on 8 a fine line not reaching to the apex. Head mainly black, labrum bright metallic blue, genae, bases of mandibles, anteclypeus and a stripe across the frons apple green, postocular spots blue. Eyes apple green capped in dark brown. Prothorax black dorsally, sides blue. Thorax black dorsally up to antero-lateral suture, pale blue



antehumeral stripe, sides apple green fading to yellow beneath. Legs pale yellow with black on extensor surfaces. Wings hyaline pterostigma yellow, darker in centre. Anal appendages bright yellow, inferiors twice as long as superiors, unlike in *A.pygmaea*. Abdomen 16–17mm; hind wing 10.5–11mm (Fig. B 20).

*Agriocnemis femina femina*, male

- 31b1 Abdomen blue on segments 1– to 6 changing to reddish or ochreous on 7. Head: occiput dark blood red, postocular spots blue. Prothorax pale pinkish brown to pale brown with a small black dorsal spot. Thorax similar with a broader black dorsal stripe. Anal appendages ochreous, small, conical and pointed, vulvar scales robust, ochreous. Other characters similar to subadult female below.

*Agriocnemis femina femina*, adult female

- 31b2 Abdomen: segments 1 to 6 cherry red with a dorsal, diffuse black band not reaching base and expanding apically on 6 alone; on 7 to 10 a broad dorsal stripe, apical borders and sides yellow or ochreous. Head similar to that of teneral form below, but postclypeus is black. Prothorax cherry red with a small dorsal black spot, posterior lobe very large with raised centre. Thorax cherry red, with a small dorsal, black stripe. Other characters similar to the teneral female below.

*Agriocnemis femina femina*, subadult female

- 31b3 Prothorax, thorax and abdomen yellow, segments 7 to 10 enfumed or black dorsally. Head: labrum metallic purple with yellow border, rest of face apple green, vertex black, occiput red with round, pale lilaceous postocular spots. Eyes apple green, capped black. Other characters similar to male. Abdomen 18mm; hind wing 11mm.

*Agriocnemis femina femina*, teneral female

*Agriocnemis femina femina*. Little is known about the habits of this species. Fraser (1933a) has doubts about the Sri Lankan records, but Lieftinck (1971) refers to a male and a female (both incomplete) taken off a "sandy beach" at Mullaitivu and at a site 10 miles East of Puttalam. Characteristics that may relate to a possible larva of this species appear in this text.

References:- Laidlaw, 1924: 373; Fraser, 1933a: 402-404, Fig. 172; Lieftinck, 1955: 77; 1971: 197. Location of type doubtful.

Synonymy:- *Ischneura femina* Brauer, 1868; *Agriocnemis incisa* Selys, 1877; *Agriocnemis pulverulans* Selys, 1877; *Agriocnemis materna* Selys-Hagen, 1877; *Agriocnemis femina* Kirby, 1890.

Distribution:- Mullativu, (2/3mf), sandy beach, flooded by rain; "South Ceylon"? (5).

32 *Agriocnemis pygmaea pygmaea*

32a Abdomen: ground colour of 1 to 6 pale greenish yellow, remaining segments brick red; marked with bronzed black dorsally: a broad band apically green on 1; a broad elongated band on 2 joined to a narrow apical ring; broad stripes on 3 to 6, which expand sub-apically and then contract to join narrow apical rings; 7 similar, but the black is diffuse apically; 8 to 10 not always shaded black. Head mainly black, labrum brilliant metallic blue, anteclypeus, bases of mandibles, genae and frons pale apple green, postocular spots pale green and very small. Eyes pale green capped with black. Prothorax apple green, black dorsally, posterior lobe tri-lobate, the middle lobe produced backwards. Thorax black dorsally up to antero-lateral suture, sides apple green antehumeral stripe apple green. Legs pale yellow with black on extensor surfaces of femurs. Wings hyaline, pterostigma pale yellow in forewings, black centrally in hind, covering less than one cell. Very old males may be much pruinose on dorsum of head and thorax. Anal appendages brick red, superiors longer than inferiors, unlike in *A. f. femina*. Abdomen 16-17mm; hind wing 9.5-10mm (Fig. B 19).

*Agriocnemis pygmaea*, male

32b1 Abdomen similar to the male above except that the ground colour of segments 2 to 6 is bright yellow and not apple green; segment 1 pale greenish yellow; terminal segments brick red as in the male; segments marked dorsally with bronzed black. In very old adults this may change to very dark brown. Head bright yellow; postocular spots blue, with a narrow mid-occipital green stripe between and black behind. Eyes bright yellow capped with black. Prothorax brick red. Thorax similar to subadult form with a broad black stripe on mid-dorsum up to a pale blue antehumeral stripe, narrow and bordered by a

reddish brown or violaceous stripe; sides pale green changing to yellowish green lower down and beneath; a small black spot on upper part of postero-lateral suture. Wings hyaline; pterostigma yellow framed in darker nervures, covering less than one cell. Anal appendages small, conical, yellow; vulvar scales yellow, robust. Very old adults do not get pruinose as in the males but may change to very dark brown. Abdomen 18mm; hind wing 11–12mm.

*Agriocnemis pygmaea*, isochrome female

- 32b2 Abdomen segments 1 to 7 dark brick red, remaining segments suffused with black. Head salmon pink or dark brick red, except for a band of black on top. Postocular spots blue, open behind. Anal appendages not noted, other characters similar to the male. Abdomen 18mm; hind wing 11–12mm.

*Agriocnemis pygmaea*, red form of female

- 32b3 Abdomen pale apple green, yellow on segments 8 to 10; marked dorsally with bronzed black, terminal segments broadly black dorsally.

*Agriocnemis pygmaea*, subadult female

*Agriocnemis pygmaea pygmaea* is a small, very common insect. In India larvae are found in temporary ponds and, after the decline of the monsoon also in slow-running, marshy streams; they are active swimmers when not attached to vegetation. Oviposition takes place in July and after a short larval period emergence is in September towards the decline of the monsoon, at which time also oviposition has been observed, suggesting that the species may be bivoltine or multivoltine with three generations, at least in India (Kumar, 1973a, 1976). Adults can be found amidst vegetation up to about 5,000m. The very old males become snowy white pruinose on the dorsum of head and thorax. The larva has been described by Kumar (Figs. B 19, C 15).

References:- Kirby, 1893: 564; Laidlaw, 1924: 372; Fraser, 1933a: 398–401, Figs. 163, 171; Kumar, 1973a; Lieftinck, 1955: 77, 1971: 197; Bedjanic, 1996. Type in the Serville collection; paratypes in most national collections.

Synonymy:- *Agrion pygmaeum* Ramb., 1842; *Agrion velare* Hagen, 1858; *Agriocnemis pygmaea* Selys, 1877; *Agriocnemis velaris* Selys, 1882; *Agriocnemis hyacinthus* Tillyard, 1913.

Distribution:- Ambalangoda, (2m, 11f (orange)); Peradeniya, (5m); Trincomalee, (1m,

9f (green)), (9m, 12f (orange)); China Bay, (3mf, 5mf, 10mf); Jaffna, (11mf, 12mf); Nuwara Eliya, (-); pond in Viharamahadevi Park, Colombo, 10m (1mf+cop); rice fields on left side of Kurunegala-Dambulla road at Ibbagamuwa, 200m, (1mf); Malwattu Oya, 700m E of A'pura temple, 100m, (1m); tributary of Walawe, 500m SE of Embilipitiya, (1mf); pond at Sinharaja Information Centre, Kudawa, 550m, (1m); Pinnewala Elephant Orphanage, Kosgoda beach, Kosgoda lagoon, Kosgoda Turtle Hatchery and Nape village, roadside ditch, (12mf).

33 The genus *Mortonagrion* with a single species here.

*Mortonagrion ceylonicum*

Abdomen brown, darkening terminally; markings light blue as follows:- a pair of large lateral spots on 1, sides below pale ochreous; four spots on 2, a pair dorso-lateral and a pair lateral; dorso-lateral spots on 3 to 6, those on 3 being largest; apices of all segments narrowly dark brown; a pair of tiny dorso-lateral spots on each of 7 and 8; 9 and 10 dark brown, unmarked. Head mainly dull metallic, bronzy black to dark greenish black. Prothorax brown, sides and anterior lobe blue-green, posterior lobe projecting behind broadly. Thorax brown, antehumeral stripes and upper sides bluish green, lower sides and underneath pale greenish yellow. Legs pale yellow with spots of blue on first two coxae. Wings hyaline, nervures dark brown; pterostigma grey-brown framed in pale yellow, lozenge shaped, covering less than one cell. Anal appendages have to be checked. Female not identified or described; it probably is similar to the male and for the present should be considered as unknown.

*Mortonagrion ceylonicum*, male

*Mortonagrion ceylonicum* which is confined to Sri Lanka was described by Lieftinck from a single male taken at Kadaimparu, 15 miles north of Negombo in January 1962; the female is not known, but Lieftinck suggests that the female taken by Laidlaw (1924) in Ambalangoda is of the same species. The larva has not been described (Figs. B21, 22).

References:- Lieftinck, 1971: 197, 198, Fig. 8; Laidlaw, 1924: 373. Holotype in the Zoological Institute, University of Lund.

Distribution:- Ambalangoda, (3f); Kadaimparu, 15 miles N of Negombo (1m).

34 The genus *Onychargia* with a single species here.

*Onychargia atrocyana*

34a Abdomen black, unmarked in the adult (marked with bright yellow on sides of 1 to 3 in teneral and subadults); 3 to 6 with narrow bluish basal annules; comparatively short and robust, slightly dilated at base and anal ends. Head with a prominent frons; frons and face very hairy; black in adults, but marked with yellow in subadults; eyes black above, brown below. Prothorax and thorax velvety black with a purple reflex dorsally on thorax; (subadults and teneral marked with yellow). Legs black. Wings hyaline, pterostigma olive yellow with a pale border, framed in thick black nervures, covering less than one cell. Anal appendages black, slightly longer than 10. Abdomen 23mm; hind wing 17mm (Fig. B23).

*Onychargia atrocyana*, adult male

34b Abdomen black or blackish brown marked in teneral and sub-adults in bright yellow as follows:- sides of 1, a lateral stripe on 2 and a smaller stripe on 3; in addition 3 to 6 have narrow basal blue rings interrupted dorsally; abdomen is comparatively short and robust and slightly dilated at base and anal ends. Head with a prominent frons; frons and face very hairy; mainly velvety black, marked in teneral and subadults in yellow on the labrum and across the eyes, and on the anteclypeus in the female; eyes black above, brown below. Prothorax and thorax velvety black with a dorsal purple reflex on thorax in the males; teneral and subadults with bright yellow sides, narrow citron yellow antehumeral stripes and a broad oblique black stripe on the postero-lateral suture. Wings hyaline, pterostigma olivaceous yellow with a pale border and framed in thick, black nervures. Claw hooks at end of claws make them appear bifid. Anal appendages: male black, slightly longer than 10; female black, short, conical; vulvar scales robust; abdomen of female has an yellow spot on side of 8 which is without an apical spine, and a pair of yellow spots beside the vulvar scales. Male abdomen 23mm; hind wing 17mm; female abdomen 23mm; hind wing 18mm.

*Onychargia atrocyana*, females  
and teneral and subadult males

*Onychargia atrocyana*. Nothing is known about the habits of this insect in Sri Lanka. In India, (Fraser, 1933a, 1924) the insect, found in submontane areas, is not common, though occasionally found in large colonies. It breeds in tanks and marshes from where, while great numbers may be seen emerging, the adult insects are rarely seen except when actually pairing - probably because they retire to the shelter of trees, often to a great height, a rare habit among the Coenagrioninae. Fraser points out that the original home of the species is Malaysia from whence the species has radiated to establish zoo-centres in Assam, Sri Lanka and W. India. No larva of the genus has been described (Fig. B23).

References:- Kirby, 1893: 563; Laidlaw, 1924: 369; Fraser, 1924: 428, 489; 1933a: 417, 418, Figs. 179, 180; Lieftinck, 1971: 195, 196. Type in the Selys collection; paratypes in most national collections.

Synonymy:- *Onychargia atrocyana* Selys, 1865; *Onychargia vittigera* Selys, 1865.

Distribution:- Minipe, (f); Udugama, (-).

35 The genus *Cercion* with a single species.

#### *Cercion malayanum*

35a Abdomen sides pale blue, beneath creamy yellow; marked black: 1 with a quadrate dorso-basal spot; 2 with a bilobed dorsal stripe not reaching base, but joined to an apical ring by a narrow stalk; similar broad bands on 3 to 7 tapering towards bases and enclosing a lateral blue spot on 5 and 6; dorsum of 7 fully black, except for a narrow blue basal ring; 8 and 9 sky blue, unmarked; 10 blue with a narrow dorsal band and black sides. Strong spines on the apical border of 8 and 9 distinguish this species from blue species of *Pseudagrion* and *Aciagrion*. Head mainly blue, vertex and occiput black, postocular spots and a line between them bluish green. Eyes olivaceous, paler and bluish-white below. Prothorax black, marked blue. Thorax bronzed black, antehumeral stripe greenish yellow, sides bluish green, beneath white. Legs bluish-white marked with black. Wings hyaline, pterostigma yellowish white with thick black nervures, covering less than one cell, 7-8 postnodals in forewing, 6-7 in hind. Anal appendages almost equal, shorter than 10. Abdomen 22mm; hind wing 15mm (Fig. B24).

*Cercion malayanum*, male

- 35b Abdomen greenish yellow; markings similar to the male above, except that 2 has a broader black band dorsally, 8 and 9 with full length black dorsal bands and only the apical border of 10 is blue. There is a short ventral spine on apex of 8. Vulvar scale robust. Other characters similar to male. Abdomen 20mm; hind wing 15mm.

*Cercion malayanum*, female

*Cercion malayanum* has a wide, but scattered distribution; it is not common anywhere (Fraser, 1933a). Nothing is known about its habits in Sri Lanka where it has been recorded from the drier and coastal regions of the island. The larva has not been described (Fig. B24).

References:- Laidlaw, 1924: 372; Fraser, 1933a: 375, 376; (sub. *Enallagma malayanum*); Lieftinck, 1955: 75, Fig. 2. Type in the Selys collection.

Synonymy:- *Enallagma malayanum* Selys, 1876. *Cercion malayanum* Lieftinck, 1955.

Distribution:-Kantalai, (9); Tissamaharama, (10mf); Trincomalee, (9m).

- 36 The genus *Enallagma* with a single species here (*Enallagma malayanum* now is in the genus *Cercion*).

*Enallagma parvum*

- 36a Abdomen pale sky blue marked in black; 1 with a dorsal, squarish spot and blue apical ring; 2 broadly black on dorsum; 3 to 7 with fine apical rings joining a dorsal spot from which a narrow stripe runs to each base; 8 and 9 sky blue; 10 sky blue with a narrow black dorsal stripe. Head mainly black, labrum, bases of mandibles, genae, anteclypeus and frons pale blue; postocular spots small, deep blue, (sometimes bordered black), joined by a narrow blue stripe. Eyes deep blue, paler below. Prothorax black with pale blue sides. Thorax black, broad, blue antehumeral stripes bordered in black, sides pale blue fading to white below. Legs white with a black line on femurs. Wings hyaline, pterostigma blackish, yellow in teneral, covering less than one cell, very oblique, in a paler frame with thick black nervures. Anal appendages: superiors and inferiors of equal length. Abdomen 17mm; hind wing 11mm (Figs. B25, 26).

*Enallagma parvum*, male

- 36b1 Isochrome females: dorsal stripes on abdomen much broader, 8 to 10 black dorsally, borders of 10 blue. Head similar to male but postocular spots are greenish and the occipital stripe yellowish; eyes paler. Thorax yellow to greenish yellow fading to pale blue below; antehumeral stripe bordered in black. Anal appendages blue, very small, conical; vulvar scales pale blue. Abdomen 17mm; hind wing 11mm.

*Enallagma parvum*, isochrome female

- 36b2 Heterochrome females similar, but postclypeus blue and unmarked, postocular spots and stripe not enclosed, occiput black behind and blue centrally, prothorax pale yellow dorsally, sides blue, antehumeral stripes not enclosed in black.

*Enallagma parvum*, heterochrome female

*Enallagma parvum* is one of the smallest damselflies. Nothing is known about its habits in Sri Lanka. In India it is common everywhere up to 4,000', breeding in perennial and seasonal monsoon ponds and resting on grasses rather far from the water. The flight period is from March to September, oviposition from March to June and emergence from March to October. The larva remains undescribed, but a description of the final instar of *E. ebrium* has been included (Figs. B25, 26, C 16).

References:- Fraser, 1933a: 376-378, Fig. 162; Lieftinck, 1955: 76, Fig. 3; 1971: 197; Kumar & Prasad, 1981: 40. Type in the Selys collection; paratypes in most national collections.

Synonymy: - *Enallagma parvum* Selys, 1976; *Ishnura immsi* Laidlaw, 1913.

Distribution:-Peradeniya, polluted stream, (3f); Wellawaya, near Radapola Ela, (3f).

- 37 The genus *Aciagrion* with a single species *occidentale* here. A second species, *hisopa* has been reported, (Fraser, 1933 and Laidlaw, 1924), but the characters of the specimens described are those of *occidentale*. However, as Fraser would have had specimens of both species when he gave Ceylon as a location, a short description of *hisopa* is given at 37c for comparison.

#### *Aciagrion occidentale*

- 37a Abdomen very slim and long; sides of 1 to 3 pale sky blue; of 4 to 7 pale yellow, of 8 to 10 blue; all except 9 marked in black dorsally: 1 with a broad band, on 2 the band joins a narrow apical ring, 3 to 7 bronzed black dorsally with pale blue spots dorso-laterally, on 7 the black is broader apically, on 8 a narrow



triangle; on 10 a small X-shaped dorsal spot, 9 fully blue. Head mainly black, genae, anteclypeus, frons and labrum pale sky blue, the last with a median black spot; postocular spots blue. Eyes capped black, then bottle green changing through pale greenish yellow to very pale blue below. Prothorax: anterior lobe blue, posterior lobe black, sides blue edged yellow. Thorax bluish black dorsally up to between humeral and first lateral sutures; sides pale sky blue; antehumeral stripe narrow, greenish yellow. Legs pale blue with black on extensor surfaces. Wings hyaline, pterostigma greyish black, that of forewing nearly double that in hind. Anal appendages black, inferiors less than half the length of superiors. Abdomen 23–24mm; hind wing 15–16mm (Figs. B27, 28).

*Aciagrion occidentale*, male

- 37b Female similar to the male, but ground colour of face, occipital stripe and antehumeral stripe is pale yellow; eyes with a black cap ringed in pale brown, then olivaceous fading to yellow below, 8 with a band of black, 9 with a dorsal spot from base to a third of segment, 10 fully blue or with a small subdorsal apical blue spot. Anal appendages black, very small; vulvar scale pale blue. Abdomen 15–16mm; hind wing 16mm.

*Aciagrion occidentale*, female

*Aciagrion occidentale* is widely distributed in submontane and montane areas in open grass besides weedy ponds and rank herbage. The larva has not been described, but a description of a larva, possibly of this genus, has been included (Figs. B27, 28, C19).

**References:**—Needham, 1911: 344, 345, Figs. 9, 10; Laidlaw, 1919: 186; 1924: 368; Fraser, 1924: 428, 491, 496; 1933a: 335–337, Fig. 145; Lieftinck, 1940: 93; 1955: 76; 1971: 197. Paratypes probably in BMNH.

**Synonymy:**—*Aciagrion hisopa* (Selys), *race occidentalis* Laidlaw, 1919; *Aciagrion paludensis* Fraser, 1922; *Aciagrion hisopa* Laidlaw, 1924.

**Distribution:**—Colpetty, Colombo 10m, (1); Eduragala, 6 mi. E of Horana, indigenous forest on hilltop in rubber area, (-); Hiniduma 30m, (1); Hulandawa, 20 mi. NE, Galle (1); Inginiyagala 75m, dry forest and scrub, (3); Ja-Ela river 1–5m, in bush and grass on shore, paddy and coconut; (-); Kandy, (5m); Kandekadamadu Aru, 15 mi. SSW of Batticaloa 20m, stream in dry forest with some grass, (3); Labugama Reservoir, 125m, (1, 3, ); Menickwalla Ela, Hatton 1, 000m, stream in ravine in tea area, (3); Negombo Lagoon 1–5m, brackish area, (-); Pali Aru, small river, sandy scrub, 20 mi. NE of Mannar, (3m); Paraiyanalankulam, Vavuniya 20m, (2); Passara (near tank); Puttalam, (1m, 2); Rambukkan Oya,

25 mi, NE of Bibile, 25m, shallow, sandy river in partly open, dry forest area, (3); Trincomalee, (9m, 12mf); Yongamulla, 3 miles E. of Yakkala 30m, valley, mainly paddy fields, dense fairly wet forest; Dasambuwa Estate, Yakkala; Alawala, 10 mi. ENE of Yakkala, 25–200m, around hill streams in cultivated areas with some thin forest, (1, 2, 3); Vairiuttu, 5 mi. W of Trincomalee 15m, (2); Wellawaya near Radapola Ela 200m, (3); Jaffna, (2mf); Kanneliya, (10mf); Palatupana, (12mf).

37c. *Aciagrion hisopa*

Segment 8 of abdomen with a short narrow black stripe on each side not extending as far as the apical end of the segment; thorax: antehumeral stripes lilaceous violet, sides of the same colour fading to pinkish beneath; lower part of sides and beneath pulverulent white in old specimens; legs creamy white; pterostigma black, framed finely in yellow and between thick black nervures; 12 postnodals in forewing, 10 in hind. The female is very similar to the male. Thorax and antehumeral stripes greenish blue. Abdomen: segments 8 and 9 broadly black on dorsum, 9 with a narrow apical ring, 10 blue, narrowly black at base; 10 postnodals in forewing, 9 in hind, pterostigma paler or olivaceous. Male abdomen 25mm; hind wing 16mm; female 26mm and 17mm. respect.

*Aciagrion hisopa*, both sexes

*Aciagrion hisopa*. Though Fraser (1933a) gives Sri Lanka as a location, the specimens described by Laidlaw (1924) conform to the description of *occidentale*. Fraser says this species occurs in widely separated areas at all altitudes up to 7,000 feet and found it very common in paddy fields around Bangalore.

References:- Laidlaw, 1924: 368; Fraser, 1933a: 340; Lieftinck, 1955: 76. Type in the Selys collection.

Synonymy:- *Pseudagrion hisopa* Selys, 1876; *Aciagrion hisopa* Selys, 1891 *Aciagrion hisopa race krishna* Fraser, 1921.

38 The genus *Ischnura* with two species here.

*Ischnura aurora aurora*

38a Abdomen yellow except segments 8 to 10, which are sky blue; the segments can be more or less red in some local areas; black bronzed markings as follows:- broad dorsal stripe on 1; 2 at base and carina fully; a subapical dorsal triangle on 6; 7 broadly except sides and extreme base; on 10 a broad dorsal spot. Head mainly bronzed black, hind border of occiput pale

greenish yellow, labrum yellow except base, anteclypeus, bases of mandibles, genae and frons green; postocular spots dark sky blue. Eyes olive green, darker above, paler below. Prothorax bronzed black, sides and anterior lobe blue. Thorax bronzed black up to humeral and antero-lateral sutures, grass green on antehumeral stripes and sides with a little black on upper part of postero-lateral suture, beneath white. Legs yellow with black stripes. Wings hyaline, pterostigma in forewing rose-red proximally, clear distally, inner and posterior borders thick black, anterior white and outer yellow, diamond shaped; in hind wing smaller, pale grey, nervures on costal border white, others thick black; a few nervures below and distal to pterostigma bright yellow. Anal appendages pale brown, then reddish brown, tipped black. Abdomen 16–20mm; hind wing 10–12mm (Fig. B30).

*Ischnura aurora aurora*, male

- 38b Abdomen yellow with a broad black dorsal stripe interrupted on 1, base of 8 and apically on 9 and 10 by narrow yellow rings; sides yellow fading to pale greenish below. Head marked in very pale green; postocular spots small, blue; occiput ochreous behind. Prothorax and thorax: sides very pale yellow, white beneath, antehumeral stripes yellow. Wings hyaline, pterostigma pale pink, much longer in the forewing. Anal appendages very pale green, very short, conical; vulvar scales very pale green. Abdomen 18–20mm; hind wing 14–15mm.

*Ischnura aurora aurora*, female

*Ischnura aurora aurora*. Nothing is known about the habits of this insect in Sri Lanka. In India it is a bivoltine species, mature larvae being found in April/May and again in September in slow-running streams, weedy banks of large rivers and in temporary monsoon ponds, attaching themselves to vegetation. The cycle from egg to emergence takes 2–3 months in the warmer time of the year and possibly very much longer when it starts getting cold later in the year (Kumar, 1973a). It could also be multivoltine with 3 generations in a year (Kumar, 1976). This species has remarkable powers of flight and aided by upper air currents has spread all over S E Asia (Figs. B30, C17).

References:- Kirby, 1893: 564 (*Micronympha aurora*); 1905; Laidlaw, 1924: 369; Fraser, 1933a: 360–362, Fig. 155 (*I. delicata*); Lieftinck, 1971: 197; Kumar, 1973a: : 90,

91, Figs. 70–79; 1976: 46; Ramachandra Rao & Lahiri, 1982: 559; Bedjanig, 1996. Type possibly in the Hagen collection.

**Synonymy:**– *Agrion delicatum* Hagen, 1858; *Agrion aurora* Brauer, 1866; *Ischnura delicata* Selys, 1876; *Micronympha aurora* Kirby, 1890; *Ischnura aurora* Ris, 1915; *Nanosura aurora* Kennedy, 1920.

**Distribution:**–Alawala, 10mi.NE of Yakkala, thin forest, (1, 3); Alutnuwara, Mahaweliganga, 75m around paddy fields, (3); Andankulam, (10); Bandarawela, (6); Chilaw 5–10m beach near lagoon, (2); Hakgala, (8m); Kahatagasdigiliya 120m, reservoir, 120m, (2); Kandy, (5m, 12); Katumana, Nuwara Eliya 1, 800m grassland, fish pond, (3); Madampe 5m, old reservoir with dense aquatic vegetation, (1); Mahagany, Trinco., (12); Mankulam, 7 mi. E of, 30m, small stream in dense bush, (2); Negombo Lagoon, brackish, (1); Passara, (6); Peradeniya, (2f); Punduloya, (-); Ramboda, (-); Trincomalee, (9, 10, 11, 12); Vellery, (10); Wellawaya near Radapola Ela 200m, (3); Wilpattu, (3mf); Jaffna, (3f); Hasalaka, (12mf); Moon Plains, (-); rice fields on left side of Kurunegala–Dambulla road at Ibbagamuwa, 200m, (1mf); Airport Garden Hotel, Seeduwa, Galle, (12mf).

39 *Ischnura senegalensis*

39a Abdomen metallic blue-black marked with yellow and blue as follows: segment 1 dorsum broadly metallic blue-black, sides and apical border sky blue; 2 dorsum and basal half of sides metallic blue-black, sides sky blue, fading to pale green below, a black stripe may separate the blue and green causing two blue spots; 3 to 7 with bright yellow sides, dorsal bands of black narrowing to points basally, expanding on 7 to the apical end; 8 sky blue, narrowly black at base; 9 black dorsally, sides sky blue; 10 black dorsally, sides yellow, apical border blue behind and below two raised tubercles. Head mainly black, with pale blue on labrum, genae, bases of mandibles and a broad band across frons; a small round, blue postocular spot. Eyes black upper half sharply separated from a pale yellow-green lower half. Prothorax black, anterior lobe pale blue, sides pale green. Thorax bronzed black to a little more than humeral suture, sides very pale green, beneath pale yellow, antehumeral stripes yellow to pale green. Legs black, some surfaces yellow, spines very numerous, short, black. Wings hyaline; pterostigma black on forewing, narrowly tinted pale whitish-blue on costal and outer border, very oblique and diamond shaped: brownish on hind wing, smaller with black nervures. Anal appendages black and yellow, superiors about a third of segment 10, inferiors longer. Abdomen 21–23mm; hind wing 13–15mm (Fig. B29).

*Ischnura senegalensis*, male

39b1 The *isochrome female* is quite rare, similar to the male except that segments 1 and 2 are non-metallic, usually two blue spots on the sides of 2 and sides of 9 green, not blue; pterostigma similar in both wings, pink or grey, with proximal, distal and posterior sides black, costal side yellow.

39b2 Abdomen broadly black dorsally, sides pale flesh coloured or grey, apical borders of segments 1, 8, 9 and 10 narrowly pale blue. Head: labium pale yellow, labrum olivaceous, tinged black, genae, bases of mandibles, anteclypeus and a broad band across the frons pale greenish rather than pale blue (as in the male), occiput orange or ochreous with pale blue, ill-defined postocular spots. Eyes pale blue, upper half separated by an equatorial black band from the lower olivaceous half. Prothorax black, sides pale green. Thorax black, sides pale flesh coloured or tinged brown, a flesh coloured antehumeral stripe may be present, or the black extends to only halfway to humeral suture. Wings hyaline, pterostigma black in forewing except for costal border and outer angle, which are pale bluish/white, very oblique, brown with black nervures in the hind wing. Anal appendages not described. Abdomen 20–24mm; hind wing 14–16mm.

*Ischnura senegalensis*, heterochrome female

39b3 Abdomen: segment 1 bright orange; 2 bright orange, its apical border narrowly black extending forward dorsally to halfway to base; 3 to 7 with pale blue sides, black dorsal bands narrowing to a point basally, expanding subapically; distal end of 7 and all of segments 8 to 10 orange fading to yellow below, all these segments broadly black dorsally, apical borders with orange rings. Head bright orange; eyes emerald green tinged with bright orange above.

*Ischnura senegalensis*, teneral female

*Ischnura senegalensis*. Nothing is known about the life history of this species in Sri Lanka apart from its recorded locations which extend from sea level to 7,000', from dry areas to wet, in the later to early months of the year. There is no record of the larvae having been collected and identified here. The larva has been described by Kumar, (1973a), who with Prasad has written notes on the biology in India. The flight period is from April to October after a short period of emergence from April

to June; newly emerged adults oviposit shortly afterwards, so that large numbers of pairs *in cop* can be observed at this time flying amidst the vegetation near slow running streams; larvae normally remain attached to submerged vegetation. Fraser, (1933a), says this is not a common insect, though found here and there in colonies (Figs. B29, C18).

References:- Kirby, 1893: 564 (*Micronympha senegalensis*); Laidlaw, 1924: 369; Fraser, 1933a: 348-351, Figs. 150, 151; Lieftinck, 1955: 77; 1971: 197; Kumar, 1973a: 91, 92, Figs. 80-91; Kumar & Prasad, 1981: 39; Bedjanic, 1996. Location of type not known; paratypes in most national collections.

Synonymy:- *Agrion senegalensis* Ramb., 1842; *Ischnura senegalensis* Selys, 1876, *Micronympha senegalensis* Kirby, 1890.

Distribution:- Katumana, Nuwara Eliya, grassland, ponds, (3); Madampe, (1); Nay Aru, Pallamadu 10mi. E of Mannar, flooded river, grazed land, (2); Paraiyanalankulam, 20 mi.W of Vavuniya, dense dry forest with glades of grass, plants, (2); Trincomalee, (9m); Trincomalee, hot springs, (11); Yoda Wewa, Tissamahrama, (3); Jaffna, (12mf); Colombo, (3mf); Central YWCA, Colombo, 10m, (1f); Airport Garden Hotel, Seeduwa, Galle, (12mf, in cop); Kosgoda beach, (12m); Nape village, roadside ditch, Galle Dt., (12m).

40 The genus *Ceriagrion* with two species here.

#### *Ceriagrion cerinorubellum*

40 Abdomen segments 1 and 2 and the basal half of 3 bright brick red as are segments 7 to 10 with an occasional dorsal black mark on 7; apical half of 3 and segments 4 to 7 black; sides of 3 to 7 blue. Head: labium white, labrum dark olivaceous, parts ochreous, clypeus dark green, base of mandibles, genae and front of frons pale greenish yellow, rest of frons and vertex dark reddish brown and distinct from the bright ochreous occiput, postocular spots absent. Eyes dark olivaceous above, paler below. Prothorax and thorax green changing to blue on the sides and yellow beneath. Legs yellow ochre with short black spines. Wings hyaline, pterostigma amber, framed in reddish brown nervures, diamond-shaped, covering one cell, 11-12 postnodals in forewing, 9-10 in hind. Anal appendages: superiors reddish brown tipped black, short; inferiors longer, ochreous, tipped black. Abdomen 31-33 mm; hind wing 20-21mm (Fig. B32).

The *female* is very similar but labrum is fully ochreous, upper surface of head darker, dorsum of thorax tinged ochreous to golden brown, pruinosed white beneath. Terminal segments

of abdomen duller, brownish-red. Abdomen 31–35mm; hind wing 20–21mm.

*Ceriagrion cerinorubellum*, both sexes

*Ceriagrion cerinorubellum*. Indian authors describe the species as being found in widely distributed colonies, generally over thickly weeded perennial water; very numerous in October and absent in November. In Sri Lanka the species has been recorded in the low-country wet zone. The combination of bright brick-red and blue on the abdomen serves to distinguish this species from others of the genus. The larva has not been described (Fig. B32).

References:- Laidlaw, 1924: 369; Fraser, 1933a: 326–328, Fig. 140; Kumar, 1977: 507; Lieftinck, 1971: 196; Bedjanic, 1996. Location of type not known; paratypes in most national collections.

Synonymy:- *Pyrrhosoma cerinorubellum* Brauer, 1865; *Agrion cerinorubellum* Brauer, 1866; *Ceriagrion cerinorubellum* Selys, 1876.

Distribution:- Ambalangoda, (3f); Polonnaruwa forest reserve, Ambalangoda, (1); Telwatte Sanctuary, Ambalangoda, swamp, (1); Hemmeliya, Baddegama, small stream, tea plantations, (1); Hiniduma, garden, stream, (1); Madinagoda, (2); Undugoda, (8m); Yakkala, cultivated area and swamp, (1, 2, 3); Colombo, (3m); Kanneliya, (10m); pond at Sinharaja Information Centre, Kudawa, 550m, (1/2mf).

41 *Ceriagrion coromandelianum*

41a Abdomen bright yellow. Head: labrum, clypeus, genae, bases of mandibles and frons bright yellow, vertex olive green, occiput and behind eyes ochreous, postocular spots absent. Eyes olive green above, pale greenish yellow below. Prothorax and thorax olive green, sides bright yellow. Legs yellow with short black spines. Wings hyaline, pterostigma golden yellow framed in brown, covering one cell, 11–12 postnodals in forewing, 10–11 in hind. Anal appendages bright yellow to ochreous, inferiors longer than superiors. Abdomen 28–30mm; hind wing 18–20mm (Fig. B31).

*Ceriagrion coromandelianum*, male

41b Abdomen olivaceous tinged golden yellow to ochre dorsally, darker on terminal segments. Frons olivaceous, vertex more brownish, sides paler. Prothorax and thorax olivaceous brown. Other characters similar to the male. Anal appendages and

vulvar scales olivaceous or golden brown. Abdomen 29–32mm; hind wing 20mm.

*Ceriagrion coromandelianum*, female

*Ceriagrion coromandelianum* is a very common damselfly recorded in Sri Lanka from all areas, excluding the south so far, and including Hakgala in hill country. Indian authors say it breeds in weedy water around which it may be found for the greater part of the year, the female in scrub jungle some distance away from the water. Kumar (1973a, 1980) describes it as having two or three generations in a year, ovipositing in tandem into submerged stems; two generations emerging in March/April and May/June lay eggs that complete the under water phase in 2 months, while the generation emerging in September/October lays eggs whose development is slowed down by the cold leading to emergence in the following March/April. This species is easily distinguished from all others by its pale yellow unmarked abdomen. The larva has been described by Kumar, 1973a, 1980 (Figs. B31, C20).

**References:-** Laidlaw, 1916: 132; 1924: 369; Fraser, 1933a: 315, 316, Fig. 132, 133; Lieftinck, 1951, Fig. 1; 1955: 74; 1971: 196; Kumar, 1973a: 89, 90, Figs. 62–69; 1980: 249–258, Figs. 1–3; Bedjanic, 1996. Location of type not known; paratypes in most national collections.

**Synonymy:-** *Agrion coromandelianum* Fabr., 1798; *Agrion cerinum* Ramb., 1842; *Ceriagrion coromandelianum* Selys, 1876.

**Distribution:-** Chilaw, (1mf; Jaffna, (9f); Kandy, (5m, 7m); Negombo lagoon, brackish, cultivated area, (1); Puttalam, (1m, 2, marsh); Trincomalee, (9mf); Yongammulla, Yakkala, small stream, paddy fields, (1); Yakkala swamp, dense bush, (1); Hakgala, (2mf); Horowopata, (3mf); Palatupana, (10mf); Sigiriya, (6mf); pond in Viharamahadevi Park, Colombo, 10m, (1m); rice fields on left side of Kurunegala-Dambulla road at Ibbagamuwa, 200m, (1f); tributary of Walawe 500m SE of Embilipitiya, (1m); Kosgoda Turtle Hatchery, (12m).

42 The genus *Pseudagrion* with three species here and possibly a fourth *decorum*, which is also included in the sub-key below.

*Sub-key*, to Sri Lankan species of *Pseudagrion*.

#### Males

- |   |   |    |
|---|---|----|
| A | Face, frons and vertex rust red.— <i>rubriceps ceylonicum</i> — | 46 |
| — | Face, frons and vertex blue or green, marked with black—        | B  |



B.	Thorax sky blue on dorsum and sides, marked with medial and humeral black stripes	C
—	Thorax very pale blue, with three fine black lines on mid-dorsal carina and a thick black humeral stripe— <i>decorum</i> —	43
C.	Superior anal appendages shorter than segment 10 and not bifid at apex as seen in profile — <i>malabaricum</i> —	44
—	Superior anal appendages as long as segment 10 and bifid at apex as seen in profile— <i>microcephalum</i> —	45
<b>Females</b>		
A.	Face, frons, eyes and vertex rust red— <i>rubriceps ceylonicum</i> —	46
—	Head with a large amount of orange— <i>microcephalum</i> —	45
—	Thorax with a thick black line on carina— <i>malabaricum</i> —	44
—	Thorax with a fine black line on carina — <i>decorum</i> —	43

43 *Pseudagrion decorum*

43a Abdomen pale sky blue, deeper on 8-10; segment 2 bluish green; markings black: on 1 a basal spot, on 2 a narrow dorsal arrow-head joining an apical ring, similar on 3 to 7 but more steely or bronzed, 8 to 10 with only apical lines and apical black spines. Head: labrum, genae, bases of mandibles, clypeus frons and vertex up to posterior ocelli pale blue green, postocular spots large, deep blue green, paler behind and joined by a narrow bridge lined finely in front and thickly behind in black. Eyes blue, bluish green and pale green from above downwards and with a small crescent of black above and behind. Prothorax mainly pale blue, posterior lobe bluish green. Thorax blue green on dorsum, sides sky blue, carina finely black, humeral stripe narrow black. Wings hyaline, pterostigma a very narrow diamond, covering less than one cell, 10 postnodals in forewing, 9 in hind. Anal appendages flesh coloured, superiors changing to pale blue and tipped black, inferiors much shorter. Abdomen 28-39mm; hind wing 18-20mm (Figs. B33, 34).

*Pseudagrion decorum*, male

43b Abdomen pale blue, greenish on basal and terminal segments, markings black: 1 with a basal dorsal spot, 2 with an arrowhead pointing forward to a basal colour of golden yellow and reaching apically to a black ring, 3 to 10 with dorsal spots or stripes which do not reach the base, expand and then contract

to meet the apical rings on 3 to 6, but expand right up to the apical ring on 7, expand from the base but do not reach apically on 8 to 10. Head: labrum, genae, bases of mandibles and clypeus very pale green; frons vertex and occiput golden green; postocular spots sky blue, very large and without black on the stripe between them. Eyes olive green above with traces of ochre, pale green below. Prothorax very pale green, a golden yellow stripe on each side and five fine black lines meeting together in front and behind, posterior lobe with the usual pair of recurved processes. Thorax pearly blue; carina and humeral sutures bordered in golden yellow. Legs pale greenish blue. Wings hyaline, pterostigma paler than in the male. Anal appendages pale bluish-green, conical, pointed; vulvar scales bluish-green. Abdomen 31mm; hind wing 20mm (Fig. B35).

*Pseudagrion decorum*, female

*Pseudagrion decorum*. Though this species has not been found in Sri Lanka, as Fraser says it should be found in the plains here, it is included in this document. Occasionally, montane or submontane, but generally limited to sea levels. Breeds in weedy water, keeping well out over the water, often hovering for long periods over one spot. In India, emergence is from March to June, the flight period extending to October. The species is distinguished easily from others by the light blue ground colour of the males with only a few black markings on the thorax and an arrow-head on segment 2. Females are more difficult to distinguish from *P. microcephalum* from which it differs in that segment 9 is without a bifid marking and segment 10 is not entirely unmarked; the dorsal arrow-head on segment 2 will distinguish it from *P. malabaricum*. The larva has not been described (Figs. B33, 34).

References:- Fraser, 1933a: 286-289, Fig. 121; Sahni, 1965: 205, Fig. 1; Kumar & Prasad, 1981: 36. Type in Selys collection; paratypes in most national collections.  
Synonymy:- *Agria decorum* Ramb., 1842; *Pseudagrion decorum* Selys, 1876.

44 *Pseudagrion malabaricum*

44a Abdomen blue with black markings: a broad quadrate, basal spot on 1; on 2 a goblet shaped dorsal mark with a thin stem to an apical ring; 3 to 7 with dorsal stripes that expand to join apical rings; only apical rings on 8 and 9; a broad dorsal band

on 10. Head mainly blue with black markings; broad black band between eyes on vertex; occiput black; postocular spots blue, very large. Eyes blue capped black. In older specimens most of the head is black. Prothorax black with some blue. Thorax sky blue with three black bands on dorsum, a small spot on the sides between the lateral sutures and another on the postero-lateral suture. Wings hyaline; pterostigma dark brown, 10-11 postnodals in forewing, 9 in hind. Anal appendages black, superiors not bifid, inferiors very small. Abdomen 33mm; hind wing 20mm (Fig. B35).

*Pseudagrion malabaricum*, male

- 44b Abdomen dark sky blue with black markings; on 2 like a chess pawn; 3 to 7 like the male above; 8 and 9 broadly black with narrow blue apical rings; 10 entirely blue. Head: labrum and clypeus pale olive green; vertex black; postocular spots turquoise blue. Eyes olive green capped brown. Posterior lobe of prothorax and processes yellow. Thorax peacock blue changing to pale sky blue on sides and beneath, markings as in male above. Anal appendages bluish, very short; vulvar scales fleshy white. Other characters as in the male. Abdomen 32mm; hind wing 22mm.

*Pseudagrion malabaricum*, female

*Pseudagrion malabaricum* breeds near enclosed water, is never found over running water; and is sometimes found in large numbers, making the whole area appear blue. The species is distinguished from *P. microcephalum* by the superior anal appendages being bifid at the apex. Recorded in Sri Lanka from the wet zone at sea level; Fraser says it replaces *P. microcephalum* in the low hills. The larva has not been described (Fig. B35).

References:- Laidlaw, 1924: 370, 371, Fig. 15; Fraser, 1933a: 284-286, Fig. 120; Lieftinck, 1940: 92; 1955: 73; 1971: 196; Ramachandra Rao & Lahiri, 1982: 559; Bedjanic 1996. Lectotype male in BMNH.

Distribution:- Ja-ela, (1) cultivated area; Madampe reservoir in cultivated area, (1); Negombo, (8f); Passara, (9mf); Peradeniya, (-m); Rajakadaluwa, (8); Yakkala swamp, dense bush in area, (1); Kanneliya, 3f); Marichchikaddi, (10f); water tank 700m SE of Abhayagiri Dagoba, A'pura, 100m, (1mf).

45 *Pseudagrion microcephalum*

45a Abdomen sky blue with black markings: quadrate basal spot

on 1; goblet shaped mark on 2 with its stem meeting a fine apical ring and a fine line from a basal ring runs to the cup; 3 to 7 with broad stripes not meeting bases of segments, but expanding subapically before contracting to meet apical rings; on 7 expansion goes on to apical ring; 8 with a broad apical ring; 9 with a narrow line and a row of apical black spines; 10 with a broad saddle shaped mark along all its length. Head: labrum, bases of mandibles, genae, frons and front of vertex very pale sky blue; three small black spots on base of postclypeus, occiput blue, postocular spots sky blue, very large, finely framed in black with a border of black or dark brown in front. Eyes dark sky blue above with a small brown cap, very pale blue below. Prothorax sky blue, anterior lobe black, five fine black lines on middle lobe. Thorax sky blue fading to white below, a broad black stripe on carina, humeral stripes black, lateral sutures black. Wings hyaline, pterostigma grey, nervures black, covering less than one cell, 10 postnodals in forewing, 9 in hind. Anal appendages: superiors black, concave and blue inside, bifid apically in profile, inferiors white, less than half length of superiors. Abdomen 27mm; hind wing 17mm (Fig. B36).

*Pseudagrion microcephalum*, male

- 45b Abdomen sky blue, with black markings different from the male above: 2 with a dumb-bell shortly stalked apically, 8 black dorsally, 9 bifid or with two elongate spots on basal two thirds, sometimes with an apical transverse line with a border of black spines, 10 unmarked, deeply notched at apex. Head: face and vertex olivaceous, tinged orange, genae paler olivaceous, black line across vertex is interrupted and absent at eyes, the black behind postocular spots is thicker, postocular spots blue, changing to olive green in front. Eyes olive green above, darker on top, very pale blue below. Prothorax bluish-green forming large mid-dorsal spots on black, posterior lobe orange in the centre which curls back into paired forward pointing spines like stalked eyes, ochreous and tipped black. Thorax bluish green, tinged orange on dorsum, sides sky blue, blue spots on tergum. Pterostigma paler brown. Anal appendages very small, black, conical; vulvar scales pale blue, short. Abdomen 29mm; hind wing 20mm.

*Pseudagrion microcephalum*, female

*Pseudagrion microcephalum* breeds in stagnant marshy water. It is an insect of the plains, being replaced by *P. malabaricum* in the hilly areas. Males are distinguished from the previous species by the dorsal markings on segment 2, by the superior anal appendages being as long as segment 10 and by lacking a transverse stripe on the vertex. Females are distinguished by the bifid black mark on segment 9 and by the orange suffusion on the vertex and the upper part of the eyes. Recorded in Sri Lanka at sea level. The larva has been described (Laidlaw, 1915, Fraser, 1919) (Figs. B36, C23).

References:- Laidlaw, 1915: 179, Fig. 1; 1924: 372; Fraser, 1919: 467; 1933a: 278–280, Fig. 118; Lieftinck, 1955: 73; 1971: 372; Bedjanić, 1996. Type in Selys collection.

Synonymy:- *Agriion microcephalum* Ramb., 1842; *Pseudagrion microcephalum* Selys, 1876.

Distribution:- Negombo lagoon, brackish, (1); Trincomalee, (1m, 7mf); Colombo, (?); Palatupana, (2mf); water tank 700m SE of Abhayaygiri Dagoba, A'pura, 100m, (1mf); stream in rice fields 500m S of Ganapinuwela, Galle, 50m, (2m); Kosgoda lagoon, (12m); Triton Hotel pool, Ahungalla, (12m); Kosgoda Turtle Hatchery, (12mf, in cop).

#### 46 *Pseudagrion rubriceps ceylonicum*

Abdomen: 1 olive green with a square black dorsal spot not quite reaching apically, a blue apical ring, sides sky blue; 2 olive green with a narrow black stripe full length or with a small dorsal blue spot and in some the black is goblet shaped with the point of a basal black triangle dipping into the cup; 3 to 7 black, bronzed green dorsally, sides pale green with a narrow blue ring; 8 with a broad black cone arising apically its apex nearly reaching the base; 9 and 10 sky blue with fine black apically and some black spines. Head: labrum, bases of mandibles, genae, clypeus frons, vertex and occiput to post-ocular region rust red and unmarked; postocular spots large triangles, dark blue beneath head, dark brownish black bordered black and greenish brown beneath eyes. Eyes, upper surface rusty red; (in *rubriceps* the eyes are olivaceous-green above changing to orange, then gold and then to bluish below.) Prothorax olive green with some black. Thorax olivaceous, rusty dorsally, sides and beneath blue, carina finely black in part, a small black spot on humeral and postero-lateral sutures. Wings hyaline, palely enfumed, pterostigma dark reddish brown in black nervures, covering less than one cell. Anal appendages black, inferiors paler and shorter than superiors which are as long as 10. Abdomen 32mm; hind wing 20mm (Fig. B37).

The female is very similar to the male, except that on segment 2 the black marking is very narrow in the basal two thirds, broadening before contracting again to join the apical ring and on 9 there is a basal bifid black mark and the apical ring broadens mid-dorsally to almost join the ends of the basal marking. Anal appendages white, small, conical; vulvar scales bluish, robust. Abdomen 29mm; hind wing 21mm (Note: in *rubriceps* the eyes are dark blue above, paling below).

*Pseudagrion rubriceps ceylonicum*, both sexes

*Pseudagrion rubriceps ceylonicum* has been described as a very common insect in Sri Lanka and recorded from the wet and dry zone and up to Kandy, but details are only available for the Indian *P. rubriceps*, which is reported as a multivoltine species, found almost all the year round, breeding in perennial and temporary ponds and marshy streams and stagnant edges of rivers. Adults fly low amidst the vegetation. There are at least three generations; the summer broods complete their life cycle in about 2 months. Eggs may be laid above water level or in submerged vegetation, in twigs or the under surface of leaves in transverse rows. The subspecies is distinguished by the head and thorax being without black markings and by much broader and extensive markings on segment 8; the female differing in resembling the male in colour and very much in the markings. The larva of *P. rubriceps* has been well described by Kumar (1973a, 1979), but that of the subspecies has not been described (Figs. B37, C21).

References:- Kirby, 1891: 205, 206, pl. 20. Fig. 4; 1893: 564; Laidlaw, 1919: 194; 1924: 370; Fraser, 1933a: 296-300, Fig. 125; Lieftinck, 1940: 92, 93; 1955: 74; 1971: 197; Kumar, 1973a: 87, 88, Figs. 40-49; 1979a: 371-381; 1979b: 126, 127; Sahni, 1965: 205, Fig. 2; Bedjanic, 1996. Fraser says type in BMNH, but it is not listed in Kimmins 1966.

Synonymy:- *Archibasis ceylanica* Kirby, 1881; *Pseudagrion rubriceps* Laidlaw, 1924.

Distribution:- Chilaw estuarine lagoon, (1); Haragama, stream near Mailapitiya, (-m); Jaffna, (3); Negombo lagoon, brackish, (1); Kandy, (7m, 8m, 9m); Kandy, muddy water reservoir, sanctuary, (1); Nalanda, (7, 9); Trincomalee (9m); Wellawaya, Radapola Ela, (3); Yakkala cultivated area, (1, 2, 3); Colombo, (2mf, 3mf, 5mf, 6mf); Horowopathana, (9mf, 10mf); Cheddikulam, (-); Palatupana, (-); water tank 700m SE of Abhayagiri Dagoba, A'pura, 100m, (1m); stream nr. Citadel Hotel, 500m before outflow into Mahaweli, 700m, (1mf).

# Key to the Anisoptera

Wings held fully open or depressed at rest: head not widened across: eyes more or less confluent in the middle line, except in the *Gomphidae* where they are widely separated: fore- and hind wings differ in shape, the hind broader than the fore: discoidal cells divided into an upper hypertriangle and lower triangle, (which may retain the name of discoidal cell) (Fig. A10).

	<b>Anisoptera</b>	1
1a	Eyes widely separated: the two primary antenodals very distinct <b>Gomphidae</b>	3
1b	Eyes meeting in the middle line in a point at least	2
2a	Eyes with a distinct projection at outer rear edge: dominant colour metallic green, sometimes black with yellow or orange markings: male hind wing with anal angle and anal triangle: abdominal segment 2 with auricles (Fig. A11). <b>Corduliidae</b>	21
2b	Eyes without such a projection and broadly contiguous: discoidal cells elongate in length of wing and made up of 2 to 7 or more rarely numerous cells; subtrigone absent or poorly formed: anal loop distinct: non-metallic <b>Aeshnidae</b>	14
2c	Eyes without such a projection: generally non-metallic: without anal angle, anal triangle or auricles <b>Libellulidae</b>	Page 140
3	The family <b>Gomphidae</b> Colour never metallic; eyes well separated; wings never coloured; tornus strongly angulated in male hind wing, base excavate, rounded in female; two strong antenodals always present; discoidal cell of forewing nearly equilateral, of hind elongated; median space never traversed; anal loop absent or rudimentary; ovipositor reduced to scales at apical end of 8.	

Determination of species, especially of females is quite difficult as venation is fairly constant. Apart from colour and markings, the useful characters are:- whether the trigones of forewing are entire (sub-families *Epigomphinae* and *Gomphinae*) or traversed (sub-family *Ictininae*) and the number of transverse veins between sectors of arc in forewing from arc to bifurcation of Rs, being at least 4 in the *Epigomphinae* or only 2 (rarely 3 or 4) in the *Gomphinae*. There are two genera of *Ictininae* in Sri Lanka, each with a single species; *Ictinogomphus rapax* with segment 8 widely dilated and with foliate lateral expansions, and *Gomphidia pearsoni* without them. There are 5 genera of *Gomphinae* and 3 of *Epigomphinae* in Sri Lanka with 5 and 7 species respectively in each. The following sub-key could be used when the specimens can be handled, especially to identify the females; otherwise the main key with more details of the species should be used.

Subkey A (the main key starts on page 119).

- A     Trigones of forewing traversed or reticulated subfamily *Ictininae*: C
- C     — Trigones of forewing always entire B
- B     At least 4 transverse veins between sectors of arc from arc to bifurcation of Rs in forewing subfamily *Epigomphinae*: D
- Only 2 (rarely 3 or 4) such transverse veins. subfamily *Gomphinae*: E
- C     *Ictininae*
- Segment 8 of abdomen dilated and with wing-like expansions; arc situated between first and second antenodals; anal loop distinct, of 4–5 cells and extending proximal to base of subtrigone; superior anal appendages acute apically. *Ictinogomphus* — 13
- Segment 8 not dilated; arc situated between second and third or at second antenodal; anal loop not so distinct and blending on proximal side with other cells; superior anal appendages blunt apically. *Gomphidia* — 12



D     **Epigomphinae**

- Incomplete basal antenodal present; 3 or more rows of cells between IA and posterior margin of forewing; 2 rows of postanal cells in forewing, 4 to 5 in hind; primary antenodals the first and the fifth, sixth or seventh; IA in forewing pectinate; usually 2 cubital veins in forewing, 1 in hind, superior anal appendages of male with an inner medial branch.

*Macrogomphus* — 10

- Incomplete basal antenodal absent; only 1 row of postanal cells in forewing, 2 to 3 in hind; primary antenodals the first and fifth; IA in forewing not pectinate; only 1 cubital vein in all wings; superior anal appendages of male with an inner medial branch; inferior only slightly notched apically.

*Microgomphus* — 11

- Incomplete basal antenodal absent; 1 row of postanal cells in forewing, 3 to 4 in hind; primary antenodals the first and fifth; IA in forewing not pectinate; 1 or 2 cubital veins in forewing, 1 in hind; superior anal appendages of male lyrate without an inner branch and with an outer robust spine; inferior deeply notched and branched.

*Heliogomphus* — 9

E     **Gomphinae**

- Anal loop absent; first postanal cell not extending proximal to base of subtrigone in hind wing; anal triangle 3-celled, 4-celled in *Paragomphus* and *Megalogomphus*.

F

- Anal loop present although rudimentary; first post-anal cell extending more or less proximal to base of subtrigone in hind wing; anal triangle 4-celled, rarely 3-celled; tornus angulate; branches of inferior anal appendage ending in two fine branches; tornus angulate

7

- F Lobe of male genitalia greatly enlarged and very conspicuous; an incomplete basal antenodal present in all wings; pterostigma very long, equal to nearly half the distance from node to proximal end of pterostigma; 2 transverse veins in forewing between sectors of arc from arc to bifurcation of Rs, 1 in hind; tornus angulate

*Cyclogomphus* — 6

- Lobe of male genitalia not so enlarged and not so conspicuous; no incomplete basal antenodal (this last character also includes the Sri Lanka species of *Anisogomphus*); pterostigma not so long.

G

- G Superior anal appendages as long as branches of inferior appendage, equally divaricate and with a black robust spinous process beneath; 3 to 4 transverse veins in forewing between sectors of arc from arc to bifurcation of Rs, 1 to 2 in hind; tornus rounded.

*Anisogomphus* — 4

- Superior anal appendages and branches of inferior appendage of equal length and equally divaricate, but without a spinous process; discoidal field with two rows of cells to beyond level of node; only two rows of cells between IA and margin of forewing; 2 transverse veins in forewing between sectors of arc from arc to bifurcation of Rs, 1 in hind; tornus angulated

*Burmagomphus* — 5

- Superior anal appendages longer than branches of inferior appendage, simple and without spines or processes beneath, very closely apposed, the apical ends curling strongly downwards; inferior appendage much shorter, its branches closely apposed and curled up hook-like; segments 8 and 9 with lateral foliate expansions; 2 transverse veins in forewing between sectors of arc from arc to bifurcation of Rs, 1 in hind; tornus angulate.

*Paragomphus* — 8

#### 4 *Anisogomphus solitarius*

Abdomen black, sparingly marked with bright ochre and yellow according to Lieftinck's description which is of a crushed specimen; the generic description gives greenish yellow and seems more likely. Basal two segments swollen, then thin and cylindrical up to 6 and expanding again up to 8 and narrowing to end. Markings are:- on 1 a mid-dorsal spot and the sides; a mid-dorsal stripe and two lateral spots on 2; dorsal carina of 3, 4 and base of 5; 3 to 6 with small spots on sides, rest of 6 black; a basal yellow band on 7 expanding apically and a spot on each side; on 8 a small middorsal basal spot and a lateral streak; 9 and 10 black; expansions on 7 to 9 light brown and yellow,

that on 10 black. Head mainly black, parts yellow. Occiput black, armed on crest with two small black teeth and fringed with hairs. Eyes dark olivaceous brown, capped black. Prothorax black, spots bright greenish yellow. Thorax black, marked bright greenish yellow, beneath yellow. Wings hyaline, nervures black, pterostigma yellow, covering 4 cells; primary antenodals the first and the sixth or seventh; antenodals 14–15 in forewing, 10 in hind, postnodals 13–14 in both wings; discoidal cell, hyper- and sub-trigones entire; 2 rows of postanal cells in forewings, 4 in hind; 3–4 cross veins between sectors of arc from arc to bifurcation of Rs in forewings, only 1, rarely 2 in hind; anal triangle 3-celled; no basal postcostal vein; cubital veins 2 in forewings, 1 in hind; anal loop absent, first postanal cell not extending proximal to middle of trigone; tornus rounded; hind wing with two veins from hind margin meeting anal vein directly. Superior anal appendages light yellow, inferior black. Abdomen + appendages 36mm; hind wing 33mm (Fig. B63).

Female not known.

*Anisogomphus solitaris*, male

*Anisogomphus solitaris*. This new species was described by Lieftinck in 1971 from a damaged male and its exuviae taken from Rambukpath Oya near Hatton and not recorded thereafter. Female not known (Figs. B63, C26).

References:- Lieftinck, 1971: 198–20; Figs. 5, 9. Type in Zoological Institute, University of Lund.

Distribution:-Rambukpothoya, 10 miles NW of Hatton, stream in deep ravine, tea and rubber estates, (3m).

5 *Burmagomphus pyramidalis sinuatus*

5a Abdomen black, marked with green; segment 1 green on sides and dorsum with a long black stripe; 2 with a mid-dorsal black stripe, tapering apically, sides and beneath yellow, but black just behind auricles and an apical lateral stripe; 3 with a basal dorsal spot and a larger latero-basal spot of green; 4 to 7 with narrow green basal rings, with dorsal spots of black on 6 and 7 a black stripe on 7; 8 black with two greenish yellow spots; 9 black, chrome yellow distally; 10 and anal appendages fully black. Eyes green. Wings hyaline, faintly tinged yellow

basally and apically in females; 2 cross veins between sectors of arc from arc to bifurcation of Rs in forewings, only 1 in hind; forewing antenodals 12–14, postnodals 8–10, hind wing 9–10 and 8–11 respectively; anal triangle 3-celled; anal loop absent; arc between first and second antenodals; discoidal cell in forewing entire; basal incomplete antenodal absent; first postanal cell in hind wing extends proximally as far as middle of base of subtrigone; hind wing with two veins from hind margin meeting anal vein directly; discoidal cells and trigones entire; triangle 3-celled; primary antenodals first and fifth; pterostigma greyish to dark brown, nervures black, covering 4–5 cells. Anal appendages black, superiors as long as 10, divaricate, pointed, with a short outer spine; inferior split into two divaricate branches, pointed and longer than superiors. Posterior hamules very robust and projecting. Male abdomen with appendages 31–32mm; hind wing 26mm (Figs. B64, 65, 68).

*Burmagomphus pyramidalis sinuatus*, male

- 5b Female similar to male but abdomen black marked with bright citron yellow, not green; 1 yellow on dorsum and sides and with along black stripe; 2 with a dorsal stripe which tapers apically, sides and beneath yellow, two small black areas at apex and base; 3 with a small baso-dorsal spot, a large baso-lateral triangle and a narrow stripe to apex; 4 to 8 with only baso-lateral spots, that on 8 joining a second long spot; joint between 8 and 9 yellow; a small apical spot on 9; 10 unmarked. Anal appendages black, short, conical; vulvar scales very short, triangular and bifid. Abdomen 34–36mm; hind wing 27–29mm respectively.

*Burmagomphus pyramidalis sinuatus*, female

*Burmagomphus pyramidalis sinuatus* was described as a new species *sinuatus* by Fraser on a single female taken at Urugalla in May. Later Lieftinck took 5 males and another female at Haragama on the Mahaweli in September; 1938, he found these specimens so close to *pyramidalis* as to merit only subspecific status. The males persisted in settling on the bright green leaves of *Acacia* trees overhanging a tributary of the river and the female was taken while ovipositing in the fast flowing river. One emerging male was taken with its exuviae (Figs. B64, 65, 68, C27, C34–3).

References:- Fraser, 1933d: 33-35, Fig. 6; 1934: 219, 220, Fig. 68; Lieftinck, 1940: 104-112, Figs. 7-9, Pl.1-Fig. 3), 1955: 83; 1971: 202. Allotype female in BMNH.

Synonymy:- *Burmagomphus sinuatus* Fraser, 1933

Distribution:- Urugalla, bush by the river (5f); Haragama, stream near Mailapitiya and banks of Mahaweli, (9mf); Giritale Forest Reserve, (2f).

## 6 *Cyclogomphus gynostylus*

Abdomen short, tumid, cylindrical from 3 to 7, then dilated again; black, marked with yellow on all segments; (marks greenish-yellow in females); sides of 1 and 2 and a mid-dorsal stripe on 2; sides of 3; basal rings on 4 to 6; a broader ring on 7 extending apically on sides; sides of 8 to 10 and a basal ring on 10. Frons yellow, with a black band across from which a short tongue runs forward; occiput dark ochreous, fringed with dark hairs. In females, frons greenish yellow and occiput yellow, without hairs. Eyes bottle green, glossy black above and behind, yellow below and behind. Prothorax black with greenish yellow markings. Thorax black marked with greenish-yellow and leaving two Y-shaped black markings on each side. Wings hyaline, tornus angulate; pterostigma yellow, swollen, covering 2-3 cells; costa brightly coloured; arc between first and second antenodals; a single row of postanal cells in forewing, 3-4 in hind; 2 cross veins between sectors of arc from arc to bifurcation of Rs in forewings, only 1 in hind; hind wing with two veins from hind margin meeting anal vein directly; discoidal cells, hyper- and subtrigones entire; anal triangle 3-celled; costal side of discoidal cell slightly longer than basal and distal slightly longer than costal in forewing, costal and distal sides about equal and nearly twice length of basal in hind; anal loop absent, first postanal cell not extending proximal to inner end of base of subtrigone; incomplete basal antenodal present in all wings; first and fifth antenodals the primaries; only 1 cubital vein in all wings. Legs short, black and yellow. Anal appendages black, distinctive; female appendages yellow, conical; vulvar scales short. Male abdomen 26mm; hind wing 23mm; female 28mm and 29mm respectively (Figs. B66, 67).

*Cyclogomphus gynostylus*, both sexes

*Cyclogomphus gynostylus*. Laidlaw (1924) referred a female taken in Kandy in May, 1911, to the species *heterostylus* having compared it with a female from Poona given to him by Fraser:

he could find no difference. However, Fraser (1933d), who erected the new species *gynostylus* in 1926 on a teneral male taken at Kandy Lake in September, 1924, states that this female "is quite certainly the female of this new species, as its markings do not differ materially from *C. heterostylus*". He adds that *heterostylus* has not been recorded further south than the Deccan and is unlikely to be found in Sri Lanka as members of the genus are very local. Fraser obtained another fully adult male (Kandy, Ambatenne, May, 1932); its markings agreed with those of the male first described by him. According to Fraser (1933a) the female of *heterostylus* is not known. It is not clear what was the female given by him to Laidlaw for comparison. It would appear that Laidlaw's specimen was given to the Colombo Museum, but it is not in a recent list of Odonata in the Museum collection given to me. To add to the confusion, Fig. 2 in Laidlaw, 1924 is from a male *heterostylus* also from Poona. Fraser (1933a, d) says the anal appendages of *gynostylus* are aberrant and will serve to distinguish this species from others of the genus. Relevant figures for both species are included here as an aid to identify collections, which should be conducted in the Kandy area.

The larva of this genus has not been described, though Needham (1911) has figured a larva assumed to be of this genus. Adults of the genus have a weak flight, settling usually in long grass and low shrubs. The larvae could be found in sluggish streams or in the surrounding marshes (Figs. B66, 67, C28-10).

References:- Fraser 1933d: 26, Fig. 3; 1934: 182-183, 185-187, Figs. 56, 58; Laidlaw 1924: 341, Fig. 2; Lieftinck 1955: 83. Holotype male in BMNH.

Synonymy:- *Cyclogomphus heterostylus* Laidlaw, 1924; *Cyclogomphus gynostylus* Fraser, 1926.

Distribution:- Kandy lake and Amabatenne; (5mf, 9m); Wace Park, Kandy, (5mf); Kurunegala tank, (6m).

## 7 The genus *Megalogomphus*

Head triangular; frons angulated. Wings with tornus angulated; primary antenodals the first and seventh; 2-3 nervures between sectors of arc from arc to bifurcation of Rs in forewings, only 1 in hind; anal triangle 4, rarely 3-celled; 2 rows of postanal cells in forewings, 5 in hind; anal loop absent or rudimentary, of 2 cells which extend proximal to base of

subtrigones; anal triangle 4-celled; discoidal cell entire usually, as are also the hyper- and subtrigones; only 1 cubital vein in all wings; hind wing with two veins from hind margin meeting anal vein directly. Abdomen tumid at base, 3 to base of 7 cylindrical, then expanding noticeably on 8 and 9 which have narrow wing- like expansions. Anal appendages: superiors straight, tapering finely to ends; inferior deeply bifid into two long branches, also bifid and slightly divaricate (Fig. B69).

7 *Megalogomphus ceylonicus*

7a Abdomen black marked with citron yellow: on sides and apical margin of 1; on 2 a trilobate mid-dorsal stripe and sides including auricles; on 3 a mid-dorsal stripe, yellow on sides restricted to basal third; 4 to 6 with mid-dorsal stripe only; basal half of 7; 8 and 9 with a baso-lateral spot; 10 unmarked. Superior anal appendages black, long and tapering, slightly convergent at apices; inferior black, deeply bifid, each nearly as long as superiors, robust spine on inner side of apex. Pterostigma black, strongly braced, covering 5 to 6 cells. Nodal index high. Rudimentary anal loop of 2 cells. Abdomen with appendages 47-48mm, hind wing 41mm.

*Megalogomphus ceylonicus*, male

7b Female. Abdomen black marked with greenish yellow: an irregular stripe on side of 1 to apical third of 3, continued on 4 to 6 as baso- lateral triangular spots; a mid-dorsal stripe, trilobate on 2 and 3, vestigial on 1, basal triangles on 4 to 6, largest on 4; basal two thirds and sides of 7; baso-lateral spots on 8 and 9 and a pair of sub-dorsal spots on 10. Thorax marked with greenish yellow. Other characters similar to those of male above. Abdomen 49mm, hind wing 46mm.

*Megalogomphus ceylonicus*, female

*Megalogomphus ceylonicus*. A rare species and known only from three specimens and a number of exuviae the more recent of which were taken in the upper reaches of the Kaluganga in the Ratnapura region from warm, fast flowing water. Fraser speaks of an exuviae in the Colombo Museum. Lieftinck writing of the larva of *M. icterops* says the eggs were laid in the shallow water along the edges of the stream where the current was swift and flowed over pebbles and gravel bars; a strong

burrowing ability enabling the larva to disappear in the sand when disturbed also permits it to live in fast running water; it is extremely rapacious ( Figs. B69, C28- 1- 8, 9).

References:- Laidlaw 1922: 412, 413, Fig. 21; 1924: 342; Fraser 1933d: 22-24, Fig. 1; 1934: 298-300; Lieftinck 1940: 113, 114; 1941: 236-240, Pl.10, Figs. 1-7; St. Quentin 1973: 119, Fig. 9. Fraser says type is in BMNH, but it is not listed in Kimmins 1966.

Synonymy:- *Heterogomphus ceylonicus* Laidlaw, 1922; *Megalogomphus ceylonicus* Laidlaw, 1930.

Distribution:- Haragama, (9e); Nalanda, (10f); Balangoda, (4m); Bodathpitiya Ela, Kaluganga, Ratnapura region, torrent coming from waterfall, (11l); Upper reaches of Kaluganga, Malwala, plantations, (11l).

## 8 The genus *Paragomphus*

Distinguished by the long curled anal appendages. Tornus angulated; primary antenodals the first and fifth; discoidal cells, hyper-and sub-trigones entire; only 2 transverse veins between sectors of arc between arc and bifurcation of Rs in forewings, 1 in hind; anal triangle 4-celled; anal loop absent, the first postanal cell extending to about middle of base of subtrigone; only 1 cubital vein in all wings; anal triangle 4-celled; 2 rows of postanal cells in forewings, 5 in hind; discoidal field with 2 rows of cells to level of node or slightly beyond. Male abdomen tumid at base, cylindrical from 3 to 7 and then dilated, especially at 8 and 9 which have broad foliate expansions.

## 8 *Paragomphus henryi*

8a Male: foliate expansions on segments 8 and 9 of abdomen; abdomen black marked with yellow; apically on 1, a mid dorsal spot and a large triangular spot on each side; an apical spot on each side of 2 extending basally to the oreillets and a clubbed stripe dorsally; a subdorsal basal spot on each side of 3 to 6, that on 3 extending apically; a long sub-dorsal spot on each side of 7; 8 and 9 unmarked, with well developed foliaceous expansions; on 10 a dull spot on each side and a bright dorsal apical spot. Head black and yellow; eyes bottle green. Prothorax black marked with yellow. Thorax black with bright yellow stripes. Legs black marked with yellow. Wings hyaline, tornus angulated; pterostigma black, centre ochre covering 4 cells; primary antenodals the first and fifth; discoidal cells, hyper-and subtrigones entire; anal triangle 4-celled; 2



transverse veins between sectors of arc from arc to bifurcation of Rs in forewings, 1 in hind; 2 rows of post-anal cells in forewings, 5 in hind; anal loop absent, the first post-anal cell extending to middle of base of sub-trigone; only 1 cubital vein in all wings. Anal appendages dark reddish brown, superiors longer than inferior, nearly twice length of 10, terminal halves curled down and closely apposed; inferior bifid almost from base, branches closely apposed. Abdomen 32–36mm hind wing 24–27mm (Fig. B70).

*Paragomphus henryi*, male.

- 8b Abdomen black marked with yellow and without the foliate expansions on 8 and 9 found in the male. Eyes bottle green. Wings sometimes enfumed palely, anal triangle 4-celled; pterostigma almost black, covering 5 to 6 cells, only 2 transverse veins between sectors of arc from arc to bifurcation of Rs in forewings, 1 in hind; 2 rows of postanal cells in forewings, 4 or 5 in hind; discoidal cells in forewings almost equilateral, distal side slightly longest, in hind elongated, distal side longer than costal, which is much longer than basal; IA in forewings pectinate; only 1 cubital vein in all wings. Anal appendages yellow. Abdomen 30–34mm; hind wing 26–28mm.

*Paragomphus henryi*, female

*Paragomphus henryi* has been described by Fraser as the commonest Gomphine to be found here and which can be seen over most streams in submontane areas, but Lieftinck did not see any adult specimens in September though he saw several teneral just emerged which flew away immediately when disturbed, taking to the trees. Breeds in streams and rivers; St. Quentin collected larvae in small cascades of fast running waters with stony bottoms (Figs. B70, C29, C30, C34–5).

References:- Laidlaw 1924: 340, 341, Fig. 1; Fraser 1933d: 33; 1934: 234, 235; Lieftinck 1940: 112, 113, Fig. 10, Pl. 1, Fig. 5; 1955: 84; 1971: 202; St. Quentin 1973: 120; Bedjanić, 1996. Cowley 1936: 509–526. Fraser says type in BMNH, but it is not listed in Kimmins 1966.

Synonymy:- *Mesogomphus lineatus*, Laidlaw, 1924; *Mesogomphus henryi* Laidlaw, 1928.

Distribution:- Stream nr. Citadel Hotel, Kandy, 700m, (11); Seetha-gangula 1km upstream of Dalhousie village, (11); Haldunmulla, (6m); Pasumale Dola and Campden Hill Dola, Deniyaya, (11/12 1); Thanipitiya Dola, Nilwala Ganga, (11/12 1); Belihuloya, nr RH, (11/12 1); Kiri-katu Oya from Horton Plains at World's End, (11/12 1).

9 The genus *Helilogomphus*

Abdomen black marked with greenish yellow, tumid at base, thin and cylindrical from 3 to 7, moderately dilated from end of 7 to 10. Superior anal appendages lyrate, forcipate, curled strongly, with a strong outer spine near base; branches of inferior widely divaricate and almost in line and projecting from below superiors. Tornus rather rounded; base of hind wing very oblique; 6 or 7 veins between sectors of arc from arc to bifurcation of Rs in forewing, 2-4 in hind; no incomplete basal antenodal vein; 1 row of postanal cells in forewings, 3-4 in hind; discoidal cell nearly equilateral in forewing, basal side shorter than costal and distal sides which are equal in the hind; discoidal cells and trigones entire; only 1 or 2 rows of cells between IA and margin of wing in forewing; 1 or 2 cubital veins in forewing, 1 in hind; hind wing with two veins from hind margin meeting anal vein directly; anal triangle 3-celled; anal loop absent. Pterostigma very short, covering 2 cells, swollen and unbraced. Head broad and zygopterous, like an *Euphaea* (Fig. B71).

- 9 There are four species of *Helilogomphus* in Sri Lanka, all peculiar to the island. The subkey below is a guide to their separation.

Subkey B (the previous subkey continues on page 119).

- a Postclypeus black with a transverse yellow stripe broken into three spots; occiput fringed behind with hairs and with minute spines; segment 7 with a broad basal annule; pterostigma long, broad and pale yellow.

Male unknown

*H. ceylonicus*, female, 9.1

- b without such characters

c

- c a large lateral spine on superior anal appendage *H. lyratus*, male, 9.2

- d labium with lateral lobes yellow, their tips black; occiput black, naked, with a narrow posterior sulcus and a transverse anterior ridge which does not have a ridge running back from its middle; costa black; pterostigma dark ochreous.

*H. lyratus*, female, 9.3

- e labium pale yellow, middle lobe bordered in brown; occiput yellow in its anterior third, black posteriorly, depressed, crest slightly elevated, fringed with short black hairs; costal border of wing finely yellow, pterostigma yellow; superior anal appendages white, tips brown. Female unknown.

*H. nietneri*, male, 9.4

- f labium with lateral lobes yellow tipped black, middle lobe black; labrum black with two large basal triangular spots; occiput black, naked, with a narrow transverse sulcus posteriorly, an anterior ridge and a short medial ridge with a depression on each side running straight back; costal borders black; pterostigma dark ochreous; anal appendages black, superiors lyriform and enclosing a foramen in their apical third (Fig. B72).

*H. walli*, both sexes, 9.5

9.1 *Heliogomphus ceylonicus*

Abdomen black marked with yellow (possibly teneral): fine mid-dorsal line on 1 to 6, broader basally on 6; 1 to 3 yellow on sides; 4 to 9 with small baso-lateral spots, larger spots on 7 which also has a broad basal ring. Frons black with yellow crest, occiput black, fringed with long hairs, (the other Sri Lankan species are naked), six spines near eyes and a tubercle behind. Eyes glossy black behind, with a spot of yellow centrally. Thorax black, marked with yellow as follows: an interrupted mesothoracic collar, narrow antehumeral stripes and small humeral spot; sides greenish yellow with two narrow black stripes on sutures. Wings hyaline. Pterostigma large, broad and pale yellow, and covering 3-4 cells, unbraced. Anal appendages black. Abdomen 41mm; hind wing 39mm.

Male not known.

*Heliogomphus ceylonicus*, female

*Heliogomphus ceylonicus*. Some information about the habits of this genus comes from St. Quentin who collected two larvae in November/December from fast running warm streams in the upper reaches of the Kalu ganga. Lieftinck obtained a specimen of the genus at the Labugama reservoir; it was immature and he could not determine the species. This species was described by Selys from a type female from Ramboda

which is in the Hagen collection. The female is very similar to the female of the Indian *H. promelas*. The male remains unknown (Fig. B71, C31).

References:-Laidlaw 1922: 398; 1924: 342; Fraser 1933d: 32, 33; 1934: 330, 331, Fig. 99; Bedjanić, 1996. Type in the Hagen collection.

Synonymy:- *Gomphus* ? *ceylonicus* Selys, 1878; *Aeshna ceylonica* Kirby, 1890; *Gomphus ceylonicus* Fraser; 1923 *Heliogomphus ceylonicus* Fraser, 1925.

Distribution:- Balangoda, (6m); Ramboda Pass (larvae of the genus from the upper reaches of the Kalu ganga -Malwala and Bodathpitiya Ela, (11/12).

## 9.2 *Heliogomphus lyratus*

Abdomen black marked with citron yellow, except on 8 to 10 which are unmarked; 1 with a small basal mid-dorsal spot and sides broadly; on 2 latero-basal spots and the oreillets, a pair of apical spots and a short mid-dorsal stripe; 3 to 7 with small baso-lateral spots; carina on 3 to 4 yellow. Superior anal appendages distinctive, black for the basal two thirds, then yellow tipped black, very broad at base at which arises a large outwardly projecting process after which the apical end curves in to nearly meet its partner; inferior shorter, black and bifid, the branches showing below the superiors. Occiput naked with a narrow posterior sulcus and a transverse anterior ridge, which has no ridge running back from its middle (cf *H. walli*). Pterostigma long, dark ochreous with a thick black border, covering 3-4 cells, unbraced. Costa black. 16 antenodals in forewing, 11-12 in hind; 14-15 postnodals in forewings, 13 in hind. Abdomen 34mm; hind wing 30mm (Figs. B72, 73).

*Heliogomphus lyratus*. male

- 9.3 Abdomen black with a greenish yellow mid-dorsal stripe on 1-7, triangular on 1, linear on the others and not reaching apical end of 5 to 7; a linear spot on sides of 1 to 8, very broad on 1 and 2 and base of 3, broken into a basal and an apical spot on 4 to 8, remaining segments unmarked. Occiput naked with a narrow posterior sulcus and a transverse anterior ridge, which has no ridge running back from its middle (cf, *H. walli*). Thorax black marked with greenish yellow or greenish white, beneath yellow. Wings palely enfumed, 2 cubital veins, rarely only 1 in forewings, only 1 in hind, pterostigma dark ochreous bordered with thick, black veins, covering 3-4 cells, unbraced.

Anal appendages yellow. Other characters as in the male.  
Abdomen 33mm; hind wing 30mm (Fig. B72).

*Heliogomphus lyratus*, female

*Heliogomphus lyratus*. Fraser who described this new species collected in Haldummulla in June, refers in his description of *H. nietneri* to finding a male in the Colombo Museum which he identified as belonging to his new species *lyratus*. In his description of this new species, he refers to a type male and holotype female in the Colombo Museum, recently traced as in that collection (Figs. B72, 73).

References:- Fraser 1993d: 32, 33, Figs. 4a, 5b; 1934: 333, 334, Fig. 102b.; Lieftinck 1971: 198.

Distribution:- Haldummulla, (6mf).

#### 9.4 *Heliogomphus nietneri*

Abdomen with large rounded auricles bearing minute black teeth; black marked with bright yellow: a dorsal triangular spot on 1; a bilobed dorsal spot on 2; carina finely marked on 3 to 7; larger basal spots on 6 and 7 sides of 1 and 2 yellow; 3 to 8 with baso-lateral spots; 8 and 9 with apico-lateral spots; 10 unmarked. Superior anal appendages white, tips brown. Labium pale yellow, middle lobe bordered brown; labrum glossy black with two bright citron yellow spots; frons black with a stripe across of greenish yellow; vertex black; occiput yellow in front, black behind, its crest slightly raised and fringed with short black hairs. Wings hyaline, costal border pale yellow, anal border of hind wing very oblique; 2 cubital veins in forewing, pterostigma yellow, narrow, not braced, covering 3 to 4 cells. Abdomen 35mm; hind wing 30mm (Fig. B73).

Female not known.

*Heliogomphus nietneri*, male

*Heliogomphus nietneri*. Known only from the type male from Ramboda in the Hagen collection, Museum of Comparative Zoology, Cambridge, Mass. Fraser refers to a specimen in the Colombo Museum labelled as *H. walli* which could be *H. nietneri*. The current Museum list includes a female of *H. walli* taken in May 1929 in Rakwana. This could not be the specimen

Fraser refers to, as he describes the anal appendages of a male specimen (Fig. B73).

References:- Fraser 1933d: 27-29, Fig. 4e; 1934: 326, 327, Fig. 100b. Type in the Hagen collection.

Distribution:- Ramboda.

#### 9.5 *Heliogomphus walli*

Abdomen black marked with citron yellow: sides and a small triangular mid-dorsal basal spot on 1; a latero-basal spot which includes the oreillets, a short mid-dorsal stripe and a latero-apical spot on each side of 2; triangular latero-basal spots on 3 to 8, largest on 8; latero-apical spots on 7 and 8; carina finely yellow from 3 to 7; 8 unmarked in the female. Male superior appendages black basally, then yellowish, broad at base the pair enclose a foramen and are lyriform; inferior black, branches project below superiors. Occiput naked, with a posterior sulcus, an anterior ridge and a short medial ridge running back from it with a depression on each side. Wings hyaline, 2 cubital veins in all wings, costal border black, pterostigma dark ochreous with thick black nervures, braced, covering 3-4 cells. sculpturing of occiput distinctive. Female anal appendages yellow; vulvar scales black, apex slightly bifid. Male abdomen 36mm, hind wing 31mm; female 38mm and 36mm respectively (Figs. B72, 73).

*Heliogomphus walli*, both sexes

*Heliogomphus walli*. Apart from recording that the three known specimens were collected from Nalanda, Balangoda and Rakwana, the literature says nothing about the habits or habitats of this species. A female from Rakwana is in the Museum collection; though Fraser says the holotype male (presumably that from Balangoda) is in that location there is no male there, while at the same time he says the type and the female from Nalanda is in his own collection.) (Figs. B72, 73).

References:- Fraser 1933d: 29-31, Figs. 4b, 5a; 1934: 331, 332, Fig. 102a. Holotype female in BMNH.

Distribution:- Morningside Estate, Rakwana, (5f); Balangoda, (4m); Nalanda, (9f).

—*Heliogomphus* sp.

Right tributary of Kaluganga 5km SE from Gallella, Ratnapura, (11).

Main key continued.

- 10 The genus *Macrogomphus*  
Segments 8 and 9 of abdomen very long, 10 very small and very short; frons strongly angulate; tornus strongly angulated; 5-6 transverse veins between sectors of arc in forewing from arc to bifurcation of Rs, 3-4 in hind; 2 rows of postanal cells in forewing, 4-5 in hind; basal incomplete antenodal present in all wings; 2 cubital veins in forewing, 1 in hind; 1A in forewing pectinate; costal and basal sides of discoidal cell in forewing equal, the distal slightly longer; distal slightly longer than costal which is much longer than basal in hind wing; anal triangle 3-celled; 2 rows of postanal cells in forewings, 4-5 in hind; anal loop absent, the first postanal cell not extending proximal to base of subtrigone; basal incomplete antenodal present in all wings; primary antenodals the first and fifth, sixth or seventh; discoidal cell, hyper- and sub-trigone entire; 2 cubital veins in forewings, 1 in hind; pterostigma very long, covering 5 cells, narrow and poorly braced. Superior anal appendages conical and acutely pointed with a long inner spine, strongly divaricate; inferior deeply bifid, its branches long, tapered and sinuous. Genitalia: anterior hamules short narrowly spatulate, posterior very broad and foliate, ending in a fine curled spine (Fig. B76).

- 10a *Macrogomphus lankanensis*  
Abdomen black, marked with citron yellow: a triangular apical mid-dorsal spot and a large triangular apical spot on each side of 1; on 2 a trilobate mid-dorsal stripe, a very large spot on each side which includes the auricles and small apical triangular lateral spots; 3 to 6 with large baso-lateral spots; 7 yellow basally with a small triangular baso-dorsal spot; 8 with a long sub-dorsal spot on each side; 9 and 10 unmarked: segments 8 and 9 very long, 8 very broad. Superior anal appendages creamy yellow, tip of inner branch black; inferior black. Wings hyaline, pterostigma blackish brown, braced, long, covering 5 cells. Abdomen 45mm, hind wing 33mm (Fig. B74).

Female not known.

*Macrogomphus lankanensis*, male

*Macrogomphus lankanensis*. Fraser says this species could be widely distributed in various parts of the island, having been

found in Murunkan in the dry zone and Haragama in the wet zone. Fraser who erected the new species in 1933 described the male from Murunkan, but relied on Laidlaw for a description of the female. The type male which was in the Colombo Museum, was said to be in the British Museum, but is not listed in Kimmmins 1966. The Colombo Museum has a type specimen from Murunkan with a damaged right wing in the current list (Figs. B74, 76c).

References:- Laidlaw 1924: 340; Fraser 1933d: 24, 25, Fig. 2c, d.; 1934: 349-351, Fig. 111.

Distribution:- Murunkan, (7m); Haragama, (7f, 8f).

10b *Macrogomphus annulatus keiseri*

Abdomen deep black, marked with bright greenish-orange; labium deep black, lateral lobes yellow; labrum black with two large greenish yellow spots; anteclypeus dark brown with a greyish spot; postclypeus deep black with a pair of greenish yellow spots joined by a fine line; frons black with a broad greenish-yellow band across, partly invaded medially by black; vertex and occiput black, the latter fringed with light brown hairs. Prothorax dull black, marked with yellow. Thorax deep black, marked with bright greenish yellow; beneath black. Pterostigma deep black, braced, covering 5 cells. Abdomen with appendages 52mm, hind wing 38mm (Figs. B75, 76).

Female not known.

*Macrogomphus annulatus keiseri* male

*Macrogomphus annulatus keiseri*. Described by Lieftinck from a single male taken at Weeragamtota in September, 1953; female unknown. He believes that this is "best considered a subspecies of the (Indian) *annulatus* which originated from the mainland comparatively recently and yet became isolated long enough to allow for its differentiation into an insular subspecies." (Figs. B75, 76, C32).

References:- Lieftinck 1955: 81-83, Fig. 4. The type is in Naturhistorisches Museum at Basle, Switzerland.

Distribution:- Weeragamtota, (9m); Haragama, (7f, 8f).



*Microgomphus wijeya*

Very small dragonflies. Abdomen black marked with green: segment 1 with a squarish spot dorsally in the middle, sides green; 2 black dorsally with a long green band pointed apically, sides including auricles green, black behind; 3 with a triangular basal mid-dorsal green spot, a similar spot on the side and another in the middle mid-dorsally; 4 to 6 with narrow basal rings, 4 with a linear spot over distal half of carina; 7 with a broad green ring with a triangular projection on each side; 8 and 9 mainly green and with minute mid-dorsal spots basally; 10 black. Head mainly black with parts green or greenish yellow. Eyes not described. Prothorax black with green markings. Thorax black marked with green and greenish yellow. Wings hyaline, slightly flavescent basally; tornus angulated; anal triangle 3-celled; pterostigma yellow with thick black nervures, covering 3-4 cells; antenodals 12-14 in forewings, 9 in hind, post-nodals 8 in both wings; arc opposite second antenodal; no incomplete basal antenodal; primary antenodals the first and fifth; 5-6 cross veins between sectors of arc from arc to bifurcation of Rs in forewings, 3-4 in hind; hind wing with two veins from hind margin meeting anal vein directly; anal triangle 3-celled; discoidal cells, hyper- and sub-trigones entire; only one row of postanal cells in forewings, 2-3 in hind; only one cubital vein in all wings; anal loop absent, the first postanal cell in hind wing extending only to middle of subtrigone. Superior anal appendages black, tips on outer side and sides of inner branches yellow, inferior short and blunt. Abdomen with appendages 25mm; hind wing 21mm. Figs. B77, 78).

Female very similar to male but with paler markings on abdomen: 1 and 2 green dorsally with a long green band on sides; 3 with a green mid-dorsal stripe and a long oval spot on sides; 4 to 6 with narrow green basal rings and mid-dorsal spots, 4 to 7 with a long green spot on the sides in the middle; 8 to 10 black, sides of 8 green basally. Anal appendages black. Abdomen 26mm; hind wing 23mm.

*Microgomphus wijaya*, both sexes

*Microgomphus wijeya*. Described by Lieftinck from 1 male and 3 females found emerging and taken with their exuviae in

September 1988 at Haragama in the bed of a small stream. The exuviae were attached to the upper surfaces of small rocks in the stream. The teneral specimens rose when they were disturbed to rest on trees overhanging the water from where they were taken easily. He collected 2 females from the same location in a later year in December. St. Quentin collected a couple of young larvae from the upper reaches of the Kalu ganga near Ratnapura in November/ December from rather large, deep and fast-running waters (Figs. B77, 78, C33, C34-4, C35).

References:- Lieftinck 1940: 98-104, Figs. 4-6; 1955: 83. The type should be in Leiden Museum.

Distribution:- Haragama, (12f).

## 12 The genus *Gomphidia*.

There is only one species in Sri Lanka and that known only from the male. Head triangular, frons angulated, occiput covered with short hairs. Wings with tornus strongly angulate; arc situated between second and third antenodals or opposite the third; 8 transverse veins between sectors of arc from arc to bifurcation of Rs in fore-wings, 4-6 in hind; 2 rows of postanal cells in forewings, 4-6 in hind; anal loop blending on the proximal side with the common wing venation; primary antenodals the first and the sixth or seventh; no basal incomplete antenodal; discoidal cell of forewing 3-4-celled, of hind wing 3-celled; subtrigone of forewing 2-celled, of hind entire; hind wing with two cells from hind margin separated by group of 2-4 cells from anal vein; anal triangle 5-celled; 3-4 cubital veins in forewing, 2 in hind. Abdomen tumid at base, then cylindrical to 7, terminal segments again dilated, but less than in *Ictinogomphus* and 8 without lateral foliate expansions. Superior anal appendages twice as long as 10, forcipate and blunt at apex; inferior very short and deeply bifid (Figs. B79, 81).

### 12a *Gomphidia pearsoni*

Abdomen black marked with citron yellow, except 9 and 10 which are unmarked. Eyes bottle green. Discoidal cells traversed, fore-wing with 4 cells, hind with 3; subtrigone of forewing 3-celled, of hind entire; hypertrigones traversed once; 3 cubital veins in forewing, 2 in hind; anal loop poorly

defined on proximal side; pterostigma black, braced, covering 5-7 cells. Eyes bottle green. Abdomen 60mm; hind wing 42mm.

This new species was earlier placed with *G. kodaguensis* from S. India, but is larger, the black background colour is more extensive, segment 10 is unmarked and the subtrigones of the forewings are 3-celled, not 2-celled.

Female not known.

*Gomphidia pearsoni*, male

*Gomphidia pearsoni*. Described by Fraser from two males, one from 5 miles above Belihuloya in May and the other from Bibile (Gal Oya) in July 1929. The type male was said to be in the Colombo Museum, and is in the Museum's current list, which also lists a male *G. kodaguensis* collected in March 1924, location not stated. The female is unknown. This species is closely related to the Indian *G. kodaguensis*, also known only from the male (Figs. B79, 80, C36).

References:- Fraser 1933d: 21, 22; 1934: 391, 392, Figs. 119a, 120.

Distribution:- (as *G. kodaguensis* ?, (4m) in Museum collection).

13 *Ictinogomphus rapax*

- 13a Male: foliate expansion only on segment 8 of abdomen, which is widely dilated; abdomen black marked with yellow; on 1 an apical dorsal stripe and narrow lateral stripe confluent with a large dorsal triangular spot and a broad lateral stripe on 2 which reaches to the oreillets; on 3 the basal half is yellow above and white below and beneath; 4 to 6 have large basal dorsal yellow areas which do not extend dorsally apically; 7 with the basal half and rather more on 8 yellow, carina and foliate expansions black; a lateral basal stripe and a lateral apical spot on 9; 10 either unmarked or with four basal and apical spots. Head black with parts yellow and occiput greenish yellow with short yellow hairs; eyes bluish grey. Prothorax black marked with yellow. Thorax black marked with yellow or greenish yellow stripes and spots. Wings hyaline, maybe slightly enfumed, tornus strongly angulated, arc situated between first and second antenodals; pterostigma black, covering 5-6 cells; discoidal cells traversed, 4-celled in forewing, of a different shape and 3-celled in hind; subtrigone

2-celled in forewing, 1-celled in hind; hyper-trigones traversed once or twice; membrane whitish; primary antenodals are first and seventh; 21–23 antenodals in forewings, 15–16 in hind; 12–13 postnodals in forewings, 13–14 in hind; 3 cubital cells in forewings, 2 in hind; 10–12 transverse nervures between sectors of arc from arc to bifurcation of arc in forewings, 6 in hind; anal triangle 5-celled; anal loop distinct and of 4–5 cells; hind wing with two veins from hind margin separated by group of 2–4 cells from anal vein; discoidal field starts with a row of 4 cells and continues with rows of 2. Legs black marked with yellow, hind femora with two rows of spines. Anal appendages black, superiors as long as 9+10, inferior much shorter. Abdomen with appendages 52mm; hind wing 40mm (Figs. B80, 81).

*Ictinogomphus rapax*, male

- 13b Female very similar to the male above except for lack of foliate expansions, 10 usually fully black. Occiput with a strong spine at its middle, sometimes bifid. Eyes bluish grey. Wings with a dark brown basal marking up to the first antenodal, pterostigma black, braced, covering 5–6 cells. Discoidal cells traversed, forewing with 4 cells, hind with 3; subtrigone of forewing 3-celled, of hind entire; hypertrigones traversed once or twice; 3 cubital veins in forewing, 2 in hind; anal loop distinct of 4 to 5 cells; Anal appendages black, short, conical; vulvar scales black with two processes which extend to base of 10. Abdomen 50mm; hind wing 42–44mm.

*Ictinogomphus rapax*, female

*Ictinogomphus rapax*. A fairly common insect over most tanks and paddy lands in the low country, breeding in both running and still water, preferring the latter. Females are rarely seen and then usually when they come to the water to mate, a process which lasts a minute or two, and which is followed by the female swiftly dipping her abdomen in the water. Males perch facing the water on twigs by the waterside, head pointing down and abdomen upwards, each male having its own preferred twig to which it returns if disturbed by some danger, a trespassing male or the arrival of a female. They are large insects, easily seen, but not so easily captured. The larvae are large, flat and rounded, their surface covered in hairs which collect mud and debris so that they merge into the bottom on

which they live. Eggs collected by Kumar from a ovipositing female hatched out in 14 days; after 13 instars emergence occurred in 234 days (Figs. B80, 81, C34-2, C42-45, C37).

**References:-** Kirby 1893: 558; Fraser 1933d: 20, 21; 1934: 373- 376, Figs. 118, 119b; Laidlaw 1924: 339; Kumar 1985: 29-38, Figs. 1-38. Type in the Serville collection.

**Synonymy:-** *Diastatoma rapax* Ramb, 1842.; *Ictinus vorax* Ramb, 1842.; *Ictinus rapax* Selys, 1854; *Ictinus praecox* Selys, 1854; *Ictinus mordax* Selys, 1857; *Ictinus rapax* race ? *mordax* Selys, 1873; *Ictinus rapax rapax* Fraser, 1923; *Ictinus rapax praecox* Fraser, 1923; *Ictinus rapax mordax* Fraser, 1923.

**Distribution:-** Kantalai, (7m, 10m); Wilpattu, (4m, 8m); Passara, (9l); Polonnaruwa, (3m); Kandy, (5m); Periyakulam, (11-); Haldummulla, (6-).

#### 14 The family *Aeshnidae*

Eyes broadly contiguous; base of hind wing in male more or less excavate, rarely rounded at tornus in both sexes; discoidal cell made up of 2-7 or rarely of numerous cells, elongated; subtrigone absent or vestigial; anal loop distinct; well formed anal triangle in male usually of 3 cells, absent in some genera; Rspl and Mspl present; abdomen as long as or more often longer than wings, tumid at base, often constricted at base, then cylindrical to end in male, tumid at base and tapering to end in female; a complete ovipositor in female, often with a pair of robust dentigerous plates (spines) formed from the 10th segment.

- |     |   |    |
|-----|---|----|
| 14a | Base of hind wing without a notch; tornus rounded in both sexes; anal triangle absent | 16 |
| 14b | Base of hind wing more or less deeply notched; anal triangle present                  | 15 |

#### 15a The genus *Gynacantha*

Coloured dull brown and green; eyes very broadly contiguous; base of hind wing more or less deeply notched; tornus of hind wing in male angulated; membrane much reduced, not extending to base of hind wing which is much narrower than broadest part of wing; pterostigma long and narrow, without any opaque cells beneath it; no incomplete basal antenodal vein; median (basal) space entire; anal triangle 3-celled; IRiii forked into two equal branches at or near the inner end of pterostigma; Riia without an abrupt curve towards and beneath the outer end of pterostigma; MA not fusing with Riv+v, but interrupted or forked at the same level; 4-6 rows

of cells between IRiii and Rspl; base of discoidal cell of forewing as far from level of arc as its own length; 6-10 cubital veins; dentigerous plate of female ending in two long curved divaricate spines; segment 3 markedly constricted; male anal appendages long and thin, superiors not prolonged at apex.

The Sri Lankan species have not been determined, though tentatively assigned to *G. hyalina* with pterostigma very pale brown and with reddish brown nervures; background colour brown with some reddish brown; very old specimens may be brighter: eyes dull purple changing to blue and olivaceous below; thorax brighter green; abdomen with some blue and green. It is quite difficult to distinguish from *G. subinterrupta*, a female of which is in the Colombo Museum. (determined by Fraser); pterostigma ochreous between dark brown nervures; abdomen without any green. The relative lengths of the anal appendages are different in the two species, the inferior being more than one third the length of the superiors in *hyalina* and less than one third in *subinterrupta*; the latter has some brownish yellow tinting at the base of the wings, absent in *hyalina*; the expanded portion of the female anal appendages extend right up to the apex in *hyalina* instead of tapering off near that point (Figs. B84-86).

*Gynacantha* sp. indet.

*Gynacantha*. Specimens of this genus come frequently to lights in houses. They are crepuscular by nature and appear at dusk. Females lay their eggs in damp soil bordering water and in the process damage their long anal appendages. Fraser (1936) says pairing takes place before the teneral condition has been lost and most specimens appear to be in this condition. During daylight adults appear to rest in scrub overhanging the water in which they breed. Though there has been no definite identification of the Sri Lankan species, the Colombo Museum has a female determined by Fraser as *G. subinterrupta*. Records are from the wet coastal regions (Figs. B84-86, C39).

References:- Kirby 1893: 558; Laidlaw 1924: 338; Lieftinck 1955: 84.; Fraser 1936: 94-115, Figs. 30-34. Type of *subinterrupta* in the Brussels Museum.

Distribution:- (as *G. subinterrupta*, det. Fraser in Museum collection without data).

#### 15b The genus *Anaciaeschna*

Base of hind wing more or less deeply notched; tornus of hind wing angulated in the male; anal triangle always present; IRiii

forked into equal branches proximal to the inner end of pterostigma; Riii making an abrupt curve towards and beneath outer end of pterostigma; MA fusing with Riv+v well before posterior border of wing; Rspl forked shortly after its origin, the posterior branch running parallel with Riv+v to posterior border of wing; superior anal appendages with apex prolonged and curled downwards abruptly.

*Anaciaeschna donaldi*

- 15b1 Head: base of labrum, face and front of frons turquoise-blue, vesicle and occiput black; eyes dark sky blue. Prothorax and thorax dark reddish-brown, with two broad blue stripes on each side, the anterior of which is bordered in black. Legs black. Wings hyaline palely enfumed yellow basally and with a blackish-brown spot on anterior half of anal triangle, which is made up of 3 cells; membrane black; pterostigma dark reddish-brown, braced; discoidal cell of forewing 6-celled, of hind 5-celled; hypertrigones traversed 3 times; anal loop 2 cells wide, of 9 or 10 cells. Abdomen dark reddish brown to black; segment 2 with a broad blue stripe on each side with short branches dorsalwards; 3 with a large triangular basal lateral blue spot; 4 to 7 with an obscure pale brown lateral spot at middle of segment; remaining segments unmarked. Anal appendages: superiors dark reddish-brown, black basally, apices ending in a curled spine pointing down and out; inferior reddish-brown, two-thirds length of superiors, long and narrow, ending in a blunt point (Fig. B89).

*Anaciaeschna donaldi* male

- 15b2 Differs from the male above in shape, colour and markings. Labium and labrum brown, the latter unmarked; face and frons olivaceous with blue clouding; above frons greenish-yellow with a broad blackish-brown T-shaped marking. Stripes on thorax apple-green. Wings evenly tinted amber-yellow, deepening to blackish-brown at bases; pterostigma dark ochreous in black nervures. Abdomen tumid at base and tapering gradually; segment 1 with an apical green stripe; 2 with a round spot on mid-dorsum at base, a triangular mid-dorsal apical spot and a broad lateral stripe, all apple green; 3 with a broad green lateral stripe, tapering apically; 4 to 7 with lateral spots as in the male, larger and green. Anal appendages very short, foliate, dark brown; ovipositor robust.

Note: There is a single female in the Colombo Museum which has been determined by Laidlaw as *Anaciaeschna martini* which is a northern species. This specimen was taken in Hakgala 5300' in April 1924.

*Anaciaeschna donaldi* female

*Anaciaeschna donaldi*. The only record of this species in Sri Lanka is of a female in the Colombo Museum taken in Hakgala, probably the Gardens in April 1924, determined by Laidlaw, (as *martini*). The species is not mentioned in any subsequent publication. Fraser (1936) says the species breeds in all the montane lakes in the South Indian hills. It is therefore not surprising that it has been found in Hakgala; one could expect it to be collected in the area again (Fig. B89).

References:- Fraser 1922: 698-702; 1936: 154, 155, Figs. 45, 46b. Lectotype and holotype in the BMNH.

Synonymy:- *Aeschna martini* Selys, 1897.; *Anaciaeschna martini* Fraser, 1924.

Distribution:- Hakgala, 5300m, det. Laidlaw, (4f).

- |     |   |    |
|-----|---|----|
| 16  | Segments 4 to 8 of abdomen with longitudinal supplementary ridges on the sides; superior anal appendages of male obtuse at apex; only 2 rows of cells between the origins of <i>Cu</i> <sub>ii</sub> and <i>1A</i> of hind wing.  |    |
| 16a | The genus <i>Anax</i>   | 17 |
| 16b | Segments 4 to 8 without such ridges; superior anal appendages acuminate at apex; 3 rows of cells between the origins of <i>Cu</i> <sub>ii</sub> and <i>1A</i> in hind wing.<br>The Genus <i>Hemianax</i>  | 16 |
| 16b | <i>Hemianax ephippiger</i><br>Abdomen bright ochreous marked with sky blue and reddish or blackish brown; 1 and base and sides of 2 pale olivaceous green or yellow, dorsum reddish brown and subdorsum of sky blue to jugal suture; sutures black; a subdorsal basal sky blue spot on 3, pearly white below this, rest olivaceous with a reddish brown stripe; 4 to 7 bright olivaceous yellow with a reddish brown dorsal stripe which is black apically; a blackish brown stripe on sides of 3 to 7, that on 7 joining the dorsal stripe on 8 and 9 to enclose a yellow lateral spot; 10 bright yellow and black. Abdomen tumid at base slightly constricted |    |



at 3, then cylindrical and of even width to end. Head: labium, labrum, face and occiput bright yellow, other parts black and olivaceous green; eyes olivaceous, paler below. Prothorax and thorax pale brown or olivaceous; beneath yellow. Wings hyaline or palely enfumed; a patch of amber yellow in the space bounded by MA, IA and the posterior border of the wing; tornus rounded in both sexes; pterostigma bright ochreous bordered with black, covering 3 cells; costal borders of wings bright yellow; no incomplete basal antenodal; discoidal cells very elongate and narrow, 5 cells in forewing, 4 in the hind; no supplemental veins to discoidal cell; hypertriangle traversed; subtriangle absent; anal loop of about 15 cells in 3 rows; IRiii not forked or only at apex of wing; Rspl and Mspl strongly curved with a sharp medial angulation unlike in *Anax*; Riii curves abruptly towards pterostigma near apex of wing.

In the female, in old specimens, the area outside the amber yellow of the wing is surrounded over the rest of the wing by bright reddish brown; otherwise the female is much like the male. Superior anal appendages dark reddish brown, lanceolate with a deep midrib; inferior yellow, upper surface studded with black spines. Female appendages dark reddish brown, ovipositor small; dentigerous plates covered in fine short spines. Male abdomen 42mm, hind wing 44mm; female 40mm and 46mm respectively (Fig. B83).

*Hemianax ephippiger*, both sexes

*Hemianax ephippiger*. A very common species in India, ranging to the Mediterranean, but not reported from Sri Lanka since been mentioned by Kirby from Hot Wells, Trincomalee (January). Breeds in shallow tanks and marshes. The larva has been described by Marmels (Fig. C69).

References:- Kirby 1893: 558; Fraser 1936: 146-149; Marmels 1975: 259-263, Figs. 1-9. Type in the Museum of Comparative Zoology, Mass.

Synonymy:- *Anax* (*Hemianax*) *ephippiger* Laidlaw, 1924.

Distribution:- Hot Wells, Trincomalee, (1-).

17 The genus *Anax* with three species in Sri Lanka.

Very large dragonflies with very large globular heads. Wings: tornus rounded in both sexes; discoidal cell very narrow and

elongate, usually of 6 cells in forewings, 5 in the hind; subtriangle absent; no incomplete basal antenodal vein; no anal triangle; anal loop of 10–12 cells in 3 or 4 rows; *IRiii* not forked or hardly so; *Rspl* and *Mspl* very strongly curved; 4–7 cubital veins in all wings; basal space entire; hypertrigones traversed in all wings; *Riii* making an abrupt curve towards pterostigma near apex of wing. Abdomen tumid at base, may be slightly constricted at 3, then cylindrical or slightly flattened to end; lateral ridges on 4 to 8; oreillets lacking. Anal appendages: superiors very constant, apices blunt with a small spine on the outer side and a very strong ridge on upper surfaces, apical areas coated with long hairs; inferior shorter; ovipositor small, dentigerous plates coated with fine short spines.

*Anax immaculifrons*

- 18a Head bluish green and blue with black and blackish brown markings; eyes sapphire blue with a black border behind. Prothorax dark reddish brown, posterior lobe with thick fringe of long hairs; thorax turquoise-blue on sides, marked with black, dorsum pale bluish green. Wings hyaline, tinted amber yellow from apex to base of discoidal cell, paler at apex, deeper towards base; pterostigma ochreous to reddish brown, covering about 3 cells; anal loop of 12 cells. Abdomen black marked with turquoise-blue, dirty blue and pale reddish brown, segment 1 black. Anal appendages reddish brown or ochreous. Abdomen 52–55mm, hind wing 55mm (Figs. B82, 83).

*Anax immaculifrons*, male

- 18b Thorax pale greenish-yellow on side; marked with black; dorsum pale brown; wings only palely tinted if at all; abdomen black marked with pale greenish yellow, black often edged in reddish brown; segment 1 warm reddish-brown. Anal appendages black-ish brown. Abdomen 56mm, hind wing 58–60mm.

*Anax immaculifrons*, female

*Anax immaculifrons*. Reported from the montane and submontane regions, breeding in rivers and streams (Sangal & Kumar). St. Quentin collected larvae from such in November/December, though Lieftinck collected his

specimens from a weedy lake in Nuwara Eliya (adult male) and a tank in Passara (female and its exuviae), both in September and another female in Kandy in January. Laidlaw obtained a male in Hakgala in August and a female in Kandy in September. The larvae cling to weeds and climb on to adjacent large stones for emergence. Fraser (1936) says the larvae can be seen in large numbers in the sluggish brooks on the patnas of Sri Lanka, the eggs are inserted into the stems of reeds, the female sometimes submerging itself completely in the process of oviposition. He has seen a piece of reed fully covered with the eggs of this species deposited by more than one female. In India the larvae overwinter to emerge in summer after about 7–8 months of larval life. Kumar collected a few eggs from a submerged leaf in which a female was observed ovipositing (April). Hatching occurred two weeks later and after 13 instars a male emerged, having taken 132 days from date of oviposition to emergence (Figs. B82, 83, C38, C68).

**References:-** Laidlaw 1924: 338; Fraser 1936: 145, 146, Figs. 42, 44a; Lieftinck 1940: 114–116, Fig. 11; 1971: 202; St. Quentin 1973: 120; Sangal & Kumar 1970: 310–313, Figs. 15–28; Kumar 1976: 37–47, 1984: 127–133, Figs. 1–35; Bedjaniç, 1996. Type in Brussels Museum.

**Distribution:-** Right tributary of Seetha-gangula 1km downstream of Dalhousie village, (11); tributary of Walawe 500m SE of Embilipitiya, (1ex); Hakgala, (4m, 8m, 11m); Kandy, (1f, 9f); Nuwara Eliya, (9m); Passara, (9f); Pasumala Dola, Gin Ganga, Deniyaya, torrent and pools, (12l); Mocha Dola, Adam's Peak Estate, Maskeliya and foot of Adam's Peak, torrents, (12l).

19 *Anax guttata*

- 19a Head mainly golden yellow or bright greenish yellow; occiput bright yellow, black behind; eyes blue or sap green. Prothorax reddish brown bordered with yellow. Thorax pale green or bluish-green or pale brown; without broad black markings, sutures beneath reddish brown. Wings hyaline, a large amber yellow patch on hind wing from discoidal cell to a little beyond node and between posterior border and bridge, costal border yellow. Abdomen constricted at 3 and then expanded to 9; with orange or chestnut coloured markings in addition to blue and white, segment 1 pale green, base narrowly reddish brown as well as suture between it and 2; dorsum coated with long grey hairs; anal appendages reddish brown. Abdomen 56–62mm, hind wing 46–50mm (Fig. B83, 87).

*Anax guttata*, male

- 19b Abdomen tumid, not constricted at 3, but tapered uniformly from 2 to end; wings without amber patch of male or only a paler patch; eyes pale green; face and frons yellowish, frons with a fine black line. Segment 1 reddish buff; small area of dorsum of 2 is blue, sides silvery white, ground colour brown rather than black; 10 almost fully yellow or with only a minute spot of reddish brown; anal appendages brown; other characters as in male above. Abdomen 56–58mm, hind wing 52–54mm.

*Anax guttata*, female

*Anax guttatus*. A species of the plains and submontane regions, breeding in still weedy water around which the adult males hunt, hardly ever leaving the neighbourhood of water. Females are rarely seen, probably arriving at or shortly after dusk to oviposit (Fraser, 1924). In India (Kumar, 1976) oviposition is in July/August and emergence in September/November; still sexually immature they leave the larval habitat to return in June/July when the monsoon rains have filled ponds and tanks around which the adults congregate for very vigorous ovipositing; because of the short period, 2 to 3 months during which bodies of water remain suitable, larval development must be very rapid. Reported here from Trincomalee and the Pearl Banks off Mannar, Kandy, Passara, Dambulla, Peradeniya (from May to December) all males and Passara, Kandy and Galagedara (September, December and January) females; no larvae. There is no other information about the habits of this species in Sri Lanka (Figs. B83, 87, C67).

References:- Kirby 1893: 558; Fraser 1936: 140–142, Fig. 43c; Laidlaw 1924: 338; Sangal & Kumar 1970: 305–310, Figs. 1–14, 28. Type in the Museum of Comparative Zoology, Mass.

Synonymy:- *Anax guttatus* Hagen, 1867; *Anax goliathus* Fraser, 1922.

Distribution:- Pearl Banks- at sea, (10m); Kandy, (5m, 12f); Dambulla, (6m); Peradeniya, (12, m, at lights); Galagedara, (1f); Trinco, (11); Passara, (9-); Kosgoda Turtle Hatchery, (12m).

## 20 *Anax indicus*

A rather fuller description of *Anax indicus* is given below as it has been separated as a species from *A. guttatus* by Lieftinck mainly on the basis of the abdominal markings. No complete description of the female is available, but the following from

Lieftinck is useful:- "Both sexes of *indicus* are readily distinguished from *guttatus* by the absence of a dark spot adjacent to the membranule of the hind wing, by the different colour and fusion of the post-jugal, light marks on the posterior abdominal segments and also by the anal appendages which are shaped quite differently, those of the female of *indicus* being decidedly more elongate and more tapered apically."

- 20a Thorax leaf green. Abdomen with segment 1 and an anterior triangular area on dorsum of 2 green; lateral region and posterior part of dorsum of 2 and prejugal dorsal spots of 3 blue; two pairs of postjugal spots on 3 yellow or orange; prejugal sides of 3 shiny white; remainder of abdomen purplish black dorsally with all pale markings bright orange to yellow; 4 to 8 each with a pair of prejugal spots bluish-yellow or orange, almost obsolete on 8 and two pairs of rounded postjugal orange spots, which on 7 and 8 coalesce to form a continuous orange band; 9 and 10 each with a pair of large orange-yellow spots, triangular with the apex directed forward on 9, rounded on 10, which sometimes is fully yellow except for a narrow reddish brown ring. Male abdomen with appendages 51+6mm; hind wing 50mm.

*Anax indicus*, both sexes

*Anax indicus*. This species was erected by Lieftinck as distinct from *guttatus* in 1942. He obtained an adult male in Elephant Pass in January 1954. Two other specimens from Sri Lanka are in the British Museum, a female from Trincomalee (November), and a male without any details. No other information is available and no other specimens have been recorded.

References:- Lieftinck 1942: 589, 540; 1955: 84-86.

Distribution:- Elephant Pass, (1m).

21 The family *Corduliidae*

21a The genus *Epophthalmia*

*Epophthalmia vittata cyanocephala*

Very large insects coloured ochreous, reddish brown or blackish with dark green cupreous or metallic reflex. Head very large; eyes globular; upper surface of frons deeply

notched. Prothorax very small and completely hidden by the head; thorax very large; all tibiae in males with membranous keels. Apices of wings pointed, pterostigma very short; base of hind wing expanded and with a short notch above the basal angle; the proximal postnodal veins all continuous with the veins below in the space between *Ri* and *Rii*; discoidal cells traversed once, hyper- and subtrigones traversed at least once; sectors of arc fused shortly in forewing, longer in hind; 4 cubital veins in forewing, 2 or 3 in hind; *Riv+v* and *MA* markedly undulated in both wings, the ends turned down very abruptly; anal triangle 2-celled. Frons and vesicle dark metallic blue; eyes bluish green occiput black. Thorax very dark reddish brown to black with a bluish green metallic reflex on dorsum and sides and marked with citron yellow. Legs black, femurs reddish brown. Wings hyaline, apices slightly enfumed, tornal angle of hind wing bright amber, pterostigma dark blackish brown, membrane very large. Abdomen black with yellow rings, 9 and 10 dark reddish brown. Male anal appendages pale ochreous to reddish brown. Female with an amber tint in costal, subcostal and cubital spaces, much darker rays in the two former spaces extending outwards; anal appendages short, yellow, vulvar scale deeply bifid. Male abdomen 52–58mm, hind wing 50–52mm; female 55mm and 50mm respectively (Figs. B88, 90).

*Epopththalmia vittata cyanocephala*, both sexes

*Epopththalmia vittata cyanocephala*. This subspecies is peculiar to Sri Lanka. It has been recorded from a number of locations ranging from Tamblagam Bay, Polonnaruwa and Colombo to Peradeniya and Hakgala Gardens. Its flight is swift and often soaring. Breeds in weedy running water. The description of the larva of *E. vittata vittata* by Liefstinck has been included here (Figs. B88, 90, C40).

References:- Kirby 1893: 557; Laidlaw 1924: 342, 343; Liefstinck 1937: 58–61, Fig. 6; 1940, 1955: 80; Fraser 1919: 459, 460, Pl.xcxi, Fig. 1, Pl.xcxi, Fig. 2; 1936: 196, 197; Bedjanić, 1996. Type in the Museum of Comparative Zoology, Mass.

Synonymy:- *Epopththalmia cyanocephala* Hagen, 1867; *Azuma cyanocephala* Laidlaw, 1924.

Distribution:- Water tank 700m SE of Abhayagiri Dagoba, A'pura, 100m, (1ex); Peradeniya, (9-); Hakgala Gardens, (9, flying high); Polonnaruwa, (7f); Kandy, (5m, 9f); Tamblagam, (10-); Colombo, (-); Ramboda, (-).

22 The genus *Macromia*

Very large insects coloured dark metallic green or blue marked with bright citron yellow. Prothorax small, thorax large; some or all the tibiae of males with membranous keels; apices of wings pointed; pterostigma very short; the proximal or first two proximal postnodal veins in all wings not continuous with veins below in space between *Ri* and *Rii*; discoidal cell entire in Sri Lankan species; subtrigone in forewing entire, hypertrigones traversed once; sectors of arc shortly fused at origin in forewing, longer fusion in hind; 2 or 3 cubital veins in all wings; *Riv+v* and *MA* markedly angulated; membrane well developed (Fig. B91).

22a *Macromia flinti*

Known from a single male taken at Uggalkaltota, Ratnapura District (500 feet) in October, 1970. Holotype in USNM, Washington. As there do not appear to be any subsequent captures, a full description taken from Lieftinck, (1977) follows. This should be useful for comparison with the second Sri Lankan species of the genus, *M. zeylanica* also described on a single male and rather similar, which Lieftinck says "is a smaller insect whose sexual organs and wing venation (especially that of the hind wing base) are of a more generalised type" (Fig. B92).

Labium dark brownish black, median lobe bright chrome, with a median streak of dark brown, lateral lobes also bright chrome but sides, anterior border and inner margins deep black and surfaces covered in short black setae; labrum deep black with irregular yellow stripe; mandibles black with spot of chrome; anteclypeus brownish black; postclypeus bright chrome, slightly indented medially by black, surface shiny, deeply pitted in the middle line with short black setae laterally. Frons dark metallic bluish green, vertex dark metallic blue-black, occiput black. Prothorax dull brown. Thorax brilliant metallic green, markings well defined in chrome yellow on almost the whole mesinfraepisternum, a trace of an antehumeral stripe, the antealar triangles, a broad metepisternal band, another broad band on the posterior of the metepimeron; the space behind remains uncoloured, ventrally dark brown. Legs long and slender, tibial keels, missing from middle pair, black. Wings hyaline, long, narrow

and pointed, veins black, membrane hyaline, extreme bases yellowish; first two proximal postnodals continue into space between R and M1, but not exactly so; hypertrigones with 4 cross veins in forewings, 3 in hind; nodal index 7.19.18.7/11.13.12.11; 5-6 cubital veins in forewing, 4 in hind; anal loop of 9-11 cells; discoidal field in forewing with 2 rows up to 3-4 cells before level of nodus, in hind wing with only 2-3 undivided basal cells; pterostigma deep black, covering 2 cells, its proximal side parallel to preceding cross vein, the distal side distinctly oblique; membranula grey.

Lieftinck's detailed description of the abdomen follows for comparison with *M. zeylanica*:-

"Abdomen slender; basal and terminal segments much expanded in dorso-ventral, but much less so in lateral dimension, the apical segments broadest at end of segment 7. Ventral ridges at base of tergite 2 with brush of closely set, short bristles. Median carinae, from about midway segment 6 as far as end of 9 progressively more sharply pronounced and pinched towards apex, these carinae on 7 to 9 ending in a swollen tubercle, which on 9 is most conspicuous, projecting a little beyond hind margin of tergite. Segment 10 even more strongly pinched dorsally, armed with a long robust spine. Colour deep black, only the basal segments 1 to 3 rather shiny but lacking metallic green lustre, except sides of 3 basally with very low bronzy reflections. Markings well defined, orange-chrome, as follows:- a pair of small transverse, mid-dorsal triangular spots placed just in front of the jugal suture on 2, these triangles only narrowly divided by black in the median line, with their apices pointing laterad; same segment moreover, with a conspicuous elongate band, broadest basally, covering lower half of sides from base to apex but slightly indented by the transverse auricular ridge, which remains black; 3 with pair of trapezoidal mid-dorsal spots just in front of the jugal suture, the same tergite marked on either side at its extreme base with a narrow transverse stripe that broadens abruptly laterally to form a thick stripe alongside the segment as far back as the jugal suture, both ends of this hooked marking tapering to a point; 4 to 5 each with pair of middorsal spots similar to those on 3 but oval and smaller, those of 5 being circular, of minute size and more widely separated in the



median line; 6 unmarked. Basal two-fifths of 7 orange roundabout the tergite and broadly attached to base of segment; laterally this ring leaves off at the jugal suture but dorsally is produced posteriorly to form a transverse offshoot indented at its base by the black jugal ridge. 8 to 10 black, only the basal two-fifths or a little more of the ventral faces of tergite 8 being yellow on either side. Genital organs black, the slender hamules smooth and shiny, apex abruptly hooked and finely pointed, though not twisted; lobus posterior markedly hollowed out externally between thick swollen ridges, clothed densely with raised, deep black hairs." (Fig. B92). Abdomen 47.5mm, hind wing 42mm.

*Macromia flinti*, male

*Macromia flinti*. This species, peculiar to Sri Lanka was described by Lieftinck (1977) who erected the species on a single male collected in October 1970 at Uggalkaltota (500 ft.) in Ratnapura district; the species has not been recorded since. The female is unknown. There is no record of the habitat from which this male was taken (Figs. B91, 92).

References:- Lieftinck 1977: 175-179, Figs. 12-14. Type should be in Lieftinck's collection.

Distribution:- Uggalkaltota, Ratnapura district, 500' (10m).

### 23 \* *Macromia zeylanica*

Described from a single male taken in Kandy in September. Female not known. Type in the British Museum (Nat.Hist). Labium yellow, middle lobe bordered black; anteclypeus black; postclypeus citron yellow; frons steely black with yellow spots against the eyes and the sulcus on each side. Eyes green, black behind; occiput black. Prothorax blackish brown; thorax metallic bluish green with citron yellow markings on antealar sinus, a narrow antehumeral stripe, a narrow lateral stripe on mesepimeron and another on posterior border of metepimeron. Legs black; anterior trochanters yellow. Wings hyaline, palely enfumed, pterostigma black, membrane white; anal loop 4-celled; hypertrigones traversed 4 times in forewings, once in hind; 4 cubital veins in forewings, 3 in hind; nodal index 5.14.15.5/9.9. 10.10, 2 rows of cells in discoidal field. Abdomen black marked with citron yellow:- a mid-dorsal spot on 2 reaching the basal side of the jugum and extending

basally as two spots, and a baso-lateral spot; a large baso-lateral spot on 3 on each side and paired mid-dorsal spots on the basal side of the jugum; similar dorsal spots on 4 to 6 becoming smaller from 4 till almost absent on 6; a narrow sub-basal ring on 7; a narrow mid-dorsal basal spot on 8 separated from a large baso-lateral; 9 and 10 unmarked, 10 strongly carinated and with a robust apical spine. Anal appendages black, superiors tapering to a point, and outer border slightly convex with a robust spine nearer apex than base followed by a row of minute teeth; inferior paler, its apex turning up slightly to overlap the apices of superiors (Figs. 39, 40).

Fraser (1936a) says this species is very close to the Indian *M. cingulata* the female of which closely resembles its male, but 9 alone is unmarked, wings marked in amber in teneralis, anal appendages black. This is a riverine species hawking over clear water flowing over gravel. Lieftinck (1977) says this species can be recognised by the conspicuous clear yellow postclypeus and similarly coloured dorsal and lateral spots on the frons, in combination with the presence of antehumeral bands and baso-dorsal as well as latero-ventral marks on the 8th abdominal tergite. He also points out that the strongly carinate 10th segment ends in a bluntly triangular boss and not in a "robust spine" as described by Fraser -a patent warning on the subjectivity of descriptions (Fig. B93).

*Macromia zeylanica*, male

*Macromia zeylanica*. This species also peculiar to Sri Lanka was erected by Fraser (1927) on a single male from Kandy. Since then more males have been collected from Gampola and Ratnapura, but the female remains unknown. Larvae have been collected in November/December from Nilwala Ganga, (Deniyaya), Belihuloya and Kuda Oya nr. Buttala, all from the banks of little fast running streams. Lieftinck (1940) who saw a male flying rapidly over the pebbles alongside a stream near Haragama (September) collected several exuviae that were attached to the wall of a stone bridge near Mailapitiya (Haragama) and has described the exuviae. While Fraser infers from the spider-like appearance with long legs that larvae of this genus are all to be found clinging to weeds (in fast running water), Lieftinck believes this species, because of its colouring,

extremely flattened body and strong legs with strong claws, belongs to a group of the genus whose larvae anchor themselves on sandy bottoms in fast running streams (Fig. B93, C34-1, C41, C46).

**References:-** Fraser 1927: 69, 70; 1936: 182, 183; Lieftinck 1940: 93-96, Fig. 3, Pl.1, Fig. 1); St.Quentin 1973: 121, 122. Type in BMNH.

**Distribution:-**Galgede-Oya, Gampola, 1600', (4m); Uggalkaltota, Ratnapura Dt, 500', (10m); Haragama (9m); Urugala(-); Mailapitiya, (9l); Thanipita Dola, Nilwala Ganga, Deniyaya, torrent, sandy ground, (11/12l); Belihuloya, on sandy ground, (11/12l); Kudaoya, Menikganga, nr Buttala, (11/12l).

**Note:-**Fraser (1936) has mentioned the possibility that *Hemicordulia asiatica*, though not reported from Sri Lanka came to India via the island, establishing itself in the Nuwara Eliya lake. The male has the lower part of the frons and its sides bright yellow, changing to bright orange above and then to brilliant metallic emerald green. Eyes emerald green. Thorax dark metallic green marked with yellow. Wings hyaline in male, apices enfumed in the female. Abdomen black with a metallic dark green reflex on dorsum and marked on the sides with bright ochreous. Anal appendages black; superiors as long as 9+10, large, eyes globular, upper surface of frons deeply notched.

## Key to the Libellulidae

The females of the following species have lateral expansions to segment 8 of the abdomen, and in one case to segment 9. The location of each in this key is given in brackets after the name: *Potamarcha congener* (33); *Cratilla lineata calverti* (25); *Hylaeothemis fruhstorferi* (22b); *Lathrecista asiatica asiatica* (26b); *Orthetrum chrysis* (27b); *Orthetrum pruinolum neglectum* (30b).

Adult males of the following species are pruinose some shade of blue, more pronounced and more extensive in old males. Again the location of each in this key is given in brackets after the name. *Diplacodes nebulosa* (38a); *Orthetrum pruinolum neglectum* (30a, purplish-red); *Lathrecista asiatica asiatica* (26a, thick bluish-white); *Orthetrum glaucum* (28a, thorax dark blue or black, abdomen pale dirty blue); *Trithemis festiva* (48a); *Brachydiplax sobrina* (24); *Potamarcha congener* (33, dark violaceous or blackish-blue); *Diplacodes trivialis* (37); *Orthetrum luzonicum* (29a, sky-blue); *Orthetrum triangulare triangulare* (32a, sky-blue); *Trithemis aurora* (47a, violaceous); *Indothemis carnatica* (40a, dark violaceous). Very old females of *Orthetrum glaucum* (28b, may have the basal segments of the abdomen pruinose dorsally).

- |    |   |     |
|----|---|-----|
| 1. | Abdomen fully black                         | 2   |
|    | Abdomen not so                              | 3   |
| 2. | Abdomen fully black                         |     |
|    | <i>Rhyothemis variegata</i> , both sexes    | 54  |
|    | <i>Rhyothemis triangularis</i> , both sexes | 53  |
|    | <i>Indothemis limbata sita</i> , male       | 41a |
|    | <i>Diplacodes nebulosa</i> , male           | 38a |
| 3. | Abdomen fully red                           | 4   |
| 4. | Abdomen not so                              | 5   |
| 4. | Abdomen fully red                           |     |
|    | <i>Orthetrum chrysis</i> , male             | 27a |
|    | <i>Orthetrum pruinolum neglectum</i> , male | 30a |
|    | <i>Rhodothemis rufa</i> , male              | 45a |
|    | <i>Aethriamanta brevipennis</i> , male      | 61a |

5.	Abdomen shade of bright red with various black markings	6
	Abdomen not so	7
6.	Abdomen a shade of bright red with various black markings	
	<i>Crocothemis servilia servilia</i> , male	37a
	<i>Trithemis kirbyi kirbyi</i> , male	49a
	<i>Urothemis signata signata</i> , male	63a
	<i>Sympetrum fonscolombei</i> , male	46a
	<i>Tramea limbata</i> , both sexes	58
	<i>Tholymis tillarga</i> , male	59a
	<i>Neurothemis fulvia</i> , males and isochrome females	42a
7.	Abdomen with some shade of red and with other coloured markings	8
	Abdomen not so	9
8.	Abdomen some shade of red with other coloured markings	
	<i>Lathrecista asiatica asiatica</i> , male	26a
	<i>Tramea basilaris burmeisteri</i> , male	57a
	<i>Pantala flavescens</i> , male	56a
	<i>Macrodiplax cora</i> , male	62a
	<i>Neurothemis intermedia intermedia</i> , both sexes.	43
	<i>Zyxomma petiolatum</i> , both sexes	60
	<i>Orthetrum glaucum</i> , female and subadult male.	28b
	<i>Brachythemis contaminata</i> , male	35a
	<i>Trithemis kirbyi kirbyi</i> , female	49b
9a	Abdomen marked distinctive cryptic black and yellow Male abdomen 19mm, hind wing 22mm: female 19mm and 23mm respect (Fig. B104).	
	<i>Bradinopyga geminata</i> , both sexes	36
9b.	Abdomen greenish yellow marked with black; segments 1-3 distinctively swollen dorso-ventrally and laterally; 4-6 cylindrical and very thin; 7-9 dilated, but compressed laterally; 10 very small; eyes greenish. Male abdomen 33mm, hind wing 33mm: female 32mm and 32mm respect (Fig. B100f).	
	<i>Orthetrum sabina sabina</i> , both sexes	31
9c.	Abdomen black with markings or pruinescence of blue	10

9d	Abdomen black and yellow or ochreous	11
9e	Abdomen black and greenish-yellow	12
9f	Abdomen black with markings of other colours	13
9g	Abdomen not as any of the above	14
10	Abdomen black with markings or pruinescence of blue	
	<i>Hylaeothemis fruhstorferi</i> , male	22a
	<i>Trithemis festiva</i> , male	48a
	<i>Orthetrum glaucum</i> , male.	28a
11	Abdomen black and yellow or ochreous	
	<i>Tetrathemis yerburyi</i> , both sexes	23
	<i>Brachydiplax sobrina</i> , both sexes	24
	<i>Diplacodes nebulosa</i> , subadult and teneral males	38b
	<i>Diplacodes nebulosa</i> , female	38c
	<i>Trithemis pallidinervis</i> , both sexes	50
	<i>Zygonyx iris ceylonicus</i> , both sexes	64
	<i>Indothemis limbata sita</i> , female	41b
	<i>Cratilla lineata calverti</i> , both sexes	25
	<i>Potamarcha congener</i> , both sexes	33
	<i>Onychothemis tonkinensis ceylanica</i> , both sexes	51
12	Abdomen black and greenish-yellow	
	<i>Hylaeothemis fruhstorferi</i> , females and teneral and subadult males	22b
	<i>Diplacodes trivialis</i> , both sexes	39
	<i>Orthetrum luzonicum</i> , female	29b
	<i>Tramea basilaris burmeisteri</i> , female	57b
	<i>Urothemis signata signata</i> , female	63b
	<i>Orthetrum triangulare triangulare</i> , female	32b
13	Abdomen black with markings of other colours	
	<i>Neurothemis tullia tullia</i> , male	44a
14	Abdomen yellow marked with black	15
—	Abdomen olivaceous-brown marked with black	16
—	Abdomen golden-yellow, golden-olivaceous or greenish-yellow marked with black	17
—	Abdomen ochreous marked with black	18
—	Abdomen olivaceous to reddish-ochreous marked with black	19
—	Abdomen, sides of basal segments yellow, rest pruinose blue	20
—	Abdomen sky-blue marked with black	21

—	Abdomen violaceous, segments 9 and 10 marked with black	22
—	Abdomen dark violaceous or blackish-brown with obscure yellow markings	23
15	<b>Abdomen yellow marked with black</b>	
	<i>Neurothemis tullia tullia</i> , female	44b
	<i>Trithemis festiva</i> , females and teneral males	48b
16	<b>Abdomen olivaceous-brown marked with black</b>	
	<i>Lathrecista asiatica asiatica</i> , female	26b
	<i>Tholymis tillarga</i> , female	59b
	<i>Brachythemis contaminata</i> , female	35b
17	<b>Abdomen golden-yellow, golden-olivaceous or greenish-yellow marked with black</b>	
	<i>Aethriamanta brevipennis</i> , female	61b
	<i>Indothemis carnatica</i> , female	40b
	<i>Acisoma panorpoides panorpoides</i> , juvenile females	34b
18	<b>Abdomen ochreous marked with black</b>	
	<i>Orthetrum chrysis</i> , female	27b
	<i>Palpopleura sexmaculata sexmaculata</i> , subadults and females	52b
	<i>Pantala flavescens</i> , female	56b
	<i>Macrodiplax cora</i> , female	62b
	<i>Rhodothemis rufa</i> , female	45b
	<i>Crocothemis servilia servilia</i> , female	37b
	<i>Sympetrum fonscolmei</i> , female	46b
	<i>Orthetrum pruinatum neglectum</i> , female	30b
	<i>Neurothemis fulvia</i> , heterochrome female	42b
	<i>Trithemis aurora</i> , female	47c
	<i>Trithemis aurora</i> , teneral male	47b
19	<b>Abdomen olivaceous to reddish-ochreous marked with black</b>	
	<i>Hydrobasileus croceus</i> , both sexes	55
20	<b>Abdomen, sides of basal segments yellow, rest pruinose blue</b>	
	<i>Orthetrum luzonicum</i> , male	29a
	<i>Palpopleura sexmaculata sexmaculata</i> , male	52a
	<i>Orthetrum triangulare triangulare</i> , male	32a
21	<b>Abdomen sky-blue marked with black</b>	
	<i>Acisoma panorpoides panorpoides</i> , both sexes	34b

- 22      Abdomen violaceous, segments 9 and 10 marked with black.  
           *Trithemis aurora*, adult male 47a
- 23      Abdomen dark violaceous or blackish-brown with obscure  
           yellow markings  
           *Indothemis carnatica*, male 40a
- 24      *Hydrobasileus fruhstorferi*
- 24a      Abdomen slim, narrowly fusiform terminally; black with pale  
           blue markings:- segment 1 with a large lateral spot and an  
           apical mid-dorsal triangular spot; segment 2 with a fine mid-  
           dorsal stripe, a large subdorsal apical spot and a large ventro-  
           lateral spot; segments 3 to 6, each with a lateral stripe incomplete  
           apically and at the jugal suture; segment 7 with a large mid-  
           dorsal spot confined to the basal three-quarters and finely  
           bisected by the black carina. Head: labium yellow and black;  
           labrum ochreous or greenish-yellow, borders black; face pale  
           greenish-yellow; frons and vesicle bright metallic blue or  
           bluish-green; occiput black; eyes bottle-green above,  
           yellowish-green below. Prothorax black, a spot on middle lobe  
           and the posterior lobe sky-blue; thorax black with two mid-  
           dorsal stripes, the antealar sinus and a humeral stripe pale  
           blue, sides blue with a broad black stripe bifurcated below;  
           legs black, anterior femurs yellow on inner side. Wings hyaline  
           with some yellow in subcostal and cubital spaces, pterostigma  
           dark ochreous to reddish-brown; discoidal cell of forewing  
           entire, of hind traversed; discoidal field of forewing a single  
           row of cells nearly to wing border; arc between 2nd and 3rd  
           antenodals; sectors of arc fused for a long distance; distal  
           antenodal complete; 1 or 2 cubital nervures in forewing, 2 in  
           hind; bridge with supplementary nervures; 1 row of cells  
           between *IRiii* and *RspI*; anal field of hind wing only 2 cells  
           deep; anal loop very small, 3 or 4 cells or obsolete; nodal index  
           8-15: 15-9/11-11: 12-10. Anal appendages black (Markings of  
           teneral and subadult males bright greenish-yellow as in  
           females instead of blue).
- Hylaeothemis fruhstorferi*, male
- 24b      Abdomen black and marked exactly like the male above, but  
           markings greenish-yellow; segment 8 of females with lateral  
           expansions: other characters as for the male. Male abdomen



23–32mm, hind wing 30mm; female 25mm and 30mm respect.

*Hylaeothemis fruhstorferi*  
females and teneral and subadult males

*Hylaeothemis fruhstorferi*. This species, now considered peculiar to Sri Lanka, breeds in the seepages alongside mountain streams in submontane regions at about 2000' where the adults can be found settled on the vegetation. Their flight is short and weak; this and the yellow markings in the subadult condition make them look like Gomphines. No larva of the genus has been described. Indian forms originally placed with this species have now been given the species name *indica*, (Fraser 1946) (Fig. B94).

References:- Kirby 1893: 556, Pl. 41, Fig. 4 (sub. *Tetrathemis*); Laidlaw 1924: 343; Lieftinck 1955: 77; Fraser 1936: 260-262, Fig. 79; 1946: 97–100, Figs. 1, 2. Type in the Berlin Museum.

Synonymy:- *Tetrathemis fruhstorferi* Karsch, 1889; *Hylaeothemis fruhstorferi* Ris, 1909.

Distribution:- Belihuloya, (-).

## 25 *Tetrathemis yerburyi*

Abdomen black marked with citron-yellow—segment 1 with a small lateral spot and narrowly on apical border; segment 2 with a broad lateral spot, short of apical border, extending dorsalwards basally; segments 3 to 6 with gradually decreasing latero-basal spots; a large mid-dorsal basal spot on 7, not reaching base; remaining segments unmarked. Head: labium yellow, middle lobe and borders of lateral lobes black; labrum black; face and frons yellow, upper part and sides of latter and vesicle brilliant metallic prussian-blue; occiput dark reddish-brown; eyes emerald green. Prothorax black, posterior lobe yellow; thorax black with a bronze-green reflex and marked with yellow on the edges of the carina, the antealar sinus, a humeral stripe and two very broad stripes on the sides, beneath yellow with a broad triangle of black; legs black, anterior femurs yellow on the inner side. Wings hyaline with maybe a hint of yellow at base of hind wing; all apices tipped with blackish-brown to proximal end of pterostigma in the males; pterostigma black; distal antenodal complete; arc between 1st and 2nd antenodals; discoidal cells entire; sectors of arc fused for a long distance; anal loop poor, of only 3 or 4 cells; nodal index 6–9: 9–6/5–7: 7–5; 1 or 2 cubital nervures in forewing, 2

or 3 in hind. Anal appendages black. Male abdomen 20mm, hind wing 22mm; female 18 mm and 23mm respect (Fig. B108).

*Tetrathemis yerburyi*, both sexes

*Tetrathemis yerburyi*. Confined to Sri Lanka and the submontane areas of the island. No larva of the genus has been described. Nothing is known about the habits or habitats of the species in Sri Lanka. Fraser referring to the habits of members of the genus says they breed in stagnant and usually small pools, the female deposits her eggs on vegetation overhanging the water from where the newly hatched larvae fall into the water; he has seen masses of eggs on leaves and on moss on trees standing well out of the water. No larvae of this genus have been described (Figs. B95, 108).

References:- Kirby 1893: 556, Pl. 1, Fig. 4; Laidlaw 1924: 343; Fraser 1936: 251, 252; 1971: 202. Fraser says type in BMNH, but it is not listed in Kimmins 1966.

Distribution:- Hanguranketa, 575m, shallow ravine, slow flowing stream, (3m); Hatton, (5f); Kandy; (5m, 6mf).

## 26 *Brachydiplax sobrina*

Abdomen black, pruinose blue in old adults, but marked with yellow in subadults and tenerals; segment 1 fully yellow; sides of segments 2 and 3 with finely black sutures and a broad black mid-dorsal stripe expanding out at jugal sutures and apical borders; segments 4 to 7 with broad baso-lateral spots extending over half the length of segments 6 and 7, more over 4 and 5. Head: labium yellow/brown with some black borders; labrum yellow with black border; face and frons creamy-white, frons above and vertex metallic blue; occiput dark brown. Prothorax dark brown; thorax olivaceous-brown to greenish-yellow with steely black or metallic markings - mid-dorsal and humeral and three stripes on each side; markings more or less obscured by pruinescence, denser on dorsum; legs black, anterior femurs yellow on inner side. Wings hyaline, uncoloured, pterostigma pale yellow; distal antenodal complete; arc between 1st and 2nd antenodals; sectors of arc with a long fusion; discoidal cells entire; 1 cubital nervure in all wings; 1 row of cells between *IRiii* and *Rsp1*; discoidal field begins with 2 rows of cells in forewing, 1 in hind where its borders are widely dilated at wing border; nodal index 6-8: 8-6/7-7: 7-7. Anal appendages black. Borders of segment 8 not

dilated in females. Male abdomen 22mm, hind wing 26mm; female 16–22mm and 22–26mm respect (Fig. B96).

*Brachydiplax sobrina*, both sexes

*Brachydiplax sobrina*. A common insect occurring in large numbers over tanks, very quick on the wing and difficult to catch. Breeding in small weedy tanks and ponds, adults perching on twigs in the surrounding scrub. Recorded from the plains and as high as Ramboda. A larva of the genus, from Chittagong, has been described (Fig. B96, C42–45).

References:- Kirby 1893: 551; Laidlaw 1924: 345; Fraser 1936: 325–327; Lieftinck 1955: 78; 1971: 203; Chowdhury & Akhteruzzaman 1981: 131–144, Pl. 1–5; Bedjanić, 1996. Type in Paris Museum.

Synonymy:- *Libellula sobrina* Ramb., 1842; *Diplax sobrina* Brauer; 1868; *Sympetrum ? sobrinum* Kirby, 1890; *Brachydiplax indica*. Kirby, 1890.

Distribution:- Pond in Viharamahadevi Park, Colombo, 10m, (1f); Malwattu Oya 700m E of Temple, A'pura, 100m, (1f); stream in rice fields 500m S of Gonapinuwela, Galle, 50m, (2f); Kandy, (3–); Polonnaruwa, (tf); Negombo, (8m); Rajakadaluwa, (8f); 13 miles NW of Trincomalee, (2f); Trincomalee, (8, 9, 10); Tanglegam, (10); Andankulam, (10); Ramboda, (-).

## 27 *Cratilla lineata calverti*

Abdomen black marked with bright ochreous—segments 1 and 2 with broad mid-dorsal and lateral stripes; segments 3 to 8 with fine stripes along the carina and ventrally, pale beneath. Head: labium yellow; labrum, face and sides of frons creamy-yellow; rest of frons dark metallic blue or green; vesicle rounded, steely black; occiput black or yellow and black. Prothorax black marked yellow; thorax bronzed black marked with yellow on mid-dorsal carina, anterior and posterior stripes and four stripes on each side; underneath yellow; legs black with some surfaces yellow. Wings hyaline, may be tipped with brown; adult wings enfumed brown near apices; distal antenodal nervure complete, rarely incomplete; 17–20 antenodals in forewing, 12–15 in hind; arc between 2nd and 3rd antenodals; a supplementary nervure to bridge present; discoidal cells traversed once; 1 cubital nervure to all wings; 2 rows of cells between IRiii and Rspl; anal loop elongated; pterostigma yellow between black nervures or fully blackish-brown. Anal appendages black. Segment 8 of female with lateral expansions. Male abdomen 31mm, hind wing 36mm; female 31mm and 38mm respect (Fig. B97).

*Cratilla lineata calverti*, both sexes

*Cratilla lineata calverti*. Described by Fraser as a very common insect on the West Coast of India, but records here are only from Kandy. Fraser says the insect is most commonly seen perched on dead twigs, wings strongly sloped to the sides and body held close to and along the twig. The larva has not been described and the habits of the species have not been mentioned (Fig. B97).

References:- Fraser 1936: 286-288, Fig. 87; Laidlaw 1924: 343; Lieftinck 1955: 77.

Type in Vienna Museum.

Synonymy:- *Agrionoptera lineata*; Kirby, 1890; *Nesoxenia lineata* Kirby, 1890.

Distribution:- Roseneath, Kandy, (7m); Kandy, (10mf).

28 *Lathrecista asiatica asiatica*

28a Abdominal segments 3 to 8 bright crimson-red; 1 and 2 with a broad lateral yellow stripe and a fine mid-dorsal one, the two separated by a subdorsal reddish-brown stripe, sutures finely black as is the carina on 2; apical sutures on 3 to 8 finely black; these markings obscured in old adults by a thick bluish-white pruinescence; mid-dorsal yellow stripe continued on to 3; 9 and 10 black (andromorph females with abdomen red are rare). Head: labium pale ochreous, middle lobe and borders of lateral lobes black, upper surface of frons steely black or metallic blue-black, face and rest of frons creamy yellow, vesicle and occiput black with three yellow spots. Prothorax blackish-brown, anterior lobe yellow, thorax dark brown on dorsum, sides bright yellow; in juveniles dorsum brighter with yellow stripes each side of the mid-dorsal ridge, two yellow spots in antealar sinus, a narrow humeral stripe and two Y-shaped black markings with a black stripe between; these markings much obscured in old adults by pruinescence; legs dark reddish-brown to black, anterior femurs yellow on inner side. Wings hyaline, apices lightly enfumed, sometimes dark reddish-brown to proximal end of pterostigma which is reddish-brown; distal antenodal incomplete; 15-17 antenodals in forewing; discoidal cell traversed in forewing, entire in hind; arc between 2nd and 3rd antenodals or at 2nd; discoidal field with 3 rows of cells; 1 cubital nervure in all wings. Anal appendages black. Abdomen 29mm, hind wing 35mm.

(Fig. B98a, b).

*Lathrecista asiatica asiatica*, male

28b Abdomen olivaceous-brown, a mid-dorsal greenish-yellow stripe from 1 to 8, bordered in black, ventral borders finely

black, 9 and 10 black; wings hyaline, tipped brown to distal end of pterostigma; borders of segment 8 not dilated at sides, that of segment 9 extended anal- and ventral- wards, its ventral plate extended ventral-wards and curled upwards. Anal appendages black. Other characters as in the male at 28a. Abdomen 30mm, hind wing 35mm (Fig. B98c).

*Lathrecista asiatica asiatica*, female

*Lathrecista asiatica asiatica*. An insect of the coastal plains, widely distributed but not very common, possibly breeding in jungle pools. The larva has not been described (Fig. B98).

References:- Fraser 1936: 281-284, Figs. 85, 86a, b.; Laidlaw 1924: 344; Kirby 1893: 553; Lieftinck 1955: 77. Kirby's type is not in Kimmmins 1966; Selys's type is in the Brussels Museum.

Synonymy:- *Lathrecista pectoralis* Kirby; 1889; *Lathrecista terminalis* Kirby, 1889; *Orthetrum asiaticum* Kirby, 1890.

Distribution:- Yala, (10m); Elephant Pass, (1f); Trincomalee and Mahagany, (9, 10, 11, 12); Velvery (11); Tamblagam, (11).

## 29 *Orthetrum chrysis*

29a Abdomen bright blood red; eyes red, broadly contiguous; wings hyaline with a trace of amber yellow at extreme base of forewing and up to first antenodal nervure in hind wing; distal antenodal complete; nodal index 9-16: 16-11/11-12: 12-12; arc between 2nd and 3rd antenodals; 2 rows of cells between IR<sub>iii</sub> and Rs<sub>pl</sub>; pterostigma dark reddish brown; abdomen strongly carinated; posterior lobe of prothorax large, erect and fringed with long hairs; frons bright scarlet in front; thorax ferruginous; legs reddish-brown; lamina with a tuft of long, stiff hairs; anal appendages red. Abdomen 30mm, hind wing 34mm (Fig. B100a).

*Orthetrum chrysis*, male

29b Abdomen bright ochreous, sutures and ventral borders finely black, borders of segment 8 markedly expanded and broadly black; wings hyaline, unmarked. Red replaced by ochreous throughout; otherwise similar to the male above. Abdomen 27mm, hind wing 33mm.

*Orthetrum chrysis*, female

*Orthetrum chrysis*. A very local insect though common where found. Frequents pools and marshes in submontane regions

and breeds in these locations. The larva has not been described (Fig. B100a).

References:- Fraser 1936: 310, 311, Fig. 92a; Lieftinck 1955: 78; 1971: 202; Bedjanić, 1996. Type probably a specimen in the Selys collection in Brussels Museum.

Distribution:- Pond at Sinharaja Information Centre, Kudawa, 550m, (1m); Kanneliya, (6, 10, mf); Kandy, Pitakande, (6m); Avissawella, (10m); Labugama reservoir, (3m).

30 *Orthetrum glaucum*

30a Abdomen ventro-dorsally dilated at segments 1 to 3, then very slim to end; pruinosed pale dirty blue to apical end of segment 8, black for the remainder. Head: labium, labrum, face and frons, except for the double facet on the crest of the last, olivaceous brown; (in old adults all these parts are glossy black); vesicle and occiput black, the latter may be dark reddish-brown or ochreous; eyes dark green capped with reddish-brown. Prothorax yellow to dark brown marked with yellow, depending on the age of the specimen; in old adults, part of the anterior collar and of the posterior lobe fully black; thorax pruinosed dark dull blue or black with a thin pruinescence in old adults; teneral and juveniles marked very variably like the female below; legs black, extensor surfaces of femurs paler. Wings hyaline, base of hind wing tinted dark amber-yellow to cubital nervure and anal triangle; whole wing enfumed brown in old adults; pterostigma dark ochreous in thick black nervures; discoidal cell traversed in forewing, entire in hind; distal antenodal complete; 12-14 antenodals in forewing, 10-12 in hind; 2 rows of cells between IRiii and Rspl; discoidal field with 3 rows of cells; Cuii arising from posterior angle of discoidal cell in hind wing. Anal appendages black. Abdomen 32mm, hind wing 36mm.

*Orthetrum glaucum*, male

30b Abdomen reddish-brown, a broad greenish-yellow band on mid-dorsum of segments 1 to 7, mid-dorsum black on 8 and 9 and base of 10; basal segments slightly pruinosed dorsally in old adults. Head: pale olivaceous-brown or yellowish; eyes dark green capped with reddish-brown. Thorax olivaceous on mid-dorsum, humeral stripe reddish-brown, antehumeral stripe diffuse black, sides reddish-brown with two yellowish-white stripes on mes- and metepimeron; legs black, extensor

surfaces yellow. Wings hyaline, enfumed brown in older specimens, extreme base of hind wing dark amber-yellow up to cubital nervure and anal triangle; pterostigma dark ochreous within thick black nervures; distal antenodal complete; 2 rows of cells between **IRiii** and **Rspl**; sectors of arc with a short fusion in forewing, longer in hind; discoidal cell of forewing traversed, that of hind entire; arc variably situated relative to 2nd antenodal; 1 cubital nervure in all wings; nodal index 13-12: 13-11/13-11: 11-11; trigone of forewing with 3 cells. Basal segments of abdomen pruinose slightly on dorsum in very old specimens. Anal appendages of female blackish-brown. Female abdomen 30mm, hind wing 34mm.

female and subadult male of *Orthetrum glaucum*

*Orthetrum glaucum*. A very common insect, but not usually found in the plains. The larva has not been described (Fig. B100b).

References:- Kirby 1893: 555; Fraser 1936: 307-309, Fig. 92c; Laidlaw 1924: 345; Lieftinck 1955: 78; 1971: 203; Bedjanić, 1996. Location of type unknown.

Synonymy:- *Orthetrum nicevillei* Kirby, 1894.

Distribution:- Right tributary of Seetha-gangula 1km downstream of Dalhousie village, (1f); Peradeniya, (4, 8, mf); Ella, (9, 11, mf); Punduloya (11mf); Kandy, (5m); Maskeliya, 4, 500' (5f); Labugama, (2m); Knuckles- fast running stream, 1100m, (3m); Madugoda, 800m, small stream, (3m); Ury Estate, Badulla, 1100m, exposed stream, (3m); Kunundu Oya, 900m, 11mi. NE of Nuwara Eliya, torrent in ravine, (3mf); Hanguranketa, 575m, shallow ravine, slow flowing stream, (3mf); Balangoda, (-).

### 31 *Orthetrum luzonicum*

31a Abdomen:- sides of segments 1 and 2 and base of 3 bright yellow, rest pruinose sky-blue, all sutures finely black; abdomen dorso-ventrally dilated at base. Head: labium and labrum pale yellow or dirty creamy; face and frons pale bluish or greenish-yellow; vesicle and occiput black; eyes bluish-green capped violet. Prothorax blackish-brown, posterior lobe greenish-yellow as is border of anterior lobe and a stripe across middle lobe; thorax pale olivaceous-green dorsally, some brownish along carina, a broad reddish-brown humeral stripe bordered in front in black, and three ill-defined brown stripes on pale olivaceous-green sides; very old adults have thorax pruinose pale sky-blue, but these adults are rare; legs blackish-brown, anterior femurs yellow on extensor surfaces

and traces of this on the other two femurs. Wings hyaline, pterostigma bright ochreous bordered black; distal antenodal complete; arc usually between 2nd and 3rd antenodals; 13–14 antenodals in forewing, 10 in hind; discoidal field with 3 rows of cells, widely dilated at wing border; 1 cubital nervure in all wings; no supplementary nervures to bridge; Cuii in hind wing arising from the distal side of discoidal cell well away from its posterior angle; base of hind wing without a black marking. Anal appendages blackish-brown. Abdomen 30mm, hind wing 31mm (Fig. B110e).

*Orthetrum luzonicum*, male

- 31b Abdomen greenish-yellow, mid-dorsal carina and sutures all black, a broad black stripe at jugal suture of segment 4 broadens apically on 7 and meets over the dorsum of 8; 9 and 10 black with an yellow dorsal spot on 10 in some cases. Thorax pale green on sides with fine black sutures and without the brown bands seen in the male; legs yellow; wings hyaline, pterostigma bright ochreous, bordered black; vesicle dark ochreous; occiput ochreous or dark brown; eyes bluish-green, capped brown. Anal appendages yellow tipped black. Other characters as in the male above. Abdomen 31mm, hind wing 31mm.

*Orthetrum luzonicum*, female

*Orthetrum luzonicum*. Widely distributed in montane and submontane areas, breeding in marshes and swampy places; the adults can be seen on vegetation bordering these locations. The larva has not been described (Fig. B100e).

References:- Kirby 1893: 555, 556; Laidlaw 1924: 344; Fraser 1936: 298–300, Fig. 90a; Lieftinck 1955: 78; Bedjanić, 1996. Type in the Selys collection.

Synonymy:- *Orthetrum tricolor* Kirby, 1893; *Orthetrum chrysostigma luzonicum* Ris, 1909.

Distribution:- Rice fields on left side of Kurunegala-Dambulla road at Ibbagamuwa, 200m, (1m); stream nr. Citadel Hotel, Kandy, 700m, (1mfj); Kandy, (5m, 11m); right tributary of Seetha-gangula 1km downstream of Dalhousie village, (1mfj); right tributary of Kaluganga 5km SE from Gallella, Ratnapura, (1m); pond at Sinharaja Information Centre, Kudawa, 550m, (1mfj); Urugalla, Karawita, Parawella, Museum collection, (3, 4, mf); Maskeliya, 4, 500' (5m, very mature and pruinosed); Punduloya, (11m).

- 32 *Orthetrum pruinsum neglectum*

- 32a Abdomen bright vermilion-red in subadults, pruinosed



distinctive purplish-red in adults; frons blue-black or near black in front; vesicle and occiput reddish-brown; eyes blue-black above, bluish-grey below; wings hyaline, enfumed pale brown, especially at apices in old adults; hind wing with a reddish-brown basal marking extending to first antenodal and tornal angle, but only a trace of this in forewing; pterostigma dark reddish brown to black; arc variably situated in relation to second antenodal; 2 rows of cells between IRiii and Rspl; nodal index 11-14: 15-10/ 12-11: 10-12; posterior lobe of prothorax large, erect and fringed with long hairs; prothorax and thorax reddish-brown to purple depending on degree of pruinescence; legs black, thinly pruinose in adults, bases of femurs reddish-brown; lamina naked; anal appendages red. Abdomen 29mm, hind wing 33mm (Fig. B100c).

*Orthetrum pruinatum neglectum*, male

- 32b Abdomen dull ochreous, sutures and borders finely black, sides of segment 8 dilated and black. Face and frons pale olivaceous-brown; vesicle and occiput brown; eyes yellowish capped brown. Thorax reddish-brown or dull ochreous, never pruinose; antehumeral stripe brown, ill-defined. Wings hyaline, enfumed pale brown, especially at apices in old adults, vestigial basal reddish-brown marking in hind wing. Anal appendages dark ochreous. Other characters as in the male. Abdomen 30mm, hind wing 37mm.

*Orthetrum pruinatum neglectum*, female

*Orthetrum pruinatum neglectum*. One of the commonest dragonflies in the plains breeding in small tanks and in riverside pools. The adults can be seen at all times of the year. Copulation lasts for 12 to 18 seconds after which the female, guarded by the male, oviposits by tapping the water surface (Matsuki, 1983). The life history of this species has been described by Arun Kumar (1970) who collected eggs from a ovipositing female by dipping its abdomen in a dish of water. As soon as the eggs were in the water a gelatinous coat was formed which made the eggs stick together. The eggs hatched in about three weeks and development was completed in about four months from hatching after ten instars. The larvae are sluggish and bottom dwelling, hairy and more or less submerged in the mud. When disturbed they cover

themselves up with mud, scooping it up with their legs, but leaving their eyes and anal appendages clear. Arun Kumar's article is a complete and well figured description of all the stages in the life history of this insect (Figs. B100c, C47).

References:- Kirby 1891: 203; 1893: 554; Laidlaw 1924: 344; Fraser 1936: 311-313, Fig. 91a; Lieftinck 1955: 78; 1971: 203; Matsuki 1983; Arun Kumar 1970: 85-93, Figs. 1-45; Bedjanić, 1996. Type in the Marchal collection at Oxford.

Synonymy:- *Orthetrum pruinatum* Kirby, 1886; *Orthetrum petalura* Kirby, 1890; *Orthetrum neglectum* Kirby, 1890.

Distribution:- Stream nr. Citadel Hotel, Kandy, 700m, (1m); Kandy, (f, 7m, 8m, 11-, 12-); right tributary of Seetha-gangula 1km downstream of Dalhousie village, (1m); pond at Sinharaja Information Centre, Kudawa, 550m, (1mf); Elkaduwa, (3, 4, m); Parawella, Urugalla, Hakgala, Museum collection, (4-); Yongahamulla, Yakkala, 50m, valley to paddy fields; Deerwood, Kuruwita, 300m, broad ravine; Balangoda, 725m, fast running stream in ravine; Hanguranketa, 575m, slow flowing stream in ravine, coconut plantation, (3m); Minipe, (3mf); Laxapathiya, (3f); Trincomalee, (9, 10, 11); Kantalai, (3-); Punduloya, (9, 10).

### 33 *Orthetrum sabina sabina*

Abdomen greenish yellow marked with black; segments 1 to 3 distinctively swollen dorso-ventrally and laterally; 4 to 6 cylindrical and very thin; 7 to 9 dilated, but compressed laterally; 10 very small; eyes greenish. Male abdomen 33mm, hind wing 33mm; female 32mm and 32mm respect (Fig. B100f).

*Orthetrum sabina*, both sexes

#### *Orthetrum sabina sabina*.

Another dragonfly of the plains and submontane regions, if anything, more common than the previous species. Breeds in perennial and seasonal ponds and slow running streams such as the irrigation and drainage channels of paddy fields. The adults of both sexes can be seen quite some distance from these breeding grounds. In India the species is multivoltine with three generations in a year. The larvae are sluggish bottom dwellers, climbing onto nearby vegetation for emergence. The final instar larva has been described by Arun Kumar (1973b) and by Chowdhury & Akhteruzzaman (Figs. B100f, C42-45, C48).

References:- Kirby 1905: 271; 1893: 554; Laidlaw 1924: 344; Fraser 1936: 300-302, Fig. 90c; Lieftinck 1955: 78; 1971: 203; Arun Kumar 1973b: 297, 298, Figs. 59-66; 1976: 37-47; Chowdhury & Akhteruzzaman 1981: 131-144, Pl. 1-4; Bedjanić, 1996. Type has been lost.

Distribution:- Water tank 700m SE of Abhayagiri Dagoba, A'pura, 100m, (1m); stream nr. Citadel Hotel, Kandy, 700m, (1m); right tributary of Seetha-gangula 1km downstream from Dalhousie village, (1m); tributary of Walawe 500m SE of Embilipitiya, (1m); pond at Sinharaja Information Centre, Kudawa, 550m, (2mf); stream 500m SW of Sinharaja Field Research Station, Kudawa, 530m, (2m); Colombo, Padawiya, Ratnapura, Museum collection, (3, 4, 5, 7, 10, m); Peradeniya, (5m, 11f); Trincomalee, (8m, 9f, 11f); Kandy, (5f, 11m); Chilaw, (1mf); Yongahamulla, Yakkala, 50m, valley to paddy fields, coconut estate, etc., (1); Ja-ela river, (1); Polhunnawa, Ambalangoda, (1); Hiniduma, (1); Bangadeniya, (2); Kosgoda beach, (12mf); Kosgoda lagoon, (12m); Triton Hotel, Ahungalla, (12m); Kosgoda Turtle Hatchery, (12mf); Nape village, roadside ditch, Galle, (12m).

34 *Orthetrum triangulare triangulare*

- 34a Abdomen pruinosed pale sky-blue except segment 1, sides of 2 and all of 8 to 10; broad at base, strongly carinated from 3 to 9. Labium dark blackish-brown; labrum, face, frons, vesicle and occiput glossy black with a single yellow spot behind head; eyes dark blue. Prothorax and thorax velvety black, with whole of metepimeron and a broad stripe on mesepimeron apple-green; legs black. Wings hyaline with a broad, triangle of blackish-brown at base of hind wing extending to third antenodal, but only a trace of this in forewing; pterostigma black; distal antenodal complete; arc between 2nd and 3rd or at 2nd antenodal; 17-18 antenodals in forewing, 13 in hind; discoidal cell 3-celled in forewing, 2-celled in hind; 2 rows of cells between IRiii and Rspl. Anal appendages black. Abdomen 29-33mm, hind wing 39mm (Figs. B99, B100d).

*Orthetrum triangulare triangulare*, male

- 34b Abdomen black, not pruinosed, with a mid-dorsal olivaceous-green or yellow stripe on segments 1 to 7, carina and sutures all finely black, borders of segments 1 to 5 with yellow or olivaceous-green stripe, broadest at basal segments, two large greenish-yellow spots beneath on 2 to 7, 8 to 10 black. Head: labium dark blackish-brown, lateral lobes pale brown; face dark brown. Thorax, olivaceous-green, suffused reddish-brown in some specimens, stripes on sides a brighter yellow. Wings usually enfumed brown, deeper at apices, broad triangular golden-yellow area at base of hind wing extending to first antenodal; (eyes dark blue). Anal appendages black. Other characters as in male. Abdomen 31mm, hind wing 37mm.

*Orthetrum triangulare triangulare*, female

*Orthetrum triangulare triangulare*. A montane species found usually at elevations above 5, 000 feet, breeding in streams flowing through marshes in the flatter areas. The larva has not been described (Figs. B99, 100d).

- References:- Kirby 1891: 204, Pl. 20- Fig. 1; 1893: 555; Laidlaw 1924: 345; Fraser 1936: 305-307, Figs. 89, 91b; Lieftinck 1955: 78. Type is in the Brussels Museum.  
 Synonymy:- *Orthetrum triangulare* Kirby, 1886; *Orthetrum delesserti* Kirby, 1890; *Orthetrum carnicum* Kirby, 1890.  
 Distribution:- Hakgala, (3m); Punduloya, (2-); Hot Wells, Trincomalee, (9-); Kittu Otu, (2-); Kantalai, (3-); Haputale, (6); Kandy, (5-); Hiniduma, (4-).

35 *Potamarcha congener*

- 35a Abdomen completely pruinose blue in old adult males; there is a great variation in colouring depending on age as younger males are only partially pruinose especially on the first 3 segments; remaining segments are as in the female with subdorsal and medial black stripes separated by subdorsal and lateral narrow yellow stripes on segments 1 to 8. Head: labium yellow, mid-lobe black; labrum yellow bordered black; face and frons olivaceous yellow; frons steely black or brown in adults; occiput yellow, reddish-brown or black. Prothorax dark brown, parts yellow; thorax black in adults but densely pruinose and appearing dark violaceous or blackish-blue; in subadults, yellow markings show vaguely though the pruinoscence; pterostigma dark reddish-brown. Other characters as in females below. Abdomen 30mm, hind wing 34mm (Fig. B101).

adult males of *Potamarcha congener*

- 35b Abdomen black marked with bright ochreous similarly to *Cratilla lineata calverti* above but ventral yellow stripes much broader so that only a narrow black stripe remains between it and the yellow above; segments 8 and 9 with similar markings, segment 10 black. Head and prothorax as in the male; thorax reddish-brown dorsally, dull ochreous on sides, mid-dorsal stripe yellow extending into alar sinus, sides with dull brown Y-shaped markings, underneath ochreous with a dark brown border. Wings hyaline, apices tipped brown; costal area of both wings in sub-adults pale yellow; pterostigma dark reddish-brown; distal antenodal nervure incomplete; 13-14 antenodals in forewing, 9-12 in hind; arc between 2nd and 3rd antenodals; no supplementary nervures to bridge; 2 rows of

cells between IRiii and Rspl; discoidal cells traversed once; 1 cubital nervure in all wings. Abdomen completely pruinosed blue in old adult males, but basal segments only, in younger males. Females rarely pruinosed. Segment 8 of females with lateral expansions. Anal appendages black. Abdomen 30mm, hind wing 34mm.

females and younger males of *Potamarcha congener*

*Potamarcha congener*. A common insect breeding in small weedy ponds and marshes, large colonies may be seen in patches of jungle or scrub near breeding sites. The larva is sluggish and bottom dwelling, collecting a thick coating of mud over its body; it has been described by Arun Kumar (1973b) (Figs. B101, C49).

References:- Kirby 1893: 553; Laidlaw 1924: 344; Fraser 1936: 289-291, Fig. 88; Lieftinck 1955: 78; 1971: 202; Arun Kumar 1973b: 298, 299, Figs. 67-72. Type could be one of the specimens in the Selys collection, Brussels Museum.

Synonymy:- *Libellula obscura* Ramb., 1842 *Libellula congener* Ramb, 1842.; *Orthemis congener* Brauer, 1868; *Orthetrum obscurum* Kirby, 1890; *Potamarcha obscura* Karsch, 1890.

Distribution; - (*P. obscura* in Colombo Museum collection) Horowopathana, (10-); Chilaw, (1mf); Galagedara, (1m); Puttalam, (1m); Batticaloa, (8f); Yakkala, (1m); Minneriya, (2m); Kosgoda Turtle Hatchery, (1m).

36 *Acisoma panorpoides panorpoides*

36a Abdomen sky-blue marked with black on 1 to 5 sutures and ventral borders and a dorsal stripe which broadens at jugal sutures and apical borders giving a serrated appearance, a speckled, interrupted subdorsal stripe on 1 to 4, on 3 to 5 a large ventro-lateral spot starting at the apical border and ending in three points in a row, segments 6 and 7 black with a large spot of blue on each side not quite to the end of segment 7, segments 8 to 10 fully black; segments 1-5 widely dilated, then slimmed and cylindrical from 6-10. Labium creamy-white; labrum pale yellow; face and frons pale sky-blue, frons bordered black at base; vesicle and occiput black, an yellow spot behind the latter; eyes blue, behind glossy black spotted yellow. Prothorax black with some pale yellow; thorax sky-blue marbled with black, forming a hieroglyphic pattern on dorsum and sides; sutures black; legs black, femurs striped in yellow. Wings hyaline, pterostigma pale yellow with black nervures; distal antenodal complete; 7 antenodals in forewing,

6 in hind; arc between 1st and 2nd antenodals; no supplementary nervures to bridge; 1 row of cells between IRiii and Rsp1. Anal appendages white bordered black. Abdomen 15–18mm, hind wing 16–22mm (Fig. B102).

*Acisoma panorpoides panorpoides*, both sexes

- 36b Colour pale ochreous; segments 4 to 8 of abdomen with mid-dorsal black markings; 3 to 5 with ventral black markings; 8 to 10 fully black; anal appendages pale ochreous; vulvar scales black, tipped pale ochreous.

juvenile females of *Acisoma panorpoides panorpoides*

*Acisoma panorpoides panorpoides*. An insect of the plains and lower elevations, with a very weak and short flight, keeping close to the vegetation around the heavily weeded tanks and other bodies of water in which it breeds and never moving far away from these locations. In India it is a multivoltine species with three generations, adults being found for the greater part of the year. Its cryptic colouration makes it rather inconspicuous. In India it is reported to be multivoltine with three generations in a year. Arun Kumar has described the life history and the larva. Oviposition is exophytic, the ovipositing female being guarded by the hovering male. Larval life is about 65 days in the laboratory and emergence is after 12 instars (Figs. B102, C50).

References:- Kirby 1893: 556; 1905: 271; Laidlaw 1924: 356; Lieftinck 1955: 78; 1971: 203; Fraser 1936: 329–331, Fig. 97. Arun Kumar 1984b. Type lost.

Distribution:- Pond in Viharamahadevi Park, Colombo, 10m, (1mf); tributary of Walawe 500m SE of Embilipitiya, (1mf) pond at Sinharaja Information Centre, Kudawa, 550m, (2mf); Sinharaja, Karawita, Kottawa, Museum collection, (4, 10, mf); Maskeliya, 4500ft, (4f); Ja-Ela, (1f); Yakkala, (1f); Ambalangoda, (1f); Madinnegoda, (2f).

37 *Brachythemis contaminata*

- 37a Abdomen reddish-ochreous marked dorsally and subdorsally with vague brown stripes. Head: labium pale ochreous; labrum reddish-ochreous; face, frons and vesicle olivaceous or pale greenish-yellow; occiput brown; eyes violaceous-brown above, rest pale olivaceous. Prothorax ochreous marked with reddish-brown stripes; thorax olivaceous-brown with an obscure reddish-brown humeral stripe and two obscure brown stripes on each side; legs ochreous, extensor surfaces

of femurs dark brown or blackish. Wings hyaline with reddish nervures and a broad bright orange fascia from base to near pterostigma in forewing and up to that in hind, the depth of colour intensifying from pale and in extent with age; pterostigma rust-red, posterior border brown; discoidal cell of forewing traversed, that of hind wing entire; sectors of arc very shortly fused at origin; arc situated between 1st and 2nd antenodals;  $6\frac{1}{2}$  or  $7\frac{1}{2}$  antenodals, the distal one incomplete; 1 cubital nervure in all wings; discoidal field beginning with 3 rows of cells; subtrigone of forewing 3-celled; 1 or 2 rows of cells between IRiii and Rspl. Anal appendages ferruginous. Juvenile males coloured and marked as in females. Abdomen 20mm, hind wing 22mm (Fig. B103).

*Brachythemis contaminata*, male

- 37b Abdomen pale olivaceous-brown, a narrow black stripe on carina from segment 2 to the end broadens on 8 and 9, a subdorsal broken dark brown stripe on 2 to 6, the space between this and the dark carina bright pale yellow, sutures and ventral borders black. Face yellowish-white; eyes pale brown above, rest pale olivaceous. Thorax pale greenish-yellow, a narrow brown stripe along carina, a dark brown stripe by humeral suture; narrow black stripes on mes- and met- epimeron with an elongate spot on the former; carina and sutures finely black. Wings hyaline, pale yellow at extreme base in hind wing; pterostigma bright ochreous. Anal appendages yellow. Other characters as in the male. Abdomen 19mm, hind wing 23mm.

*Brachythemis contaminata*, female

*Brachythemis contaminata*. A very common insect of the plains found on the borders of sluggish streams and over weedy tanks around which many teneral may be collected. The larvae are sluggish and prefer the shallower water with standing reeds onto which they climb for emergence. Eggs collected from a ovipositing female hatched in the laboratory in 8 to 10 days. The female laid her eggs by beating the tip of her abdomen repeatedly on submerged leaves or stems, being guarded all the while by the male. As soon as the eggs came into contact with the water, a gelatinous coat developed which bound the eggs together. Emergence took place in about 90 days after 10 instars (Figs. B104, C42-45, C51).

References:- Kirby 1905: 271; 1893: 551; Laidlaw 1924: 347; Fraser 1936: 363-366, Figs. 48, 103; Lieftinck 1955: 79; 1971: 205; Kumar 1973b: 300, Figs. 81-88; Begum, Bashar & Biswas 1982: 89-97; Chowdhury & Akhteruzzaman, 1981: 131-144, Pls. 1-4; Kerdpibule, Nicharat & Sucharit, 1979: 540-542, Fig. 1. Type has been lost.

Synonymy:- *Libellula contaminata* Fabr. 1783; *Libellula truncatula* Ramb., 1842.

Distribution:- Pond in Viharamahadevi Park, Colombo, 10m, (1m); water tank 1500m SE of Nuwarawewa tank, A'pura, 100m, (1mf); tributary of Walawe 500m SE of Embilipitiya, (1f); Ranna, (7-); Colombo, (10-); Kandy, (7m); Colpetty, (1-); Ja-Ela, (1mf); Negombo, (1mf); Yakkala, (1mf); Kosgoda, (1mf); Ambalngoda, paddy fields, (1mf); Madampe, reservoir, (1mf); Mundel, Chilaw, brackish lagoon, (2mf); Puttalam 10mi E of, marsh, (2mf); Maradan Maduwa, Wilpattu, scrub around reservoir, (2mf); Deduru Oya, 5 mi NE of Kurunegala, shallow river, (2mf); Ritigala reserve, 200m, pool along stream, (2mf); Nilaveli, 5mi NW of Trinco, brackish mud flats, (2mf); Kahagasdigiliya, tank-grassland, (2mf); 7mi E of Mankulam, dry forest reservoir, (2mf); Paraiyanalankulam, 20mi W of Vavuniya, small stream in secondary forest, (2mf); Giant's Tank, (2mf); Moneragala mountain, slow flowing stream, (3mf); Gal Oya at inflow of river into reservoir, (3mf); Rambukkan Oya, shallow river, dry forest, (3mf); Mahaweli Ganga at Aluthnuwara, (3mf); Kuda Oya, Wellawaya, river in secondary dry forest, (3mf); Malala Oya, 5mi NE of Hambantota, slow flowing stream, (3mf); Trinco, (7, 10, 11); Adankulam, (10); Kantalai, (11); Ramboda, (-); Kosgoda lagoon, (12m); Kosgoda Turtle Hatchery, (12m).

### 38 *Bradinopyga geminata*

Abdomen marked *distinctive* cryptic black and yellow. Male abdomen 19mm, hind wing 22mm; female 19mm and 23mm respect (Fig. B104).

*Bradinopyga geminata*, both sexes

*Bradinopyga geminata*. A distinctive insect because of its cryptic colouration, marbled black and dirty yellow, often found settled on and breeding in cemented domestic ponds and in the wild settled on granite rocks. Both locations provide a suitable background to its own markings. The larva has been described by Sangal & Kumar (Figs. B104, C52).

References:- Kirby 1893: 553, Pl. 41, Fig. 3; Laidlaw 1924: 347; Fraser 1936: 48-350, Fig. 101; Lieftinck 1955: 79; Sangal & Kumar 1970a: 36-38, Figs. 9-16. Type is in the Selys collection.

Synonymy:- *Bradinopyga stigmata*, 1893 Kirby.

Distribution:- Cave temple, Dambulla, (1m); Horowopathana, (10-); Jaffna, (12-); Jaffna, (6f); Batticaloa, (9f); Haragama, (1, 11mf); Trinco, (7m), Colombo.

### 39 *Crocothemis servilia servilia*

39a Abdomen blood red, mid-dorsal carina black; wings hyaline,



bases amber-yellow, more so in hind wing including the tornal angle. Head: labium ferruginous; labrum blood red; anteclypeus pale red; rest of face and frons blood-red; occiput orange; eyes red above, rest purple, paler below. Prothorax ferruginous, posterior lobe of prothorax small, median lobe with stiff reddish hairs; thorax ferruginous, often blood-red dorsally; legs ochreous. Pterostigma dark ochreous between black nervures; distal antenodal incomplete (unlike in *Urothemis signata* which it resembles); nodal index 9–10½: 10½–9/9–9: 9–9; arc between 1st and 2nd antenodals; discoidal cell in forewing narrow, traversed once, usually entire in hind; subtrigone in forewing of 3 cells; 1 cubital nervure in all wings; sectors of arc with a short fusion in forewing, a long one in hind; discoidal field beginning with 3 rows of cells; no supplementary nervures to bridge. Anal appendages red. Abdomen 30mm, hind wing 32mm (Fig. B105).

*Crocothemis servilia servilia*, male

- 39b Abdomen ochreous, segments 8 and 9 blackish along mid-dorsal carina according to Fraser, but specimens at the Colombo Museum have this stripe along the full length of the abdomen. Labium pale yellow; labrum, face, frons, occiput and vesicle olivaceous-brown; eyes brown above, olivaceous below. Prothorax and thorax olivaceous-brown, often tinged ferruginous; legs ochreous. Wings hyaline, bases marked with pale amber-yellow to cubital nervure in forewing and to first antenodal, arc and tornal angle in hind, the neurulation in this area bright yellow, not orange as in the male. Anal appendages ochreous. Other characters as in the male above. Abdomen 25–32mm, hind wing 31–37mm.

*Crocothemis servilia servilia*, female

*Crocothemis servilia servilia*. A common species found everywhere near stagnant water. Described as a multivoltine species in India with three generations in a year. The larva has been described by Sangal & Kumar (Figs. B105, C53).

References:- Kirby 1893: 551; Laidlaw 1924: 346; Fraser 1936: 345–347, Fig. 100; Lieftinck 1955: 78; 1971: 203; Sangal & Kumar 1970: 34–36, Figs. 1–8. Type has been lost.

Synonymy:- *Crocothemis reticulata* Kirby, 1886; *Crocothemis soror* Kirby, 1886.

**Distribution:-** Rice fields on left side of Kurunegala-Dambulla road at Ibbagamuwa, 200m, (1m); water tank 700m SE of Abhayagiri Dagoba, A'pura, 100m, (1f); Malwatu Oya 700m E of A'pura temple, 100m, (1f); Colombo, Palatupana; Cheddikulam; Museum collection, (2, 3, 5, 6, 7, mf); Kandy, (7m); Chilaw, (1mf); Trincomalee, (9f); Jaffna, (9f); Andankulam, (10); Tanglegam, (10); Kantalai, (3); Trinco, (7, 8); Mahagany, (7, 8); Ramboda, (-); Mundel lake, brackish lagoon, (2); 10 mi E of Puttalam, marsh, scrub, (2); Madampe, old reservoir with thick vegetation, (1); Airport Garden Hotel, Seeduwa, Galle Dt. (12m); Kosgoda Turtle Hatchery, (12m).

40 *Diplacodes nebulosa*

- 40a Abdomen thinly pruinose blue in old adults; apices of wings blackish brown to proximal end of pterostigma, this dark area sharply defined; pterostigma reddish-brown within thick black nervures; distal antenodal incomplete; arc between 1st and 2nd antenodals; nodal index  $5-7\frac{1}{2}$ :  $7\frac{1}{2}-6/6-5$ :  $5-6$ ; discoidal cell of hind wing entire; discoidal field in forewing beginning with a row of 2 cells; 1 row of cells between **IRiii** and **Rspl**; no supplementary nervures to bridge. Head blackish brown, frons and vesicle dark metallic violet; eyes dark violet above. Prothorax, thorax, legs and abdomen black, thinly pruinose in old adults; anal appendages black or yellow, base black in juveniles. Abdomen 16mm, hind wing 18mm (Fig. B106).

*Diplacodes nebulosa*, male

- 40b Abdomen black, sides marked with yellow; apices of wings blackish-brown to proximal end of pterostigma, this dark area sharply defined; frons and vesicle dark metallic violet; eyes dark violet. Abdomen 16mm, hind wing 18mm.

subadult and teneral males of *Diplacodes nebulosa*

- 40c Abdomen black, sides marked with yellow; prothorax and thorax bright citron-yellow with extensive black markings including a broad mid-dorsal stripe trifid above and a Y-shaped mark in the humeral region; wings hyaline, only a trace of amber-yellow near membrane in hind wing; labium, labrum, face, frons and vesicle creamy yellow; occiput bright ochreous; eyes reddish-brown. Legs black, bases of femurs and extensor surfaces of tibiae yellow. Other characters as in male at above. Abdomen 14mm, hind wing 18mm.

*Diplacodes nebulosa*, female

*Diplacodes nebulosa*. A wide ranging species from the plains to the mid-country, but not very common. Marshes and heavily weeded tanks are the preferred habitats and the adults are rarely seen far from the areas in which they breed. The larva has not been described.

**References:-** Kirby 1893: 556; Laidlaw 1924: 346; Fraser 1936: 335, 336; Lieftinck 1955: 78; 1971: 202. Type has been lost.

**Synonymy:-** *Libellula nebulosa* Fabr., 1793; *Diplax nebulosa* Brauer, 1868.

**Distribution:-** Pond in Viharamahadevi Park, Colombo, 10m, (1mf); rice fields on left side of Kurunegala-Dambulla road at Ibbagamuwa, 200m, (1f); pond at Sinharaja Information Centre, Kudawa, 550m, (2mf); Wilpattu, (4, 7, mf); Labugama, (5, 6, -); Inginiyagala, (-); Kandy, (7m); Ambalangoda, (2mf); Madinnegoda-Yakkala, (mf); Yakkala, (1mf); Kosgoda, reservoir, (1mf); Giltcroft, Ambalangoda, paddy fields, (1mf); Madampe, old reservoir with thick vegetation, (1mf); Airport Garden Hotel Seeduwa, Galle Dt. (12mf).

#### 41 *Diplacodes trivialis*

Abdominal segments 1 to 3 greenish-yellow, sutures finely black, mid-dorsal and subdorsal black stripes start at jugal border of segment 2 and expand at apical borders of 2 and 3—these markings masked by blue pruinescence in adults; remaining segments black, heavily pruinose in adults; in subadults yellow subdorsal stripes on 4 to 7 extend full length on 4 to 6 and nearly to apex to 7. Head: labium, labrum and bases of mandibles creamy-yellow; face, frons and vertex pale sky-blue; eyes reddish-brown above, pale yellowish or bluish below. Prothorax brown or black with an yellow mid-dorsal stripe; thorax greenish-yellow or olivaceous, sutures finely black, between carina and humeral suture violaceous-brown, speckled with minute dots; this area and black markings pruinose in adults; the whole thorax pruinose blue in old adults; legs greenish yellow marked with black in subadults, black marked with yellow in adults, parts of femurs and tibiae yellow in subadults. Wings hyaline with only a minute yellow spot in cubital space of hind wing; distal antenodal incomplete; antenodals 7–8 in forewing, 6 in hind; arc between 1st and 2nd antenodals; no supplementary nervure to bridge; only 1 cubital nervure in all wings; discoidal cell in forewing entire or traversed, entire in hind; 1 row of cells between *IR*<sub>iii</sub> and *R*<sub>spl</sub>. Anal appendages yellow.

Female very similar, but abdominal markings extend from 8 to 10; 10 fully yellow; spots may form a continuous stripe on

full length of abdomen. Abdomen 20mm, hind wing 21mm (Fig. B106).

*Diplacodes trivialis*, both sexes

*Diplacodes trivialis*. A very common insect of the plains and mid-country. It wanders far from water, settling at times on bare ground and not often seen over water except when ovipositing; it has been taken at sea. It breeds in ponds and pools in sluggish streams and in India it is a multivoltine species with three generations in a year. The larva has been described by Chodhury et al and the life history by Kumar (Figs. B106, C42-45, 54).

References:- Kirby 1891: 203; 1893: 550; Laidlaw 1924: 345; Fraser 1936: 336-338, Fig. 98; Lieftinck 1955: 78; 1971: 203; Chowdhury & Akhteruzzman 1981: 131-144, Pls. 1-4; Arun Kumar 1984: 13-22, Figs. 1-34. Type is in Brussels Museum.

Synonymy:- *Libellula trivialis* Ramb., 1842; *Diplax trivialis* Brauer, 1866; *Trithemis trivialis* Kirby, 1889.

Distribution:- Rice fields on left side of Kurunegala-Dambulla road at Ibbagamuwa, 200m, (1f); water tank 700m SE of Abhayagiri Dagoba, A'pura, 100m, (1mf); tributary of Walawe 500m SE of Embilipitiya, (1f); pond at Sinharaja Information Centre, Kudawa, 550m, (2m); beach at Thiranagama guest house, Hikkaduwa, (2m); Urugala, (3, 4, mf); Horowopathana, (4-); Horton plains, (-); Gurulupotha, (-); Trincomalee, (12m); Peradeniya, (5m); Sigiriya, (9mf); Kandy, (11m); Batticaloa, (8mf); Jaffna, (9m); Galagedara, (1f); Chilaw, (1f); Negombo lagoon, (1mf); Yakkala, (1mf); 13 mi E of Puttalam, chena, (2mf); Maradan Maduwa, Wilpattu, reservoir, (2mf); Deduru Oya, shallow river, (2mf); Ritigala, (2mf); Kiniya, Trinco. hot wells, (2mf); Kahatagasdigiliya, reservoir, (2mf); Point Pedro, brackish water area, (2mf); Mullativu, beach (2-); Giant's Tank, (2mf); Pallamadu, Mannar, river, (2mf); Pali Aru, Mannar, river, (2mf); Belihuloya, (3mf); Moneragala mountain, (3mf); Peradeniya, (3mf); Puttalam, (-); Airport Garden Hotel, Seduwa, Galle Dt. (12f).

#### 42 *Indothemis carnatica*

42a Abdomen dark violaceous or blackish-brown with obscure yellow markings; teneral with abdomen coloured as in females. Head: labium ochreous, middle lobe and borders of laterals black; labrum and face blackish-brown, a yellow spot on sides of postclypeus; frons and vesicle metallic violet-black, a small yellow spot on each side of former; occiput brown, behind head bright yellow; eyes violaceous above, paler below. Prothorax blackish-brown, mid-dorsum paler, anterior lobe yellow in front; thorax blackish-brown, thinly pruinosed,

uniformly dark violaceous in full adults; subadults with greenish-yellow colour showing through pruinescence; tenerals coloured as in females; legs black, femurs and extensor surfaces of tibiae greenish-yellow. Wings hyaline with a point of amber-yellow at base of hind; pterostigma bright ochreous in thick black nervures; distal antenodal incomplete;  $8\frac{1}{2}$  antenodals in forewing, 7 in hind; discoidal cell in forewing traversed or entire, in hind wing entire; 1 row of cells between  $IR_{iii}$  and  $Rs_{pl}$ ; discoidal field beginning with 2 rows of cells, sides of field divergent at wing border, characters which serve to distinguish it from *Trithemis festiva* which it resembles closely; no supplementary nervures to bridge. Anal appendages dull ochreous. Abdomen 25mm, hind wing 29mm (Fig. B107).

*Indothemis carnatica*, male

- 42b Abdomen golden-yellow on dorsum fading to greenish-yellow on sides, marked with black and reddish-brown; all sutures and ventral borders finely black; a narrow broken subdorsal stripe from 2 to end and joined to the ventral black on 5 to 9; a mid-dorsal stripe, black on carina, brown at its borders from 2 to 9 and joining the subdorsal stripe on terminal segments; 10 yellow, base and apical borders black. Head bright yellow except for clypeus and sides of frons which are greenish; eyes brown above, golden-yellow below. Prothorax ochreous with a reddish-brown spot on sides of middle lobe; thorax golden-yellow dorsally, sides pale greenish-yellow, antehumeral stripe a diffuse brown, borders of antealar sinus with dark brown points, lateral sutures dark brown to black; legs yellow, tarsi and spines black. Wings hyaline with a point of amber at base of hind; pterostigma bright ochreous in thick black nervures; venation as in male. Anal appendages pale yellow, tipped black. Abdomen 24mm, hind wing 29mm.

*Indothemis carnatica*, female

*Indothemis carnatica*. A comparatively scarce and local insect whose larva has not been described. In India it breeds in small ponds, the adults hiding in the long grass in the area, a loud rustling of the wings as they thread their way through the grass betraying their presence; the males are often seen hovering above bare patches (Fig. B107).

References:- Laidlaw 1924: 346; Fraser 1924: 426, 436, 437; 1936: 340, 341; Lieftinck 1955: 78; 1971: 203, 204, Fig. 10. Type in Brussels Museum sub. *caesia*.

Synonymy:- *Libellula caesia* Ramb., 1842; *Trithemis caesia* Brauer, 1868 *Indothemis caesia* Fraser; 1936.

Distribution:- Mannar, (1m); Jaffna, (m); Trincomalee, (4m).

43 *Indothemis limbata sita*

43a Wings hyaline, bases of hind wing dark brown to first antenodal nervure in forewing and to second antenodal and arc and to tornal angle in hind; pterostigma ochreous, paler on posterior border, with a thick black border anteriorly and thin one posteriorly; distal antenodal incomplete; nodal index 8-10½: 10½-9/9-9: 9-9 sectors of arc with a long fusion; 1 row of cells between *IRiii* and *Rspl*; discoidal field only 2 cells wide, its borders diverging at wing border; no supplementary nervures to bridge. Head black, frons and vesicle with purplish steely reflex; eyes black above, brown below; frons and vesicle with purple steely reflex. Prothorax, thorax, anal appendages and legs black, claw hooks shorter than claws. Abdomen 26mm, hind wing 30mm (Fig. B109).

*Indothemis limbata sita*, male

43b Abdominal segments 1 to 3 yellow with fine black sutures and narrow mid-dorsal and subdorsal black stripes from jugal suture on 2; remaining segments black marked with yellow—segments 4 to 8 with long tapering subdorsal and ventro-lateral spots extending from base towards apex, shortening to become vestigial on 8; 9 with a tiny basal subdorsal spot; 10 fully black. Head: labium black, large yellow spot on lateral lobes; labrum ochreous with a black spot; face and frons ochreous with some black markings; vesicle black; occiput reddish-ochreous; eyes brown, black behind with bright ochreous borders. Prothorax black; thorax bright yellow with a broad mid-dorsal reddish-brown stripe, antehumeral stripe black bordered brown, humeral stripe black, a black and a dark brown stripe on the sides, area between suffused reddish-brown; legs black with a little yellow. Wings hyaline, bases amber-yellow to first antenodal in forewing and to second antenodal and arc and to tornal angle in hind; pterostigma creamy-white, nervures black; venational details as for male above. Anal appendages black. Abdomen 20mm, hind wing 26mm.

*Indothemis limbata sita*, female

*Indothemis limbata sita*. A scarce and shy insect, difficult to capture except when the males are fighting each other; the females are rarely seen and appear to be hiding in the surrounding jungle. The larva has not been described (Fig. B109).

References:- Fraser 1924: 426, 435, 436; 1936: 342, 343, Fig. 99; Laidlaw 1924: 346; Lieftinck 1955: 78; 1971: 203. Type said to be in BMNH but is not in Kimmins 1966 list.

Synonymy:- *Indothemis limbata* Fraser, 1924.

Distribution:- Horowopathana, (10m); Wilpattu, (4-).

44 *Neurothemis fulvia*

44a Abdomen reddish-brown, sutures and borders finely black; wings opaque dark reddish-brown with a clear irregular triangular uncoloured area at apices up to posterior border, bordered with dark brown on background of amber-yellow towards costa and outwards; margin of dark area beginning near proximal end of pterostigma and running straight back in forewing, obliquely back in hind with an irregular border; dark area with clear amber areas in costal and basal spaces, base of hypertrigones, space distal to arc and at node and subnode; reticulation in dark areas close and bright yellow except in the clear spaces; eyes dark reddish-brown above, golden-brown below. Prothorax and thorax also reddish-brown.

Isochrome females differ only in having the apices of forewings clear and that of hind amber-yellow and not opaque brown.

Male abdomen 24mm, hind wing 30mm: female 22mm and 28mm respect.

males and isochrome females of *Neurothemis fulvia*

44b Abdomen ochreous or pale reddish-brown (as are also head and thorax), some darker brown at apices of segments 3 to 7. Wings clear amber-yellow, darker in the costal space and in the subcostal space at the node where it expands into a large spot, postnodal area clear with some brown again in the costal space; basal half of hind wing dark brownish-black extending over anal loop; eyes dark reddish-brown above, golden-brown below.

This species has not yet been reported from Sri Lanka, but it is very common in India and is likely to be found here in wet and semi-wet areas. Abdomen 22mm, hind wing 28mm.

heterochrome females of *Neurothemis fulvia*

*Neurothemis fulvia*. Reported as a very common insect throughout India in wet and semi-wet areas, often in large colonies, but so far not reported from Sri Lanka. It is very likely to be found here, for which reason it is included, un-numbered. A sub-montane species breeding in shady jungle streams.

References: - Fraser 1924: 426, 428; 1936: 353, 354. Type has been lost.

Distribution:-(not so far reported from Sri Lanka).

45 *Neurothemis intermedia intermedia*

Abdomen bright reddish-ochreous, sutures on segments 2 and 3 finely darker and a ventro-lateral brownish stripe on 3 to 8 interrupted at apical ends of segments; small dark points at base of 10. Head: most parts pale yellow, some often creamy-white or olivaceous; vesicle olivaceous; occiput reddish-brown; eyes reddish-brown above, golden-yellow below. Prothorax reddish-brown; thorax pale greenish-yellow, dorsum tinged ferruginous, humeral stripe reddish-brown. Wings hyaline; in males, palely tinted yellow and with a broad basal amber-yellow band in all wings; in females, tinted pale yellow, darker along costal border, basal markings absent; pterostigma dark ochreous between dark brown nervures; distal antenodal incomplete; discoidal cells traversed, once only; subtrigone in forewing with 3 cells; 3 or 4 cubital nervures in forewing, 2 in hind; discoidal field beginning with rows of 3 cells; nodal index 10-11½: 11½-10/11-10: 10-9. Anal appendages reddish. Male abdomen 23mm, hind wing 25mm; female 22mm and 26 mm respect.

*Neurothemis intermedia intermedia*, both sexes

*Neurothemis intermedia intermedia*. A common insect of the plains, but rare in submontane regions. It has a very weak flight and can be seen on the banks of streams. The larva has not been described (Fig. B111).



**References:-** Kirby 1893: 550; Laidlaw 1924: 347; Fraser 1924: 426, 437, 438; 1936: 350, 351, 357, 358 Fig. 102; Lieftinck 1955: 79; 1971: 205. Type in Brussels Museum.

**Synonymy:-** *Libellula intermedia* Ramb, 1842.; *Trithemis intermedia* Brauer, 1868.

**Distribution:-** Stream nr.Citadel Hotel, Kandy, 700m, (1f); Kandy, (1, m, 4f, 7f, 11m); Hakgala, (10-); Kanneliya, (3-); Deniyaya, (9-); Yongahamulla, Yakkala, (1mf); Yakkala, (1mf).

46 *Neurothemis tullia tullia*

46a Abdomen black with a broad mid-dorsal interrupted stripe of creamy-white on segments 1 to 8, broadest at base of segments, becoming vestigial on segments 7 and 8; wings hyaline for apical half, opaque steely blue-black for basal half, the separation in both wings running from costal border a cell distal to node in forewing, two or three cells distal in hind, to the posterior border of the wings; a broad opalescent, tapering white band lies on the border of the black and not quite reaching the posterior border; distal antenodal incomplete; pterostigma dull ochreous bordered black. Labium blackish-brown; labrum, face, frons; vesicle and occiput black; eyes blackish-brown above, violaceous below. Prothorax and thorax black, mid-dorsal carina of thorax yellow. Anal appendages creamy-white tipped black. Abdomen 18mm, hind wing 21mm (Fig. B111 - wings of *N. terminata*).

*Neurothemis tullia tullia*, male

46b Abdomen bright yellow with a broad black stripe from segment 1 to end, black beneath, black areas enclose a narrow yellow stripe which tapers from base of abdomen to segment 8; at apical ends of segments the black stripes expand to constrict the yellow dorsally and on segments 8 and 9 resulting in enclosed yellow spots; 10 and the short anal appendages bright yellow. Wing patterns very variable - base of wings to just beyond node bright amber-yellow; subcostal space from base to node blackish-brown which then broadens into a large area nearly to posterior border sickle-shaped in hind wing, very variable in forewing; apices of wings opaque blackish-brown to middle of pterostigma or a little beyond; neuration including costal pale yellow between these dark areas. Head: labium creamy-white; labrum, face and frons olivaceous or greenish-yellow; vesicle olivaceous-brown; occiput olivaceous with a bright yellow spot behind; eyes pale brown above, rest pale olivaceous. Prothorax and thorax greenish-yellow; a

bright yellow stripe, bordered blackish-brown, extends from anterior lobe of former to carina and antearlar sinus; lateral sutures finely black; legs flesh-coloured and yellow. Abdomen 18mm, hind wing 22mm.

*Neurothemis tullia tullia*, female

*Neurothemis tullia tullia*. A very common insect breeding in marshes and the drainage channels of paddy fields. The distinctive colour of the wings in both sexes makes it easy to identify and its weak fluttering flight makes it easy to capture. The larva has not been described.

References: - Kirby 1983: 550; 1905: —; Laidlaw 1924: 347; Fraser 1924: 426, 437; 1936: 360–362; Lieftinck 1955: 79; 1971: 205. Type has been lost.

Synonymy:- *Libellula tullia* Drury, 1773.

Distribution:- Pond in Viharamahadevi Park, Colombo, 10m (1mf); rice fields on left side of Kurunegala-Dambulla road at Ibbagamuwa, 200m, (1m); tributary of Walawe 500m SE of Embilipitiya, (1m); right tributary of Kaluganga 5km from Gallella, Ratnapura, (1m); pond at Sinharaja Information Centre, Kudawa, 550m, (2mf); Colombo, (2, 6, 7, mf); Maha Oya, (8, 10, mf); Trincomalee, (9m); Kandy, (1f, 5mf); Chilaw, (1mf); Ambalangoda, (2mf); Mimipe (1mf); Laxapathiya, (1mf); Airport Garden Hotel, Seeduwa, Galle Dt. (12mf); Pinnewala Elephant Orphanage, (12mf); Kosgoda beach, (12mf); Kosgoda lagoon, (12mf); Kosgoda Turtle Hatchery, (12mf); Nape village, roadside ditch, Galle Dt. (12mf).

#### 47 *Rhodothemis rufa*

47a Abdomen brilliant scarlet red; eyes brown above, scarlet below, meeting only at a point; wings hyaline, extreme base of forewing and slightly more of hind wing amber yellow; costa and basal nervures reddish; pterostigma bright ochreous, nervures black; distal antenodal incomplete;  $11\frac{1}{2}$  antenodals in forewing, 10 in hind; discoidal cell in forewing narrow and traversed once, entire in hind wing; sectors of arc with a long fusion in both wings; arc lies between 1st and 2nd antenodals in both wings; subtrigone of forewing 3-celled; 1 row of cells between *IRiii* and *Rspl*; discoidal field beginning with a row of 3 cells, continues as rows of 2 cells for 5–7 cells length, then widens to border of wing. Labium reddish-brown; labrum and anteclypeus reddish-ochreous; postclypeus, frons and vesicle blood-red; occiput reddish-brown. Abdomen triquetral in section; prothorax and thorax reddish-brown; posterior lobe of prothorax large, forming two rounded lobes heavily fringed with long hairs; anal appendages bright red.

Closely resemble males of *Orthetrum chrysis*, *Crocothemis servilia* and *Urothemis signata*, differing in the very short contiguity of the eyes, the discoidal field starting with a row of 3 cells and then continuing in rows of 2, and in the long and robust legs, the hind femurs with 8 small, closely set spines and 5 or 6 very robust gradually lengthening spines. Abdomen 26mm, hind wing 35mm (Fig. B110).

*Rhodothemis rufa*, male

- 47b Abdomen dark golden-brown with a bright citron-yellow mid-dorsal stripe on segments 1 to 4, replaced by a pair of small basal dorsal spots on 5 to 8 or 9; sutures and ventral borders black. Labrum, anteclypeus and lower part of postclypeus ochreous, rest of postclypeus and frons up to crest blackish-brown, rest of frons bright yellow bordered dark brown at base; occiput yellow; eyes reddish-brown above, olivaceous below. Prothorax dark brown, mid-dorsal stripe yellow; thorax blackish-brown dorsally, with a bright yellow stripe from front of dorsum to between the wings; this stripe splits into two antehumeral stripes by the dark brown carina; golden-brown on sides; legs dark reddish-brown. Wings hyaline with a restricted basal amber-yellow spot; pterostigma bright ochreous with black nervures. Anal appendages yellow. Other characters as in the male above. Abdomen 27mm, hind wing 34mm.

*Rhodothemis rufa*, female

*Rhodothemis rufa*. A common insect of the plains, less so in submontane regions. Breeds in weedy tanks and ponds, the female hiding in the surrounding jungle. The larvae are gregarious and in laboratory conditions took four months to complete their development. The larva has been described by Nirmala Kumari et al. (Figs. B110, C42-45, C55).

References:- Kirby 1893: 554; Laidlaw 1924: 348; Fraser 1924: 426, 438; 1936: 368, 369, Fig. 104; Lieftinck 1955: 79; Nirmala Kumari & Balakrishnan Nair 1981. Type in Brussels Museum.

Synonymy:- *Libellula rufa* Ramb., 1842; *Libellula oblita* Ramb., 1842; *Erythemis rufa* Brauer, 1868; *Orthetrum oblitum* Kirby, 1893; *Crocothemis rufa* Van Der Weele, 1900.

Distribution:- Water tank 700m SE of Abhayagiri Dagoba, A'pura, 100m, (1m); Malwatu Oya 700m E of A'pura Temple, 100m, (1f); Horowopathana, (m); Balangoda, (-); Rajakadalawa, (7f); Hot Wells, Trinco, (8-); Velvery, (12-).

48 *Sympetrum fonscolombei*

48a Abdomen blood red; a large dorsal spot on segment 1, base of segment 2, dorsum of segments 8 and 9 and all of the ventral border finely black; on 8 this black widens to enclose a spot of red; underneath black with large spots on 6 to 9. Head: labium reddish-brown, labrum, face and frons red, sides of face pale yellow; vesicle olivaceous with a spot of red, occiput olivaceous-brown; eyes brown above, sides red, pale olive-yellow below. Prothorax black, a spot on middle lobe and entire posterior lobe reddish; thorax golden-brown on dorsum, covered in yellow hair, densely on dorsum, a pale bluish stripe on posterior of mes- and metepimeron, black on carina, humeral suture, in front of spiracle and on postero-lateral suture. Legs black, extensor surfaces of tibiae and femurs yellow. Wings with costal border and nervures proximal to node red, bases amber-yellow, pterostigma ochreous between black nervures; distal antenodal incomplete; nodal index  $6-7\frac{1}{2}$ :  $6\frac{1}{2}-6$ /6-5: 5-6; discoidal cell traversed in forewing, usually entire in hind; discoidal field with 3 rows of cells nearly throughout; 1 cubital nervure in all wings. Anal appendages long and slender, red. Abdomen 25mm, hind wing 26mm (Fig. B112).

*Sympetrum fonscolombei*, male

48b Abdomen dark ochreous above, sides bright yellow ventrally, ventral borders black; a subdorsal black stripe from segment 3 to base of 10, incomplete basally on 3 to 7; ventral black extends up to meet this stripe finely, basally and apically. Face pale yellow; eyes brown above, red at sides, pale olivaceous-yellow below; pale brown antehumeral stripe incomplete above; wings with costal border and nervures proximal to node red, bases of wings amber-yellow, more so in hind wings; pterostigma bright yellow with thick black nervures. Anal appendages chrome-yellow. Otherwise resembles the male above, but red colouring replaced everywhere by ochreous. Abdomen 23-28mm, hind wing 28mm.

*Sympetrum fonscolombei*, female

*Sympetrum fonscolombei*

A wide ranging species that breeds in ponds and marshes around Nuwara Eliya and Hakgala in Sri Lanka. The life history in Europe has been studied and the larva described, but nothing

is known about its habits in Sri Lanka. The fully grown larva has a habit of resting on the stem of a reed with head and thorax above water. Eggs are laid at random in shallow water by a unaccompanied female striking the surface of the water with the tip of her abdomen; the eggs, elliptical in shape and with a colourless nipple-shaped pedicel at the anterior pole, are covered in a sticky gelatinous coat. In the laboratory in England, the eggs hatched out in about 3 weeks and the cycle from egg to emergence took about 30 weeks and 12 instars (Figs. B112, C57).

**References:-** Fraser 1936: 377-379, Figs. 105, 106b; Laidlaw 1924: 348; Lieftinck 1940: 97; 1955: 79; Longfield 1946: 47, 48, Fig. 1; Gardner 1951a: 56-66, Figs. of larval stages. Type in Selys collection.

**Synonymy:-** *Libellula flaveola* (nom.preoc) Fonscolombe, 1837; *Libellula fonscolombe* Selys, 1840; *Libellula erythroneura* Schneider, 1845; *Diplax fonscolombe* Brauer, 1866; *Sympetrum fonscolombe* Meyer-Dur, 1874; *Sympetrum rhaeticum* Buchecker, 1876.

**Distribution:-** Hakgala, (3mf, 8m); Uma Oya, (3mf); Horton Plains, (10mf); Horton Plains, (-); Nuwara Eliya, (5, 6-).

#### 49 *Trithemis aurora*

49a Abdomen violaceous, segment 9 on sides of ventral border and 10 at base marked with black; swollen dorso-ventrally at base, slightly constricted at 3 and then dilated again. Labium dark ochreous, middle lobe and borders of lateral lobes black; labrum dark brown, black on border; face and front of frons ochreous, reddish above; vesicle and upper surface of frons metallic violaceous; occiput brown; eyes crimson above, sides brown, lilaceous below. Prothorax reddish-brown, anterior lobe paler, parts of middle and posterior lobes black; thorax dull purple caused by a thin pruinescence over a reddish ground colour; humeral stripe brown but obscure, black stripes on postero-lateral suture and at level of spiracle; underneath olivaceous with a black square crossed by a black line; legs black, tibiae and tarsi ferruginous on flexor surfaces. Wings hyaline with crimson nervures and a broad amber area at base with darker brown rays in subcostal and cubital spaces; pterostigma dark reddish-brown with black nervures; distal antenodal incomplete;  $12\frac{1}{2}$  to  $14\frac{1}{2}$  antenodals in forewing, 9-11 in hind; arc between 1st and 2nd antenodals; discoidal cell of forewing traversed, of hind entire; 2 rows of cells between IRiii and Rspl. Anal appendages red. In teneral specimens,

the abdomen is bright ochreous, the wings have a yellow neurulation and the basal marking restricted; the thorax is yellow or olivaceous and without any pruinescence, the black markings contrasting sharply with the ground colour. Abdomen 21–29mm, hind wing 24–34mm (Fig. B114b).

adult males of *Trithemis aurora*

- 49b Abdomen very narrow and triquetral, bright ochreous and usually without black markings on 9 and 10; wings hyaline with yellow nervures. Abdomen 21–29mm, hind wing 24–34mm.

teneral males of *Trithemis aurora*

- 49c Abdomen ochreous, nearly cylindrical with parallel sides and marked with black which may even replace the background colour; dorsal carina and ventral border black, the two areas of black joining apically to enclose spots of yellow ground colour; a subdorsal black stripe on 1 to 3 which on later segments joins the ventral black. Face and frons olivaceous or bright ochreous, upper part of frons yellow with a black basal line above; occiput golden-brown to black, spotted with yellow; eyes purplish-brown above, lilaceous or grey below. Thorax pale olivaceous on sides, darker dorsally, a brown humeral stripe, a brownish stripe on carina, sutures black. Wings hyaline, usually tipped brown to middle of pterostigma, nervures bright yellow to brown, basal markings pale brown without rays into costal and cubital spaces. Anal appendages black. Other characters as in the male above. Abdomen 19–27mm, hind wing 24–31mm.

*Trithemis aurora*, female

*Trithemis aurora*. A common insect of the plains and submontane regions, breeding in sluggish streams and irrigation channels rather than in ponds and tanks. Adult males can be seen resting on vegetation on the banks, making short beats up and down but always returning to the original resting place. Females and teneral males resort to the surrounding jungles away from the water. The larva has not been described. The violaceous colouring of the male is distinctive; it is smaller than the similarly coloured male of *O. pruinosa neglectum*, the only other male with which it could be confused (Figs. B114b, C58).

**References:-** Kirby 1893: 550; 1905: 271; Laidlaw 1924: 348; Fraser 1924: 439; 1936: 383-385, Fig. 109b; Lieftinck 1955: 79; 1971: 205. Type in Museum of Comparative Zoology, Mass.

**Synonymy:-** *Libellula aurora* Burm., 1839; *Trithemis aurora* Brauer, 1868; *Trithemis soror* Brauer, 1868; *Trithemis adelpha* Selys, 1878 *Trithemis fraterna* Albarda, 1881; *Trithemis congener*, Kirby, 1890; *Trithemis yerbury* Kirby, 1890; *Trithemis liturata* Selys, 1891.

**Distribution:-** Cave Temple, Dambulla, (1f); stream nr.Citadel Hotel, Kandy, 700m, (1f); tributary of Walawe 500m SE of Embilipitiya, (1mf); Horowopathana, (10mf); Jaffna, (7mf); Ella, (6mf); Inginiyagala, (-); Kandy, (7m); Haragama, (5mf, 7mf), Trincomalee, (12f); Alawala, Yakkala, (1mf); Gilcroft, Ambalangoda, paddy fields, (1mf); Madampe, reservoir, (1mf); Mundel Lake, (1mf); 5mi NE and 10mi E of Puttalam, marsh, (2mf); Maha Bulankulama, Talawa Oya, A'pura, (2mf); Ritgala, (2mf); Hot Wells, Trinco, (2mf, 7-, 9-); Moneragala, slow flowing stream, (3mf); Gal oya reservoir, (3mf); Udawela, Kandy, paddy fields, (3mf); Harassbedde, Nuwara Eliya, small stream, (3mf); Wellawaya settlement, (3mf, 6mf); Kantalai, (7-); Ramboda, (-); Punduloya, (-); Peradeniya, (6-); Kandy, (12-).

50 *Trithemis festiva*

50a Abdomen black, segments 1 to 3 with a thin bluish pruinescence; though Fraser (1936) does not indicate this, Sri Lankan specimens have elongated ochreous-yellow markings on the sub-dorsal sides of abdominal segments 5 to 7 with traces on earlier and later segments, while the pruinescence is very pronounced. Head: labium blackish-brown; labrum dark olivaceous-brown or blackish; vesicle and frons above metallic violet, rest of frons and occiput dark brown; eyes dark brown above with a purple reflex, rest bluish-grey. Prothorax dark blue; thorax black with thin purplish pruinescence; legs black. Wings hyaline with an opaque dark brown mark at base of hind wing with dark rays in costal and subcostal spaces; distal antenodal incomplete; arc between 1st and 2nd antenodals; sectors of arc with a long fusion at origin; discoidal cell traversed in forewing, entire in hind; 1 cubital nervure in all wings; discoidal field beginning with 3 rows of cells, its borders strongly convergent at wing border in forewing, characters which distinguish it from *Indothemis carnatica*; 2 rows of cells between IRiii and Rspl; no supplementary nervures to bridge; nodal index 8-10½: 10½-9/10-7: 8-10. Anal appendages black. Teneral males coloured as for females. Abdomen 25mm, hind wing 26-32mm (Figs. B113, B114c).

*Trithemis festiva*, male

50b Abdomen cylindrical and tapering to end, bright yellow marked with black - a narrow mid-dorsal stripe, a very narrow ventral border, a broad subdorsal stripe the full length of the abdomen, expanding at basal ends of segments to join the mid-dorsal and ventral stripes to enclose wedges of yellow except in the final three segments where the black takes over fully, sutures finely black on basal segments. Head: labium pale brown and black; labrum, face and frons dirty yellow to dark brown on the non-metallic upper surface of frons; eyes dark brown above, lilaceous below. Thorax greenish-yellow or olivaceous, humeral stripe blackish-brown, mid-dorsal stripe dark brown, a stripe on mesepimeron and on postero-lateral suture; olivaceous underneath; legs black, anterior femurs yellow, coxae and trochanters pale olivaceous. Wings hyaline, in adult dark reddish-brown at apices to proximal end of pterostigma, with rays in some of the neural spaces. Anal appendages black. Other characters as in the male above. Abdomen 22mm; hind wing 26mm.

females and teneral males, *Trithemis festiva*

*Trithemis festiva*. The dominant species of the genus and found commonly from the plains to montane regions, breeding freely in both still and running water, preferring the latter. It is never found away from water usually settling on rocks mid-stream or on twigs over-hanging water. The life history has been studied by Kumar who collected eggs from an ovipositing female. The eggs hatched in three weeks and the larvae were reared to emergence after 11 instars, taking a total of 109 days from oviposition. The larvae are sluggish and tend to remain attached to submerged vegetation. Females are not accompanied by males when ovipositing (Figs. B113, 114c, C59).

References:- Kirby 1893: 551; Laidlaw 1924: 348; Fraser 1924: 426, 439; 1936: 387-389, Figs. 108, 109c; Lieftinck 1955: 79; 1971: 205; Arun Kumar 1972: 103-112, Figs. 1-51. Type in the Selys collection.

Synonymy:- *Libellula festiva* Ramb., 1842; *Libellula infernalis* Brauer, 1868 *Dythemis infernalis* Brauer, 1868; *Trithemis infernalis* Brauer, 1868; *Trithemis festiva* Brauer, 1868; *Trithemis proserpina* Selys, 1868.

Distribution:- Stream nr. Citadel Hotel, Kandy, 700m, (1ml); right tributary of Seethagangula 1km downstream from Dalhousie village, (1m); Diyaluma Falls, 500m, (1m); tributary of Walawe 500m SE of Embilipitiya, (1m); right tributary of Kaluganga 5km SE from Gallella, Ratnapura, (1m); Kudawa ganga under bridge 500m from Base Camp, Sinharaja Forest, Kudawa, 380m, (1m); Deniyaya, (9mf); Ella, (3mf); Panwila, (-); Hasalaka, (9mf); Trincomalee, (11m);



Punduloya, (11mt); Kandy, (7m); Galagedara, (1m); Chilaw, (1m); Haragama, (5m); Punduloya, (11f); Trinco., (8, 9, 12); Hot Wells, Trinco., (11); Alawala, Yakkala, (1m); Hot Wells, Trinco, (2m); Minneriya, (2m); Deerwood, Kuruwita, (2m); Balangoda, (2m); Kahawatta, Ratnapura, (3m); Uduwela, Kandy, (3m); Foothills of Knuckles, small, fast running stream, (3m); Ury Estate, Badulla, (3m); Hanguranketa, slow flowing stream, (3m); Kumundu Oya, Nuwara Eliya, (3m); Rambukpath Oya, Hatton, (3m); Menickwella Ela, Hatton, (3m); Wellawaya settlement, (3m).

51 *Trithemis kirbyi kirbyi*

- 51a Abdomen brilliant red with black spots basally on mid-dorsum of segments 8 and 9. Head generally pale yellow or whitish; frons pale yellow usually with a rosy-red blush; vesicle yellow; occiput brown; eyes bright red above, lilaceous below. Prothorax ochreous, a black collar between anterior and middle lobes; thorax olivaceous to golden-brown, tinted with rose-red on dorsal, humeral and metepimeral regions; mesepimeron very pale olivaceous or bluish or greenish white; in some specimens the whole side barring a greenish-white stripe on epimeron, brilliant red; beneath, the black square of the genus indistinct. Legs flesh-coloured, extensor surfaces of tibiae and femurs, yellowish or red, flexor surface of hind femurs, black distally. Wings hyaline with bright red neuration, a variable broad, basal, bright reddish-yellow marking on all wings, deeper in colour and wider in extent in costal and subcostal spaces, discoidal cell and whole anal area of hind wing up to posterior border; pterostigma black with a narrow red or yellow stripe in its middle; distal antenodal complete or not so; nodal index 7–11: 10-7/8–8: 8–8; discoidal cell may be traversed twice in forewing, once in hind; may have 2 cubital nervures in forewing; discoidal field beginning with 3 rows of cells; 2 rows of cells between IRiii and Rspl; no supplementary nervures to bridge. Anal appendages bright red. Abdomen 22mm, hind wing 25mm (Figs. B113, B114a).

*Trithemis kirbyi kirbyi*, male

- 51b Abdomen rusty red (ferruginous) dorsally, pale olivaceous on sides, often pinkish and with a variable? sub-dorsal stripe from segments 5 to 10 or full length, sometimes absent or reduced to basal spots on 5 to 9; dorsal spots on 8 and 9; wings variable, in some as in the male above; in the more common form the basal markings restricted to two rays at the extreme base of forewing to the subcostal and cubital spaces. Head:

face pale creamy-yellow to citron-yellow on parts of frons and vesicle; occiput golden-yellow. Thorax pale greenish-white, sometimes with a rose-red suffusion; antehumeral stripe diffuse olivaceous-brown; black markings better defined than in the male. Anal appendages yellow. Abdomen 23mm; hind wing 27mm.

*Trithemis kirbyi kirbyi*, female

*Trithemis kirbyi kirbyi*. Fraser says it is a very local insect, but common where it occurs; he has not seen it in Sri Lanka and therefore cannot confirm Kirby's record of it. A wary insect, difficult to capture and usually found resting on bare rock in hot barren waste areas. Females are rare and only seen when they come to water to oviposit. The occurrence of this species in Sri Lanka needs confirmation (Fig. B114a).

References:- Kirby 1983: 551; Laidlaw 1924: 348; Fraser 1924: 426, 439, 440; 1936: 385-387, Fig. 109a; Lieftinck 1955: 79. Type in the Selys collection.

Synonymy:- *Trithemis aurora* Kirby, 1886; *Trithemis kirbyi* Selys 1891; *Trithemis kirbyi kirbyi* Ris, 1912.

## 52 *Trithemis pallidinervis*

52a Abdomen black marked with bright yellow—very broadly on segments 1 to 3, extending up to dorsum on 1 and 2, but tapering apically on 3, long wedges on 4 to 7 and a small basal subdorsal spot on 8; remaining segments black; sutures on basal segments black; abdomen long and slender, basal segments only slightly tumid. Head: labium pale yellow; labrum black with two large basal yellow spots; clypeus and front of frons yellow or light brown; rest of frons and vesicle metallic purple; occiput olivaceous or yellow; eyes reddish-brown above, brown on sides and bluish-grey below. Prothorax dark brown/black with some yellow; thorax olivaceous-brown dorsally, and coated with greyish hairs, brighter on sides; a brown triangle on mid-dorsum and three black stripes on each side; legs black with some yellow. Wings hyaline, reticulation reddish and a bright amber-yellow marking at extreme base of forewing, but extending to first antenodal, cubital and nearly to tornus in hind; pterostigma black with creamy white ends; nodal index 9-8½: 8½-10/9-6: 6-10; other venational details as for *T. festiva*. Anal appendages yellow at base, then black. Abdomen 30mm, hind wing 30-36mm.

*Trithemis pallidinervis*, male

- 52b Very similar to male above, but frons metallic golden-green, vesicle bright yellow, wings often tinted with yellow or reddish brown at apical half, segment 10 yellow with base black. Anal appendages yellow. Abdomen 27mm, hind wing 31mm.

*Trithemis pallidinervis*, female

*Trithemis pallidinervis*. A local species breeding in large stagnant tanks or sluggish streams, usually in marshy areas, sometimes in sizeable colonies. The adult is often seen perched on top of a tall reed, elevated by its long, spidery legs bunched together like a stalk. Males never wander far from water unlike the females.

References:- Laidlaw 1924: 349; Fraser 1924: 426, 440; 1936: 389-391; Lieftinck 1955: 79; 1971: 205. Type said to be in BMNH but is not listed in Kimmins 1966.

Synonymy:- *Sympetrum pallidinervis* Kirby, 1889; *Trithemis dryas* Martin, 1904; *Trithemis pallidinervis* Morton, 1907.

Distribution:- Quadrangle ruins, Polonnaruwa, 60m, (1m); Horowopathana, (3, 10mf); Colombo, (-); Wahalkada, (-); Chilaw, (1mf); Hakgala, (8m); Gilcroft, Ambalangoda, paddy fields, (1mf); Madampe reservoir, (1m); Airport Garden Hotel, Seeduwa, Galle Dt. (12m).

53 *Onychothemis tonkinensis ceylanica*

Abdomen black marked with citron-yellow and reddish-ochreous —a triangular mid-dorsal spot on segment 1, a diamond-shaped mid-dorsal spot on 2, dorsum and sub-dorsum of 3, making an annule basally plus a mid-dorsal stellate spot bifid apically and a large ventro-lateral spot on jugal suture; segments 4 to 9 similar, but the lateral spots on 4 to 6 much smaller, confluent with the mid-dorsal spot which is very much larger on 5 to 9, smaller on 5 and enlarging till on 9 almost the whole segment is yellow with rust-red lateral and posterior borders; 10 yellow except for lateral and apical borders; large pairs of citron-yellow spots beneath 3 to 8. Head: labium ochreous, parts black; labrum black with a yellow spot on each side; anteclypeus and postclypeus yellow with a curved black stripe across latter; frons and vesicle dark metallic blue, lower border of former yellow; occiput black with a large yellow spot; eyes bottle green. Prothorax black with borders and two spots yellow; thorax dark metallic blue marked with yellow on carina finely, a humeral stripe which may be incomplete, and a stripe on the side; legs black, long and robust, claws without hooks, hind femurs with 5-8 very

robust spines. Wings hyaline. apices clear or tipped with brown; pterostigma long, black; distal antenodal incomplete; antenodals 14–17 in forewing, 10–11 in hind; arc between 1st and 2nd antenodals; no supplementary nervures to bridge; discoidal cell of forewing traversed, of hind entire; R<sub>iii</sub> and IR<sub>iii</sub> markedly undulated; 2 rows of cells between IR<sub>iii</sub> and R<sub>sp1</sub>; 1 cubital nervure to all wings. Anal appendages black. (Figs. B115, B116a).

Females similar to males except in abdominal markings—spots on 3 form complete ring at jugum, broad on dorsum and sides; lateral spots absent or much reduced on 6; dorsal spots on 6 to 8 small and separated from the lateral; 9 and 10 unmarked, though 9 may have a small baso-lateral spot; wings in very old females often enfumed deep brown. Male abdomen 34mm; hind wing 40mm; female 36mm and 43mm respect.

*Onychothemis tonkinensis ceylanica*, both sexes

*Onychothemis tonkinensis ceylanica*. A submontane species which in India breeds in streams running through heavy jungle. Though the type has come from Sri Lanka, there is no specimen in the Museum collection, nor have any of the usual authors reported on having seen any specimens from here (Figs. B115, 116a).

References:- Laidlaw 1924: 249; Fraser 1924: 426, 442; 1936: 404–406, Fig. 111a, 112. Type in Selys collection.

Synonymy:- *Onychothemis testacea ceylanica* Laidlaw, 1924.

54 *Palpopleura sexmaculata sexmaculata*

- 54a Abdomen pruinosed light blue, sides of 1, 2 and base of 3 yellow, as is the underneath with a median stripe of black; tenerals and juveniles coloured as in females. Head: labium yellow with some black; labrum and face creamy yellow; frons and vesicle brilliant metallic blue; occiput olivaceous-brown; eyes olivaceous capped brown. Prothorax dark brown with some yellow; thorax pale greenish-yellow, marked in reddish-brown dorsally, paling to yellow along border of humeral suture which is black, as are a stripe above spiracle and the postero-lateral suture; legs bright yellow, tibiae, tarsi and outer sides of middle and anterior femurs black. Wings hyaline marked with black, hind wing usually tinted with yellow from base to proximal end of pterostigma; variable black spots at

node, in subcostal space, extending to a few cells in costal space in forewing, at sectors of arc, but not in hind wing, and in the cubital space to half the discoidal cell in the forewing and the whole of it in the hind; pterostigma black in adults, centre streaked white, yellow in teneral with borders and distal third black; distal antenodal incomplete;  $10\frac{1}{2}$  to  $11\frac{1}{2}$  antenodals in forewing, 7-8 in hind; arc between 1st and 2nd antenodals; supplementary nervures often present in bridge. Anal appendages black. Abdomen 15mm; hind wing 17mm (Fig. B117).

*Palpopleura sexmaculata sexmaculata*, male

- 54b Abdomen bright ochreous, sutures and ventral borders finely black; a narrow mid-dorsal black stripe from segment 3 to end broadening analwards; another broad subdorsal stripe on the same segments, also broadening analwards and continuing on to the black anal appendages. Head: labium yellow; labrum, face and the non-metallic frons, brighter yellow; eyes olivaceous, capped brown. Prothorax yellow, except base of anterior lobe, sides of posterior lobe and a spot on each side of the middle lobe, dorsum of thorax rich ochreous, traces of a brown antehumeral stripe and a vestigial black stripe on the sides. Wings hyaline, more broadly marked with blackish-brown and black and more deeply tinted amber-yellow than in the male, nervures in dark areas golden-yellow; pterostigma creamy-yellow in proximal half, rest black; venation as in male above. Anal appendages black. Abdomen 14mm; hind wing 20mm.

subadults and female of

*Palpopleura sexmaculata sexmaculata*

*Palpopleura sexmaculata esxmaculata*. A wide ranging insect but apparently not very common in Sri Lanka. Breeds in rocky marshy pools in streams, adults occur away from water, moving into vegetation soon after emerging. The larva of this species has not been described, but that of another has been and a brief description has been included with a figure. Fraser says he has specimens from Sri Lanka, but neither other recent workers nor the Museum collection lists the species. Fraser also says that this subspecies of the genus occurs (in India) in large colonies in marshy spots, usually in bamboo jungle where

they breed. Some of the species, he does not name this one, "are remarkable for their mimicry of hymenopterous insects, which they resemble in appearance and flight, the latter being low, circling and unsustained" (Figs. B117, C56).

References:- Fraser 1936: 318-320, Fig. 94; 1955: 51, 52, Fig. 1; Sahni 1965: 281, Figs. 6-9. Type has been lost from Fraser's collection.

Synonymy:- *Libellula sexmaculata* Fabr., 1787; *Aeshna minuta* Fabr., 1793; *Palpopleura sexmaculata* Brauer, 1868.

55 *Rhyothemis triangularis*

Wings hyaline enfumed pale brown; bases black with dark metallic blue reflex, to about a fourth of the length of the forewing, to about a third in hind wing. Head black, frons and vesicle dark green or metallic blue-green; eyes blackish-brown above, paler or lilaceous below. Prothorax blackish-brown, thorax dark metallic green. Legs black. Anal appendages black (Fig. B118). Male: abdomen 18mm, hind wing 26mm; female 16mm and 26 mm respect.

*Rhyothemis triangularis*, both sexes

*Rhyothemis triangularis*.

Fraser says the species occurs in profusion over most tanks in S.Coorg; the Sri Lankan records are from Kandy and Udugama, where he says the species is not "uncommon". He adds that the species mimics bees in their flight, probably deriving considerable protection from birds thereby; the imago rarely seems to become fully adult, the body, especially the abdomen, being soft and weakly chitinated quite late in life. The larva has not been described (Fig. B118).

References:- Kirby 1893: 549; Laidlaw 1924: 350; Fraser 1924: 426, 443, 444; 1936: 419-421, 427-428, Fig. 116. Type said to be in BMNH by Fraser but is not listed in Kimmins 1966.

Synonymy:- *Rhyothemis lankana* Kirby, 1893; *Rhyothemis bipartita* Tillyard, 1906.

Distribution:- Kandy, (5mf); Udugama, (4m).

56 *Rhyothemis variegata variegata*

Wings marked with black and amber yellow:

Male: wings fully tinted yellow, apices blackish-brown almost to pterostigma; forewings with black spots at node and apex, discoidal cell and middle of Riii; hind wing with two broad longitudinal basal black bands with dark metallic blue reflex,

these bands enclosed in a large chrome-yellow area; pterostigma blackish-brown. Head mostly black and creamy, frons and vesicle dark metallic green, occiput black; eyes dark reddish-brown above. Prothorax black, thorax dark metallic green, legs black. Anal appendages long.

Female: resembles the male except in wing markings; forewing hyaline from node to apex, basal half tinted golden-yellow with broad blackish-brown markings - a stripe in costal/subcostal space up to node where it joins a broad band which extends posteriorly almost to the wing border and meeting a triangular spot at the base of the discoidal cell; hind wing apex hyaline, rest of wing golden amber marked with blackish-brown, somewhat as in the male; pterostigma blackish-brown, about half the size of that in the male. Andromorph females are common.

Male: abdomen 24mm, hind wing 34mm: female; 21mm and 28-37 mm respect.

*Rhyothemis variegata variegata*, both sexes

*Rhyothemis variegata variegata*. A local insect of the plains, being in numbers where found around weedy tanks. The larva has been described by Chowdhury et al from specimens collected in a weedy pond. The larvae were bottom dwelling, sluggish and occasionally sprawling on the bottom feigning death (Figs. C42-C45).

References:- Kirby 1891: 203; 1893: 549; Laidlaw 194: 350; Fraser 1924: 426, 443; 1936: 423, 424; Lieftinck 1955: 80; Chowdhury & Akhteruzzaman 1981: 131-144, Pls. 1-4. The type has been lost.

Synonymy:-*Libellula variegata* Linn., 1763; *Libellula marcia* Drury, 1773; *Libellula indica* Fabr., 1787; *Libellula histrio* Fabr., 1787 *Libellula celestina* Olivier, 1792; *Libellula marcia* Fabr., 1793; *Rhyothemis variegata* Hagen, 1867; *Rhyothemis marcia* Hagen; *Rhyothemis murcia* Brauer, 1868; *Rhyothemis phyllis phyllis* Fraser, 1924; *Rhyothemis variegata* Ris, 1913.

Distribution:- Pond in Viharamahadevi Park, Colombo, 10m, (1mf); water tank 700m SE of Abhayagiri Dagoba, A'pura, 100m, (1f); Ranna, (9, 11mf); Colombo, (7mf); Polonnaruwa, (8, 9mf); Padaviya, (4, 5mf); Chilaw, (1mf); Polonnaruwa, (2mf); Trinco., (11-); Kantalai (11-); Airport Garden Hotel, Seeduwa, Galle Dt. (12mf); Kosgoda lagoon, (12mf).

## 57 *Hydrobasileus croceus*

Abdomen olivaceous changing to reddish or ochreous towards anal end, marked with black—all sutures, mid-dorsal carina and ventro-lateral borders finely; apical ends of 3 to 9 bright

yellow; 4 to 9 with apical and basal dorsal black spots which gradually meet to enclose spots of ground colour on 5 to 7 and to cover dorsum of 8 and 9 completely; 10 black except for yellowish dorsal carina and a spot on each side. Head: labium pale yellow; labrum bright golden-ochreous; anteclypeus, sides of postclypeus and vesicle olivaceous; rest of postclypeus, frons and occiput bright ochreous; eyes reddish-brown above, rest olivaceous to yellowish. Prothorax olivaceous, slightly golden, a black band between middle and anterior lobes; thorax olivaceous suffused a golden reddish-brown; legs ochreous. Wings hyaline, palely tinted burnt-brown to amber, apices darker burnt-brown, posterior area of hind wing with a slipper-shaped reddish-brown fascia roughly in the tornal angle; pterostigma ferruginous above, bright ochreous beneath; distal antenodal incomplete;  $15\frac{1}{2}$  to  $16\frac{1}{2}$  antenodals in forewing, 10 in hind; arc between 1st and 2nd antenodals; discoidal cell traversed once or twice in forewing, entire in hind; discoidal field beginning with 3 or 4 rows of cell and continuing with rows of 3 cells; subtrigone in forewing not defined; 1 cubital nervure in all wings; no supplementary nervures to bridge; 2 rows of cells between IRiii and Rspl. Anal appendages reddish-brown. Male: abdomen 31mm, hind wing 41mm: Female: abdomen 30mm, hind wing 45mm (Fig. B119).

*Hydrobasileus croceus*, both sexes

*Hydrobasileus croceus*. This species does not appear to be common in Sri Lanka as only a single record is available. Fraser says it breeds in weedy tanks over which the males can be found waiting for females. After mating, females deposit their eggs in clumps on floating weeds. The larva of a undetermined species of the genus has been described. These larvae were found among weeds and also on clean sandy bottoms (Fig. B119, C42-C45).

**References:-** Kirby 1893; 547, Pl. 41, Fig. 1; Laidlaw 1924 : 350; Fraser 1924: 426, 444; 1936: 428-430, Fig. 117; Lieftinck 1855: 80; Chowdhury & Akhteruzzaman 1981: 131-144, Pls. 1-4. Type is in the Selys collection.

**Synonymy:-** *Tramea croceus* Brauer, 1867; *Tramea extranea* Hagen, 1867; *Hydrobasileus croceus* Karsch, 1890; *Hydrobasileus extraneus* Kirby, 1893.

**Distribution:-** Kandy, (5f).



58 *Pantala flavescens*

58a. Abdomen tinted with bright red dorsally, rest bright ochreous except for sides of segments 1 to 4 which are pale yellow, and mid-dorsal black pyriform spots on segments 8 to 10. Head: labium yellowish and dark brown, labrum ochreous with black border, anteclypeus olivaceous yellow, postclypeus and frons golden-yellow or orange suffused reddish in front, vesicle bright ochreous, eyes reddish-brown above, rest lilaceous or bluish. Prothorax ochreous with a band of reddish-brown between anterior and middle lobes, thorax olivaceous or ferruginous, coated thickly with yellowish downy hair, bluish-green or greenish-white, unmarked; legs black, extensor surfaces of femurs yellow. Wings hyaline, base of hind wing pale golden-yellow to anal loop, narrow apical brown spot on posterior border, pterostigma bright ochreous or reddish-brown, distal antenodal incomplete, antenodals 12-13 in forewing, 7 in hind, *IR*<sub>iii</sub> and *R*<sub>iii</sub> very sinuous, sectors of arc widely fused in both wings, arc between 1st and 2nd antenodals, discoidal cell in forewing traversed, in hind entire, discoidal field in forewing beginning with rows of 3 cells, 1cubital nervure in forewing, 2 in hind, anal loop long and slender. Anal appendages long and slender, apices black. Abdomen 32mm, hind wing 39mm (Fig. B120).

*Pantala flavescens*, male

58b Abdomen bright ochreous (dorsum not tinted with bright red as in the male), sides of 1 to 4 pale olivaceous, 8 to 10 with black mid-dorsal pear-shaped spots narrow at base of segment, may be vestigial in some segments; not constricted at segment 3. Face bright chrome-yellow without any reddish tinge; eyes olivaceous brown above, rest lilaceous or bluish. Wings hyaline, evenly enfumed and without an apical brown spot above. Other characters as in the male above. Abdomen 31mm, hind wing 40mm.

*Pantala flavescens*, female

*Pantala flavescens*. A very common and wide ranging dragonfly, breeding in weedy, marshy and shallow water and emerging in large numbers when they do. An insect of the plains and submontane regions, showing distinct migratory habits. The life history has been studied by Arun Kumar and the larva described by Chowdhury et al. Oviposition takes place in

tandem; eggs hatch in 6–9 days and emergence from the 12th instar is in about 60 days from oviposition. The larvae are active weed dwellers (Fig. B120, C42–45, C60).

**References:-** Kirby 1893: 547; 1905: 271; Laidlaw 1924: 379; Fraser 1924: 426, 443; 1936: 413–416, Fig. 115; Liefstinck 1955: 80; 1971: 205; Kumar 1973b: 304, 305, Figs. 115–123; 1984: 43–50, Figs. 1–30; Chowdhury & Akhteruzzaman 1981: 131–144, Pls. 1–4. Type has been lost.

**Synonymy:-** *Libellula flavescens* Fabr., 1798; *Libellula viridula* Palisot de Beauvais, 1805; *Libellula analis* Burm., 1839; *Libellula terminalis* Burm., 1839; *Pantala flavescens* Hagen 1861.

**Distribution:-** Dehiwela Zoo, 100m, (1m); water tank 700m SE of Abhayagiri Dagoba, A'pura, 100m, (1m); Cave Temple, Dambulla, (1f); stream nr. Citadel Hotel, Kandy, 700m, (1f); pond at Sinharaja Information Centre, Kudawa, 350m, (mf); Horowopathana, (4, 10mf); Jaffna, (12mf); Yala, (3, 4mf); Kanneliya, (9mf); Anuradhapura, (-); Kegalla, (-); Jaffna, (9mf); Trincomalee, (9mf); Balangoda, (2m); Trinco., (10, 11, 12-); Mahagany, Trinco., (9-); Pigeon Island, (11-); Peradeniya, (10); Kandy, (-); Yatiyantota, (-); Airport Garden Hotel, Seeduwa, Galle Dt. (12m); Pinnewala Elephant Orphanage, (12m); Kosgoda beach, (12m).

59 *Tramea basilaris burmeisteri*

59a Abdomen bright brick-red marked with black; apical annules on segments 4 to 7, nearly interrupted dorsally and becoming broader from segment to segment; segment 8 black with a triangular yellow basal spot on each side; 9 and 10 black with a small spot on each side; apical joints of 7 to 9 bright yellow; beneath black surrounded with yellow. Head: labium yellow, middle lobe black, labrum reddish-brown bordered in black, anteclypeus and sides of postclypeus olivaceous yellow, rest of postclypeus and frons bright red, vesicle and occiput olivaceous, the former tipped red, eyes dark reddish-brown above, rest lilaceous. Prothorax yellow, thorax olivaceous tinged reddish dorsally and bluish-green laterally marked with black. Legs black, coxae, trochanters and inner side of anterior femurs olivaceous. Wings hyaline, hind wing variably dark reddish-brown with yellow nervures at base, pterostigma ochreous, much shorter in hind wing than in forewing; distal antenodal incomplete; arc between 1st and 2nd antenodals; 10½ or 11½ antenodals in forewing; discoidal cell traversed once or twice in forewing, entire in hind; 2 rows of cells between *IRiii* and *Rspl*; subtrigone of forewing merged in basal neuration; discoidal field beginning with 3 or 4 rows of cells; no supplementary nervures to bridge. Anal appendages

very long, dark reddish-brown to black. Abdomen 33mm, hind wing 42mm (Fig. B121, 122).

*Tramea basilaris burmeisteri*, male

- 59b Abdomen olivaceous-green or yellowish marked with black apical annules on 4 to 7 very constricted dorsally and becoming broader from segment to segment; 8 to 10 black with a spot on each side; apical joints yellow. Face and frons chrome-yellow, not tinted with red. Thorax bluish-green on sides; humeral suture finely black, expanding above; lateral stripes expanded to form elongate spots; wings hyaline, usually tinted yellow which deepens up to pterostigma, hind wing with two dark blackish-brown basal spots surrounded by an areola of golden amber, one spot is in the area of the cubital space, discoidal cell, hypertrigone and base of the anal loop, the other runs from the midrib of the anal loop to near the tornal angle; nervures in dark area bright yellow; distal antenodal incomplete; antenodals 11-12 in fore-wing, 10-12 in hind; eyes dark reddish-brown above, rest lilaceous. Anal appendages black. Other characters as in the male above. Abdomen 34mm, hind wing 41mm.

*Tramea basilaris burmeisteri*, female

*Tamea basilaris burmeisteri*. A common insect of the plains, but reported in India occasionally from montane regions. Breeding in weedy tanks and marshes. The larvae have been described by Kumar as weed dwelling and active swimmers (Figs. B121, 122b, C61).

**References:-** Kirby 1893: 548; Laidlaw 1924: 350; Fraser 1924: 426, 415; 1936: 431-434, Fig. 118, 119b; Lieftinck 1955: 80; Arun Kumar 1973b: 305-306, Figs. 124-133. Burneister's type is in the Museum of Comparative Zoology, Mass. Kirby's type of *T. burmeisteri* which Fraser says was in BMNH is not listed in Kimmins 1966.

**Synonymy:-** *Libellula chinensis* Burm., 1839; *Libellula basilaris* Hagen, 1862; *Tramea burmeisteri* Kirby, 1880.

**Distribution:-** Colombo, (4mf); Talawila, (-); Chilaw, (1m); Mannar, (-); Elephant Pass, (-); Trinco., (11-); Mahagany, Trinco., (11-).

— *Tramea* sp.

**Distribution:-** Pond at Sinharaja Information Centre, Kudawa, 350m, (1 ex).

60 *Tramea limbata*

60 Abdomen blood red, last three segments mostly black; a large reddish triangular spot ventrally and baso-laterally on 8; another small spot on each side of 9; 10 entirely black. Head: labium dull yellow, labrum black or reddish with black in the middle, anteclypeus, postclypeus and lower border and sides of frons olivaceous or ochreous, rest of frons dark metallic violet, vesicle and occiput dark olivaceous; eyes dark brown above, rest olivaceous. Prothorax dark brown, thorax olivaceous with a reddish suffusion, legs black, coxae and trochanters reddish-brown. Wings hyaline, nervures red towards base of wings, sometimes palely enfumed, base of hind wing marked variably with black, this area not surrounded by a golden areola as in *T. basilaris burmeisteri*, pterostigma dark ochreous, distal antenodal incomplete, nodal index 10–11½: 11½–11/13–7: 7–13; discoidal cell of forewing traversed once or twice, that of hind wing entire; arc between 1st and 2nd antenodals; 1 cubital nervure to all wings; discoidal field beginning with 4 rows of cells; 2 rows of cells between IRiii and Rspl; subtrigone in forewing merged with basal neururation; no supplementary nervures to bridge. Anal appendages very long and red in the male, nearly as long but black in the female. Male abdomen 33mm, hind wing 45mm; female 32mm and 44mm respect (Figs. B121, 122).

*Tramea limbata*, both sexes

*Tramea limbata*. Lieftinck (personal comm. to Kumar & Prasad, 1976) has stated that the Indian forms should belong to the species *similata* Rambur, a possibility that Fraser (1936) has also considered, but as there are many Indian forms appearing to be a series, Fraser has retained the Indian forms in *limbata*.

An insect of the plains and submontane regions; little has been recorded about its habits and habitats. Fraser (1919) who has described and figured the larva, rather inadequately, says it breeds in weeded collections of water (Figs. B122a, C62).

References:- Kirby 1893: 548; Laidlaw 1924: 350; Fraser 1919: 460, 461, Pl. 32, Fig. 3, Pl. 34, Fig. 3; 1924: 426, 415; 1936: 431, 432, 436–438, Fig. 119a; Lieftinck 1940: 97; 1955: 80; Kumar & Prasad 1977: 199–202, Figs. 1–10. Type is in Selys collection in Brussels Museum.

Synonymy:- *Libellula limbata* Desjardins, 1832; *Libellula incerta* Ramb., 1842; *Libellula mauriciana* Ramb., 1842; *Libellula stylata* Ramb., 1842; *Libellula similata* Ramb. 1842; *Tramea rosenbergi* Brauer, 1866; *Tramea transmarina* Brauer; 1867

*Tramea samoensis* Brauer, 1867; *Tramea mauriciana* Brauer, 1868; *Tramea similata* Brauer, 1868; *Tramea stylata* Brauer, 1868; *Tramea eurybia* Selys, 1878; *Tramea euryale* Selys, 1878; *Tramea continentalis* Selys, 1878; *Tramea limbata* Kirby, 1889; *Tramea translucida* Kirby, 1889; *Tramea madagascariensis* Kirby, 1889; *Tramea limbata continentalis* Ris, 1908; *Tramea limbata race similata* Fraser, 1920.

**Distribution:-** Palatupana, (2mf); Irrakkandi-, Trinco, (5mf, 9-); Peradeniya, (11m); Trincomalee, (9m); Puttalam, (1m); Jaffna, (9m); Passara tank, 1200m, (9-); Kosgoda Turtle Hatchery, (12mf, in cop).

61 *Tholymis tillarga*

61a Abdomen rusty red, sides of basal segments paler; wings hyaline with a broad, smoky golden-brown fascia from node to base of hind wing and which is bordered distally by an opalescent white oval spot. Head: face and frons ochreous often with a crimson flush, occiput dark ochreous, rest olivaceous or pale yellowish-brown., eyes brown capped reddish, olivaceous below. Prothorax and thorax golden yellow or olivaceous with a reddish suffusion on dorsum, legs ochreous. Pterostigma reddish-brown, distal antenodal incomplete, nodal index 8-10½: 9½-8/10-7: 7-9; arc lying between 1st and 2nd antenodals; sectors of arc with a long fusion in both wings; discoidal cell traversed in forewing, entire in hind; discoidal field in forewing begining with 3 rows of cells; 2 rows of cells between IRiii and Rspl; no supplementary nervures to bridge; 1 cubital nervure in both wings. Anal appendages ochreous or reddish, long and slender. Abdomen 30mm, hind wing 35mm (Fig. B123).

*Tholymis tillarga*, male

61b Abdomen olivaceous brown, segment 8 in female not dilated at sides; wings hyaline with a pale and obscure golden-brown fascia in hind wing from node to base and without any opalescent spot; head and thorax olivaceous and without any reddish tinge; eyes brown capped reddish, olivaceous below. Otherwise closely similar to the male above. Abdomen 29mm, hind wing 34mm.

*Tholymis tillarga*, female

*Tholymis tillarga*. A crepuscular insect, appearing shortly before dusk and coming often to house lights. Found in the plains and the lower montane regions. Breed in marshes and other weeded water; the larvae are sluggish bottom dwellers, completing development quickly in 2 to 3 months, the adults

lying up in the surrounding vegetation during the day. The larva has been described by Arun Kumar and by Chowdhury et al (Figs. B123, C42-45, C63).

**References:-** Kirby 1893: 547; 1905: 271; Laidlaw 1924: 349; Fraser 1919: 460, Pl. 32 Fig. 2, Pl.34, Fig. 1; 1924: 426, 442, 443; 1936: 410-413, Fig. 114; Lieftinck 1955: 80; 1971: 205; Kumar 1973b: 303-304, Figs. 107-114; Chowdhury & Akhteruzzaman 1981: 131-144, Pls. 1-4; Mitra 1985: 144-146. Type lost.

**Synonymy:-** *Libellula tillarga* Fabr., 1798; *Libellula pallida* Palisot de Beauvais, 1805; *Libellula bimaculata* Desjardins, 1835; *Pantala tillarga* Brauer, 1864; *Zyxomma tillarga* Bräuer, 1866; *Tholymis tillarga* Hagen, 1867; *Tholymis pallida* Hagen, 1867.

**Distribution:-** Water tank 1500m SE of Nuwarawewa, A'pura, 100m, (1m); tributary of Walawe 500m SE of Embilipitiya, (1f); Horowopathana, (-); Colombo, (5-); Gampaha, (11-); Lahugala, (-); Kandy, (12m); Belihuloya, (2m); Trinco., (10-); Kantalai, (11-); Henerathgoda, (5-); Ramboda, (-); Kosgoda lagoon, (12mf).

## 62 *Zyxomma petiolatum*

Abdomen reddish-brown changing to black on terminal segments sides of segments 1 to 3 pale brown; sutures finely blackish. Head: labium pale yellow; labrum pale ochreous; face and frons pale olivaceous, reddish-brown above with a margin of golden-yellow below in front; vesicle dark reddish-brown; eyes brilliant emerald-green. Prothorax and thorax dark brown, the latter coated with long fine hair, paling at sides, unmarked; legs pale reddish-brown or ochreous; wings hyaline, enfumed brown with age, apices dark brown to beyond proximal end of pterostigma which is dark blackish-brown; distal antenodal incomplete; discoidal cell in forewing traversed, that of hind entire; sectors of arc fused shortly in forewing, longer in hind; 1 cubital nervure in all wings; discoidal field in forewing beginning with 3 rows of cells, its sides converging at wing border; 1 row of cells between *IR*<sub>iii</sub> and *R*<sub>sp</sub><sub>1</sub>; apex of anal loop remains open; nodal index is 6-10½: 10½-7/9-8: 8-8. Anal appendages reddish-brown, very long and slim, quite often damaged. Male abdomen 39mm, hind wing 33mm: female 39mm and 35mm respect (Fig. B124).

*Zyxomma petiolatum*, both sexes

*Zyxomma petiolatum*. Another crepuscular insect appearing shortly before dusk and coming often to house lights. Breed in small stagnant pools and even in domestic wells. Found in the plains and in the lower montane regions. The larva has

been described by Arun Kumar and by Chowdhury et al. (Figs. B124, C42-45, C64).

References:- Kirby 1893: 554; Laidlaw 1924: 350; Fraser 1924: 421, 442; 1936: 407-410, Fig. 113; Arun Kumar 1973b: 302-303, Figs. 97-106; Chowdhury & Akhteruzzaman 1981: 131-144, Pls. 1-4. Type is in Selys collection., Brussel's Museum.

Distribution:- Horowopathana, (10m); Ramboda, (-).

63 *Aethriamanta brevipennis*

- 63a Abdomen brilliant vermilion-red, dilated and flat; eyes dark red-dish-brown above, paling on sides and below, broadly contiguous; labium yellow with some brown, middle lobe and borders of laterals black; anteclypeus and borders of frons olivaceous-brown; postclypeus and frons blackish-brown, darkening to steely black on upper surface and with face, vesicle and labrum thickly coated with stiff black hairs; occiput reddish-brown; prothorax black; thorax dark brown dorsally, black in humeral region, paling on sides to golden olivaceous-brown; legs black, distal end of hind femurs with a bright red spot. Wings hyaline with bases golden-amber, more so in hind wing; pterostigma blackish-brown; distal antenodal complete; nodal index 5-6: 6-5/5-5: 5-5; arc between 1st and 2nd antenodals; discoidal cells entire; sectors of arc separate in forewing, shortly fused in hind; 1 cubital nervure in all wings; no supplementary nervures to bridge; 1 row of cells between **IRiii** and **Rspl**; discoidal field beginning with a row 3 cells and continued as such to near wing border. Anal appendages red. Abdomen 18mm, hind wing 24mm (Figs. B125, 126b).

*Aethriamanta brevipennis*, male

- 63b Abdomen golden olivaceous with sutures well picked out in black; dorsally, apical ends of 5 and 6 and all of 7 to 10 broadly black; 3 and 4 with vestigial apical black marks. Labium yellow, lateral lobes bordered black; labrum glossy black with an elongate yellow basal spot; face and frons bright yellow; vesicle yellow, dark brown on middle and dorsum; eyes dark reddish-brown above, rest paler. Thorax golden-olivaceous dorsally, paler on sides, carina, antealar sinus and sutures sharply black; legs black with a well defined yellow femoral spot. Wings hyaline, tinted dark amber at base, to first antenodal and spreading narrowly downwards in forewing, more broadly

in hind, opaque black basal spot much smaller than in the male; pterostigma greyish-white within thick black nervures. Anal appendages black. Other characters as in the male above. Abdomen 16mm, hind wing 23mm (Fig. 126a).

*Aethriamanta brevipennis*, female

*Aethriamanta brevipennis*

Not a common insect as it is not mentioned by the usual workers, is unrepresented in the Museum collection and has not been recorded from here since first mentioned by Selys (1897). Fraser says it must be very local and very rare; it breeds in small weedy tanks surrounded by jungle. It is a wary, restless insect usually keeping well over water and difficult to capture (Figs. B125, 126a, b).

References:- Fraser 1924: 426, 445; 1936: 444-447, Figs. 122a, b, 123; Lieftinck 1955: 80. Type in Paris Museum.

Synonymy:- *Libellula brevipennis* Ramb., 1842; *Diplacina brevipennis* Brauer, 1886; *Aethriamanta brevipennis* Kirby, 1889; *Urothemis brevipennis* Selys, 1891; *Aethriamanta brevipennis brevipennis* Ris, 1929.

64 *Macrodiplax cora*

64a Abdomen short, tinted with bright red dorsally, rest bright ochreous except for black markings - a triangular dorsal spot on segment 1, a mid-dorsal stripe on segments 2 and 3 expanded at jugal sutures and apical borders, hour-glass-shaped mid-dorsal stripes on segments 4 to 7, similar but much broader stripes on segments 8 and 9, constricted on base of 8, mid-dorsal points only on 10. Head: labium creamy white and black, labrum black, narrowly yellow at base; anteclypeus olivaceous; postclypeus and frons ochreous suffused with red, sides of frons and face yellow, base of frons above black; vesicle red; occiput reddish-brown; eyes reddish-brown above, rest lilaceous or pale yellow. Prothorax blackish-brown; thorax golden olivaceous-brown dorsally, olivaceous or bluish-green on sides with black spots along sutures; legs black, coxae, trochanters and bases of femurs yellow. Wings hyaline, sometimes with a narrow amber-yellow band in hind wing up to cubital vein and nearly to tornal angle, pterostigma ferruginous to ochreous between thick black nervures; sectors of arc separated in forewing, shortly fused in hind; nodal index 5-6: 6-5/5-5: 5-5; 1 cubital nervure in all wings; 1 row of cells between *IRiii* and *Rspl*; discoidal cells entire; arc between 1st



and 2nd antennodals. Anal appendages ochreous. Abdomen 16mm, hind wing 31mm (Fig. B127).

*Macrodiplax cora*, male

- 64b Abdomen ochreous (dorsum not tinted with blood red as in the male), with mid-dorsal black markings—a triangular dorsal spot on 1, mid-dorsal stripes on 2 to 10, hour-glass shaped on 4 to 7, broader on 8 and 9, but more extensive on 10. Face, frons and vesicle creamy-white, base of frons glossy black; eyes reddish-brown above, lilaceous or pale yellow below. Prothorax black; thorax golden-yellow dorsally, pale greenish-yellow on sides, sutures black. Wings hyaline, sometimes with a narrow amber-yellow band at base of hind wing up to tornal border. Anal appendages yellow. Other characters as in male above. Abdomen 24mm, hind wing 32mm.

*Macrodiplax cora*, female

*Macrodiplax cora*. An insect of the plains that does not appear to be common. Laidlaw suggests that it may be breeding in brackish water. Fraser says it breeds in marshes, has seen it in great numbers and its habit of returning to the same twig after being disturbed makes it easy to capture. The larva has not been described (Fig. B127).

References:- Kirby 1893: 552, Pl. 42, Fig. 2; Laidlaw 1924: 357; Fraser 1936: 447-450, Fig. 124; Lieftinck 1955: 80; 1971: 205. Type in Vienna museum, paratype in Selys collection.

Synonymy:- *Diplax cora* Brauer, 1867.

Distribution:- Negombo lagoon, (1f, 8m); Trinco., (9-).

65 *Urothemis signata signata*

- 65a Abdomen blood red with some black markings dorsally on segments 8 and 9. Head: labium, labrum and postclypeus ochreous, sides of the last, antedclypeus and sides of frons olivaceous, rest of frons blood-red; occiput reddish brown; eyes blood red above, reddish-brown laterally, lilaceous below. Prothorax dark reddish-brown; thorax red dorsally, sides olivaceous with a reddish suffusion; legs dark reddish-brown to ochreous; wings hyaline with crimson or bright ochreous nervures in dark areas of hind wing, base of forewing golden-amber, broader in hind wing, spreading into the tornal angle where there is a black spot with bright ochreous or crimson neurulation; often similar colouration in costal and subcostal spaces; distal antenodal complete (unlike *Crocothemis s. servilia*

which it resembles); 1 cubital nervure in all wings; 1 row of cells between *IRiii* and *Rspl*; discoidal cells entire; discoidal field beginning with 2 rows of cells; pterostigma ochreous above, pale whitish-yellow below; nodal index 7-7: 7-7/ 7-5: 5-7. Anal appendages pale reddish. Abdomen 27mm, hind wing 35mm (Figs. B127d, B128).

*Urothemis signata signata*, male

- 65b Abdomen greenish-olivaceous, may be reddened dorsally, small apical subdorsal black spots on 3 to 7 with more extensive dorsal markings on 8 and 9; wings hyaline with crimson nervures, three dark areas at base of hind wing, apices often tipped brown. Head: labrum golden-yellow; face, frons and vesicle lemon-yellow; occiput ochreous; eyes brown above, lilaceous below. Thorax olivaceous-green on sides, ochreous or golden-brown dorsally. Anal appendages reddish-brown or brown, tipped black. Other characters as in the male above. Abdomen 26mm, hind wing 35mm (Fig. B126c).

*Urothemis signata signata*, female

*Urothemis signata signata*. A fairly common insect of the plains also extending to lower montane regions. Breeds in weedy tanks and sluggish streams around which males can be seen. The larva has been described by Nirmalakumari et al, by Begum et als and by Chowdhury & Akhteruzzaman 1981: 131-144, Pls. 1-4 (Figs. B126c, d, B128, C42-45, C65).

References. Kirby 1893: 552; Laidlaw 1924: 351; Fraser 1924: 46, 445; 1936: 442-444, Figs. 121, 122c, d; Lieftinck 1955: 80; 1971: 205; Nirmalakumari & Balakrishnan Nair 1983: 193-197, Figs. 1-8; Begum, Bashar & Biswas 1991: 125-132, Figs. 1-11. Type is in Selys collection, Brussel's Museum.

Synonymy:- *Libellula sanguinea* Brauer, 1839; *Libellula signata* Ramb., 1842; *Urothemis sanguinea* Brauer,, 1868; *Urothemis signata signata* Ris, 1913.

Distribution:- Pond in Viharamahadevi Park, Colombo, 10m, (1m); water tank 700m SE of Abhayagiri Dagoba, A'Pura, 100m, (1m); Colombo, (6, 7, 8, -); Inginiyagala, (-); Jaffna, (6mf, 9-); Ja-Ela, (1mf0; Rajakadaluwa, (-); Inginiyagala, (-); Maha Oya, E.P, (-); Kantalai, (11-); Ramboda, (-).

66 *Zygonyx iris ceylonicus*

- 66 Abdomen black marked with yellow—sides of 1 to 3 narrowly and carina finely yellow from 2 to 6 or 7; upper part of male head rich purple, or dark metallic blue, of female metallic green; wings very much longer than abdomen, apices often enfumed;

eyes dark reddish-brown above, paler below. Labium bright yellow, borders black; labrum black; sides of frons and postclypeus bright yellow; occiput black. Prothorax blackish-brown, parts dull yellow; thorax dark metallic blue or greenish blue with bright yellow markings; legs black, some surfaces bright yellow, claw hooks longer than claws. Distal antenodal not always complete; antenodals from 15 to 17; discoidal field in forewing beginning with 3 rows of cells; only 1 row of cells between *IRiii* and *Rsp1*; 1 or 2 cubital nervures in forewing, 1 in hind; discoidal cells traversed once. Anal appendages black. This description needs careful checking with fresh specimens of both sexes. Male abdomen 38mm, hind wing 51mm; female 45mm and 50mm respect (Figs. B116b, B129).

*Zygonyx iris ceylonicus*, both sexes

*Zygonyx iris ceylonicus*. A common species in submontane and montane regions. Fraser says the species was very common on all the streams around Kandy. The larva has been described for the first time by St. Quentin from collections made from among gravel and stones by the banks of small fast-running brooks (Figs. B116b, B129, C66).

**References:-** Kirby 1905: 273; Laidlaw 1924: 349; Fraser 1924: 426, 441, 442; 1936: 396, 397, Fig. 110; Lieftinck 1955: 79; 1971: 205; St. Quentin 1973: 122, Figs. 10-12; Matsuki & Kitagawa 1986: 24, 25, Figs. 1-7. The type which Fraser says was in the BMNH is not listed in Kimmins 1966.

**Synonymy:-** *Zygonidia ceylanica* Kirby, 1905; *Zygonyx iris* Ris, 1912

**Distribution:-** Kudawa ganga under bridge 500m from Base Camp, Sinharaja Forest, Kudawa, 380m, 1m); Kanneliya Lankaberiya dola, Ratnapura, (4mf); Deerwood, Kuruwita, (2m); Diyaluma Falls, Koslanda, (4m); Wewalwatte, Sab., (10m); Kandy, (-); Campden Hill Dola (Deniyaya), (11/12); Kiriwel Dola, Deniyaya, (11/12); Thanipita Dola, Nilwala Ganga, (11/12); Katugas Ela, Kaluganga, very shaded torrent, (11/12); Rajanawa Dola, Kaluganga, shaded torrent, (11/12); Kiri-katu Oya from Horton Plains at World's End, (11/12).

Fraser (1936) has a key to the genera of the Libellulidae from which the sections relevant to the Sri Lankan genera have been extracted and follow. However, the characters as used in the key are not always consistent with the characters as given in the text for the respective genus.

1. Base of discoidal cell in hind wing widely distal to level of arc; costal side of discoidal cell in forewing markedly angulated, so that the cell is four sided; anal loop very small, consisting of 3 or 4 cells; discoidal field beginning with only 1 row of cells. *Hylaeothemis*
- Base of discoidal cell in hind wing at level of or but a shade distal; costal side of discoidal cell in forewing not angulated; anal loop elongate, made up of more than 6 cells; discoidal field beginning with 2 or more rows of cells. 2
2. Claws without hooks; thorax metallic *Onychothemis*
- Claw-hooks equal in length to claws, which thus appear bifid; thorax metallic. *Zygonyx*
- Claw-hooks shorter than claws and arising from about middle of latter; thorax rarely metallic. 3
3. Borders of anal loop running on to meet posterior border of wing; apex of loop open. 4
- Borders of anal loop converging and meeting before posterior border of wing; apex of loop closed.
4. Abdomen broad at base, then tapering gradually to the end; male with an opalescent white spot in centre of hind wing. *Tholymis*
- Abdomen very tumid at base, then abruptly narrowed and very slim and cylindrical to the end; wings broadly tipped with dark brown and without an opalescent white spot in centre of hind wing. *Zyxomma*
5. Distal antenodal nervure in forewing complete. 6
- Distal antenodal nervure in forewing incomplete.

6. Lobe of prothorax large and fringed with long hairs. 15
- Lobe of prothorax small, inconspicuous, and usually naked. 7
7. Frons metallic above 9
- Frons non-metallic above. *Brachydiplax* 8
8. Only 6 antenodal nervures in forewing; abdominal segments 1 to 6 dilated, 7 to 10 slim and cylindrical. *Acisoma*
- Never less than 12 antenodals in forewing; shape of abdomen never resembling the last. *Orthetrum*
9. Sectors of arc in forewing arising from a common and rather long stalk; frons metallic above. 10
- Sectors of arc in forewing separated at their origin; frons non-metallic 11
10. Base of discoidal cell in hind wing situated at level of arc; only 1 cubital nervure in all wings; anal loop very long and overlapping distal end of discoidal cell. *Cratilla*
11. Only 1 or 2 rows of cells between **IRiii** and **Rspl**. 12
12. Subtrigone in forewing a single cell. 13
- Subtrigone in forewing 3-celled. 14
13. Hind wing with a conspicuous black and golden-yellow basal marking; neuration black. *Aethriamanta*
14. Hamules of male genitalia long and conspicuous; black dorsal markings on abdominal segments 8 and 9 only. *Urothemis*
- Hamules of male genitalia small, triangular and inconspicuous; black dorsal markings on all segments from 1 to 10. *Macrodiplax*
15. Lobe of prothorax large and fringed with long hairs.

- 16
- Lobe of prothorax small, usually naked.
- 19
16. *Cuii* widely separated from posterior angle of discoidal cell in hind wing; eyes meeting at a point only; discoidal field beginning with a row of 3 cells and then continued as rows of 2 cells.
- Rhodothemis*
- *Cuii* arising from posterior angle of discoidal cell in hind wing; eyes more or less widely contiguous; discoidal field variable.
- 17
17. Borders of discoidal field (nervures MA and *Cuii*) converging strongly at wing border.
- Sympetrum*
- Borders of discoidal field diverging widely at wing border.
- 18
18. Eyes contiguous for a short length; discoidal cell in hind wing entire; costal border of forewing straight; frons non-metallic above; discoidal field beginning with a row of 2 cells.
- Diplacodes*
- Eyes more broadly contiguous; discoidal cell in hind wing traversed; costal border of forewing sinuous near base; frons metallic above; discoidal field beginning with a row of 3 cells at least.
- Palpopleura*
19. Sectors of arc in forewing separated and diverging at origin.
- 20
- Sectors of arc in forewing arising from a common and rather long stalk.
- 21
20. Body very dark metallic; frons metallic above; discoidal field in fore-wing with borders parallel or strongly convergent at wing border; wings generally broadly coloured black or black and golden-amber.
- Rhyothemis*
21. Discoidal field with borders converging strongly at wing margin.
- 22
- Discoidal field with borders parallel or widely divergent.
- 23
22. Discoidal cell in forewing very narrow, its costal side only about one-fourth to one-third the length of basal; a conspicuous supplementary nervure (*IRii*) present between *Rii* and *Riii*.

*Pantala*

- Discoidal cell in forewing broader, its costal side about one-half the length of basal; no supplementary nervure present between **Rii** and **Riii**.

*Trithemis*

- 23. Discoidal field in forewing adjacent to discoidal cell only 2 cells wide.

*Indothemis*

- Discoidal field in forewing adjacent to discoidal cell 3 or more cells wide.

24

- 24. Genital hamules very long, projecting and conspicuous in profile, hind wing very broad at base and rather tapered at apex; cells at base of hind wing becoming arranged into straight rows or closely packed narrow cells; pterostigma very short and usually unequal in fore- and hind wings.

25

- Genital hamules small and inconspicuous in profile; hind wing not markedly wide at base and apex not markedly tapered; cells at base of hind wing not closely packed in straight rows; pterostigma variable and usually of equal size in fore- and hind wings.

26

- 25. Only 1 row of cells between **IRiii** and **Rspl**; **Riii** markedly angulated; pterostigma of almost equal size in fore- and hind wings; distal and apical angles of anal loop equal.

*Hydrobasileus*

- 1 or 2 rows of cells between **IRiii** and **Rspl**; **Riii** evenly curved, not undulated; pterostigma smaller in hind wing than in fore; apical angle of anal loop much more acute than distal.

*Tramea*

- 26. Pterostigma bicolorous, black with white ends; 2 rows of cells between **IRiii** and **Rspl**.

*Bradinopyga*

- Pterostigma unicolorous; 1 or rarely, 2 rows of cells between **IRiii** and **Rspl**.

27

- 27. Wings coloured amber-yellow at base or more broadly dark reddish-brown, and often with a development of close secondary reticulation, especially proximal to node; more than 1 cubital nervure to all wings.

*Neurothemis*

- Wings usually uncoloured or with but a small basal yellow marking in hind wing (a broader medial fascia in *Brachythemis*); no secondary reticulation in the wings; only 1 cubital nervure in all wings. 28
- 28. Red or ochreous species with basal or medial yellow markings to wings. 29
- Variably coloured and darker species, never or only partly red or ochreous. 30
- 29. Wings with small basal yellow marking; eyes shortly contiguous; face and frons red;  $9\frac{1}{2}$  to  $10\frac{1}{2}$  antenodal nervures in forewing.

*Crocothemis*

- Wings with broad reddish-yellow medial fascia; face and abdomen never red; eyes broadly contiguous; only  $6\frac{1}{2}$  to  $7\frac{1}{2}$  antenodal nervures in forewing.

*Brachythemis*

- 30. Arc situated between second and third antenodal nervures; only 1 row of cells between IRiii and Rspl.

*Lathrecista*

- Arc situated between the first and second antenodal nervures; 2 rows of cells between IRiii and Rspl.

*Potamarcha*

**Key to the species of *Orthetrum* in Sri Lanka (males)**

- 1. Males coloured some shade of red. 2
- Males coloured brown or black with yellow markings; often pruinosed. 4
- 2. Males bright red; frons bright red or yellow in front. 3
- Males violaceous-red, due to a thin overlying pruinescence; frons blue-black anteriorly. *pruinoseum neglectum*
- 3. Lamina of male genitalia with a tuft of stiff black bristles; basal spot in hind wing small extending only to first antenodal



nervure and end of membrane.

*chrysis*

4. Abdomen enormously swollen at base and then slimmed and compressed laterally to the end; black marked with greenish-yellow; not not pruinosed.

*sabina*

- Abdomen variable but never very slim nor compressed laterally; mostly with pruinosed abdomen and thorax.

5

5. Base of hind wing with a large black triangular marking.

*triangulare*

- Without such a marking.

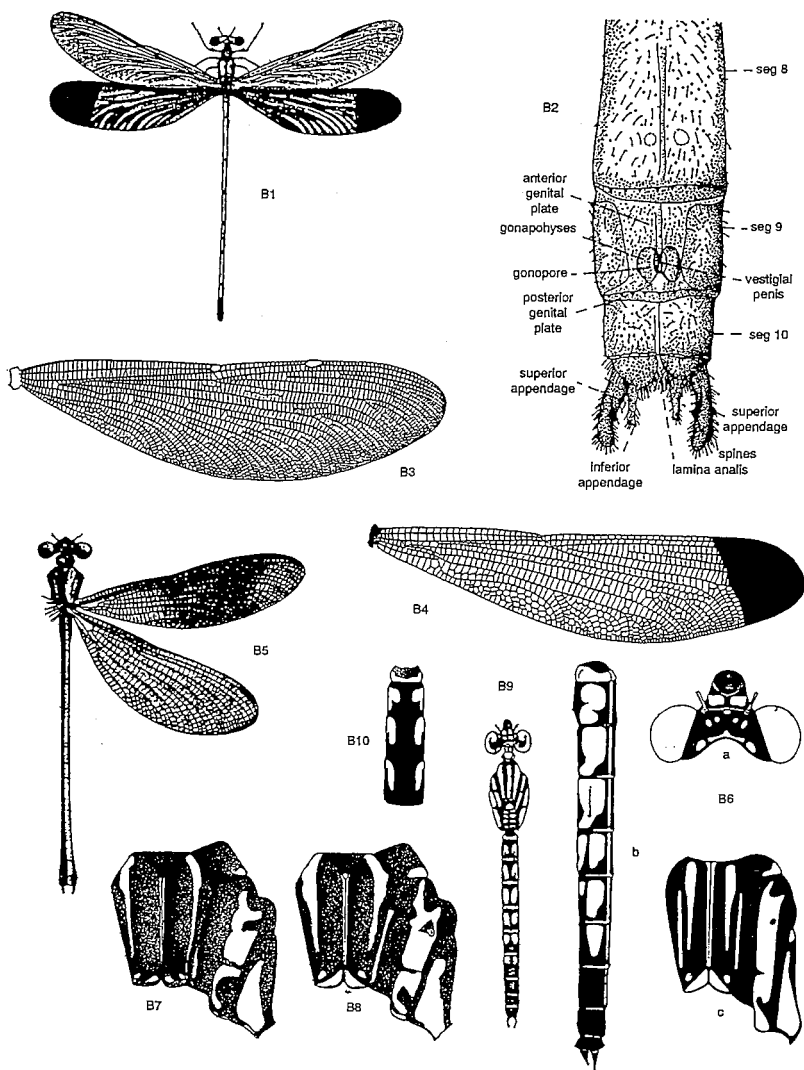
6

6. *Cu<sub>iii</sub>* in hind wing arising from the distal side of discoidal cell well away from its posterior angle.

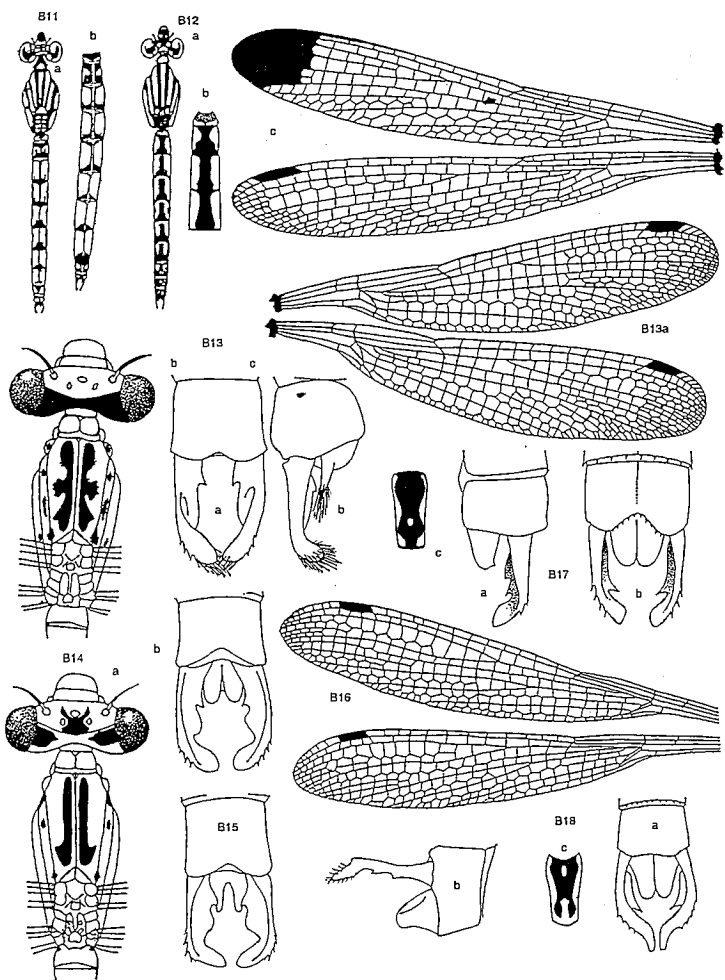
*luzonicum*

- *Cu<sub>iii</sub>* in hind wing arising from the posterior angle of discoidal cell; two rows of cells between *IR<sub>iii</sub>* and *Rspl*; costal border of wings and antenodal nervures black; abdomen long and narrow, pruinosed pale dirty blue from segment 1 to apical end of segment 8, black for the remainder; face and frons olivaceous- to blackish- brown, pruinosed dull blue or black in old adults.

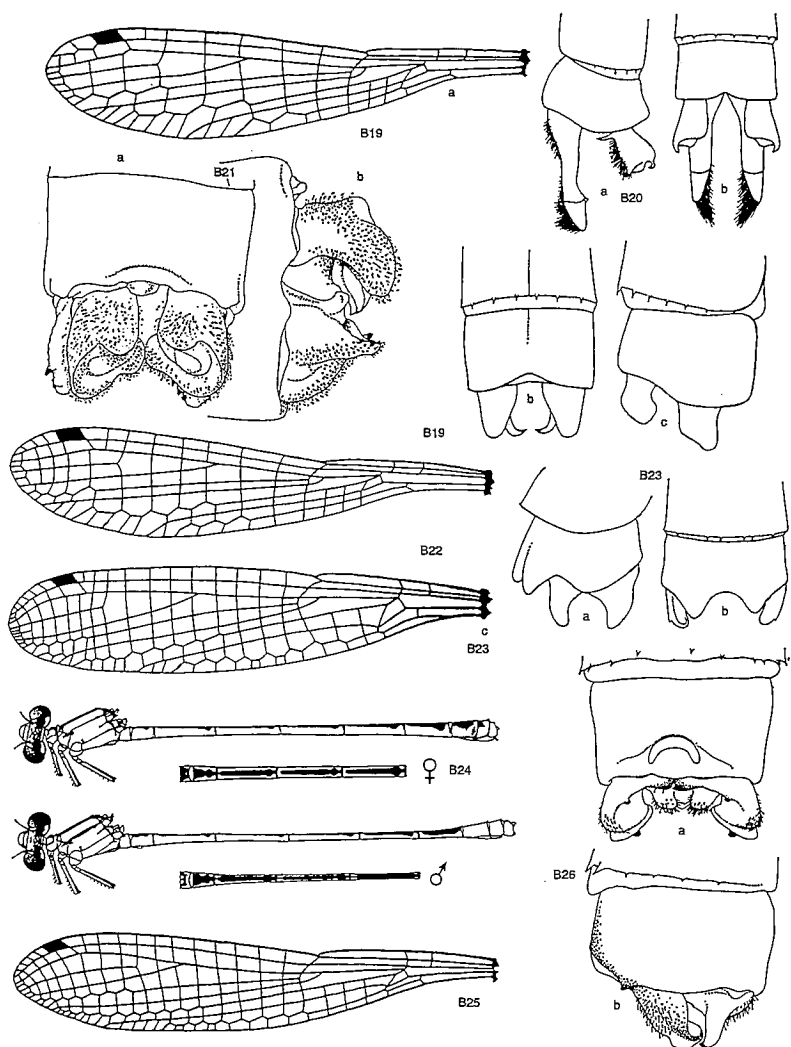
*glaucum*



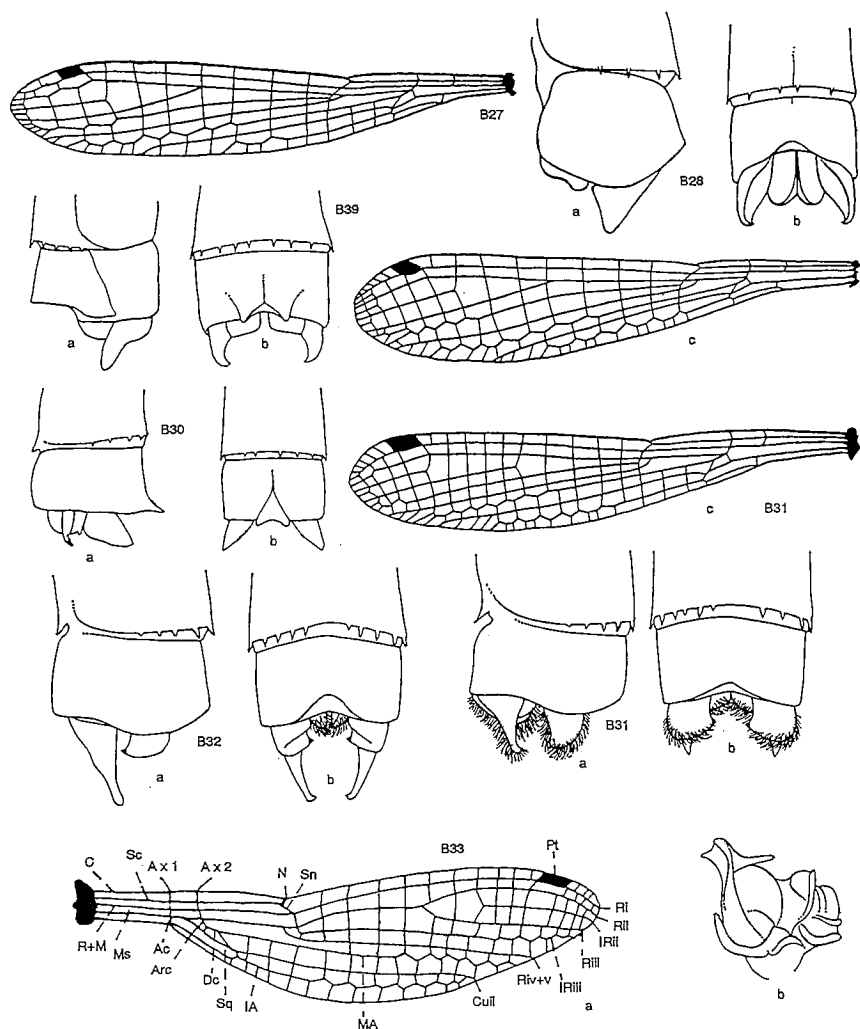
B 1-3: *Neurobasis chinensis chinensis*: 1- male; 2- ventral view of male showing primary copulatory complex (from Ajit Kumar, 1974); 3- hind wing of female (from Fraser, 1934a). B4: wing of *Vestalis apicalis* male (from Fraser, 1934a). B5: *Euphaea splendens* (from Kirby, 1893). B6: *Libellago adami* (From Fraser, 1939): (a) dorsal view of head; (b) left latero-dorsal view of abdomen; (c) dorsum and right side of synthorax. B 7,8: (from Lieftinck, 1940): male synthorax of, B7- *Libellago finalis* and B8 - *Libellago finalis*, male, dorsal view, (from Fraser, 1934a). B9: *Libellago finalis*, male, dorsal view (from Fraser, 1934a). B10: *Libellago finalis*, male, dorsal view of first four abdominal segments, (from Laidlaw, 1924).



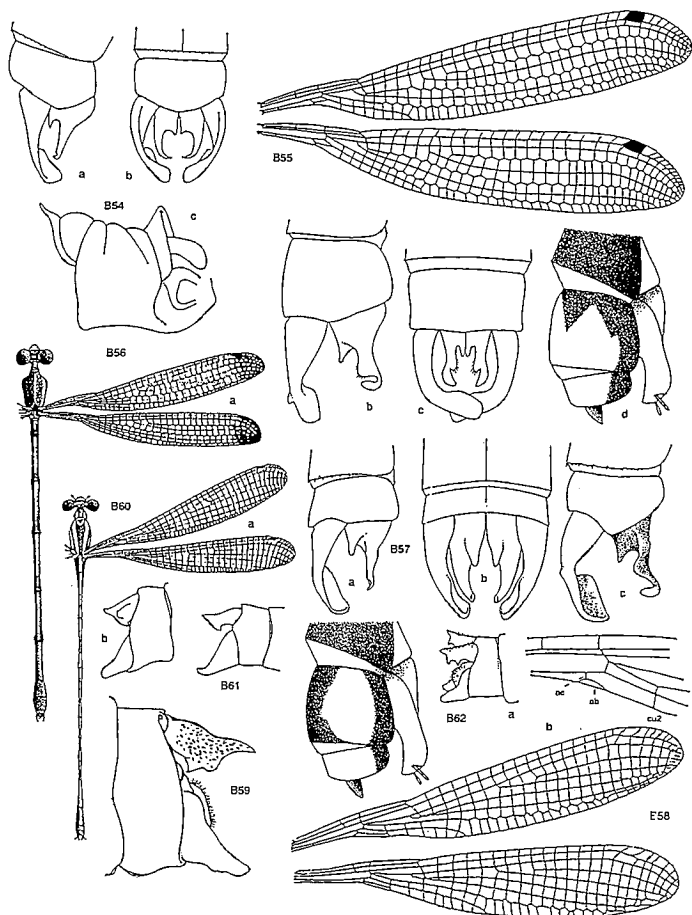
B11: *Libellago greeni*, male: (a) dorsal view, (from Fraser, 1934a); (b) dorsal view of first four abdominal segments, (from Laidlaw, 1924). B12: *Libellago indica*, male, (a) dorsal view, and (c) wings (from Fraser, 1934a), (b) dorsal view of final abdominal segments (from Laidlaw, 1924). B13: *Lestes praemorsus praemorsus*, male: (a) wings; (b) head and thorax; (c) dorsal and right lateral view of anal appendages. B14: *Lestes elatus*, male: (a) head and thorax; (b) dorsal view of anal appendages. B15: *Lestes malabarica*, male: dorsal view of anal appendages. B16: *Indolestes* sp. male wing. B17: *Indolestes divisus*, male (a) left lateral and (b) dorsal view of anal appendages, (from Fraser, 1933a); (c) dorsum of second abdominal segment, (from Laidlaw, 1924). B18: *Indolestes gracilis gracilis*, male: (a) dorsal view of anal appendages (from Fraser, 1933a); (b) lateral view of anal appendages and (c) dorsum of second abdominal segment, (from Laidlaw, 1924). (except where otherwise indicated, figures are from Fraser, 1933a).



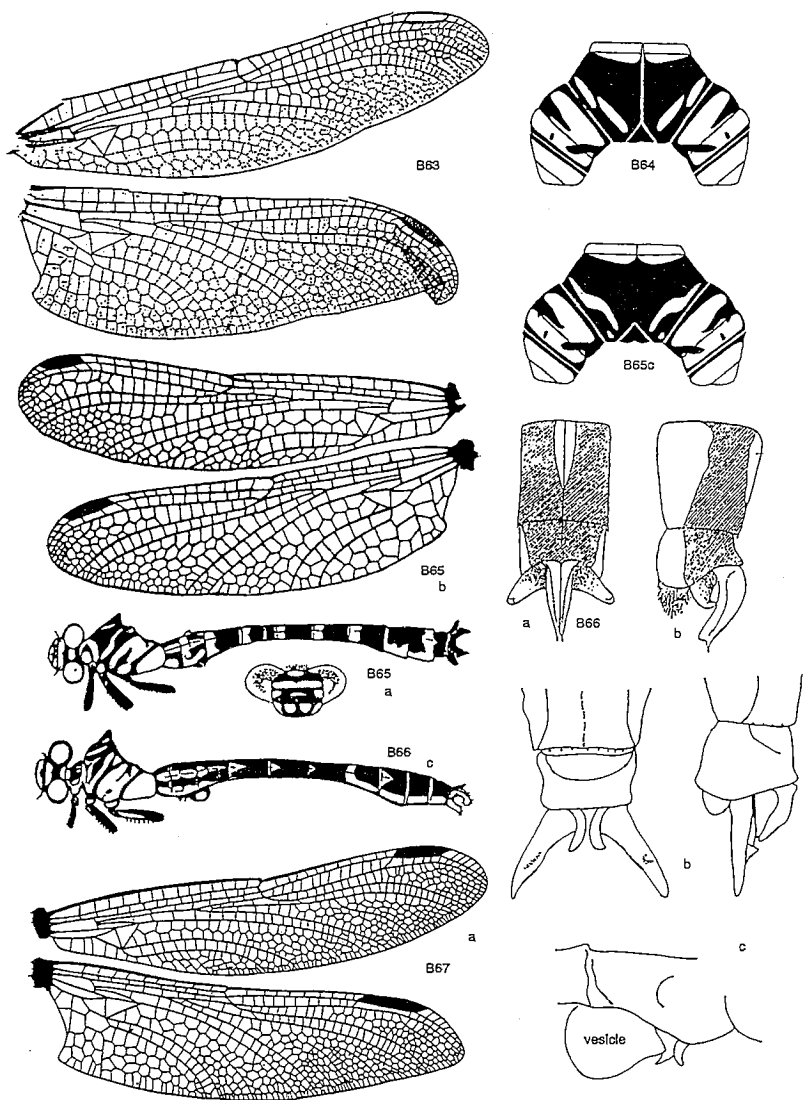
B19: *Agriocnemis pygmaea*, male: (a) hind wing; (b) dorsal and right lateral view of male anal appendages. B20: *Agriocnemis femina femina*, male, left lateral and dorsal view of anal appendages. B21: *Mortonagrion ceylonicum*, male: (a) dorsal and b-left lateral view of anal appendages, (from Liefstinck, 1971). B22: *Mortonagrion varalli*, male hind wing. B23: *Onychargia atrocyana*, male, (a) right dorso-lateral and (b) dorsal view of anal appendages, (c) hind wing. B24: *Cercion malayanum*, colour pattern of body and dorsal view of abdominal segments 1-5 of both sexes, (from Liefstinck, 1955: not from Sri Lankan specimens). B25: *Enallagma cyathigerum*, male, hind wing. B26: *Enallagma parvum*, male: (a) dorsal and (b) right lateral view of anal appendages, (from Liefstinck, 1955). (except where otherwise indicated, figures are from Fraser, 1933a).



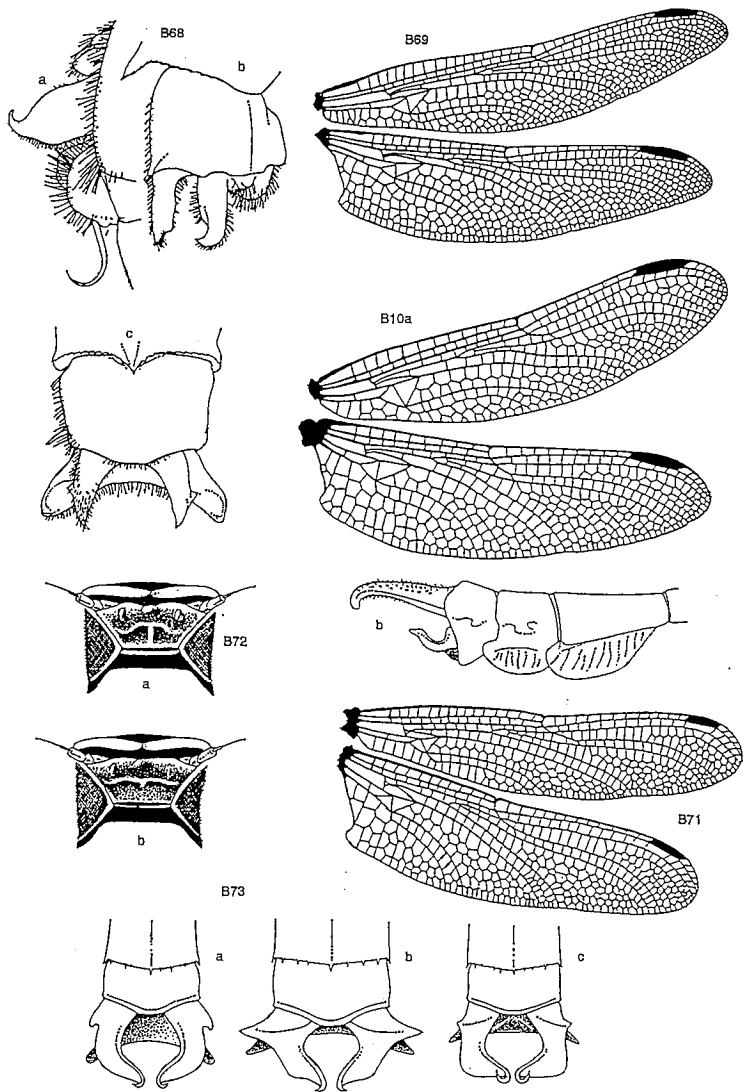
B27: *Aciagrion hisopa*, wing of male. B28: *Aciagrion occidentale*, (a) left lateral and (b) dorsal view of male anal appendages. B29: *Ischnura senegalensis*, male: (a) right lateral and (b) dorsal view of anal appendages and (c) hind wing. B30: *Ischnura aurora aurora* (a) left lateral and (b) dorsal view of male anal appendage. B31: *Ceriagrion coromandelianum*, male: (a) left lateral and (b) dorsal view of anal appendages and (c) wing. B32: *Ceriagrion cerinorubellum*, (a) left lateral and (b) dorsal view of male anal appendages. B33: *Pseudagrion decorum*, (a) labelled forewing (after Sahni, 1965); (b) Prothorax of female showing horn-like processes on posterior lobe, (except figure B33a. all figures from Fraser, 1933a).



B54: *Drepanosticta walli* (a) right lateral and (b) dorsal view of male anal appendages (after Fraser, 1933a) and (c) female prothorax, posterior lobe to the left (after Fraser, 1933a). B55: *Platysticta deccanensis*. male wings (after Fraser, 1933a). B56: *Platysticta apicalis*. (a) imago (after Kirby 1893), (b) right lateral and (c) dorsal views of male anal appendages (after Fraser, 1933a) and (d) segments 9 and 10 of female to show blue markings (after Fraser, 1933b). B57: *Platysticta maculata*. male appendages (a) right lateral and (b) dorsal views (after Fraser, 1933a) and (c) right lateral view and (d) segments 9 and 10 of female to show blue markings (after Fraser, 1933b). B58: *Disparoneura ramajana*, wings of male (after Lieftinck, 1971). B59: *Elatoneura bigemmata*, left lateral view of male appendages (after Lieftinck, 1971). B60: *Elatoneura tenax*, (a) imago (after Kirby, 1819) and (b) male anal appendages (after Laidlaw, 1924). B61: *Elatoneura caesia*, male anal appendages (after Laidlaw, 1924). B62: *Prodasineura sita*, right lateral view of male anal appendages and (b) part of male forewing (after Laidlaw, 1924).

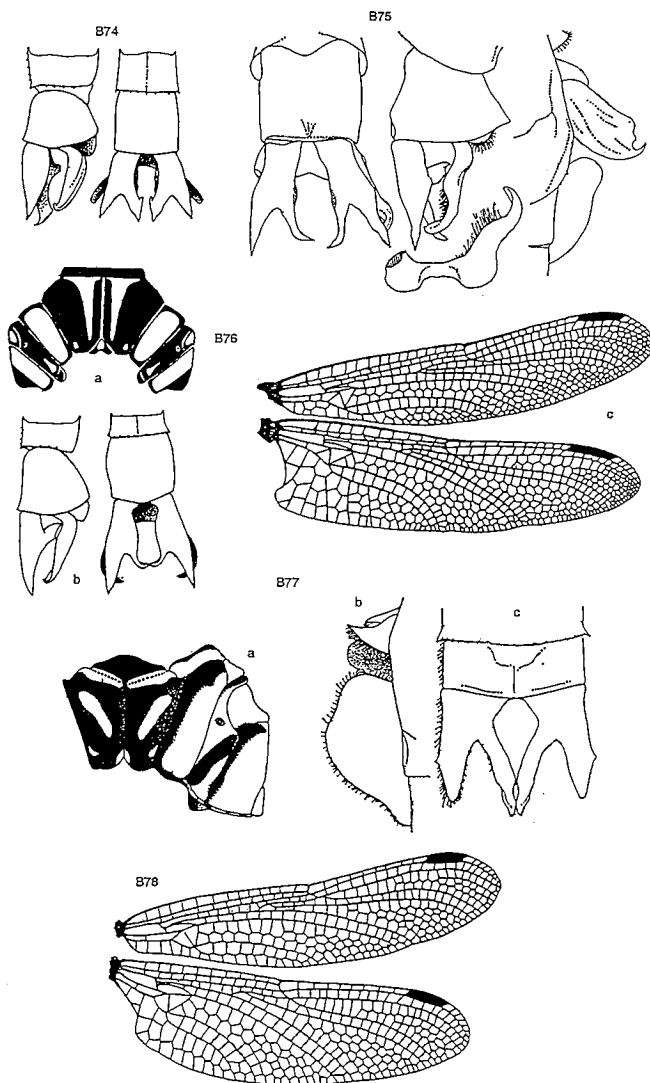


B63: *Anisogomphus solitaris*, male wings (from Leiftnick, 1971). B64: *Burmagomphus pyramidalis sinuatus*, male, thoracic markings. (from Fraser, 1934). B65: *Burmagomphus pyramidalis*, male, (a) side view (from Fraser, 1926), (b) wings and (c) thoracic markings. (from Fraser, 1934). B66: *Cyclogomphus gynostylus*, male, (a) dorsal and (b) lateral view of anal appendages. (from Fraser, 1933d) and (c) side view (from Fraser, 1925). B67: *Cyclogomphus heterostylus*, male, (a) wings, (b) dorsal and lateral views of anal appendages (from Fraser, 1934) and (c) side view of segment 2 showing the greatly enlarged vesicle, (after Laidlaw, 1924).

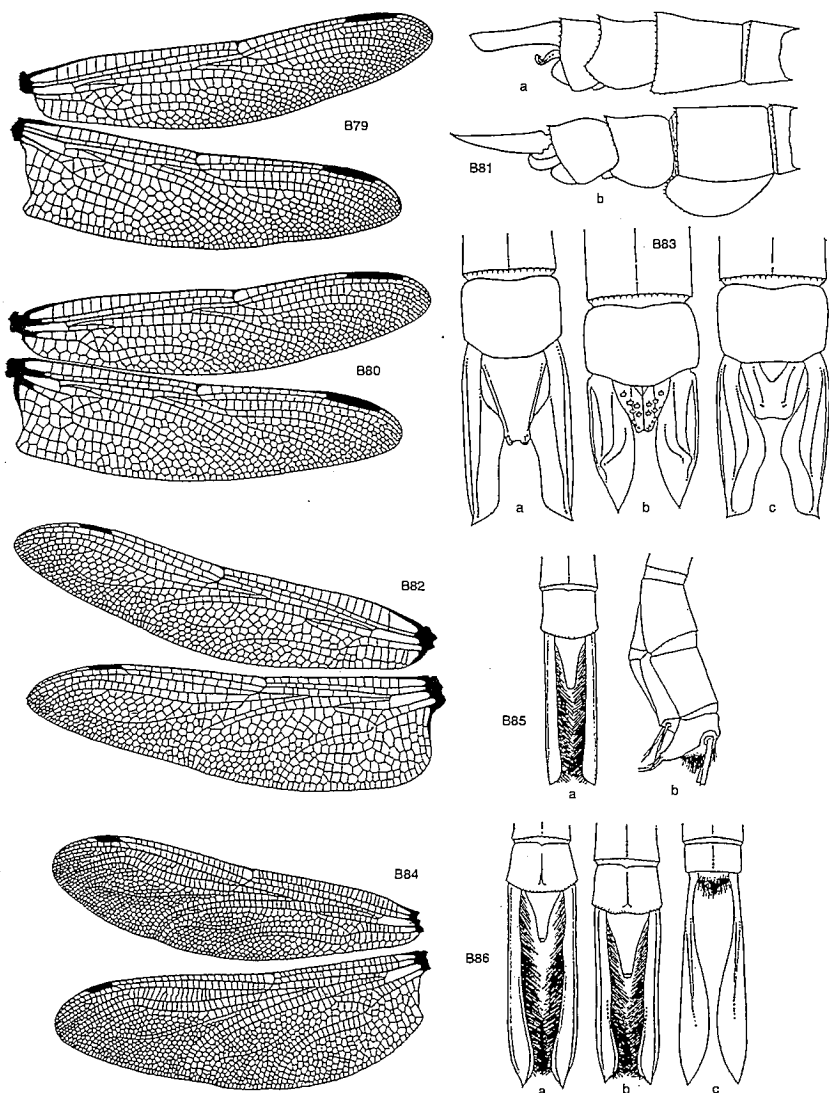


B68: *Burmagomphus pyramidalis sinuatus*, male, (a) side view of genitalia, (b) right side and (c) dorsal view of anal appendages, (from Lieftinck, 1940). B69: *Megatogomphus superbus*, male wings, (from Fraser, 1934). B70: *Paragomphus henryi*, male, (a) wings (from Fraser, 1934), and (b) terminal segments (from Laidlaw, 1924). B71: *Heliogomphus promelas*, male wings, (from Fraser, 1934). B72: Dorsal view of male/female vertex and occiput of (a) *Heliogomphus walli* and *H. lyratus* (from Fraser, 1933d). B73: Dorsal view of male anal appendages of *Heliogomphus* species - (a) *H. walli*, *H. lyratus* and *H. nietneri* (from Fraser, 1934).

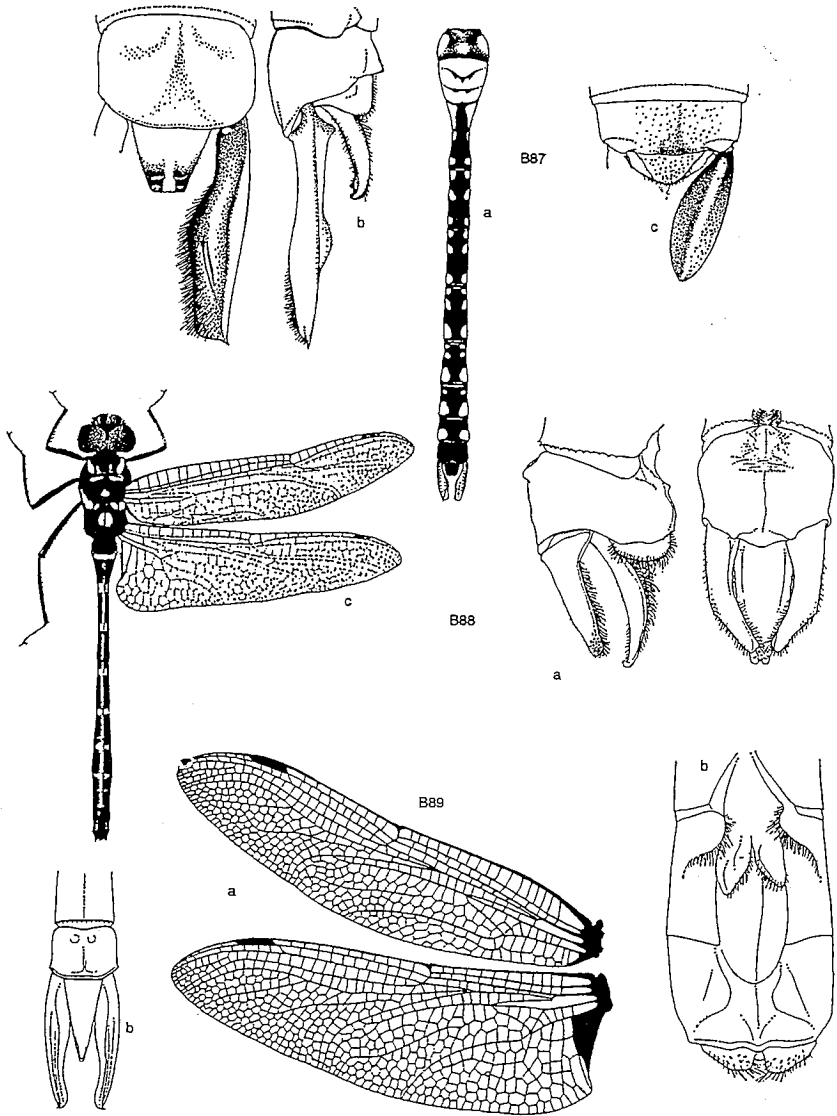




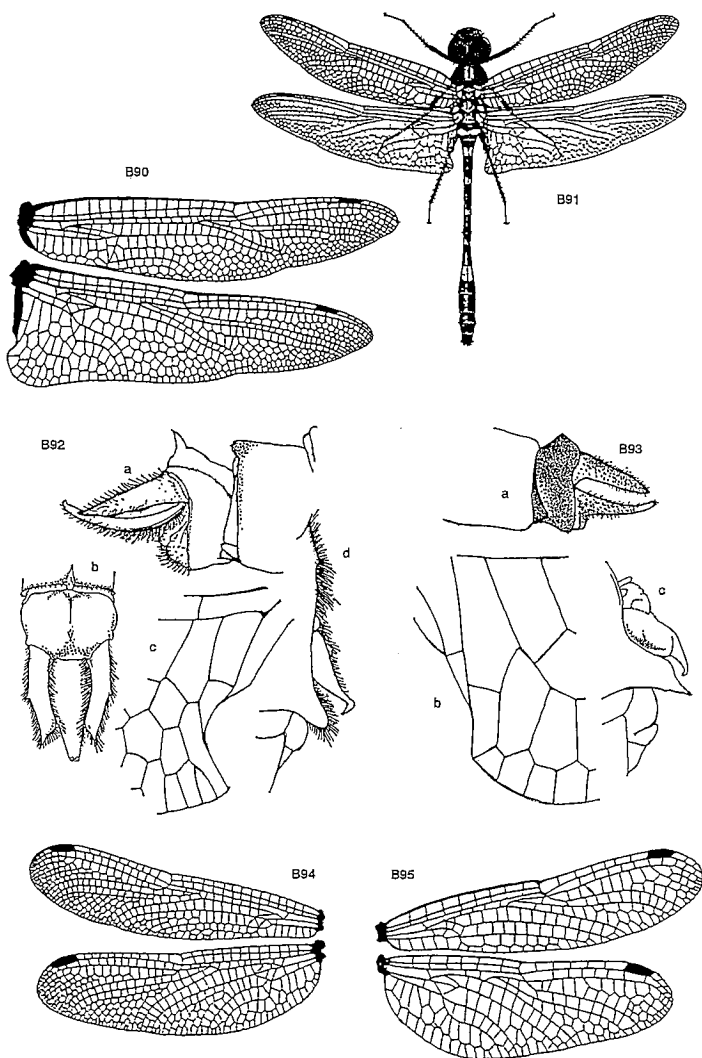
B74: *Macrogomphus lankanensis*, male, anal appendages, (from Fraser, 1934). B75: *Macrogomphus annulatus keiseri*, male, dorsal and right lateral view of anal appendages, ventral view of right branch of inferior appendage and right lateral view of genitalia. (from Liefstinck, 1940). B76: *Macrogomphus annulatus*, male, (a) thoracic markings (b) anal appendages and (c) *Macrogomphus seductus*, male wings. (from Fraser, 1934). B77: *Microgomphus wijaya*. male. (a) thoracic markings, (b) genitalia, left side view and (c) anal appendages, (from Liefstinck, 1940). B78: *Microgomphus torquatus*, male wings, (from Fraser, 1934).



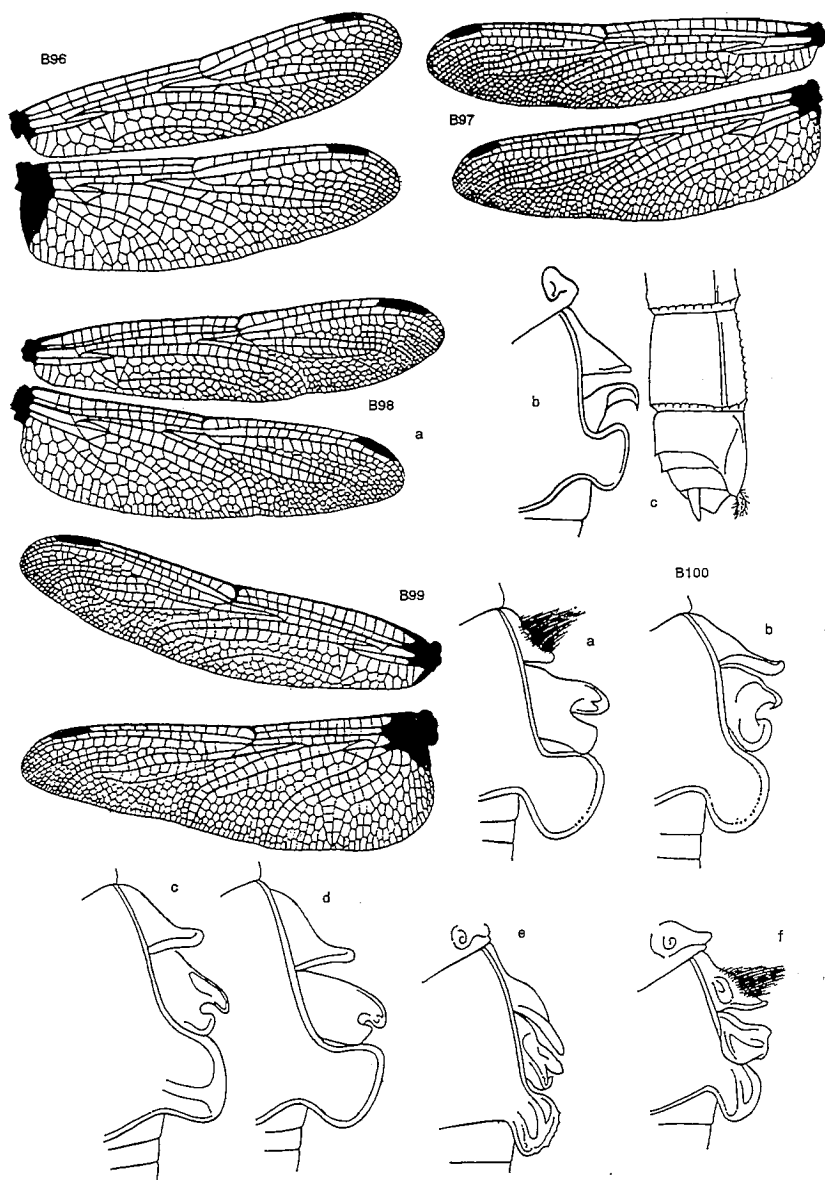
B79: *Gomphidia kodaguensis*, male wings. B80: *Ictinogomphus rapax*, male wings. B81: Terminal abdominal segments and anal appendages of (a) *Gomphidia kodaguensis*, male and (b) *Ictinogomphus rapax*, male. B82: *Anax immaculifrons*, male wings. B83: Male anal appendages of (a) *Anax immaculifrons*, (b) *Hemianax ephippiger* and (c) *Anax guttatus*. B84: *Gynacantha hyalina*, male wings. B85: *Gynacantha bayadera* (a) male and (b) female terminal segments, (female anal appendages fractured off). B86: Anal appendages of (a) *Gynacantha subinterrupta* and *Gynacantha hyalina* (b) male and (c) female, (B79-B86 from Fraser, 1936).



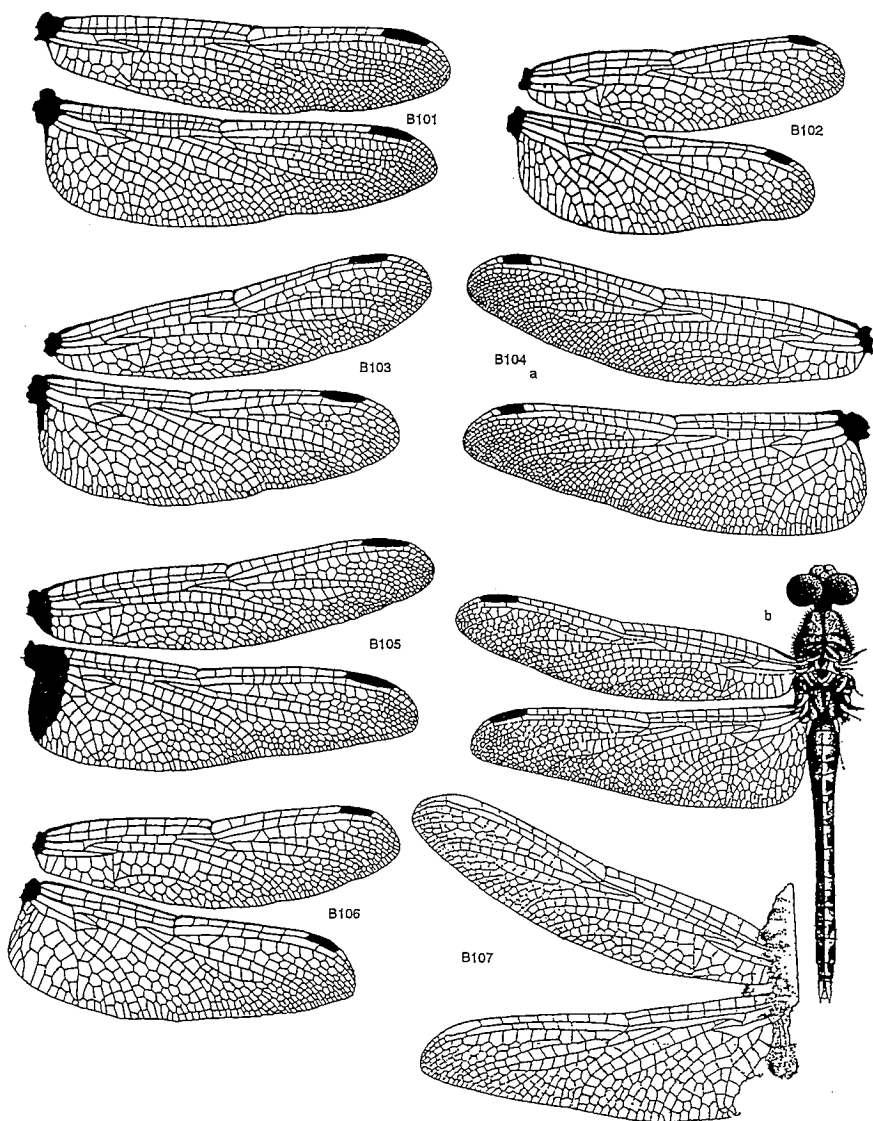
B87: *Anax guttatus*, male, (a) dorsal view of abdomen, (b) anal appendages, dorsal and side view, and (c) female anal appendages, (from Lieftinck, 1942). B88: (a) *Epophthalmia vittata cyanocephala*, male anal appendages, (b) *E. vittata vittata*, female, ventral view of terminal segments. (segments 9 and 10 strongly bent down, appendages broken), and (c) *E. vittata sundana*, male adult, (from Lieftinck, 1937). B89: *Anaciaeschna martini*, male, (a) wings, (b) anal appendages, (from Fraser, 1936).



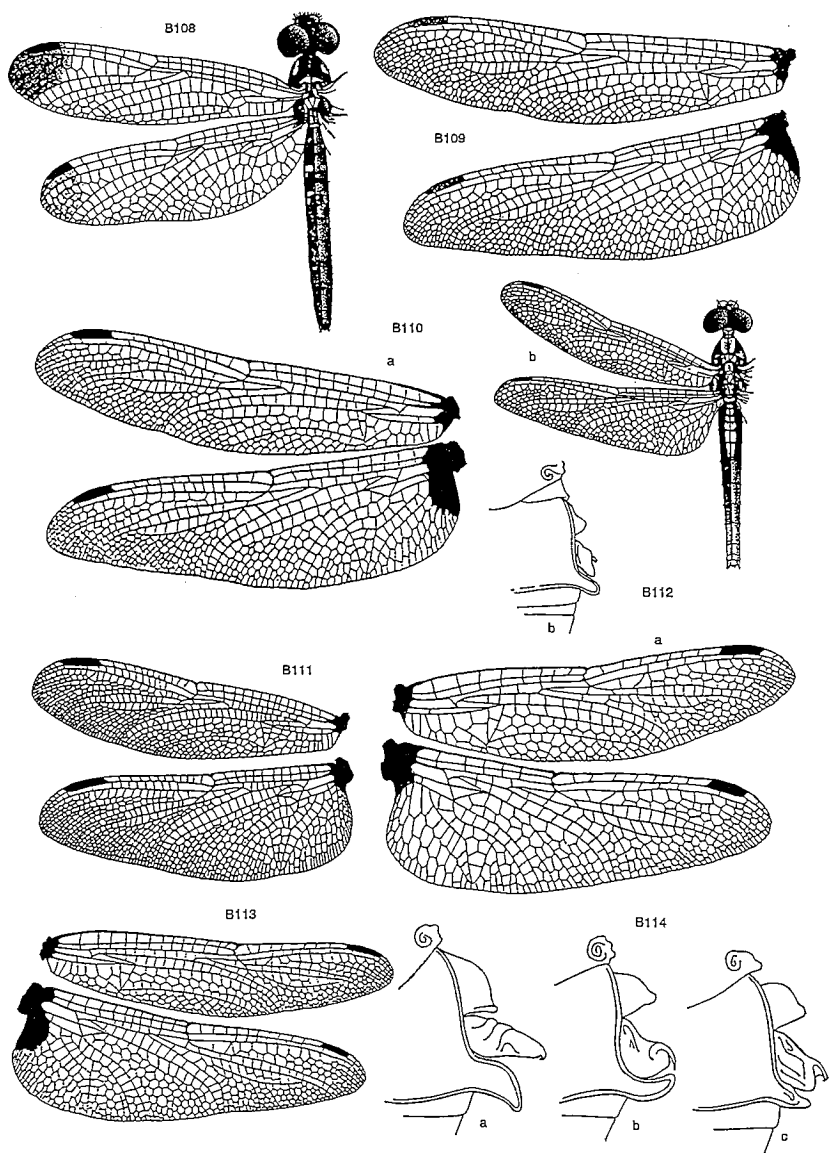
B90: *Epophthalmia vittata vittata*, male wings. B91: *Macromia moorei*, male. B92: *Macromia flinti*, male, (a) terminal abdominal segment and anal appendages, right lateral view, (b) the same, dorsal view, (c) part of left hind wing base, (d) right lateral view of genitalia, (from Lieftinck, 1977). B93: *Macromia zeylanica*, male, (a) terminal abdominal segment and anal appendages, (b) part of right hind wing, (c) right lateral view of genitalia, (from Lieftinck, 1977). B94: *Hylaeothemis fruhstorferi*, male wings. B95: *Tetrathemis platyptera*, male wings (all figures from Fraser, 1936. except where otherwise indicated).



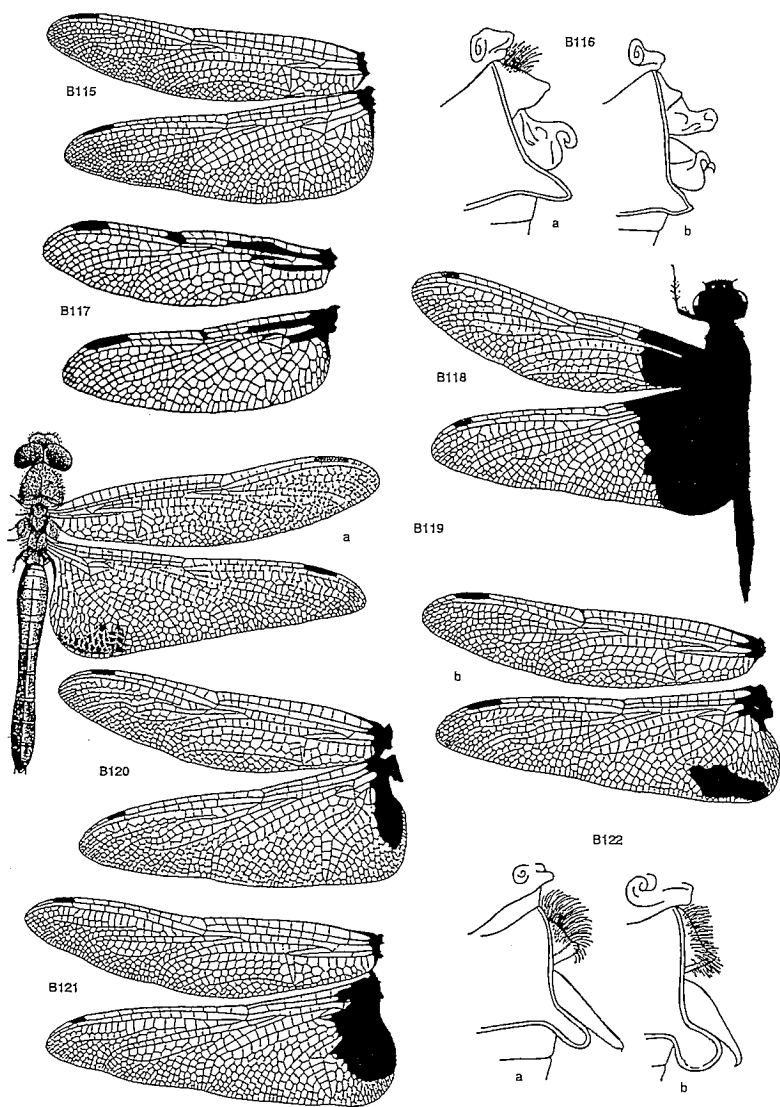
B96: *Brachydiplax chalybaea*, male wings. B97: *Cratilla lineata*, male wings. B98: *Lathrecista asiatica asiatica*, male, (a) wings, (b) genitalia, (c) female terminal segments. B99: *Orthetrum triangulare triangulare*, male wings. B100: male genitalia of *Orthetrum* species, (a) *O. chrysis*, (b) *O. glaucum*, (c) *O. pruinusum neglectum*, (d) *O. triangulare triangulare*, (e) *O. luzonicum*, (f) *O. sabina sabina*.



B101: *Potamarcha congener*, male, wings. B102: *Acisoma panorpoides panorpoides*, male, wings. B103: *Brachythemis contaminata*, male, wings. B104: *Bradinopyga geminata*, (a) male, wings, (b) imago, (after Kirby, 1893). B105: *Crocothemis servilia*, male, wings. B106: *Diplacodes trivialis*, male, wings. B107: *Indothemis carnatica*, wings, (after Lieftinck, 1971). (all after Fraser, 1936, except otherwise stated).

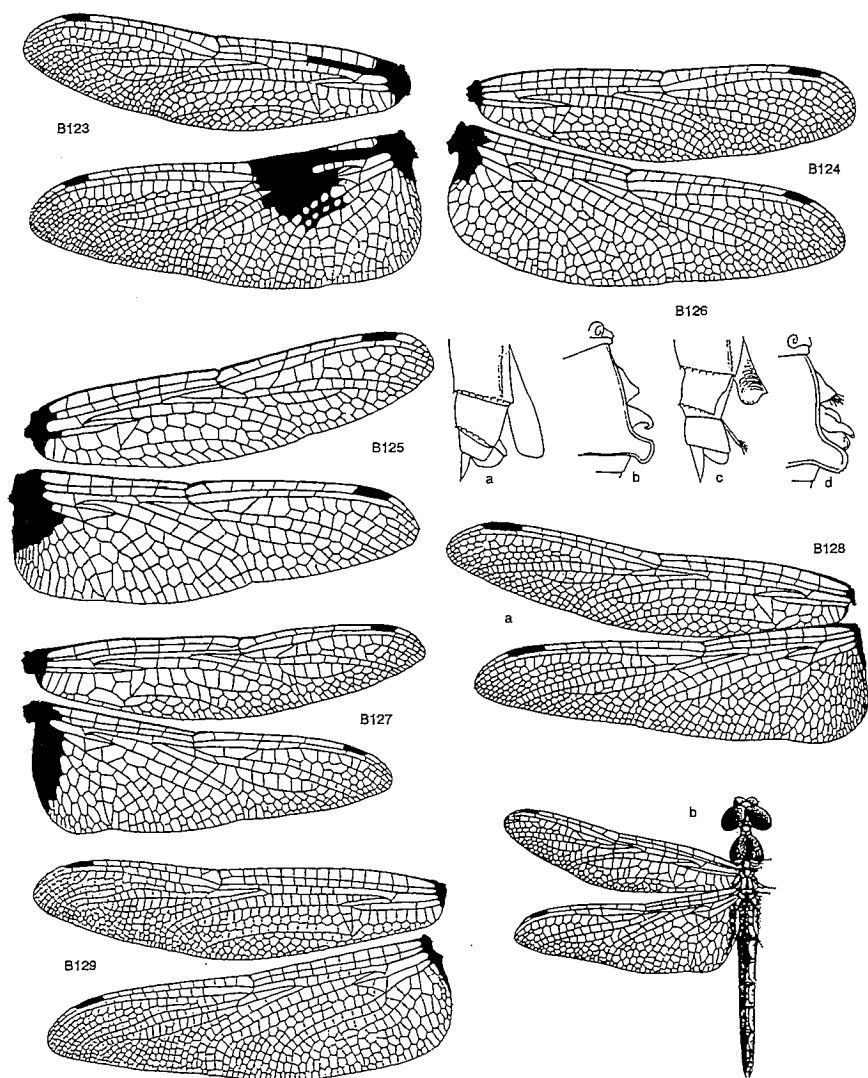


B108: *Tetrathemis yerburyi*, imago, (after Kirby, 1893). B109: *Indothemis limbata sita*, male, wings. B110: *Rhodothemis rufa*, (a) male, wings, (b) imago, (after Kirby, 1893). B111: *Neurothemis terminata*, male, wings. B112: *Sympetrum fonscolombei*, male, (a) wings, (b) genitalia. B113: *Trithemis festiva*, male, wings. B114: *Trithemis*, male genitalia of (a) *kirbyi kirbyi*, (b) *aurora*, (c) *festiva*. (all after Fraser, 1936, except where stated otherwise).



B115: *Onychothemis tonkinensis ceylanica*, male, wings. B116: Male genitalia of (a) *Onychothemis tonkinensis ceylanica*, and (b) *Zygonyx iris*. B117: *Palpopleura sexmaculata sexmaculata*, male, wings. B118: *Rhyothemis triangularis*, male, wings. B119: *Hydrobasileus croceus*, (a) male, wings, (b) imago, (after Kirby, 1893). B120: *Pantala flavescens*, male, wings. B121: *Tramea virginia*, male, wings. B122: Male genitalia of (a) *Tramea limbata*, and (b) *Tramea basilaris burmeisteri*, (all after Fraser, 1936, except where otherwise stated).





B123: *Tholymis tillarga*, male, wings. B124: *Zygomma petiolatum*, male, wings. B125: *Aethriamanta brevipennis*, male, wings. B126: Genitalia of (a) *Aethriamanta brevipennis*, female, (b) the same, male, (c) *Urothemis signata signata*, female, (d) the same, male. B127: *Macrodiplax cora*, male, wings. B128: *Urothemis signata signata*, (a) male, wings, (b) imago, (after Kirby, 1893). B129: *Zygonyx iris malabarica*, male, wings, (all after Fraser, 1936, except where otherwise stated).

## Key to the final stage larvae of Sri Lankan Odonata

The larvae of only some of the Sri Lankan species are known and these larvae are covered in this key. The remaining species have been brought into the key by introducing the larvae of the genera where possible.

1. Larvae usually long, slender and cylindrical; with caudal gills.  
Zygoptera - 2
- Larvae usually rounder and fatter or flattened; without caudal gills but with short, spiniform appendages.  
Anisoptera - 21
2. Zygopteran larvae
- 2a. Larvae with 7 pairs of abdominal gills; caudal gills saccoid.  
Epallagidae - The genus *Euphaea* - 8
- 2b. Antennae with 7 or 8 segments, the first or second segment very long; median lobe of labium with a large cleft; caudal gills two or three, long and narrow.  
3
- 2c. Antennae with first segment much shorter than other segments together; median lobe of labium not deeply cleft; caudal gills long and broad, lamellate.  
4
- 3a. Antennae of 7 segments, the first at least as long as the other six put together; median lobe of labium with a large diamond shaped cleft; the three caudal gills long and narrow.  
Calopterygidae - 9
- 3b. Antennae of 8 segments, the first very short and the second very long; median lobe of labium cleft, the two distal ends overlapping in the middle, the lateral lobes narrow; the lateral caudal gills are narrow and triquetral in cross section, the third is reduced to a short, conical spine.  
Chlorocyphidae - 10
- 4a. Labial palp, with movable hook carrying the major setae; basal

lobe of labium very elongated, median lobe with a narrow short cleft; caudal gills denodate and rounded at apex with secondary branches of tracheae at right angles to central trachea and not branching till near the margin of the gills. Tibial comb of bidentate setae.

Lestidae - 11

- 4b. Labial palp without major setae on movable hook; labium almost triangular in outline; basal lobe of labium short, median lobe not divided, except in the *Protoneuridae*; caudal gills often nodate; pointed at apex, secondary branches of tracheae oblique to central trachea; tibial comb mostly of tridentate setae.

Coenagrionoidea - 5

- 5a. Labium with major premental and palpal setae, (major premental setae absent in *Argiinae*, minor scattered setae near base) distal margin of prementum without a median cleft, formed into crenations, each bearing a single claviform seta; caudal gills lamellar; tibial comb with tridentate setae.

6

- 5b. Labium without major premental or palpal setae, distal margin of prementum with a median cleft and beset with jagged palisade setae; caudal gills saccoid; tibial comb with spinate setae.

7

- 6a. Caudal gills rounded or pointed at apex but without any long thin extensions, nodate or denodate, lamellar, marginal setae thick and differentiated into stout antenodal and fine postnodal setae; first segment of antennae longer than pedicel; labium with major premental and palpal setae; labium with setae in two lateral oblique rows (except *Argiinae*); distal margin of prementum without a median cleft; formed into crenations each bearing a single claviform seta; tibial comb with a number of tridentate setae.

Coenagrionidae - 12

- 6b. Caudal gills with a long thin extension; first segment of antennae shorter than pedicel; labium with 4 setae arranged in a single transverse row. Fraser- slender, cylindrical, three caudal gills subnodate, lamellar, broadly dilated into paddle

like processes at the ends, marginal setae long, hair-like and not differentiated into antenodal and postnodal setae; mask kite shaped, flat, with major premental and palpal setae, distal margin of median lobe entire, without a cleft, and formed into crenations, each bearing a single claviform seta; lateral lobe robust with long movable hooks; legs long and slim, tibial comb with a number of tridentate setae. Breed in small montane streams, clinging to twigs or roots with the abdomen curled back well over the dorsum and waving freely in the current.

#### Platycnemididae - 18

- 7a. Larvae slender, cylindrical, furnished with three triquetral gills, mask flat, subquadrate, Gomphine-like, without setae, middle lobe cleft, lateral lobe robust with a long movable hook, legs long and slim. Breeding in torrential montane streams or seepages on the sides of hills in virgin jungle. Fraser says larvae unknown for *Platysticta*, *Ceylonosticta* and *Drepanosticta*.

#### Platystictidae - 19

- 7b. Very little known about the larvae. Labium without major pre-mental or palpal setae, distal margin of prementum has a median cleft and is beset with jagged tipped palisade setae. Caudal gills saccoid. Tibial comb of a number of spinate setae.

#### Protoneuridae - 20

8. **Euphaeidae (Epallagidae).**

Larvae with seven pairs of abdominal S-shaped processes on segments 1-7, the distal pair usually poorly developed; these processes are considered by some to be functional gills, but by others to serve as hooks to prevent the larvae from being washed down the swiftly flowing streams in which they usually are found. The caudal gills are bladder-like, (saccoid) and thickly coated with coarse hairs. The mask is simple and without setae, the distal margin of the medial lobe having a small median cleft. Two rows of spines on the head, one beneath the large eyes and the other on the outer margin of the mandibles. Length 18mm (Figs. C1 - C4).

#### *Euphaea splendens*

9. **Calopterygidae**

- 9a. Larvae slender and long like a stick insect; wing cases extend

to fourth abdominal segment; caudal gills triquetral; antennae 7–8mm long with scape about 3 times as long as remaining length and projecting forwards characteristically, like tusks; labium deeply and widely cleft, quite distinctive; palp long with its apex ending in three hook-like processes and bearing a thick movable hook, about half the length of the palp. Legs and caudal gills marked with dark bands. Final instar 25 cm long (Figs. C5 -C10).

*Neurobasis chinensis chinensis.*

- 9b. Basal segment of antenna long, projecting forwards, rest of antenna bent outwards; eyes very large and prominent; labium ovoid, with a broad cleft reaching to the level of the base of the palps; movable hook four times longer than the other three hooks, wing sheaths reach back to segment 5 of abdomen and project outside margin of abdomen; ovipositor of female reaches to the middle of segment 10; caudal gills foliate and similar to each other. Final instar 22mm long ( Figs. C11, C12).

*Vestalis apicalis nigrescens.*

# 10. Chlorocyphidae - The genus *Libellago*.

The larvae of the four Sri Lankan species have not been described, namely *L.adami*, *L. finalis*, *L.greeni* and *L. indica*. The larva of the Indian species, *L. lineata* has been described and the description below is of the larva of that species (Fig. C13).

Front projecting markedly. Eyes projecting slightly, only this part is faceted; antenna 8-jointed with a very long pedicel, the base and tip of which are pigmented; a strong backwardly directed process behind each eye; ocelli are very distinct. Labium long and narrow, median lobe deeply cleft, the two corners of the cleft over-lapping, outer borders with tooth-like blunt crenations; lateral lobes bifid, with a strong hook on each division, the inner with a long movable hook which overlaps its fellow in the middle line. Prothorax with two strong outwardly directed horns on each side; legs long and slender with very few hairs. Abdomen twice as long as wing cases with a row of closely set spines along the apical border of each segment. Only two caudal gills, triquetral in section, each with four rows of setae; probably not functioning as gills; they may be defensive in function as they break off easily.

11. Lestidae - The genus *Lestes*

None of the larvae of the species of *Lestes* found in Sri Lanka has been described. However, the life history of the Indian species, *Lestes praemorsus praemorsus* has been described (Arun Kumar, 1972) and the description and the figures of the final instar that follow are from this work (Fig. C14).

The final instar is the fifteenth, is slender, yellowish green with brown markings dorsally. Head broader than long, eyes olive green to brown, placed on the side of the head; antennae 7-segmented, the pedicel the longest. Labium laddle shaped, basal part elongated, distal part triangular, serrated, with a short, narrow, apical cleft, on each side of which is a small chitinous projection with a seta at its base; a thin seta present at base of each denticle on distal margin; premental setae 6+6; palpal setae 3, one on palpus and two on movable hook; palpus divided into two by a deep cleft, the outer consisting of a curved hook, a short middle serrated part and an inner lobe, the inner serrated mesally and forming a long hook; movable hook long, slender and with two long setae.

Wing sheaths reach to middle of fourth abdominal segment. Legs thin and long; tibial comb of bidentate setae, first two tarsal segments with a double row of bidentate setae, third with simple setae. Gonapophyses on 9th and 10th segments; in male as median paired triangular processes arising from middle of 9th and extending to the middle of its apical half; in the female as conspicuous paired processes arising from basal end of the 9th segment and extending into the apical half of the 10th segment. Caudal gills simple lamellate, with broad, dark bands; epiproct with a depression in the middle; venation palmate, tracheae dark brown. Small paired cerci on each side of epiproct.

Larva 29mm long, including caudal gills.

It should be noted that from the 2nd instar onwards the larvae of *Lestes* can be distinguished from other Zygopteran larvae by the presence of bidentate setae. The larvae of the Sri Lankan species of *Lestes* may differ from each other and from the larva of *L. praemorsus praemorsus* in the number and disposition of the setae on the median lobe of the labium and the palpus, the shape of the median lobe and palpus and the details of the armature of the margins, the location and size of the gonapophyses, the shape of the caudal gills and in the

overall colour and markings.

For this reason, these features in any larvae identified as belonging to the genus should be examined and carefully recorded.

## 12. Coenagrionidae

- A. No premental setae; caudal gills lamellate
  - Premental setae not more than 1+1, but a number of finer setulae are present: caudal gills lamellate, apices rounded
    - Argiinae—14
    - Pseudargiinae—17
  - Premental setae more than 1+1: caudal gills lamellate, ending in long narrow processes
    - Ischnurinae—16
- B. Caudal gills broader in the middle, apices sharply pointed: spiniform setae on median trachea and on lateral margins in ante-nodal regions
  - Caudal gills shorter and broader; without pigmented bands, apices obtusely pointed; antennae with only 6 segments; premental setae in two sets
    - Coenargiinae—15
    - Agriocneminae—13

## 13. Sub-family Agriocneminae

The genera *Agriocnemis* and *Mortonagrion*.

The larvae of the two Sri Lankan species of *Agriocnemis* have been described, but the larva of *Mortonagrion ceylonicum* has not. The following description and the figures of the larva of *Agriocnemis pygmaea pygmaea* are from Arun Kumar (1973a).

Antennae filiform; premental setae in two groups, 3 + 2 on each side; a single spiniform seta just below the base of the palpus and a few spiniform setae on the sides; palpal setae 4 on each palpus the distal margin of which is divided into two lobes, the outer lobe bearing four teeth, while the inner terminates in a curved hook: movable hook about half the length of the palpus (Ameen et al, 1982, give premental setae as 3 + 1 on each side; no medial slit and palpal setae as 5 on each palpus: antennae 7-jointed: caudal gills de-nodate,

coloured white with 4–6 transverse dark bands).

Tibial comb of scattered tridentate setae; tarsi beset with a double row of pectinate setae. Caudal gills fusiform; oblique secondary and tertiary tracheae arise from a well developed main trachea; a row of spiniform setae along the lateral margins in the antenodal region. Larvae 13–14mm long, nearly black, caudal gills paler (Fig. C15).

*Agriocnemis pygmaea pygmaea*

Carchini, Samways & Di Domenico (1995) refer to a "striped pattern along the body, which is almost continuous from the head to the abdomen" as apparently peculiar to their new species, *A. pinheyi*. An unidentified species from Thailand (Kerdpibule et al, 1979) had distinct dark bands on the caudal gills which were not evident on larvae of *A. femina*; these authors however, do not refer to the mixed pectinate and tridentate setae on the tibial comb described by Kumar on *A. pygmaea pygmaea* above. The caudal gills of *A. pinheyi* lack a line of breakage suggested in Kumar's figures for *A. pygmaea pygmaea*.

These variations and variations in the number and distribution of premental and palpal setae should be looked for as possible characters to identify the larvae of *Agriocnemis femina femina*.

14. Subfamily **Argiinae**  
with one Sri Lankan species - *Onychargia atrocyana*.  
No larvae of this genus have been described.
15. Subfamily **Coenagriinae**  
with one Sri Lankan species - *Cercion malayanum*, the larva of which has not been described.
16. Subfamily **Ischnurinae**  
with genera *Enallagma*, *Aciagrion* and *Ischnura*.
- 16a. The genus *Enallagma*.  
The larvae of the Sri Lankan species *Enallagma parvum* has not been described. A short description of the larva of the British *E. cyathigerum* by Gardner (1954) states:- premental setae 3+3 to 5+ 5; labial palpi with 6 to 7 setae; caudal gills subnodate;



larvae some tint of green.

A description of the final (11th) instar of *Enallagma ebrium* by Pilon and Fontaine gives:- antenna 6 or 7-jointed, prementum without a medial slit, premental setae varying from 3 to rarely 5 on each side, palpal setae 5, rarely 6, on each palp (Fig. C16).

*Enallagma* sp.

- 16b. The genus *Aciagrion* with a single species *A. occidentale* in Sri Lanka. The larva has not been described.

Needham (1911) describes two larvae from India which he believes are *Aciagrion* species as follows:- Length 12.5mm + gills 3.5mm and width 3mm. - not very slender with short gills. Head deeply and squarely notched behind between wide hind angles that are beset with minute prickles. Prementum with a barely noticeable median slit and with a single seta on each side; 8 palpal setae. Legs short and rather stout with spinulous longitudinal keels. Wing cases reach middle of fourth abdominal segment. Abdomen rather short, cylindrical, tapering posteriorly, with a row of pale dots across the apical border of each segment. Gills oval, widest just beyond middle and bearing minute spines on less than the basal half of the dorsal margin of the median gill and of the ventral margins of the lateral gills; tracheal branches issue separately near the base and gradually diverge as they pass outward along the axial thickening of the gill. Ovipositor of the female is large; the 9th segment of the male is armed ventrally with two sharp spines (Fig. C19).

*Aciagrion* sp.

- 16c. The genus *Ischnura* with two species in Sri Lanka, *I. aurora* and *I. senegalensis*. The larvae of both species have been described by Arun Kumar (1973a) and the descriptions that follow are from his paper.

Colour distinctly green with an yellowish tinge noticeable prior to emergence. Caudal gills almost transparent, tracheation greenish. Premental setae 4 + 4; scattered spiniform setae present near mid-apical region of prementum which is without a cleft; similar setae also on its sides. Palpal setae 4 on each palpus, distal margin of palpus in two lobes, the outer carrying fine denticles on its distal side, the inner terminates in

a short, curved end hook; movable hook slender, about half the length of palpus. Tibial comb is a number of haphazardly arranged tridentate setae; a double row of pectinate setae present on the inner side of the tarsi. Caudal lamellae foliaceous, duplex, distinctly differentiated into ante and post-nodal regions; margins of the antenodal region beset with a row of spiniform setae; lamellae widest in the middle, tapering towards both ends; epiproct 4.4mm, paraproct 4.6mm. Larva 12.0 to 13.1mm, 2.1 mm wide at maximum across eyes (Fig. C17).

*Ischnura aurora aurora*

Colour sienna to black, caudal lamellae a little lighter. Premental setae (1-3) + (3-1); a few spiniform setae present on sides of prementum which is without a cleft. Palpal setae 5 on each palpus, distal margin of palpus in two lobes, the outer carrying four small teeth, the inner terminates in a thick curved end hook; movable hook about half the length of the palpus. Tibial comb is a number of haphazardly arranged tridentate setae; a double row of long pectinate setae on the outer side and a few thin simple setae on the tibial side. Caudal lamellae foliaceous, duplex, tapering at both ends, light brown with darker tracheae. Tracheation well developed, lateral tracheae oblique; a row of small spiniform setae on the medial trachea in the antenodal region; epiproct 3.0mm, paraprocts 4.3mm. Larva 13.5 to 15.2mm; 2.1mm wide at maximum across eyes (Fig. C18).

*Ischnura senegalensis*

17. The subfamily *Pseudagriinae*  
There are two genera in this subfamily in Sri Lanka, *Ceriagrion* and *Pseudagrion*.
- 17a. The genus *Ceriagrion*  
Two species are found in Sri Lanka, *C. cerinorubellum* and *C. coromandelianum*.  
The larva of *C. cerinorubellum* has not been described.

The larva of *C. coromandelianum* has been described by Laidlaw (1916) as follows. The body is sandy yellow or brown in colour; the head broad and flat with no indication of the frontal ridge of the adult. The labium when folded just reaches the base of

the second pair of legs, its outer margin with 6 or 7 short, stout spines along its distal half; prementum without a medial slit; premental setae 5 + 5 in an oblique row diverging distally, the outermost being the largest; 7 long setae on each palpus. Abdomen cylindrical, tapering very gradually backwards; each segment has a ring of short, blunt setae on the hind margin and each of the last five segments has in addition a pair of similar setae dorsally, one on each side of the middle line; the members of the pair on segment 10 are much more separated from each other than those on the other segments. The caudal lamellae are leaf-like, lanceolate, in some specimens acuminate, but more often irregularly rounded apically; not jointed or marked across, but the basal half is stouter and more strongly chitinised than the apical. Each has two stout main tracheae; in the lateral gills these tracheae lie nearer the ventral margin, in the median gill the situation is reversed. On the lateral gills, the basal two fifths of the tracheae bears a row of chitinous teeth on the outer side; on the median gill a similar row is present on both sides. Lastly, on the ventral margin of the lateral pair and on the dorsal margin of the central gill there is another row of teeth extending from the base for two fifths of the length of the gill. Laidlaw claims that this description is from larvae raised in the laboratory; a small sketch of the prementum is provided.

A description by Arun Kumar (1973a) that follows differs in many respects from the above and may be reflecting local differences. However, it would be useful if the larvae are raised to emergence again and a new description made.

Larvae uniformly shiny black, except for the caudal lamellae which because of alternate black and white bands and rounded spots along the periphery have a mottled appearance. Premental setae (1+7): (7+1): a row of spiniform setae present a little below the crenations on the distal margin of the prementum. Palpal setae 6 + 6; distal margin of palpus divided into two lobes, the outer produced into short blunt teeth distally and beset with small setae, while the inner projects as a prominent curved end hook. Movable hook thick and long - a little less than half the length of the palpus. Tibial comb consists of a number of scattered tridentate setae; tarsi beset with a double row of pectinate setae. Gonapophyses in male small, triangular processes situated on the 9th segment; in the female, elongated and arising from the anterior margin of

segment 9 and extending up to the middle of the posterior half of 10. Caudal gills duplex, oval and produced into small processes apically; Tracheation palmate with a main median trachea from which obliquely running secondary and tertiary tracheae arise. Larva 13.5–15.2mm; maximum width across eyes 3.2mm; epiproct 2.6mm; paraprocts 2.7mm (Figs. C 20 a-h).

Ameen et al.'s (1982) describing the larva of the genus gives premental setae 4 + 4 (one large and 3 small); ocelli absent (?); caudal gills de-nodate (but Kumar's figure shows an oblique transverse mark). The larva of this species is described briefly as being pale greenish and the gills with 4–5 deep black spots towards the apical lateral margin.

*Ceriagrion coromandelianum*

17b The genus *Pseudagrion*

Three species are found in Sri Lanka, namely *P. malabaricum*, *P. microcephalum* and *P. rubriceps ceylonicum*. It is likely that a fourth, *P. decorum* will be found here. Only the larvae of the last two Sri Lankan species have been described.

Laidlaw (1915) describing the larva of *P. microcephalum* says it is very similar to the European *Erythromma najas*. Larvae were reared to emergence at which time the length was about 22mm of which the caudal gills were about 8mm. Larvae pale sandy grey in colour, head pentagonal, antennae 7-jointed; anterior border of mask gently rounded, extending when folded, beyond the insertion of the second pair of legs, its outer margin with a few small spines; a single large premental seta on either side of the middle line; four large palpal setae are directed inwards and the movable hooks are long and overlap. Caudal lamellae have nearly parallel sides and are bluntly rounded at their apices, each is divided at about its middle by a transverse fold or joint; the proximal part of the gill has its margins spiny and there is a distinct notch on the lower margin of the lateral lamellae between the two parts. The last spine on either margin before the transverse fold is the largest of the series; margins of the distal parts are smooth. There are two tracheal trunks in each lamella, their branches are arborescent near the margins and are of a dark brown colour making the lamellae look mottled (Fig. C23).

*Pseudagrion microcephalum*

The larva of *Pseudagrion rubriceps* has been described in all its stages by Arun Kumar (1973) and the description of the final (10th) instar is from his work. The larva of the Sri Lankan subspecies *ceylonicum* has not been described and is not likely to differ much from that of the species.

The final stage larva is coloured yellowish green to yellowish brown, spotted with brown markings dorsally. Premental setae 1+1, a few scattered setulae present near the bases of the setae; a row of spiniform setae on the sides of the prementum; palpal setae 4+4; distal end of palpus formed into two lobes, the outer bearing tooth-like lobes, the inner produced into a curved end hook; movable hook long and slender, about two-thirds the length of the palpus. Tibial comb of a number of haphazardly arranged tridentate setae with a double row of pectinate setae on each tarsus. Caudal lamellae flat, duplex (nodate); apex rounded, darker proximally than distally; sides of proximal half beset with spiniform setae while sides of distal half bear a few trichiae; secondary and tertiary tracheae oblique, arising from a main median trachea; epiproct 4.6mm, paraproct 5.4mm. Overall length of larva 20-22mm (Fig. C21).

*Pseudagrion rubriceps*

18. The family **Platycnemididae** with a single genus and a single species *Copera marginipes* in Sri Lanka.

The larva of this species has been described by Fraser (1919b), Lieftinck (1940b) and Arun Kumar (1973a). The antenna is 7-jointed with a distinct apical spine on segment 6. Distal margin of prementum crenulated, each crenation with a small claviform seta; a row of 10-12 small setae on each side; premental setae 2+2. Palpal setae 5+5; palpus produced distally into two lobes, the outer bearing a number of denticles, the inner produced into a long curved end hook; movable hook long, about half the length of the palpus. Tibial comb consists of haphazardly arranged tridentate setae; a double row of pectinate setae present on the outer side of each tarsus. Caudal lamellae petiolate and nodate, paddle-like with peculiar fringed ends, spotted brown. Legs long and thin with minute spines (Fig. C22).

*Copera marginipes*

19. The family *Platystictidae* with two genera in Sri Lanka, *Drepanosticta* with 15 species and *Platysticta* with two.

No larva of any of the Sri Lankan species of *Drepanosticta* has been described. Lieftinck (1934) has given a full description of the larva of the Javan *D. sundana* (Krug.), based on the nymphal skin of a female that was captured and identified. No larva of the genus *Platysticta* has been described. In the same paper Lieftinck says the known larvae of the family suggest that the family is primitive and specialised; thus any larva of *Platysticta* found in Sri Lanka is likely to be similar to that of *Drepanosticta*. The description that follows and the figures are from Lieftinck's paper. Head large, transverse, slightly concave posteriorly, ocelli invisible; labrum protruding, densely fringed with soft setae along distal margin. Antennae 7-jointed, segments 3-7 much thinner than basal ones, 3 the longest. Mandibles biramous as in *Euphaea* and asymmetrical. Labium when folded reaching back to the bases of the prothoracic legs; prementum broad, plate-shaped, squarish, produced only very slightly, with a deep and narrow median cleft bearing a number of radiant striae, the distal ends of the cleft come together almost enclosing a fenestrum; distal margin clothed with a great number of minute, flattened, scale-like setae which are widened and branched apically; premental setae completely absent, but just around the median cleft are a few setae and on the middle of the prementum are two finely striated areas. Lateral lobes with a long movable hook and with a simply rounded distal tooth, but with no other processes, - the entire structure strongly resembling that of a Gomphine nymph. Prothorax large and broad, smoothly rounded with two low dorsal tubercles. Meso- and meta- thorax a little narrower. Front wing pads reach to middle of segment 4, those of hind wings to end of segment 5. Legs long and slender, sparsely pilose; tibiae of anterior pair with a row of 3-4 strong setae along inner margin and with three short spine-like bristles at apex; tarsi 3-jointed, claws simple. Abdomen cylindrical, yellowish, no colour pattern discernible; segments unarmed, a little hairy aside; rudiments of female gonapophyses large. Caudal gills, unique in shape among the Odonata, are saccoid, lack a petiole and much enlarged immediately after their bases with the greatest width at halfway between the base and the end of the ovoid portion; then they taper rapidly and continue

backwards to form longishly drawn out, pointed filaments. Median gill semi-transparent, evenly greyish purple-brown in colour, the convex dorsal surface is of darker brown chitin and finely pilose, the ventral and lower mesial surfaces distinctly paler and bearing very short and fine hairs only along lower margin at base. The posterior pointed portion of the gill is covered with irregularly placed hairs, most of which are long and slender, giving it a somewhat shaggy appearance. This gill receives two well separated tracheae. Each lateral gill is longer than the median, very probably triquetro-cylindrical in section, the mesial surface being nearly plane. In life the gills would probably have been sausage-shaped, with maybe a suspicion of the formation of longitudinal ridges or midribs. It must be remembered that this description has been made from a single nymphal skin (Fig. C24).

(*Drepanosticta sundana*)

20. The family **Protoneuridae**, the Sri Lankan genera being *Disparoneura* with a single species, *Elattoneura* with five species and *Prodasineura* again with a single species. No larvae belonging to any of these species has been described, but the larva of *D. campioni* Fraser has been described by Arun Kumar (1973) as follows.

A chocolate coloured larva with dark green eyes. Prementum flat and rectangular, major premental and palpal setae absent; distal end of prementum convex with a cleft the distal ends of which come together, serrated and beset with jagged tipped palisade setae, long trichiae present on either side adjacent to the palisade setae; two pairs of small median setae on the prementum, one near the distal end and the other at about its middle, with a pair of lateral setae in between these two pairs; small scattered spiniform setae at the apical end. Palpus with three lateral spiniform setae near its base. Movable hook thick and about three fourths the size of the palpus. Tibial comb of simple thick setae; tarsi beset with scattered simple setae. Female gonapophyses extend to the anterior half of segment 10. Caudal lamellae simplex, napiform ending in long filaments. Compare this larva with that of *Drepanosticta sundana* and note the difference in the tracheae in the lamellae (Fig. C25).

*Disparoneura campioni*

21. **Anisoptera**
- 21a. Antennae 4-jointed, generally short and broad; fore and middle legs with tarsi of 2 segments, hind legs with 3 segments, in some genera the numbers are 1 and 2 respectively; labium flat, palpus with an end hook, medial margin without crenations; larvae in many species flattened dorso-ventrally  
**Gomphidae - 25**
- 21b. Antennae 7-jointed, long and tapering; tarsi of 3 segments in all legs; labium flat or concave; species not generally flattened dorso-ventrally  
**22**
- 22a. Labium flat; labial palpus without setae but with well-developed movable hook and end hook; medial margin without crenations; abdomen very elongated  
**Aeshnidae - 35**
- 22b. Labium concave and spoon shaped; palpus with setae and smaller movable hook, medial margin produced into denticles or crenations; abdomen short or elongated  
**23**
- 23a. Median lobe of labium divided into two apically; palpus with strong irregular teeth along inside edge; abdomen elongated  
**Cordulegasteridae**
- 23b. Median lobe of labium not divided apically; palpus without strong teeth on inside edge but with a number of crenations; abdomen oval  
**24**
- 24a. Superior appendages more than half as long as paraprocts; regular weak teeth on inside edge of palpus; legs long  
**Corduliidae - 36**
- 24b. Superior appendages half as long as paraprocts; internal edge of palpus barely denticulated; legs generally short  
**Libellulidae - 37**
25. The family **Gomphidae**  
 There are ten genera of this family in Sri Lanka; *Heliogomphus*



with four species, *Cyclogomphus* and *Macrogomphus* each with two species, the remaining genera, namely, *Anisogomphus*, *Burmagomphus*, *Megalogomphus*, *Paragomphus*, *Microgomphus*, *Gomphidia* and *Ictinogomphus* have a single species each - a total of 15 species. Fraser (1919) described three larvae which he assigned to the genus *Cyclogomphus*, but Lieftinck (1940) considers that Fraser's *C. minusculus* should be referred to *Microgomphus torquatus*, his *C. heterostylus* probably is *Burmagomphus pyramidalis* and his third described as *C. verticalis* Selys could be of a *Cyclogomphus* (but not of *C. verticalis* which Fraser has since transferred to the genus *Microgomphus*). There is no figure of this larva and only a brief description. Lieftinck has also cast doubts on the identification by other authors of larvae as belonging to this genus. It is therefore necessary to enter a reservation that the larva of *Cyclogomphus* may not have been described. However, the labium of the specimen questioned by Lieftinck on the grounds that no species of the genus has been found at the elevation at which this specimen is reported to have been taken, is figured here (Fig. C28-10) from Needham (1911). Lieftinck (1932) considers the larvae of *Cyclogomphus* and *Macrogomphus* together, having an elongate body, shaped as in *Gomphus*, short, robust legs with a long fringe of hairs on the exterior surface of femora, the anterior border of the median lobe of the labium straight, not projecting in front while the distal end of the lateral lobe is long and much pointed at the tip, rather kukri-shaped: these differ from the larvae of *Microgomphus* and *Heliogomphus* where the body is ovate and much flattened dorso-ventrally, the legs rather longer, the femora without a distinct fringe of hairs, naked or with scattered hairs only, the median lobe of the labium with its anterior border convex, projecting in front, and the distal end of the lateral lobe of the labium short and much rounded.

The following tentative key is offered as being all that could be prepared with the very limited and uncertain information available.

The larvae of *Heliogomphus* are easily identified by their very peculiar antennae - the first two joints are small and cylindrical, the third is enormously enlarged, plate-shaped with its inner (mesial) margin nearly straight, the fourth joint absent (Fig. C31-4).

The genus *Heliogomphus* - 30

Similarly the larvae of *Macrogomphus* can be identified by segments 9 and 10 of the abdomen being greatly elongated, the abdomen itself not being carinated (Fig. C32, 1-3).

The genus *Macrogomphus* - 31

The remaining genera have been divided into two groups, based on the shape of the abdomen and the appearance of the wing sheaths, which last character is being used only in relation to the Sri Lankan species as it does not appear to be constant across a genus.

- A. Abdomen flattened and almost circular; wing sheaths parallel. B
- Abdomen obovate; wing sheaths parallel C
- Abdomen obovate; wing sheaths divergent D
- B1. Antenna club shaped (Fig. C34-a)

The genus *Gomphidia* - 33

- B2. Antenna of usual gomphid shape, segment 4 very reduced.
- The genus *Ictinogomphus* - 34

- C1. Movable hook very long, end hook slightly incurved, inner surface feebly serrate; median lobe of labium not convex, with two crescent shaped emarginations, one on either side of a central triangular tubercle; segment 3 of antenna flattened dorso-ventrally and fringed on either side with long, soft, pale hairs, segment 4 a much reduced tubercle (Fig. C26, 1-4).

*Anisogomphus solitarius* - 26

- C2. Median lobe of labium slightly convex; lateral lobe of palpus incurved, end hook finger-like, inner surface with 7-8 quadrate teeth; segment 3 of antenna probably with scattered stiff setae, segment 4 a much reduced tubercle (Fig. C27, 1-11).

*Burmagomphus pyramidalis sinuatus* - 27

- D1. Abdomen elongated oval with marked dorsal spines on segments 2-9; median lobe of labium not convex; tibial spurs well developed on fore and mid legs (Fig. C28, 8-9).

*Megalogomphus ceylonicus*-28

- D2. Median lobe of labium convex with a central semi-circular depression; body elongate (Fig. C28-10).

*Cyclogomphus* (?) sp.

- D3. Antennae irregularly beset with thick cylindrical hairs, which are themselves densely covered with microscopic hairs; third segment slender and cylindrical, fourth vestigial, not clearly demarcated from the third: median lobe of labium slightly convex and with about 16 short teeth between which are hair-like scales; lateral lobe stout, rounded distally with 11-12 subquadrate teeth on the inner margin; dorsal hooks on abdomen poorly developed (Fig. C33, 1-3; Fig. C34-4).

*Microgomphus wijaya* - 32

- D4. Segment 4 of antenna reduced, thin and slender, about as long as segment 1; median lobe of labium slightly convex, fringed with thick setae; lateral lobe tapering slightly, end hook rounded and apparently without teeth on inner margin (Fig. C29, 1, 2; Fig. C30, 1-7).

*Paragomphus henryi* - 29

- 26 The larva of *Anisogomphus solitarius* has been described in great detail by Lieftinck (1971) from the exuviae of a single male which was taken and served to describe this new species. The following and the figures are from his description.

General appearance of a *Gomphus* and certain species of *Burmagomphus*, but with smaller head, longer thoracic segments, shorter legs and a less flattened abdomen. Body slender, yellow brown in colour. Labrum trapezoidal, free margin with a dense fringe of longish, pale hairs. Antenna 4-segmented, the second flattened dorso-ventrally and fringed on either side with long, soft, pale hairs which are longest externally, distal segment very small. Labium exceptionally long, length: breadth ratio approx. 4.3: 3, extending back to base of mid-coxae; no major premental or palpal setae present; median lobe not protuberant, with two crescent-shaped emarginations, one on either side of a triangular tubercle which projects anterad; entire margin with a dense fringe of about 50 long, closely set, rod-like setae with blunt apices. Palpus broad at base, narrowing abruptly to form a long, curved,

claw-like end-hook, the inner margin of which is feebly serrate with low molar-like ridges. Movable hook extraordinarily long and slender, more than  $1\frac{1}{2}$  times as long as palpus and arising very near the palpal base. Wing cases parallel or almost so, tip of forewing reaching back to end of segment 3 of abdomen. Legs short and robust; first two pairs of femora short, broad and a little curved, dorsal and ventral longitudinal ridges densely fringed with long soft hairs and outer faces of each with two naked length-wise stripes; all femora markedly compressed; fore and mid tibiae with well-developed, triangular, outcurved, extero-apical burrowing hooks; all tibial and tarsal ridges strongly setiferous; claws slenderly curved. Abdomen rather narrow and less flattened than in *Burmagomphus*; dorsal hooks vestigial and present only on segments 7-9, on which only lateral spines are found. Anal pyramid slightly longer than segment 10. Total length 28mm, greatest width across abdomen 6.8mm (Fig. C26, 1-4).

Lieftinck has placed his specimen in this genus with some doubt; as regards the larva, the great length of the labium, the singular form of the palpus with its long claw-like end-hook and the enormous, basally articulated movable hook differ from the only other larva of the genus described (*A. maaacki* (Selys)) at the time of his writing. Since then Arun Kumar (1973b) has described the larva of *A. occipitalis* Selys - the distal margin of the labium is described as convex, serrated and beset with palisade setae; it differs markedly in shape from that of *solitaris* (Fig. C26, 5-12).

*Anisogomphus solitaris*

- 27 The following description of the larva of *Burmagomphus pyramidalis sinuatus* is taken from Lieftinck (1940) who collected an emerging male and its exuviae.

Uniform yellowish-brown in colour. Skin of head and prothorax, upon epicranium and pronotum, with two roundish smooth areas on each side of the middle. Posterior half of abdominal segments indefinitely mottled with very short, scale-like brown hairs; 3-7 with a fine longitudinal brown line on each side of the pale mid-dorsal line, posterior margin darker; 8-10 pale brown; 2-6 with small blotches of pale brown in a row on each side of the middle line. Body rather slender, moderately flattened. Labrum rather broad, sides and anterior

border fringed with long hairs; clypeus also hairy. Labium extending back to end of procoxae; median lobe very slightly convex, densely fringed with palisade setae (hair-like scales); palpal lobes short with strongly incurved end-hooks; on the inner margin are 7-8 quadrate teeth; movable hook moderately long. Legs moderately long, anterior and middle femora curved; posterior edges of femora and tibiae fringed with long hairs; burrowing hooks on anterior and middle tibiae moderate. Wing cases reach base of 4th segment. Abdomen widest before the middle; proximal segments more flattened dorsally than distal ones; dorsal hooks only on 8 and 9, sharp and pointed; lateral spines on 7 to 8 short, those on 9 slender reaching to the end of 10 or beyond. Total length 28.5mm, width of abdomen 5.6mm (Fig. C27, 1, 2; Fig. C34-3).

The antennae have not been fully described but the figures of the larva of *B. sivalikensis* Laidlaw by Arun Kumar (1973b) suggest possible differences from *Anisogomphus* species (Figs. C27, 3-11).

*Burmagomphus pyramidalis sinuatus*

- 28 Fraser (1933) has described a single exuviae of *Megalogomphus ceylonicus* which is in the Colombo Museum. His figure of this specimen is copied here. He says it is a miniature of the S. Indian *M. hanningtoni*, being 34mm long and 8mm across the abdomen. The lateral lobe of the labium is "deeply bifid at the end and has two robust teeth preceding the two long and equal terminal ones" (The meaning of this last statement is not clear even though the reference must be to the median lobe and not the lateral). By his figure, (Fig. C28, 8, 9) the tibial spurs are very strongly developed. Lieftinck (1940) writing of a fragment of a larval skin - only the abdomen - "it could easily be identified as a species of *Megalogomphus* by the characteristic armature and markings of the abdominal segments, which are very similar to those of the Javan *M. icterops* (Martin)", which he describes (1941) as naked, very hairy on all lateral margins of head thorax and abdomen, the last being broad, tumid and strongly keeled, with dorsal spines on segments 1 to 9, that on 1 minute, knob-like, those on 2 to 4 small but steadily increasing in size and length, convex dorsally and imbricated backwards; those on 5 to 9 increasingly carinated longitudinally and overlapping posterior border of segments, gradually lengthening to a robust spine that is longest on 9;

lateral spines on 7 to 9 short and acute. St. Quentin (1973) questions Fraser's statement that the lateral lobe is bifid (Fig. , 8, 1-7)).

*Megalogomphus ceylonicus*

29. The larva of *Paragomphus henryi* has been described by Lieftinck (1940) as follows:- pale sandy yellow in colour and very similar to the larva of *P. lineatus* (Selys). The fourth joint of the antenna is very small and slender. The median lobe of the labium is smoothly rounded and fringed with long palisade setae. Total length 23mm, greatest width across abdomen 5.2mm (Figs. C29, 1, 2; C30).

The larva of *P. lineatus* has been described by Arun Kumar (1973b) (as *Mesogomphus lineatus*). A large number of setae present on scape, pedicel and proximal segment of antenna; three spiniform setae on either side of prementum just below insertion of palpus the inner margin of which is slightly serrated; wing sheaths strongly divergent; legs short, strong and beset with setae; abdomen elongated, mid-dorsal protuberances on 2 to 9; small lateral spines on 3 to 9; caudal gills beset with setae (Fig. C30, 1-7).

*Paragomphus henryi*

30. There are four species of *Heliogomphus* in Sri Lanka. St. Quentin (1973) collected 3 larvae which agreed more or less with the description of *kelantanensis* from Malaya by Lieftinck (1932). These larvae were dark brown, only the tarsi being yellow, 20mm in length, 5mm in greatest width, the wing sheaths lying parallel and reaching the 5th abdominal segment. The median lobe of the labium is slightly convex and with a dense fringe of short yellow bristles; the lateral lobes are wide basally and tapering, the inner margin slightly curved and armed with 16-18 denticles; the movable hook is long and slender. Antennae typical for the genus, 1st and 2nd joints small, cylindrical, the 3rd plate shaped and enlarged. Abdomen flattened dorso-ventrally, segments 5 to 9 with robust dorsal hooks, 6 to 9 with lateral spines. Legs short and robust (Fig. C31, 1-4).

*Heliogomphus* sp.

31. The larvae of the Sri Lankan species of *Macrogomphus*, *M. lankanensis* and *M. annulatus keiseri* have not been described.

Fraser (1919) has described and figured the larva of the Indian *M. annulatus*. The following is from his paper.

Labium typically Gomphine, very flat, oblong, the basal half constricted, distal half square, lateral lobes kukri-shaped, armed with five robust teeth on the inner border and a long, movable hook on the outer; no setae; mid-lobe straight, not projecting, minutely crenate along its border. Eyes globular, comparatively large; head small; antennae short, club-shaped, 4 segments, coated with short coarse hairs. Wing cases very narrow, triquetral. Abdomen tapering, cylindrical, not carinated, greatly elongated, especially the last two segments, the 9th having a robust, backwardly directed spine on mid-dorsum. Legs very short and robust, the femora and tibiae strongly curved, the former furnished with a long fringe of hairs on the extensor surface. The elongated abdomen forms a siphon which projects from the mud (Fig. C32, 1-3).

*Macrogomphus annulatus*

32. The larva of *Microgomphus wijaya* was described by Lieftinck (1940) when he erected this new species from 1 male and 3 females (all freshly emerged with exuviae). The following description and the figures are from his paper.

A smooth and flat larva, yellowish-brown dorsally. Head very small, flattened dorsally, mouth parts projecting; dorsal surface of head covered with minute warts; fourth joint of antennae vestigial, apparently fused with the third; antennae beset irregularly with thick and cylindrical wart- or scale-like hairs, which themselves are densely covered with minute hairs. Labium extends back to posterior surface of procoxae; median lobe slightly convex and furnished with about 16 very short, squarish teeth between which hair-like scales are inserted; inner margin of palpus with 11-12 sub-quadrate teeth. Pronotum with a blunt, narrowly triangular process on each side about the middle; wing sheaths divergent, extending back to almost the end of segment 4; (possibly parallel in the living larva), pale brown, darker basally; legs moderately long, tibiae and tarsi yellow, other parts darker and brownish. Abdomen smooth, yellowish-brown, dorsal warts dark brown, two longitudinal rows of small roundish dark spots on each side of 3-8 and an inner row of basal spots. Total length 17.8mm; maximum width across abdomen 6.2mm (Fig. C33, 1-3; Fig. C34-4, C35).

*Microgomphus wijaya*

33. The larva of *Gomphidia pearsoni* has not been described. Wilson (1995) has figured the larva of *G. kelloggi* Needham without any description. His figures are copied here (Fig. C36).

*Gomphidia* sp.

34. The life history and larval stages of *Ictinogomphus rapax* have been described by Arun Kumar (1985) and Anwara Begum, Bashar & Biswas (1980). Figures from both authors have been copied here because of differences between them. My own knowledge favours the more rounded shape of the larva drawn by Anwara Begum et als. The antennae are 3-jointed according to Kumar, though his figure appears to show a very rudimentary 4th segment, while a 4-jointed antenna is shown by Anwara Begum et als. Labium extending up to anterior margin of middle coxae, distal margin of prementum straight, serrated and beset with jagged tipped palisade setae; palpal setae 16+16 arranged linearly; movable hook strongly curved and sharply pointed. Wing sheaths extending up to the 6th abdominal segment and pressed closely obliquely. Tarsi of fore and middle legs 2-segmented, of hind 3-segmented according to Kumar, but 1- and 2-segmented by Anwara Begum et als. Abdomen convex dorsally; mid-dorsal spines on 2-9 exposed; lateral border of all segments densely fringed with long hairs; 10th segment vestigial. Larval colour dark brown (Figs. C34-2, C37).

*Ictinogomphus rapax*

35. The family Aeshnidae

There are four genera of this family in Sri Lanka with six species; one, *Anax* with three species and the others, *Hemianax*, *Gynacantha* and *Anaciaeschna* with a single species each. Of the three species of *Anax* the larvae of two, *guttatus* and *immaculifrons* have been described. The third *indicus*, of doubtful separation from *guttatus* has not. The larva of *Hemianax ephippiger* has been described briefly and figured from exuviae by Marmels: the larva of *Anaciaeschna* has not been described. A figure of the larva of *Gynacantha millardi* from Fraser (1936) is at C39.

Sangal and Kumar (1970) have described the larvae of the two species of *Anax* named above and the descriptions that follow are taken from their paper.



- 35a Length 41–44mm; maximum width 7–8.5mm. A slender larva coloured light brown, the abdomen with a darker mid-dorsal stripe and paler lateral areas. Eyes: shape typical of the genus, dark brown to steely grey in life. Antennae piliform. Labium reaching the coxae of the middle pair of legs, widest distally, pear-shaped, prementum convex with a distinct cleft 0.5mm deep and with small setae on the distal margin, movable hook strong, slender and pointed. Thorax well built, compact and collar like. Wing buds parallel to abdomen, the hind reaching the anterior end of the fourth abdominal segment. Legs robust, brown with faint dark bands towards the posterior ends of tibiae. Abdomen robust, strongly convex dorsally, pale brown with three rows of cloudy spots, one beaded median row and paired broader lateral rows; lateral spines on segments 7–9 (Fig. C67).

*Anax guttatus*

- 35b Length 52–55mm (60), maximum width 9.5–11mm: altogether a larger larva and more pigmented than that of *A. guttatus*. Dark brown with incomplete dark brown bands on the femurs of all three pairs of legs; abdomen with darker mid-dorsal and paler lateral areas. Eyes blackish in life. Antennae piliform. Labium reaching upper half of the coxae of the hind pair of legs, widest distally, more or less spoon-shaped, prementum convex, cleft only 0.2mm (2.6) deep, small setae on distal margin, palpus truncated distally, its inner margin curved into a prominent spine; inner margin with a row of small low serrations; movable hook longer than in *guttatus*. Thorax strong, compact and collar-like. Wing buds parallel to abdomen, the hind reaching the posterior half of the fourth abdominal segment. Abdomen very robust, convex dorsally, darker brown than in *guttatus*, with three rows of cloudy spots, one median row and paired broader lateral rows; lateral spines on segments 6 to 9. Enclosed in brackets in the foregoing description are variations appearing in an exuviae of a Sri Lankan female described by Lieftinck (1940) (Figs. C38, C68).

*Anax immaculifrons*

- 35c. Length 42–45mm, greatest width 7.5mm coloured brown with lighter markings. Lateral abdominal processes on segments 7 to 9 (Fig. C69).

*Hemianax ephippiger*

36. The family *Corduliidae*

There are two genera of this family in Sri Lanka, *Epophthalmia* with one species, *E. vittata cyanocephala*, and *Macromia* with two, *M. flinti* and *zeylanica*. All three species are peculiar to the island. The larva of *M. zeylanica* alone has been described, but included here are descriptions of the larva of a species of each of these genera; it is likely that the larvae of the Sri Lankan species will not be very different.

The larvae of three species of the genus *Epophthalmia* have been described by Lieftinck with a generalised description from which the following summary has been made. The head is small with small very prominent, knob-like, rounded eyes. Sides of the head convex, on each outer hind angle, which is always completely rounded, a nipple-shaped projection of slightly variable length. Labium very large and of extraordinary shape, extending between the middle legs as far as an elevated transverse ridge between the hind legs. Lateral lobes strongly developed, of a very peculiar shape, comb-like, with strong, hook-like, incompletely interlacing teeth. No setae. Movable hook spine-like, very short. Wing pads reaching to end of fifth segment or a little more, strongly spotted with black. Legs widely distant, much flattened and very long, claws shorter than last tarsal joint, slightly curved, without teeth, femora with three or more dark bands. Abdomen broadly ovate, lateral spines always present on segments 8 and 9, sharp and nearly straight, those on 9 the longer, reaching at least slightly beyond end of 10; dorsal hooks on 3-9 or 4-9. Anal appendages form a thick short pyramid. Body rather smooth, with thin pubescence, coloured light ochreous or dull yellow with a rather uniform brown design dorsally. Total length 32-35mm. This description applicable to larvae of *E. elegans*, *vittata* and *vittigera* (Fig. C40).

*Epophthalmia* sp.

The larva of *Macromia zeylaica* has been described by Lieftinck (1940) from several exuviae collected at Mailapitiya. Head broader than long, eyes very prominent, erect, semi-circularly rounded above, antennae with first two joints thickened, the remainder tapering. Labium extending back to hind end of mesocoxae; 7 premental and 6 palpal setae on each side, palpus with 7 crenations on medial edge. Abdomen very flat, lateral

spines on segments 8 and 9 conspicuous, strong dorsal hooks on segments 3 to 9. Total length of body 20.5mm, coloured yellowish brown, femora with three dark transverse bands, abdomen speckled with pale and dark mesially, ridges and apices of dorsal hooks black. The larva of *Macromia moorei* Selys has been described by Kumar and the larvae of some Papuasian species by Lieftinck. There is considerable difference in the drawings of the larvae by the two authors as can be seen in the figures copied here. Kumar raised larvae to emergence so that his identification has to be considered more reliable than Lieftinck's, who says that while the identity of his larva remains a little doubtful, its determination is probably correct. The labium as figured by the two authors varies only in that the setae on the crenations on the distal margin of the palpus are in distinct tufts on the ends of each crenation in Lieftinck's figures, while they are evenly spread along the margin in Kumar's. The following description is summarised from Kumar. A distinct protuberance is present between the antennae. Labium very large, distal margin of prementum strongly convex; movable hook short. Legs long, thick, giving the larva a spider-like appearance. Abdomen ovate, prominent dark mid-dorsal spines on segments 1 to 9, that on one projects almost vertically upwards; small lateral spines on 8 and 9. Anal appendages short. Body: total length 19mm, colour from brown to almost black (Figs. C34-1, C41, C46).

*Macromia zeylanica*

### 37. The family Libellulidae

The following tentative key has been prepared using the available descriptions of the larvae that are included and keys from Arun Kumar (1973b) and Chowdhury et al. (1981).

Larvae of the following genera have not been described:-  
*Hylaeothemis*, *Tetrathemis*, *Cratilla*, *Lathrecista*, *Indothemis*,  
*Neurothemis*, *Onychothemis*, *Aethriamanta*, *Macrodiplax*.

#### A. Mid-dorsal abdominal protuberances absent.

B

*Potamarcha*, *Acisoma*, *Bradinopyga*, *Crocothemis*, *Diplacodes*,  
*Rhodothemis*, *Palpopleura*, *Pantala*, *Tramea basilaris burmeisteri*,  
*Sympetrum fonscolombi*.

Mid-dorsal abdominal protuberances present.

G

*Brachydiplax*, *Orthetrum*, *Brachythemis*,  
*Sympetrum* (some species), *Trithemis*, *Rhyothemis*,  
*Hydrobasileus*, *Tholymis*, *Zyxomma*, *Urothemis*,  
*Zygonyx*, *Tramea limbata*.

- B. Tarsi and claws of mid and hind legs black. Lateral spines very large, longer than segments bearing them. Inner borders of labial palps distinctly notched. Premental setae 17+17; palpal setae 13+13. Epiprocts longer than paraprocts. Tibial comb beset with tridentate setae. Length 20–22.5mm.

*Pantala flavescens* - 52

- Tarsi and claws of mid and hind legs not black. Lateral spines smaller than segments bearing them.

C

- C. Inner borders of labial palps less notched. Premental setae 14+14; palpal setae 10+10; tibial comb and tarsi beset with a few tridentate and mostly furcate setae. Epiproct shorter than paraprocts. Length 22–24.2mm.

*Tramea basilaris burmeisteri* - 53.1

- Inner borders of labial palps slightly wavy

D

- D. Not longer than 17.5mm.

E

Always longer than 17.5mm

F

- E1. No setae on median lobe of labium. Premental setae 14+14; palpal setae 10+10. Length 15–17.5 mm

*Diplacodes trivialis* - 45

- E2. No setae on median lobe of labium. Premental setae 9+9; palpal setae 9+9. Length 16mm.

*Palpopleura* sp - 49

- E3. No setae on medial lobe of labium. Premental setae 11+11; palpal setae 8+8. Length 17.1mm.

*Acisoma panorpoides panorpoides* - 41

- E4. Median lobe of labium studded with setae. Premental setae 13+13 to 15+15; palpal setae 10+10 to 11+11. Length 14–16.5mm.  
*Crocothemis servilia servilia* - 44
- F Always longer than 17.5mm.
- F1. Median lobe of labium studded with setae. Premental setae 13+13 to 14+14; palpal setae 8+8. Length 18–20mm.  
*Rhodothemis rufa* - 46
- F2. Body hairy. Head rectangular, eyes capping fronto-lateral part of head; premental setae 11+11, palpal setae 8+8. Length 21.5mm.  
*Potamarcha congener* - 40
- F3. Median lobe of labium studded with setae. Premental setae 20+20; palpal setae 15+15. Greyish to black. Length 20–23mm.  
*Bradinopyga geminata* - 43
- G. Mid-dorsal abdominal protuberances present.
- G. Body generally *densely* covered with hairs. Head rectangular, eyes capping fronto-lateral part of head; abdomen long and tapering; mid-dorsal protuberances on segments 4 to 7 or 8; palpal setae less than 9+9; 4 large and numerous minute premental setae.  
*Genus Orthetrum* - N
- Body smooth, not covered with hairs. Head triangular, legs slender; all premental setae large, subequal. H
- H. Lateral spines on abdominal segments 8 and 9 very long, nearly double length of segments bearing them.  
*Hydrobasileus croceus* - 51
- Lateral spines on abdominal segments 8 and 9 very small, shorter than length of corresponding segments I
- I. Posterior margin of abdominal terga without fringe of setae, or if present, barely noticeable.

- I1. Epiproct and paraprocts long and equal. Premental setae 10+10; palpal setae 5+5; prominent mid-dorsal spines on segments 4 to 10; tibial comb and tarsi beset with tridentate setae. Length 22-24.5mm.  
*Tholymis tillarga* - 54
- I2. Head with processes at posterior outer angle of head.  
*Tramea limbata* - 53.2
- Fringe of setae present on the posterior margin of all abdominal terga. Epiproct and paraprocts short, the former always shorter than the latter.
- J. Palpal setae 8 or less J
- Palpal setae not less than 9. K
- L
- K1. Premental setae 2, palpal setae 5. Medial lobe of labium studded with small setae. Mid-dorsal protuberances on segments 3 to 9. Epiproct and paraprocts almost equal in size. Cerci greater than or equal to half the length of epiproct. Length 16mm.  
*Rhyothemis variegata variegata* - 50
- K2. Premental setae 12 to 14; palpal setae 6 or 7. Median lobe of labium not studded with setae. Mid-dorsal protuberances on segments 4 to 9 (2-8). Epiproct slightly shorter than paraprocts. Cerci greater than half length of epiproct. Length 17-18mm.  
*Brachythemis contaminata* - 42
- K3. Premental setae 13; palpal setae 8. Median lobe of labium with a few setae and hairs. Mid-dorsal protuberances present on segments 4 to 9 or 10. Epiproct slightly shorter than paraprocts. Cerci small, less than half the length of epiproct. Length 18-22mm.  
*Zyxomma petiolatum* - 55
- K4. Premental setae 10 or 11; palpal setae 6 or 7. Median lobe of labium studded with small setae. Mid-dorsal protuberances

on segments 3 to 9. Epiproct shorter than paraprocts. Cerci less than half length of epiproct. Length 13–15.5mm.

Genus *Trithemis* - O

- L. Cerci equal to or greater than half the length of epiproct. Mid-dorsal spine absent on segment 9. Palpal setae more than 8.

M

- M1. Premental setae 12; palpal setae 9. Median lobe of labium studded with small setae. Mid-dorsal protuberances on segments 4 to 8. Epiproct slightly shorter than paraprocts. Cerci equal to or slightly longer than half length of epiproct.

*Urothemis signata signata* - 56

- M2. Premental setae 14; palpal setae 12. Median lobe of labium studded with small setae. Mid-dorsal protuberances on segments 4 to 8. Paraprocts nearly double length of epiproct. Cerci equal to or longer than half the length of epiproct.

*Brachydiplax sobrina* - 38

- M3. Premental setae 17 or 18; palpal setae 11 to 14. Median lobe of labium studded with short setae. Small mid-dorsal protuberances present on segments 3 to 8.

*Sympetrum fonscolombei* - 47

- M4. Premental setae 8–10; palpal setae 7–9. Mid-dorsal protuberances on segments 2 to 10. Epiproct equal to or slightly shorter than paraprocts. Cerci shorter than half the length of epiproct. Length 24–29mm (Some details have been extracted with some doubt from the Japanese text and figures, others are from St. Quentin and must serve only as a guide).

*Zygonyx iris* - 57

- N. The genus *Orthetrum*

- Premental setae 11+11; palpal setae 9+9. Mid-dorsal spines on segments 4 to 7 reduced.

*Orthetrum sabina sabina* - 39b

- Sienna to black. Length 19 to 21mm. Prominent mid-dorsal spines on segments 4 to 8. Premental setae 21+21; palpal setae 7+7.

*Orthetrum pruinatum neglectum* - 39a

O. The genus *Trithemis*

- Length 13 to 14.5mm. Premental setae 10+10; palpal setae 7+7. Tibial comb and tarsi beset with tridentate setae.

*Trithemis aurora* - 48a

- Length 15 to 16mm. Premental setae 11+11; palpal setae 6+6. Tibial comb and tarsi beset with furcate setae.

*Trithemis festiva* - 48b

38. The larva of *Brachydiplax sbrina* has not been described. Two larvae collected from weedy ponds were raised to emergence as adult males by Chowdhury & Akhteruzzaman (1981) who identified them as a species of *Brachydiplax*. There are only three species of this genus recorded in India by Fraser (1936) and the difficulty to identify the species could have been due to the adults being teneral. Their description of the larva follows.

Length 15–16 mm. width 5mm across segment 6. Body slender, smooth, coloured light brown. Head much wider than long with small spines on vertex, occiput and genae; antennae 7-segmented, eyes large, projecting dorso-laterally. Premental setae 14, palpal setae 12; spines on medial border of palps fairly long; median lobe studded with small spines, its margin entire with a row of long spines. Legs long and slender. Wing pads extend to posterior border of segment 6 of abdomen which is elongated and strongly convex dorsally; a fringe of setae along posterior margins of all the terga; mid-dorsal spines on segments 4 to 8; short lateral spines on segments 8 and 9. Epiproct much smaller than paraprocts; cerci greater than or equal to half the length of epiproct ( Figs. C42–45).

*Brachydiplax* sp.

39. The genus *Orthetrum*

Of the six species of this genus in Sri Lanka, the larvae of only two have been described, namely of *O. pruinsum neglectum* and *O. sabina sabina*. A larva of *O. chrysostigma* (not *luzonicum*) has been described by Cammaerts (1975); the differences from the larva of *O. pruinsum neglectum* do not appear to be significant - the wing sheaths extending up to the end of segment 5, the premental setae 20 + 21 and the palpal setae 7 + 7. Characters common to larvae of the genus are the eyes



capping the fronto-lateral part of the head, the densely hairy body, the abdominal spines being in the form of protuberances and the number of palpal setae being less than 9 + 9.

- 39a. A very detailed account of the life history of *O. pruinorum neglectum* has been given in Kumar (1970), from which are the description of the final instar which follows and the figures.

Length 19–21mm; colour sepia-brown. Premental setae 21 + 21; palpal setae 6 + 6; a few crenations on the labium bear 4, others 3 claviform setae. The hind wing sheaths extend almost up to the end of segment 6. Legs hairy, moderately long; tibial comb consists of a number of tridentate setae and two thick, blunt spiniform setae; tarsal segments beset with small blunt setae. Prominent mid-dorsal spines on segments 4 to 8; distinct lateral spines present on segments 8 and 9; abdominal setae increasing in length and number towards the terminal segments. Anal appendages dark and hairy. Antennae 7-jointed (Fig. C47).

*Orthetrum pruinorum neglectum*

- 39b. The final instar larva of *O. sabina sabina* has been described by Arun Kumar (1973b) and by Chowdhury & Akhteruzzaman (1981) from whose works the following description and figures have been taken.

Length 19–21mm; brown to near black, generally covered with long hairs. Head nearly quadrangular; small spines and hairs on vertex, occiput and genae. Antennae 7-jointed, covered with prominent hairs. Distal margin of prementum convex, premental setae 11 + 11; palpal setae 9 + 9; distal margin of palpus formed into characteristic, beak-like crenations, each of which, except the posterior two which bear 2 setae each, bear 3–4 claviform setae; two spiniform setae present near the base of the palpus. Legs short and robust. Tibial comb consists of a number of scattered tridentate setae, a row of which are present on the outer side of the tibiae also; tarsi beset with a double row of tridentate setae on the outer side. Wing pads extend to end of segment 5. Abdomen strongly convex dorsally, hairy posteriorly, setae along posterior margin of all abdominal terga; mid-dorsal protuberances present on segments 5 to 9 (4–7?); lateral spines present on segments 8 and 9; abdominal setae, in normal conditions, stick around the lateral spines of segment 9 to give the impression of long

outwardly projecting spines. The first five segments pale yellowish, the remaining posterior ones a much darker sepia. Anal appendages sepia, hairy. Epiproct only slightly shorter than paraprocts; cerci less than half the length of epiproct (Figs. C42-45, C48).

*Orthetrum sabina sabina*

40. Arun Kumar (1973b) has described the larva of *Potamarcha congener* (under its synonym of *obscura*). The description and figures that follow are from this work.

Length 21.5mm; rust coloured with a thick collection of mud on the body which has a mid-dorsal band. Distal margin of prementum convex, premental setae 11 + 11; palpal setae 8 + 8; distal margin of palpus crenated, with each crenation except the last bearing 3 claviform setae; movable hook thin and long. Tibial comb consists of a number of scattered tridentate and simple spiniform setae; tarsi with a double row of tridentate setae and a few simple setae. Small lateral spines on abdominal segments 8 and 9; abdomen hairy posteriorly. Anal appendages dark, hairy; epiproct shorter than paraprocts; beset with setae. Larvae sluggish, bottom dwelling and covered in mud (Fig. C49).

*Potamarcha congener*

41. Arun Kumar (1984) has described the life history of *Acisoma panorpoides panorpoides*. The following description and the figures of the final instar larva are from this work.

Length 17mm; dark dirty grey, with darker wing-buds. Labium spoon-shaped, premental setae 11+11, distal margin of prementum strongly convex, crenated, each crenation with a claviform seta; palpal setae 8 + 8, small setulae near base of palpus the distal margin of which is crenated, some of the crenations bearing 3 claviform setae; laterally beset with a row of hair-like setae. Hind wing buds extend to middle of 7th segment. Tibial comb and tarsi beset with a number of furcate, pectinate and simple setae on the ventral side. Tuft of long mid-dorsal setae on abdominal segments. Anal appendages thickly beset with long setae dorsally and laterally (Fig. C50).

*Acisoma panorpoides panorpoides*

42. The life history of *Brachythemis contaminata* has been described by Begum et al. (1982). The description of the final instar larva

that follows is from that work.

Length 13.5mm, colour pale green that gradually turns brown. Head rectangular, broader than long. Labium spoon-shaped, pre-mental setae 12 + 12, distal margin of prementum convex with 24 claviform setae; palpal setae 7 + 7; eight palpal crenations, each with 3 claviform setae; movable hook moderately long and reddish in colour. Wing sheaths extend up to 5th segment. Tibial comb of randomly arranged tridentate setae. Abdomen hairy with mid-dorsal spines on segments 2 to 8 and lateral setae on 6 to 8. Another author (Kerdpibule et als) give from specimens collected in the wild: length 16mm, premental setae 11 + 11, palpal setae 6 + 6, mid-dorsal spines well developed on 3-9 and lateral spines short on 8 and 9 (Fig. C51).

*Brachythemis contaminata*

43. The larva of *Bradinopyga geminata* has been described by Sangal & Kumar (1970a) from whose work the following has been taken.

Length 20-23mm; colour greyish, mottled black with bands on wings and abdomen. Labium spoon-shaped, prementum convex with 19 to 21 premental setae on each side; distal margin of palpus crenated, each crenation bearing setae; palpal setae 14 to 16 on each side. Wing sheaths extend up to middle of 6th segment. Legs slender with tridentate setae on tarsi and black bands on femur and tibia and dark spots on tarsi. Small lateral spines present on segments 8 and 9. Epiproct and paraprocts beset with setae laterally, the former the shorter (Fig. C52).

*Bradinopyga geminata*

44. The larva of *Crocothemis servilia* has been described by Sangal & Kumar (1970a) from whose work the following has been taken.

Length 14-18mm; colour yellowish-brown. Eyes whitish with a darker lower region. Labium spoon-shaped, prementum convex with 13 to 15 premental setae on each side; distal margin of palpus crenated, each crenation bearing setae; palpal setae 10 to 11 on each side. Wing sheaths extend to lower half of 6th segment. Legs slender with tridentate setae on tarsi and with dark bands on femur and tibia and dark spots on tarsi. Small lateral spines present on segments 8

and 9, those on 9 slightly incurved and extending to sides of anal appendages. Epiproct and para-procts beset with setae laterally, the former the shorter (Fig. C53).

*Crocothemis servilia servilia*

45. The life history of *Diplacodes trivialis* has been studied by Arun Kumar (1984) from whose work the following has been taken.

Length 15–18mm; colour brownish. The head is broadly triangular with antero-dorsally placed eyes. The labium is typically libelluline, premental setae 14 + 14, palpal setae 10 + 10. Wing sheaths reach to the middle of segment 6 (Fig. C42–45, C54).

*Diplacodes trivialis*

46. The final instar of *Rhodothemis rufa* has been described by Nirmala Kumari & Balakrishnan Nair.

Length 18–20mm; colour varies from dark green to dark brown. Body hairy. Head with two lateral projections, eyes antero-lateral. Labium extends to base of fore coxae; prementum almost triangular, margin with a number of long and short spiniform setae; premental setae 13, rarely 14, on each side; palpus feebly crenated, each crenation bearing 3 or 4 setae, inner margin with small spiniform setae; palpal setae 8 + 8; movable hook of moderate size. Legs hairy, long and slender, tibial comb consists of a few simple, blackish spines, tarsi bear a double row of long simple spines. Abdomen short and semicircular, wing buds reach the posterior of segment 7, postero-lateral spines present on 9th segment; paraprocts longer than epiproct, both beset with short hairs (Figs. C42–45, C55).

*Rhodothemis rufa*

47. The larva of *Sympetrum fonscolombei* has been described by Gardner and by Longfield.

Length 18mm; colour olivaceous with darker markings. Distal margin of prementum sharply convex, premental setae 18 + 18; lateral lobes triangular, palpal setae 14 + 14. Wing buds reaching up to 7th segment. Legs slender and long, armed with "divided" setae and simple setae. Abdomen without dorsal hooks, lateral spines on 8 and 9 short and acute. Anal appendages short and very hairy (Fig. C57).

*Sympetrum fonscolombei*

48. Of the four species of *Trithemis* in Sri Lanka the larvae of *T. aurora* and *T. festiva* have been described by Arun Kumar. The larvae of the two remaining species have not been described.

48a. Length 13–14.5mm; coloured yellowish, marked extensively with greyish spots dorsally. Premental setae 10 + 19; two spiniform setae present below base of palpus. Palpal setae 7 + 7; distal margin of palpus formed into crenations, each bearing 2–3 claviform setae; a row of spiniform setae present at the sides of the palpus. Movable hook long and slender. Legs long and slender, with dark markings on femur, tibia and tarsus; tibial comb consists of scattered tridentate setae; tarsi with a double row of tridentate setae. Wing sheaths extend up to middle of 6th segment. Abdomen with a dark mid-dorsal stripe; mid-dorsal spines present on segments 3 to 9; on 3 to 5 small, almost vertical, on 6 to 8 strong, triangular and directed backwards, that on 9 again small. Small lateral spines on 8 and 9. Anal appendages small, hairy; epiproct shorter than paraprocts (Fig. C58).

*Trithemis aurora*

48b. Length 15.5mm; dark coloured with extensive greyish spots. Premental setae 11 + 11; spiniform setae present at lateral sides of labium near base of palpus; palpal setae 6 + 6. Wing sheaths extend up to middle of 6th segment. Tibial comb and tarsi beset with furcate setae. Prominent mid-dorsal spines on segments 3 to 9 (but compare the figures for these spines from the same author for the two species and note the differences: this may be significant) (Fig. C59).

*Trithemis festiva*

49. The larva of *Palpopleura sexmaculata sexmaculata* has not been described, but that of *P. lucia Drury* has been by Fraser (1955) and may serve as a guide.

Length 16mm, premental setae 9, palpal setae 9, distal margin of palpus not crenated, wing sheaths extend to 5th segment, no mid-dorsal abdominal spines, lateral spines on segments 8 and 9 (Fig. C56).

*Palpopleura* sp.

50. The larva of *Rhyothemis variegata variegata* has been briefly described by Chowdhury & Akhteruzzaman. The larva of *R. triangularis* has not been described.

Length 16.5mm, blackish grey in colour. Head: vertex, occiput and genae covered with spines. Eyes small, dorso-laterally projected. Premental setae 2 + 2; palpal setae 5 + 5; median lobe studded with small setae. Wing sheaths extend up to end of 5th segment. Abdomen strongly convex dorsally; mid-dorsal spines on segments 3 to 9; lateral spines on 8 and 9. Anal appendages very short; epiproct and paraprocts of almost equal size (Figs. C42-45).

*Rhyothemis variegata variegata*

51. The larva of *Hydrobasileus croceus* has not been described, but that of a unplaced member of the genus has been briefly described by Chowdhury & Akhteruzzaman.

A fairly large larva, length 25-26mm coloured brownish with greyish patches all over. Head: vertex, occiput and genae covered with small spines. Eyes large, dorso-laterally projected. Premental setae 12+12; palpal setae 9 + 9; median lobe not studded with setae. Wing sheaths extend up to end of 5th segment. Abdomen strongly convex dorsally, mid-dorsal spines on segments 3 to 8; large lateral spines on 8 and 9. Anal appendages long; epiproct slightly shorter than paraprocts (Figs. C42 -45).

*Hydrobasileus* sp.

52. The larva of *Pantala flavescens* has been described by Arun Kumar and by Chowdhury & Akhteruzzaman.

Length 20-22.5mm, coloured pale yellowish with black markings all over. Head: vertex, occiput and genae covered with small spines. Eyes small, protuberant, directed more upwards than outwards. Labium enormous; premental setae 17 + 17; palpal setae 13 + 13; distal margin of palpus formed into large crescentic crenations, each of which except the last two which bear 1 and 2 setae respectively, bear 4 claviform setae. Median lobe not studded with setae. Movable hook thick and strong. Legs slender, tarsi and claws of mid and hind legs black; tibial comb consists of haphazardly arranged tridentate setae; tarsi beset with a double row of tridentate setae. Abdomen strongly convex dorsally, one broad median

stripe and two lateral rows of dark spots present dorsally; paired dorsal spots on segments 5 to 9. Mid-dorsal spines absent, but large lateral spines present on segments 7, 8 and 9, that on 8 reaching almost to the end of segment 10 and that on 9 up to the end of the epiproct, which is distinctly longer than the paraprocts (Fig. C42-45, C60).

*Pantala flavescens*

53 The larva of *Tramea basilaris burmeisteri* has been described by Arun Kumar; that of *T. limbata* has been described by Fraser.

53.1 Length 22-24mm, coloured yellowish-green with brown markings.

Labium large, premental setae 13 + 13, spiniform setae present on the mid-anterior region of prementum, the strongly convex distal margin of which bears a row of claviform setae. Palpal setae 10 + 10; distal margin of palpus crenated, each crenation, except a few posterior ones, bear 6-8 claviform setae; two spiniform setae present near base of palpus. Movable hook long and slender. Legs long, tibial comb consists of furcate setae; tarsi beset with a double row of simple and furcate setae. Abdomen with prominent lateral spines on segments 8 and 9. Anal appendages dark; epiproct shorter than paraprocts, both beset with long, black spinate setae (It would appear from Kumar's text and figures that there are no dorsal abdominal spines) (Fig. C61).

*Tramea basilaris burmeisteri*

53.2 Length 26mm. Labium strongly convex, lateral lobe with 16 interlocking teeth, pigmented at the tips. Anterior margin of prementum moderately straight, slightly crenate along the border and fringed with coarse hairs. Antennae long and filiform. Eyes small and shaped as horn-like processes which project markedly from the sides of the head; two or three coarse hairs posterior to the eyes and a largish horn-like process at the posterior angle of the head. Abdomen stout, tumid, strongly carinated by a row of 6 stout, backwardly directed spines, each over-lapping the following segment; the last four segments with short spines on the postero-lateral corners and segments 7 to 9 with smaller but robust spines mesially on the borders. Legs very long and spidery, naked. (Fig. C62).

54. The larva of *Tholymis tillarga* has been described by Arun Kumar and by Chowdhury & Akhteruzzaman.

Length 22–24.5mm, coloured light brown, sometimes darker. Abdomen with a dark, broad mid-dorsal stripe extending up to the anal appendages. No spines or setae on vertex, occiput and genae. Eyes small, projected dorso-laterally. Premental setae 7 to 10 on each side, a few spiniform setae on mid-anterior region of prementum and 3 on each side. Palpal setae 5 or 6 on each palpus; spiniform setae present at the base of each palpus; distal margin of palpus crenated, each crenation, except the last two, bear 3–4 claviform setae. Movable hook of medium size. Legs short and slender; tibial comb consists of scattered tridentate setae; tarsi beset with a double row of tridentate setae. Wing sheaths extend to end of 5th segment. Mid-dorsal spines present on abdominal segments 4–9, that on the 4th almost vertical, the others directed posteriorly; lateral spines present on 8 and 9. Anal appendages elongated, about equal in length to 9 + 10 together. Epiproct shorter than paraprocts, both beset with setae- (Figs. C42–C45, C63).

*Tholymis tillarga*

55. The larva of *Zyxomma petiolatum* has been described by Arun Kumar and by Chowdhury & Akhteruzzaman.

Length 20–22.5mm, coloured brown to near black; markings present on dorsal side of head, thorax and abdomen and on legs. Vertex, occiput and genae covered with small spines. Premental setae 13 + 13; some scattered setae and hairs present on mid-anterior side of prementum. Palpal setae 8 + 8, a few spiniform setae present at base of palpus; distal margin of palpus crenated, each crenation, except the last two next to the movable hook which bear two claviform setae, bears 3–4 long claviform setae. Movable hook long and thick. Tibial comb consists of furcate and furco-pectinate setae; tarsi beset with a double row of pectinate setae. Wing sheaths extend to end of 5th segment. Abdomen angular dorsally with paired dorso-lateral marks on segments 5 to 9; mid-dorsal spines present on 4 to 9 or 10, that on 4 small and pointing up, that on the others point backwards; lateral spines present on 8 and 9, that



on 8 small, that on 9 prominent and extends to middle of anal appendages which are short and beset with setae. Epiproct shorter than paraprocts (Figs. C42-45, C64).

*Zyomma petiolatum*

56. The larva of *Urothemis signata* has been described by Chowdhury & Akhteruzzaman, Nirmalakumari & Balakrishnan Nair and by Begum, Bashir & Biswas.

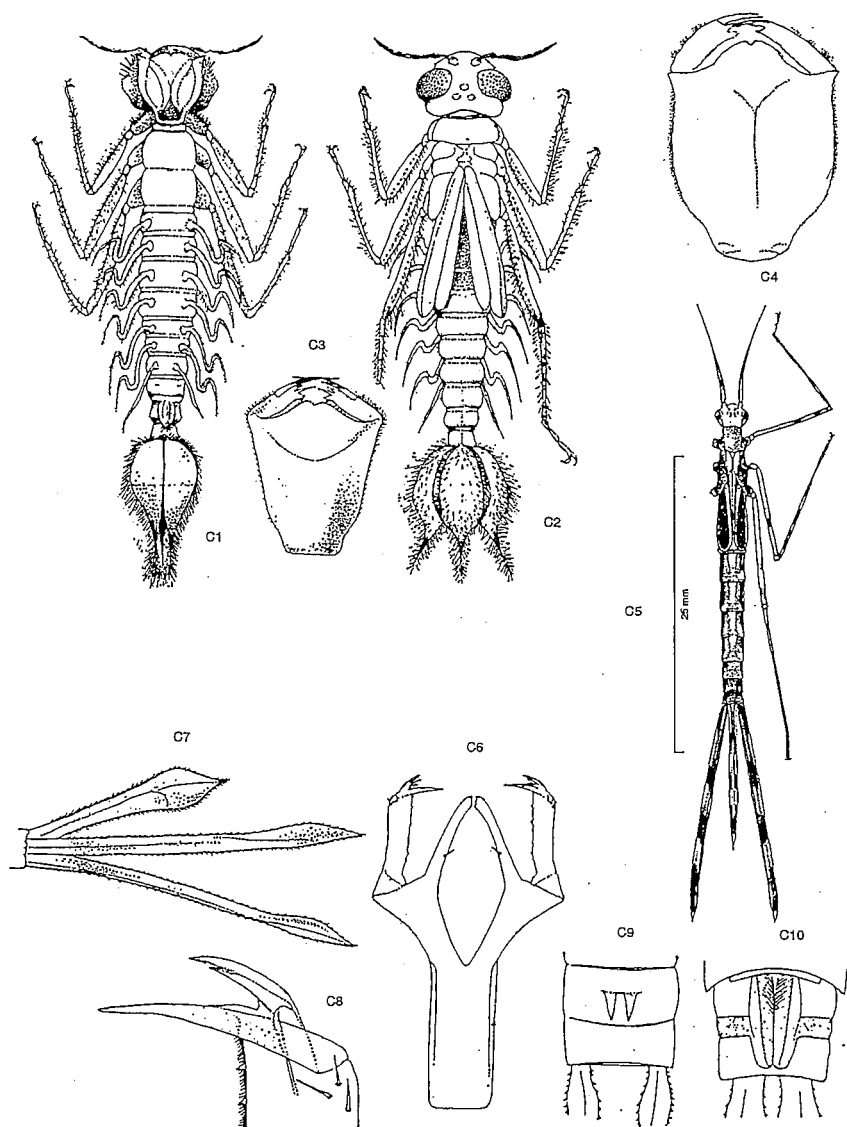
Length 20-22mm, coloured straw-yellow, pale brown or green with irregularly transparent spots all over body which is moderately hairy. Eyes antero-lateral, postero-lateral border elevated. Labium enormous, median lobe studded with setae; pre-mental setae 12 + 12; palpal setae 8 + 8 to 10 + 10; distal margin of palpus crenated, each crenation bearing 3-4 setae. Movable hook medium sized. Legs long and slender, tibial comb bears a number of simple, long spines; tarsi beset with a double row of simple setae. Mid-dorsal abdominal hooks present on segments 3 or 4 to 8, large lateral spines on segments 8 and 9 which also bear paired dorsal marks, which marks also appear on the other segments; long hairs on ventral and lateral surfaces of segments 6 to 10. Wing sheaths reach to the 7th segment. Paraprocts are longer than epiprocts, both bear spines and hairs on sides (Figs. 42-45, C65).

*Urothemis signata signata*

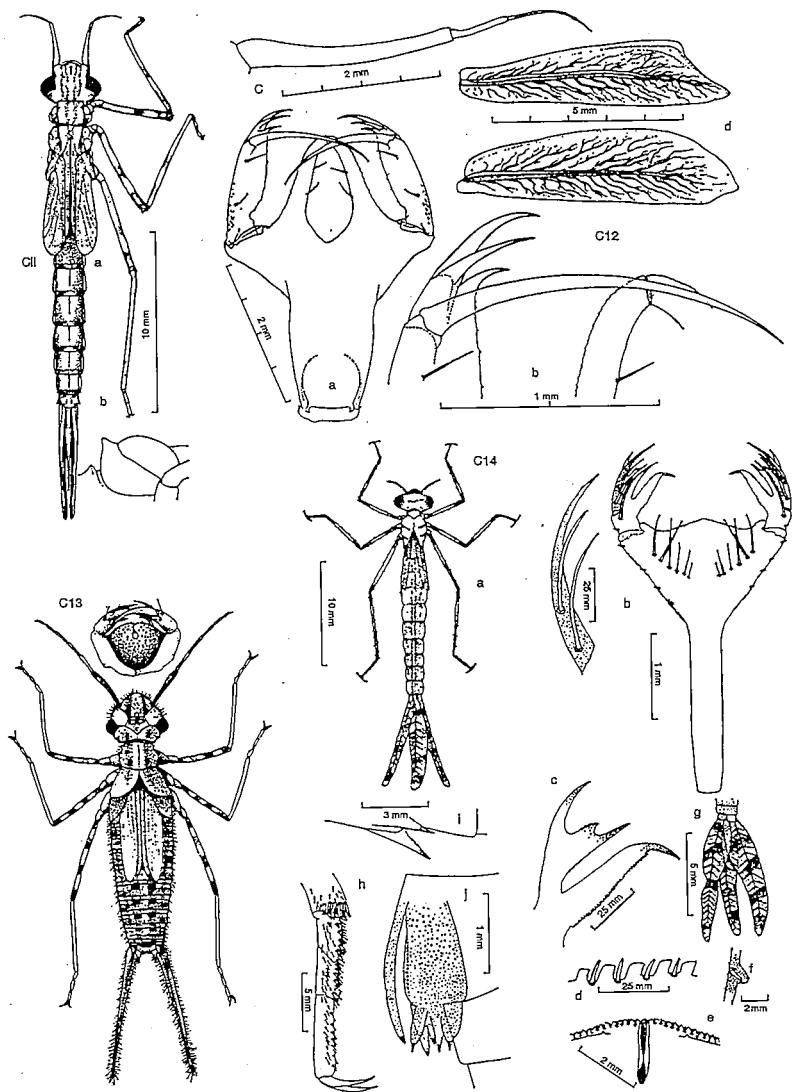
57. The larva of *Zygonyx iris ceylonicus* has been described briefly by St. Quentin.

Length 24mm. Labium short, extending to the fore-coxae, the anterior margin densely fringed with short bristles. Premental setae 8 to 10, palpal setae 8 to 9; lateral lobes almost rectangular, the movable hook rather short. Abdominal hooks on segments 3 to 9, lateral spines on 8 and 9. Epiproct shorter than paraprocts, cerci are a third of the paraprocts. Kazuo Matsuki & Kazuma Kitagawa (in Jap.) have described and figured the larvae of two other species. Note that the abdomen bears mid-dorsal processes. Their figures for *Z. iris malayanum* have been copied here (C66).

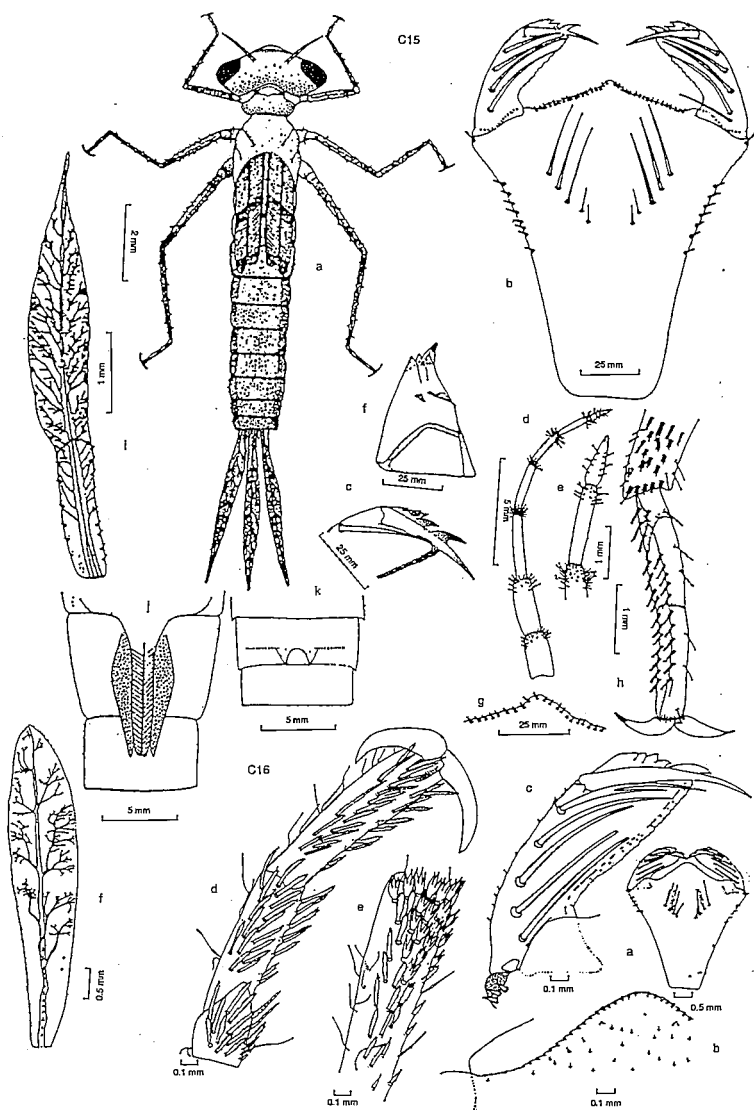
*Zygonyx iris ceylonicus*



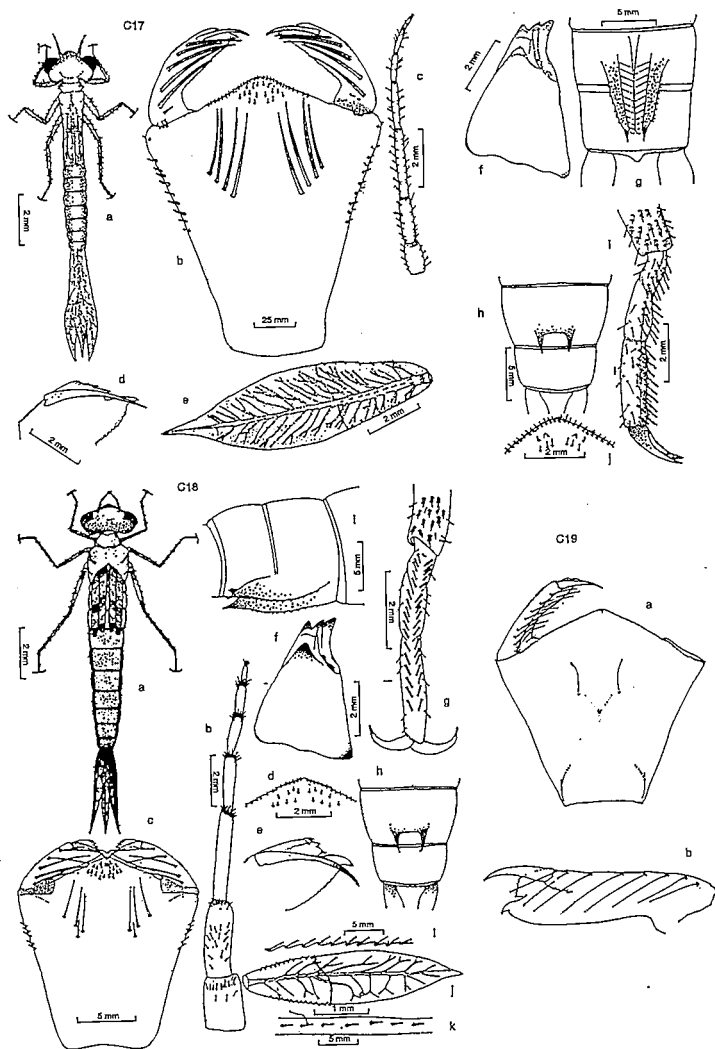
C1: *Euphaea splendens*: larva, ventral view: C2, C3: *Indophaea fraseri* (Laid): larva, dorsal view and labium for comparison, (C1-C3 after Fraser 1929): C4: *Euphaea variegata* Ramb. labium (after Ris 1912): C5-C10: *Neurobasis chinensis chinensis*: C5: larva (after Fraser 1933): C6: labium: C7: caudal gills: C8: labial palp, (enlarged view): C9: male gonapophyses: C10: female gonapophyses. (C6-C10 after Arun Kumar 1973).



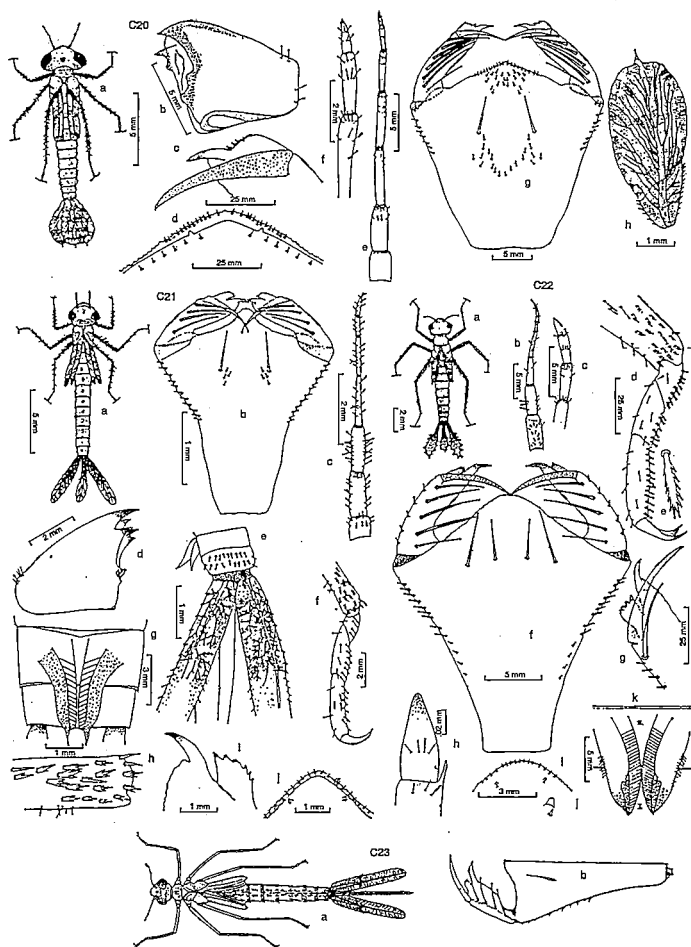
C11, C12: *Vestalis luctuosa* (after Lieftinck, 1905). C11a. final instar larva: C11b. post ocular tubercle and base of antenna on right side, enlarged: C12a. labium: C12b. palpus and movable hook: C12c. antenna: C12d. median (above) and lateral gills: C13: *Libellago indica*; final instar larva and labium (after Fraser, 1918). C14 *Lestes praemorsus praemorsus* (after Arun Kumar, 1972): C14a. final instar larva: C14b. labium and movable hook: C14c. palpus: C14d. anterior margin of palpus: C14e. left on median lobe: C14f. chitinous projection on edge of cleft: C14g. caudal gills: C14h. tibial comb and tarsi: C14i. male and C14j. female gonapophyses.



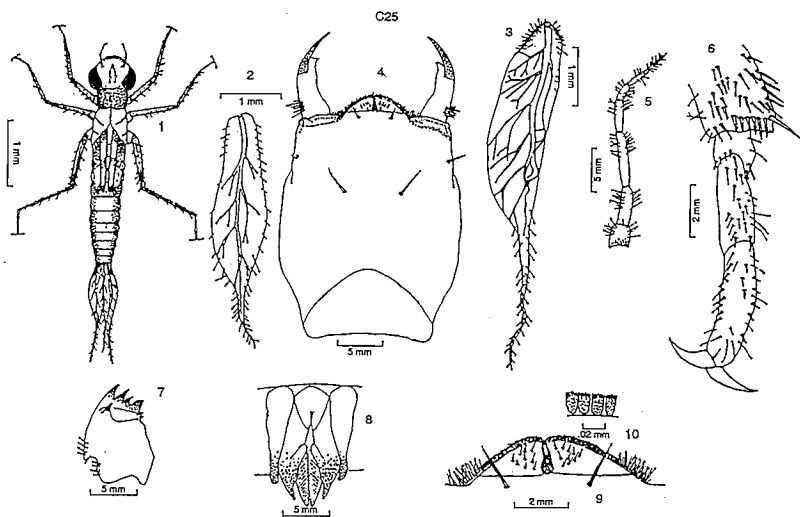
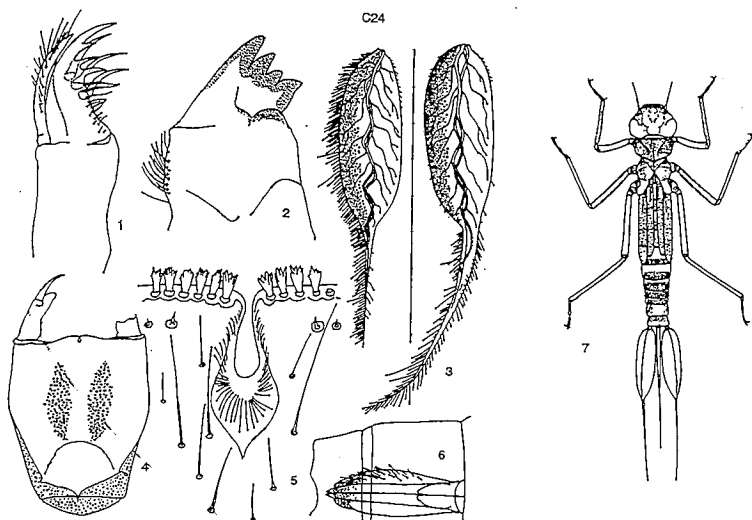
C15: *Agrioenemis pygmaea* (after Arun Kumar, 1973): (a) final instar larva; (b) labium; (c) enlarged view of distal margin of labial palp; (d) antenna; (e) enlarged view of distal margin of antenna; (f) mandible; (g) enlarged view of distal margin of prementum; (h) tarsus and tibial comb; (i) epiproct; (j) female gonapophyses; (k) male gonapophyses. C16: *Enallagma ebrium* (after Pilon & Fontaine, 1980): parts of final (11th) instar: (a) labium; (b) enlarged view of distal margin of prementum; (c) labial palp; (d) tarsus; (e) tibia; (f) caudal lamella.



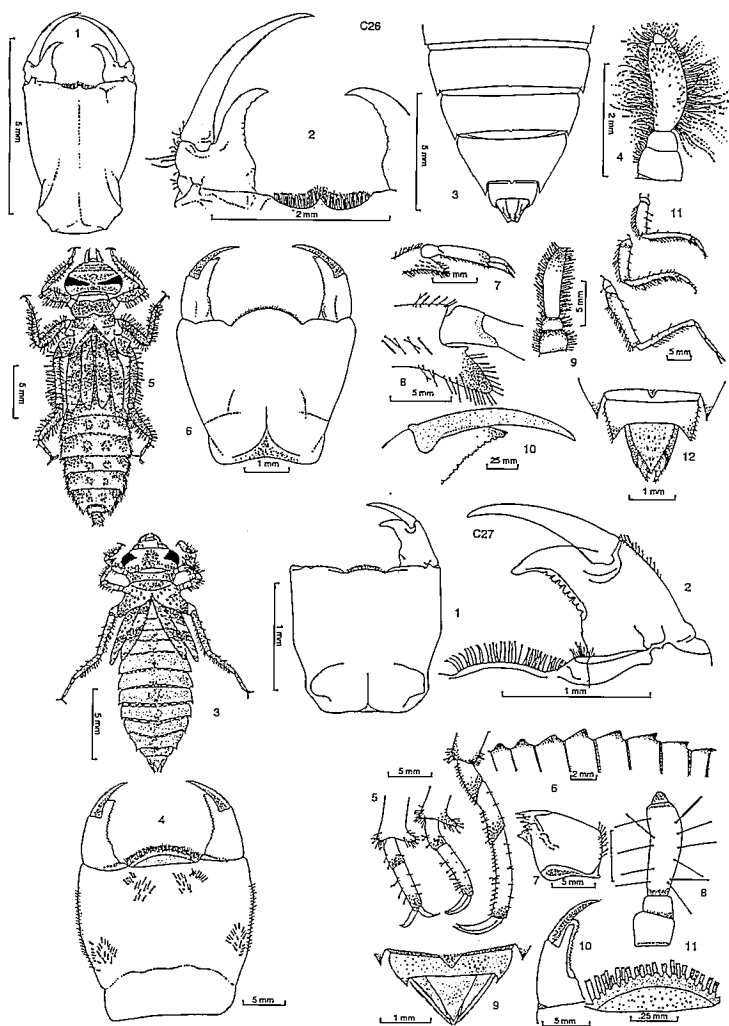
C17 a-j. *Ischnura aurora* (after Arun Kumar, 1973): (a) final instar larva; (b) labium; (c) antenna; (d) enlarged view of distal margin of palpus; (e) epiproct; (f) mandible; (g) female and (h) male; gonapophyses; (i) tibial comb and tarsi; (j) enlarged view of distal margin of prementum. C18. *Ischnura senegalensis* (after Arun Kumar, 1973), (a) final instar; (b) antenna; (c) labium; (d) enlarged view of distal margin of prementum; (e) enlarged view of distal part of palpus; (f) mandible; (g) tibial comb and tarsi; (h) male and (i) female gonapophyses; (j) epiproct; (k) enlarged view of setae on median trachea of epiproct; (l) enlarged view of lateral margin of epiproct. C19. *Aciagrion* sp. (after Needham, 1911), (a) labium; (b) enlarged view of palpus.



C20 a-h: *Ceriagrion coromandelianum* (after Arun Kumar, 1973): (a) final instar larva: (b) mandible: (c) enlarged view of distal part of palpus: (d) enlarged view of distal margin of prementum: (e) antenna: (f) distal segments enlarged: (g) labium: (h) epiproct. C21 a-j: *Pseudagrion rubriceps* (after Arun Kumar, 1973): (a) final instar larva: (b) labium: (c) antenna: (d) mandible: (e) caudal lamellae: (f) tibial comb and tarsi: (g) female gonapophyses: (h) enlarged view of tibial comb: (i) enlarged view of distal part of palpus: (j) enlarged view of distal margin of prementum. C22 a-k: *Copera marginipes* (after Arun Kumar, 1973): (a) final instar larva: (b) antenna and (c) distal segments enlarged: (d) tibial comb and tarsi: (e) a pectinate seta: (f) labium: (g) enlarged view of distal part of palpus: (h) apical spine of 6th segment of antenna: (i) enlarged view of distal margin of prementum and (j) a chitinous projection on prementum: (k) female gonapophyses. C23: *Pseudagrion microcephalum*: (a) final instar larva (after Fraser, 1919b): (b) labium (after Laidlaw, 1915).

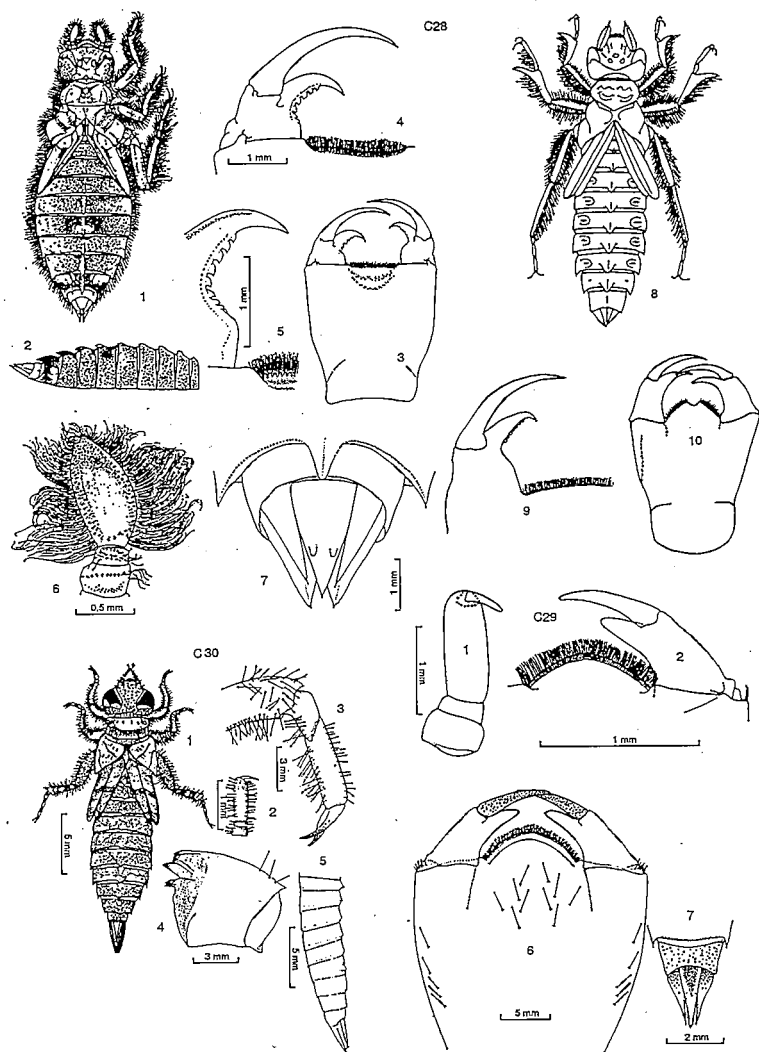


C24 1-7: *Drepanosticta sundana* (after Lieftinck, 1934): 1. right maxilla, ventral aspect. 2. right mandible, ventral aspect. 3. medium and left lateral caudal gills, interior view. 4. interior view of labium. 5. medio-apical view of prementum, showing median cheft, marginal scales and setae. 6. ventral view of female gonapophyses. 7. nymphal skin, median caudal gill collapsed. C25 1-10: *Disparoneura campioni* (after Arun Kumar, 1973b): 1. larva. 2. epiproct. 3. paraproct. 4. labium. 5. antenna. 6. tibial comb and tarsi. 7. mandible. 8. female gonapophyses. 9. enlarged view, distal margin of prementum. 10. palisade setae.

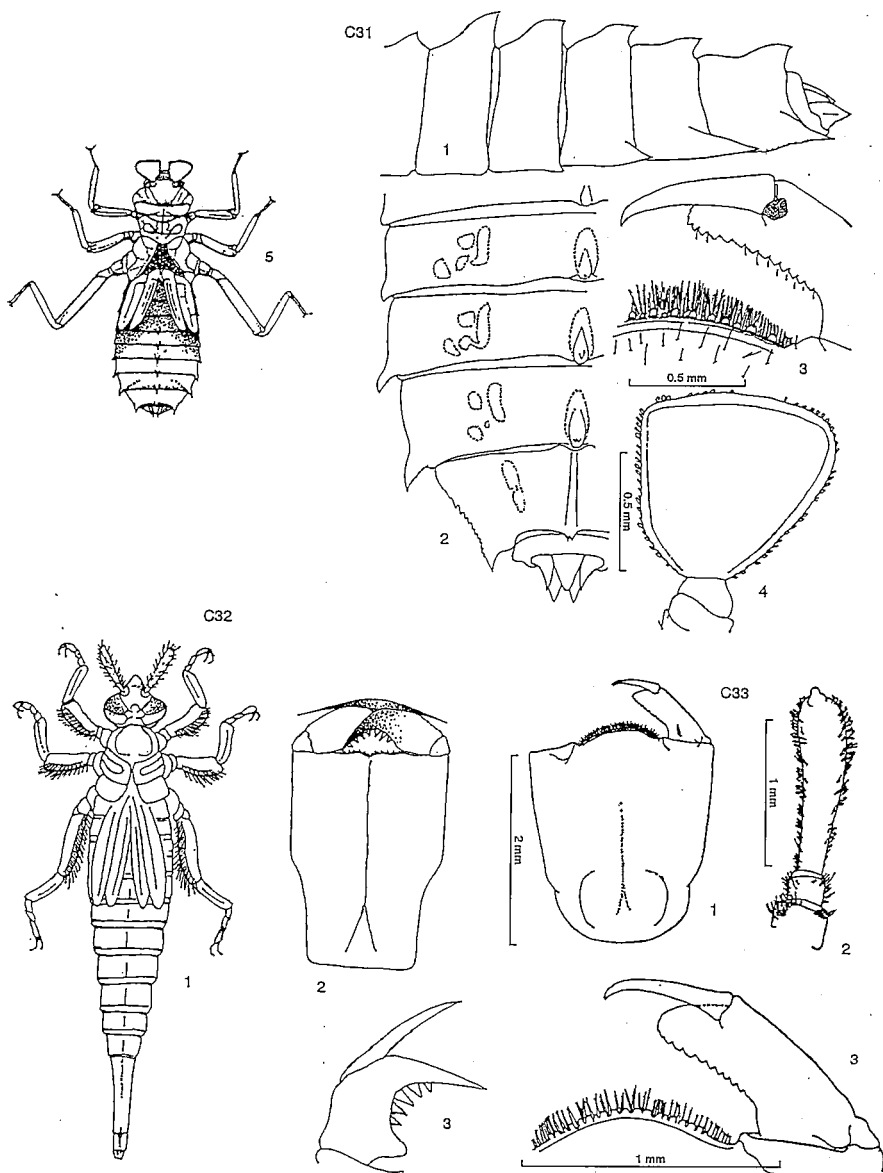


C26 1-4: *Anisogomphus solitarius* (after Lieftinck, 1971): 1. labium. 2. details of labium. 3. apex of abdomen, dorsal view. 4. right antenna. C26 5-12: *Anisogomphus occipitalis* (after Arun Kumar, 1973b): 5. larva. 6. labium. 7. tibial spur. 8. enlarged view of tibial spur. 9. antenna. 10. distal end of palpus. 11. fore, mid and hind legs. 12. male anal appendages. C27 1,2: *Burmagomphus pyramidalis sinuatus* (after Lieftinck, 1940): 1. labium. 2. labial palp. C27 3-11: *Burmagomphus pyramidalis sinuatus* (after Lieftinck, 1940): 1. labium. 2. labial palp. C27 3-11: *Burmagomphus sivalikensis* (after Arun Kumar, 1973b): 3. larva. 4. labium. 5. fore, mid and hind legs. 6. mid-dorsal abdominal protuberances. 7. mandible. 8. antenna. 9. male anal appendages. 10. distal end of palpus. 11. distal margin of prementum.

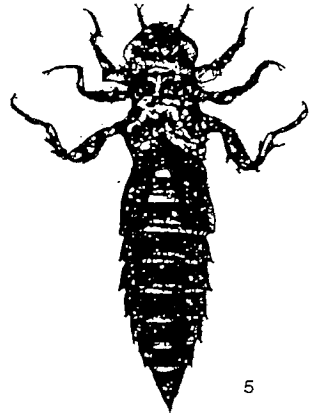
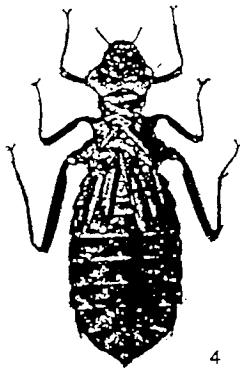
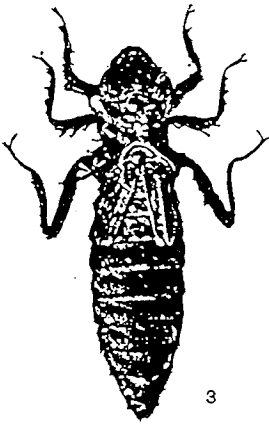
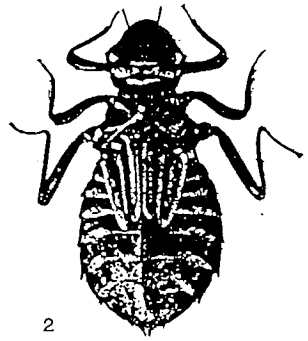
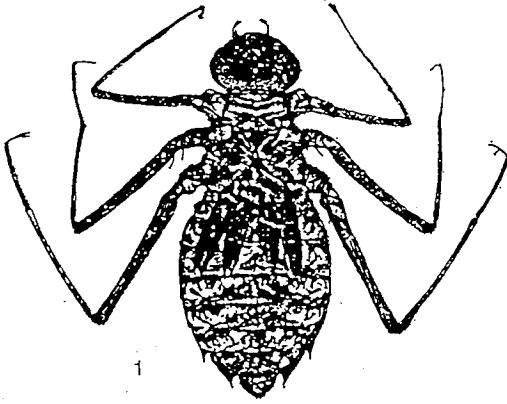




C28 1-7: *Megalogramphus icterops* (after Liefstinck, 1941): 1. larva. 2. abdomen, side view. 3. labium. 4. left lateral lobe and median lobe of labium. 5. part of lateral lobe enlarged. 6. right antenna. 7. apex of male abdomen. C28 8,9: *Megalogramphus ceylonicus*: 8. final instar larva (after Fraser, 1933d). 9. lateral and median lobe of labium, (after St. Quentin, 1973). C28 10: *Cyclogomphus* sp. (assumed), labium, (after Needham, 1911). C29 1,2: *Paragomphus henryi* (after Liefstinck, 1940). 1. right antenna and 2. labial palp of larval exuviae. C30 1-7: *Paragomphus lineatus* (after Arun Kumar, 1973b). 1. final instar larva. 2. antenna. 3. tibial comb and tarsi. 4. mandible. 5. mid-dorsal abdominal protuberances. 6. labium. 7. male anal appendages.

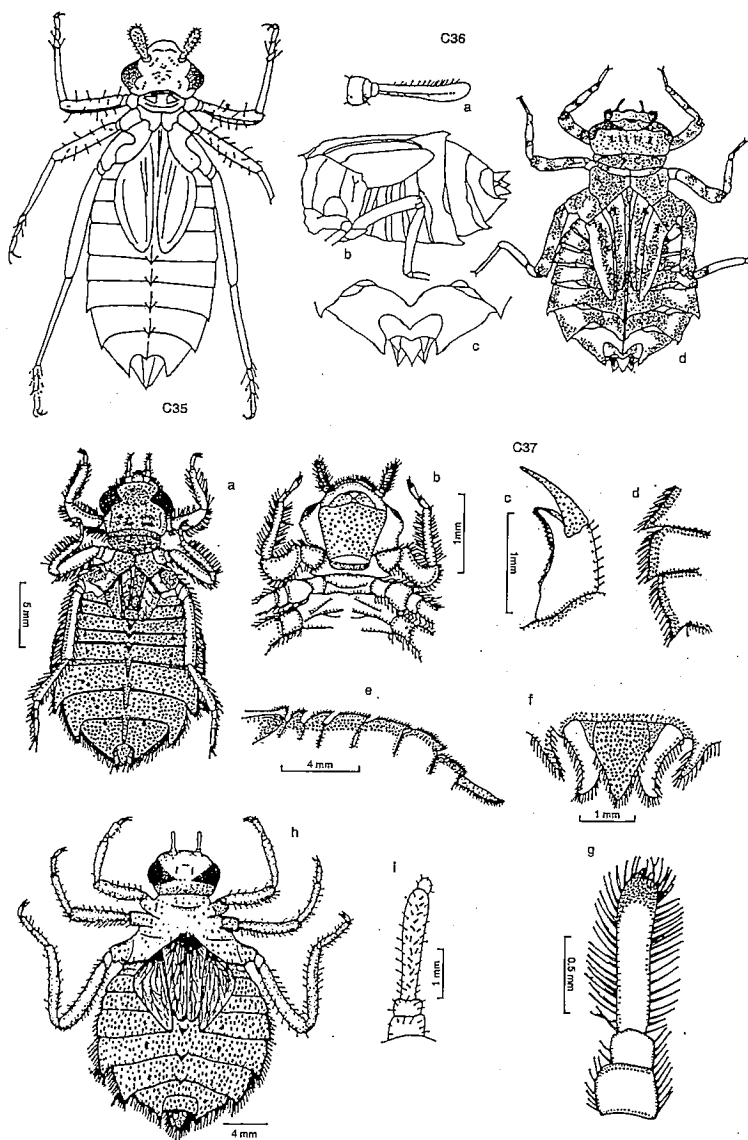


C31. 1-4: *Heliogomphus kelantanensis* (after Lieftinck, 1932). 1. abdomen, side view, and, 2. dorsal view. 3. palpus and median lobe of labium. 4. antenna. 5. exuviae of larva. C32 1-3: *Microgomphus annulatus* (after Fraser, 1919). 1. final instar larva. 2. labium. 3. palpus. C33 1-3: *Microgomphus wijaya* (after Lieftinck, 1940). 1. labium. 2. antenna. 3. palpus and median lobe of labium.

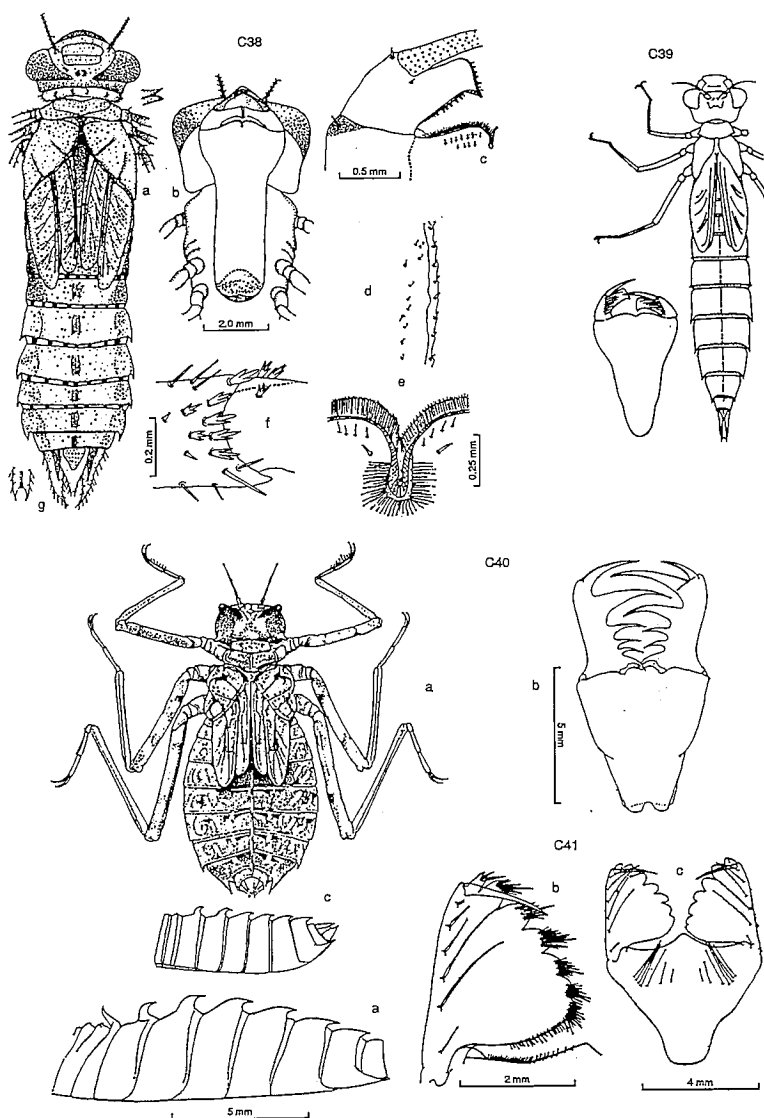


Exuviae of Sri Lankan dragonfly larvae (Lieftnick, 1940).

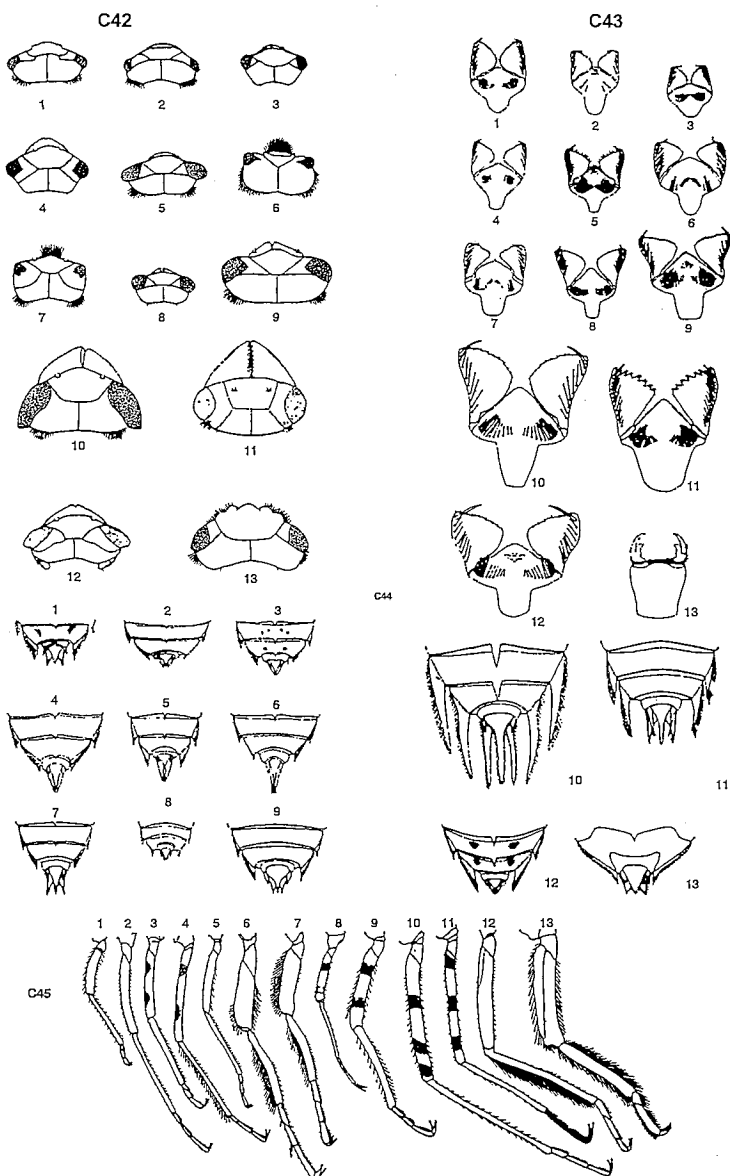
1. *Macromia zeylanica* (Fraser). 2. *Ictinogomphus rapax* (Ramb.)
3. *Burmagomphus pyramidalis sinuatus* (Fraser). 4. *Microgomphus wijaya*.
5. *Paragomphus henryi* (Laidlaw).



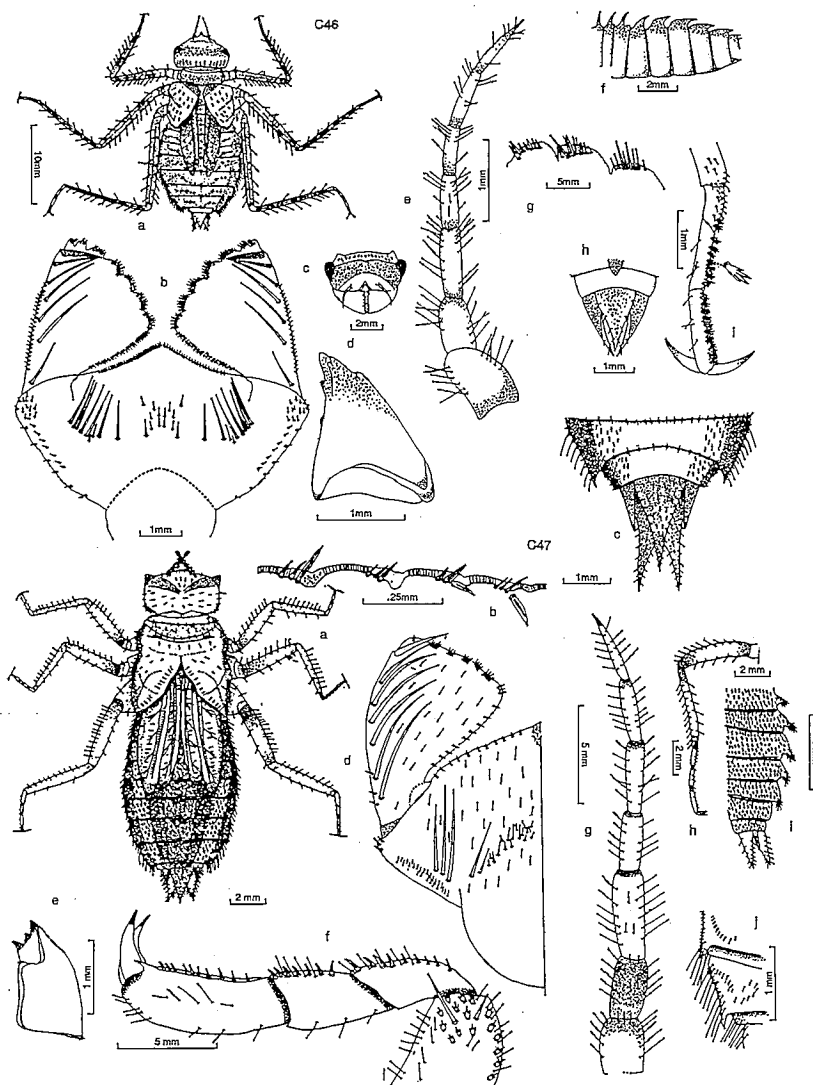
C35: *Microgomphus torquatus*, larva (from Fraser, 1919 as *Cyclogomphus minusculuc*).  
 C36: *Gomphidia kellogi*. (a) antenna, (b) lateral view of abdomen, (c) terminal segments, (d) larva, (from Wilson, 1995). C37: *Ictinogomphus rapax*. (a) final instar larva, (b) ventral view of labium, (c) palpus, (d) lateral abdominal spines, (e) mid-dorsal abdominal spines, (f) anal appendages, (g) antenna (from Arun Kumar, 1985), (h) larva, (i) antenna, (from Anwara Begum, Bashar and Biswas, 1980).



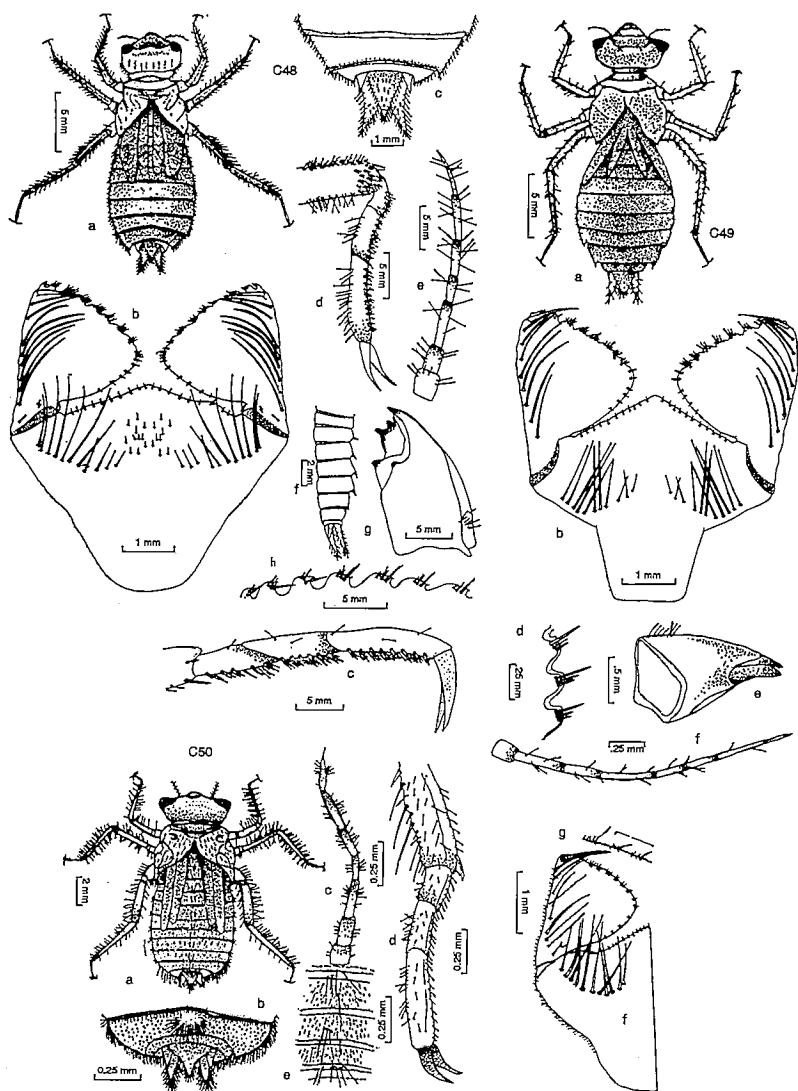
C38: *Anax immaculifrons*, (a) larva, (b) ventral view of labium, (c) distal end of labium, (d) lateral margin of palpus, (e) distal margin of prementum, (f) tibial comb, (g) distal margin of epiproct, (from Kumar, 1984). C39: *Gynacantha millardi*, larva and labial mask, (from Fraser, 1936). C40: *Epophthalmia vittata vittata*, (a) larva, (b) labium, (c) left side view of abdominal segments, (from Lieftinck, 1937). C41: *Macromia zelanica*, (a) left side view of abdominal segments, (b) lateral palp, (c) labium, (after Liefinck, 1940).



C42: dorsal view of head. C43: labium. C44: terminal segments. C45: legs of 1. *Zygomma petiolatum*. 2. *Rhyothemis variegata*. 3. *Brachythemis contaminata*. 4. *Tholymis tillarga*. 5. *Brachydipax* sp. 6. *Orthetrum sabina*. 7. *O. testaceum testaceum*. 8. *Diplacodes trivialis*. 9. *Rhodothemis rufa*. 10. *Hydrobasileus* sp. 11. *Pantala flavescens*. 12. *Urothemis signata signata*. 13. *Ictinogomphus rapax*. (after Chowdhury & Akhteruzzaman, 1981).

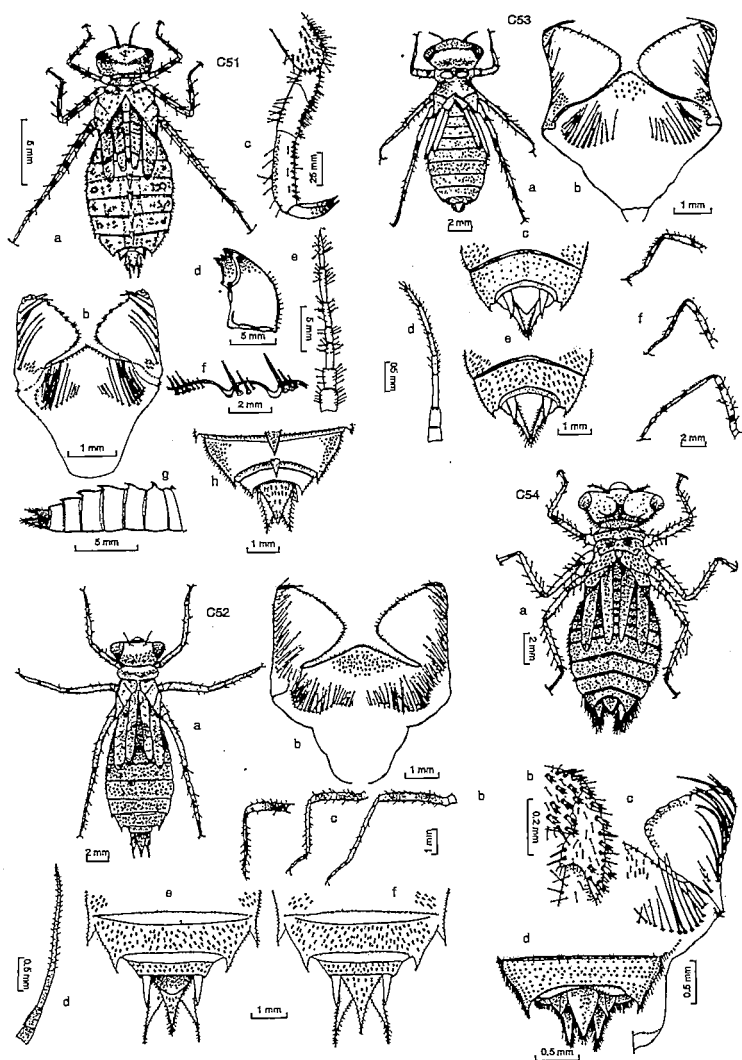


C46: *Macromia moorei*, (a) larva, (b) labium, (c) head, frontal view, (d) mandible, (e) antenna, (f) mid-dorsal abdominal spines, (g) enlarged view of distal margin of palpus, (h) anal appendages, male, (i) tibial comb and tarsi, (after Arun Kumar, 1973b). C47: *Orthetrum pruinosum neglectum*, (a) larva, (b) distal margin of palpus, (c) anal appendages, (d) labium, (e) mandible, (f) tibial comb and tarsi, (g) antenna, (h) fore-leg, (i) mid-dorsal abdominal spines, (j) lateral abdominal spines (after Arun Kumar, 1972d).

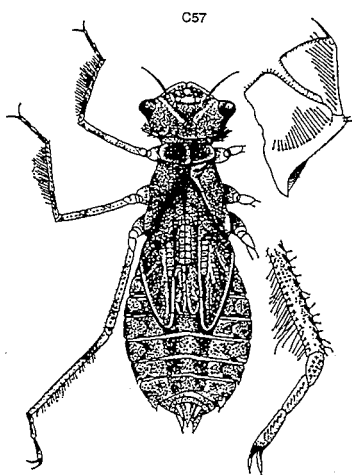
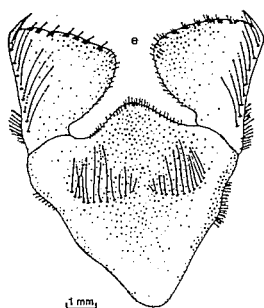
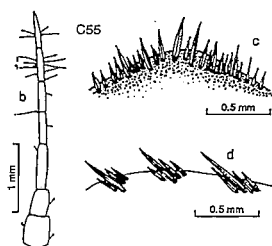
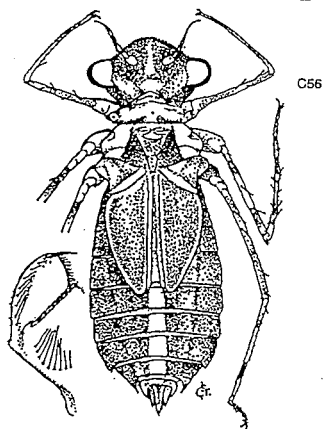
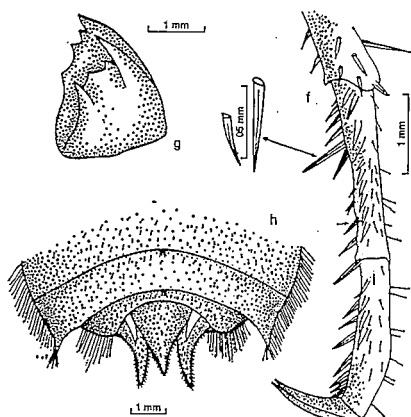
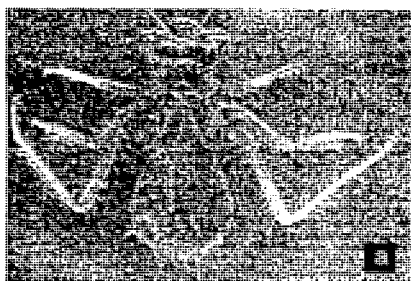


C48: *Orthetrum sabina*, (a) larva, (b) labium, (c) anal appendages, (d) tibial comb and tarsi, (e) antenna, (f) mid-dorsal abdominal segments, (g) mandible, (h) distal margin of palpus, enlarged view. C49: *Potamarcha congener*, (a) larva, (b) labium, (c) tibial comb and tarsi, (d) distal margin of palpus, enlarged view, (e) mandible, (f) antenna. C50: *Acisoma panorpoides panorpoides*, (a) larva, (b) anal appendages, (c) antenna, (d) tibial comb and tarsi, (e) three abdominal segments, enlarged dorsal view, (f) labium, (g) distal margin of palpus, enlarged view. (C48, C49 after Arun Kumar, 1973b, C50 after Arun Kumar, 1984b).

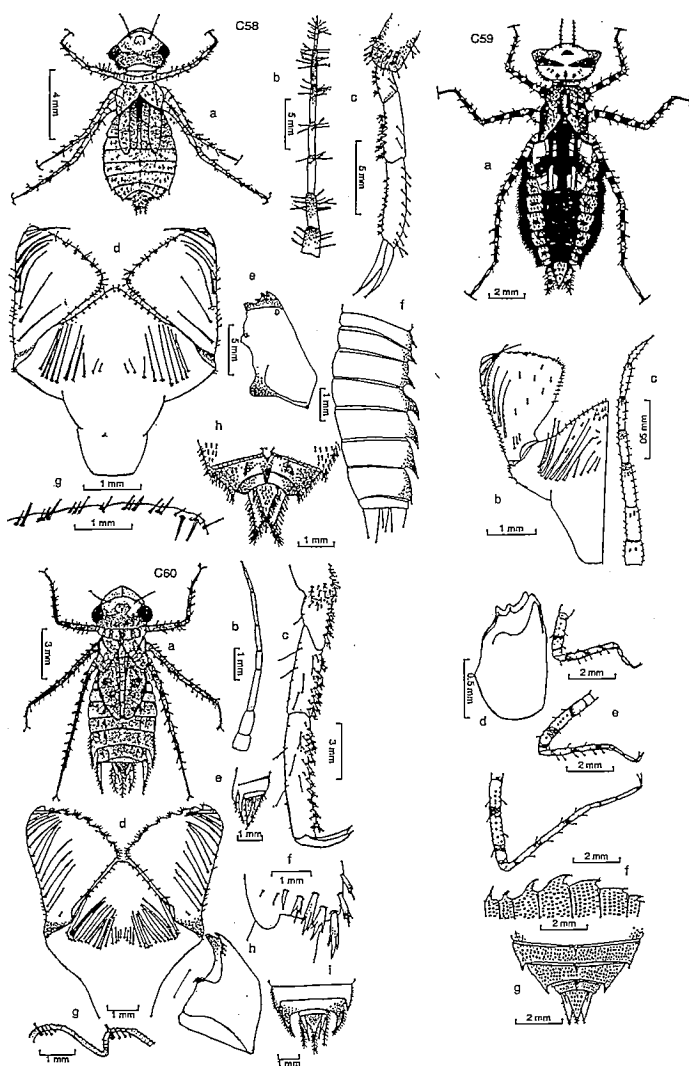




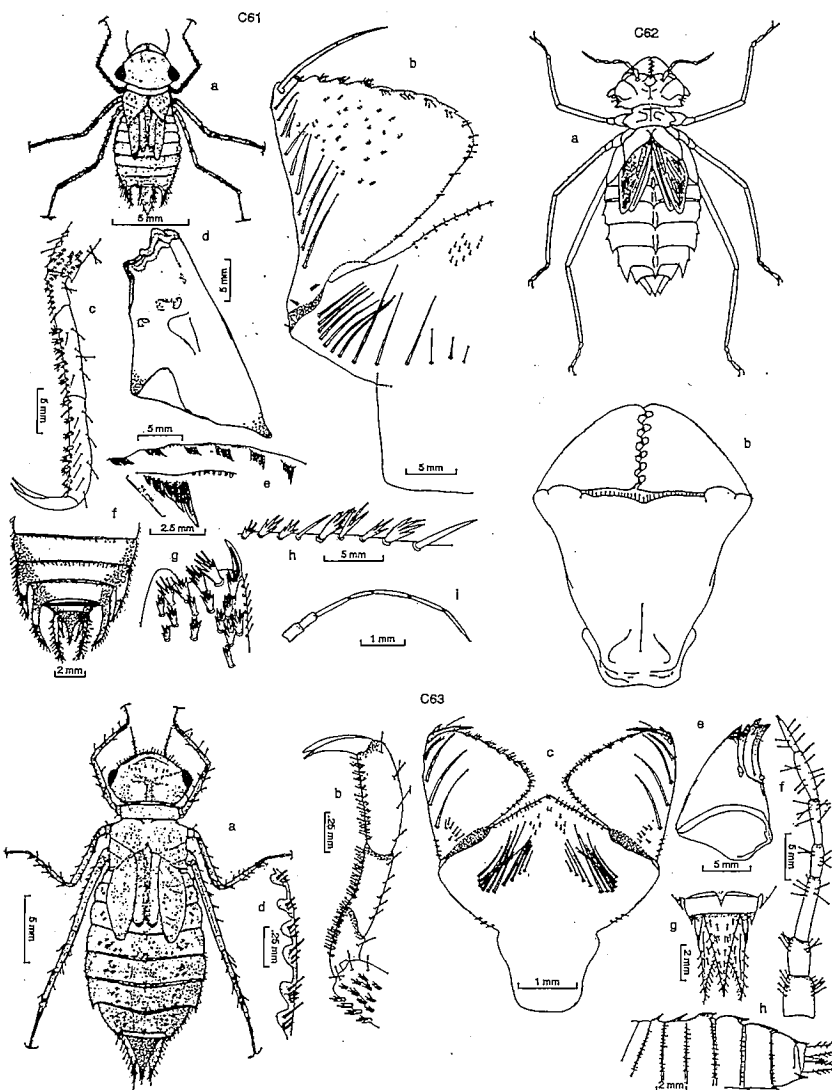
C51: *Brachythemis contaminata*, (a) larva, (b) labium, (c) tibial comb and tarsi, (d) mandible, (e) antenna, (f) distal margin of palpus, enlarged view, (g) mid-dorsal abdominal spines, (h) anal appendages, female. (after Arun Kumar, 1973b). C52: *Bradinopyga geminata*, (a) larva, (b) labium, (c) legs, (d) antenna, (e) anal appendages, male. (after Sangal & Kumar, 1970). C53: *Crocothemis servilia servilia*, (a) larva, (b) labium, (c) anal appendages, male, (d) antenna, (e) anal appendages, female, (f) legs. (after Sangal & Kumar, 1970). C54: *Diplacodes trivialis*, (a) larva, (b) tibial comb and tarsi, (c) labium, (d) anal appendages. (after Arun Kumar, 1984a).



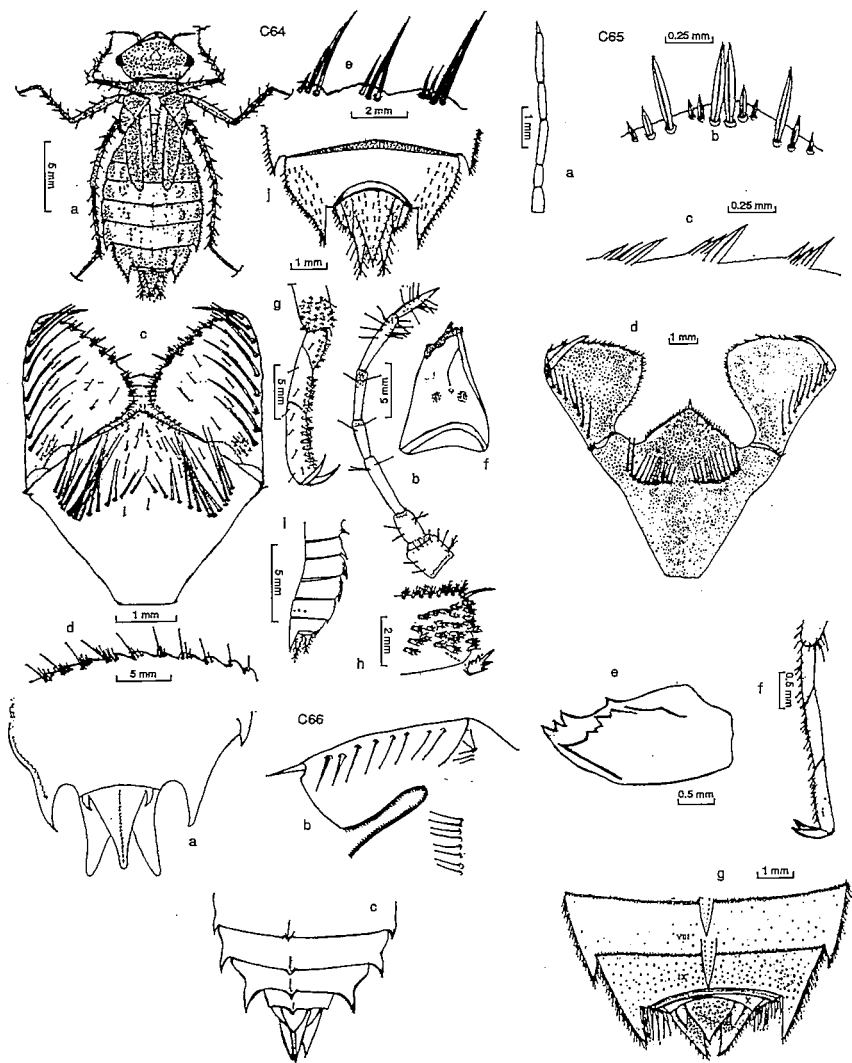
C55: *Rhodothemis rufa*, (a) larva, (b) antenna, (c) anterior margin of prementum, enlarged view, (d) distal margin of palpus, enlarged view, (e) labium, (f) tibial comb and tarsi, (g) mandible, (h) anal appendages. (after Nirmalakumari & Nair, 1981). C56: *Palpopleura lucia*, larva and labium. (after Fraser, 1955). C57: *Sympetrum fonscolombei*, larva, labium and mid-tibia and tarsus, enlarged (after Longfield, 1946).



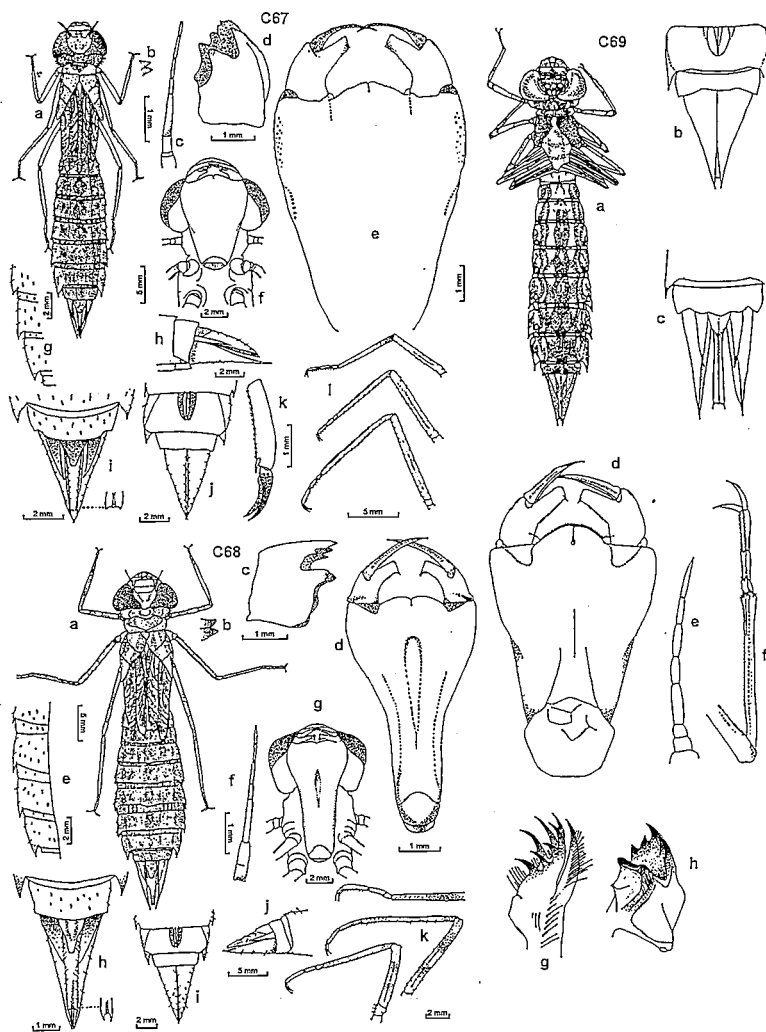
C58: *Trithemis aurora*, (a) larva, (b) antenna, (c) tibial comb and tarsi, (d) labium, (e) mandible, (f) mid-dorsal abdominal spines, (g) distal margin of palpus, enlarged view, (h) anal appendages, female. C59: *Trithemis festiva*, (a) larva, (b) labium, (c) antenna, (d) mandible, (e) legs, (f) mid-dorsal abdominal spines, (g) anal appendages. (after Arun Kumar, 1972b). C60: *Pantala flavescens*, (a) larva, (b) antenna, (c) tibial comb and tarsi, (d) labium, (e) anal appendages, lateral view, (f) tibial comb, enlarged view, (g) distal margin of palpus, enlarged view, (h) mandible, (i) anal appendages, male. (C58, C60 after Arun Kumar, 1973b).



C61: *Tramea basilaris burmeisteri*, (a) larva, (b) labium, (c) tibial comb and tarsi, (d) mandible, (e) distal margin of palpus, enlarged view and one crenation further enlarged, (f) anal appendages, male, (g) tibial comb, enlarged view, (h) setae of tarsi further enlarged, (i) antenna. C62: *Tramea limbata*, (a) larva, (b) labium. (after Fraser, 1919). C63: *Tholymis tillarga*, (a) larva, (b) tibial comb and tarsi, (c) labium, (d) distal margin of palpus, enlarged view, (e) mandible, (f) antenna, (g) anal appendages, female, (h) mid-dorsal abdominal spines. (C61, C63 after Arun Kumar, 1973b).



C64: *Zyxomma petiolatum*, (a) larva, (b) antenna, (c) labium, (d) distal margin of palpus, enlarged, (e) a few crenations of palpus further enlarged, (f) mandible, (g) tibial comb and tarsi, (h) tibial comb, enlarged view, (i) mid-dorsal abdominal spines, (j) anal appendages, female. (after Arun Kumar, 1973b). C65: *Urothemis signata signata*, (a) antenna, (b) mid-anterior margin of prementum, enlarged view, (c) distal margin of palpus, enlarged view, (d) labium, (e) mandible, (f) tibial comb and tarsi, (g) anal appendages. (after Nirmalakumari and Nair, 1983). C66: *Zygonyx iris ceylonicus*, (a) anal appendages, (b) left lateral lobe of labium, (after St. Quentin, 1973); (c) dorsal view of terminal abdominal segments of *Zygonyx* sp. (after Matsuki, 1986).



C67: *Anax guttatus*, (a) larva, (b) propleural process, (c) antenna, (d) mandible, (e) labium, (f) labium, ventral view, (g) lateral abdominal spines of segments 7-9, (h) anal appendages, male, lateral view, and, (i) dorsal view, (j) gonapophyses female, ventral view, (k) last tarsal segment with claw, (l) legs. C68: *Anax immaculifrons*, (a) larva, (b) propleural process, (c) mandible, (d) labium, (e) lateral abdominal spines of segments 6-9, (f) antenna, (g) labium, ventral view, (h) anal appendages, male, (i) gonapophyses, female, ventral view, (j) anal appendages, male, lateral view, (k) legs. (C67, C68 after Sangal & Kumar, 1970). C69: *Hemianax ephippiger*, (a) exuviae, (b) gonapophyses, female, ventral view, (c) anal appendages, male, (d) labium, (e) antenna, (f) tibia and tarsus of hind leg, (g) maxilla, (h) mandible. (after de Marmels, 1975).

PLATE 1



*Vestalis apicalis nigrescens*, male (RB).



*Vestalis apicalis nigrescens*, juvenile male  
(MB), Galella.

PLATE 2



*Libellago greeni*, male (MB), Galella.



*Euphaea splendens*, male (MB), Sinharaja Forest.



PLATE 3



*Agriocnemis pygmaea*, male (PMA).



*Ischnura aurora aurora*, male (MM).

PLATE 4



*Ceriagrion cerinorubellum*, male (MK).



*Ceriagrion coromandelianum*, male (MM), Kalutara.

PLATE 5



*Pseudagrion rubriceps ceylonicum*, male (MB), Embilipitiya.



*Elatoneura bigemmata*, in tandem (MB), Kudawa Field Research Station, Sinharaja Forest.



PLATE 6



*Elatoneura tenax*, male (MB), Diyaluma Falls.



*Paragomphus henryi* male (RB).

PLATE 7



*Ictinogomphus rapax*, male (RB).



*Orthetrum pruinatum neglectum* male (RB).

PLATE 8



*Orthetrum sabina* male (MM), Polonnaruwa.



*Potamarcha congener*, female (MM), Polonnaruwa.



PLATE 9



*Potamarcha congener*, juvenile male (MM), Polonnaruwa.



*Acisoma panorpoides panorpoides*, juvenile (MB), Sinharaja Forest.

PLATE 10



*Brachythemis contaminata*, male (RB).



*Crocothemis servillia*, male (PMA).



PLATE 11



*Crocothemis servillia*, juvenile male, identified by the coloured wing bases and the typical black dorsal line on the abdomen (MM).



*Diplacodes nebulosa*, juvenile female (MB), Sinharaja Forest.

PLATE 12



*Diplacodes trivialis* (MB).



*Diplacodes trivialis*, male (MM), Sinharaja Forest.

PLATE 13



*Neurothemis tullia tullia*, adult male (RB).



*Neurothemis tullia tullia*, juvenile male (MB).



PLATE 14



*Neurothemis tullia tullia*, adult female (RB).



*Neurothemis tullia tullia*, teneral female (MM).

PLATE 15



*Trithemis aurora*, male (MB).



*Trithemis festiva*, male (MB).

PLATE 16



*Trithemis pallidinervis*, juvenile male (MB), Polonnaruwa.



*Rhyothemis variegata variegata*, female (MB), Viharamahadevi Park, Colombo.

PLATE 17



*Pantala flavescens*, male (MB).



*Tramea limbata*, male (RB).



PLATE 18



*Tholymis tillarga*, male (TdeF), Colombo.



*Tholymis tillarga*, female (PHA).



PLATE 19



Pair of damselflies in tandem, male on the right.

PLATE 20



Pair of dragonflies, *Orthetrum sabina*, in the "wheel position"; the female has curved her abdomen to collect sperm from the male accessory genitalia on segment two.

## Rearing of dragonfly larvae

The larvae of most dragonflies can be raised fairly easily from egg to emergence. Eggs can be obtained from an ovipositing female as soon as it is captured by dipping the tip of its abdomen in water or from species that lay their eggs into water weeds by collecting the weeds into which a female has been seen to oviposit. Stages of larvae can be captured by dredging in water over which adults, particularly females are seen. Tap water is not suitable for the rearing of any larvae, unless such water has been allowed to stand for several days before use, preferably with some water weeds in it. The earliest stages can be fed on *Paramoecium* which are easily raised in a culture of paddy straw in water, and later on *Daphnia*. As the larvae grow they will take various stages of mosquito larvae or "blood worms" which may be available from pet fish suppliers. Larvae are cannibalistic and will attack anything of suitable size that moves; too many larvae should not be kept together except in large containers with plenty of water plants. As the final stage approaches, the larvae should be provided with short sticks standing out of the water for them to crawl up. Emergence is usually in the early hours of the morning. The exuviae should be kept together with the emerged imago in the collection, even though the latter will be teneral.

## Making and keeping a collection

Keeping proper records is essential, whether rearing larvae or making a collection of adults. Colour and markings of the fresh specimen should be carefully recorded as changes occur quite soon after death. The location should be set out to enable a later return to it if necessary and should be accompanied by a short description of the habitat; dates and times should also be recorded as should the occurrence of the species in the location, sexes and numbers and of other dragonfly species even if not taken.

It is necessary to keep the abdomen of the insect intact; the segments will fall apart if no steps are taken to prevent this. Fine stainless steel wire may not be available in Sri Lanka, but a suitable alternative is fine fuse wire that can be obtained from an electrical goods supplier. A length of wire should be passed into the abdomen from its end and carefully into the thorax. The surplus can be cut off at the end of the abdomen or a few mm left to enable the specimen to be handled. The preservation of the colour of adults is difficult. Soon after wiring, specimens could be kept in methylated spirits for about 20–30 minutes, before being laid out on a setting board made by pasting two strips of cork packing on a sheet of wood or thick card; the space between is for the body of the insect, best placed dorsum down, wings and legs being kept in place with strips of paper. Because of the variation in size of the body, setting boards with narrow or wide spacing between the cork strips will be necessary. The specimen has to dry as fast as possible after it is set on the board. This is easily done by placing the board, insect-side up, over a 20/30 watt electric bulb in a suitable box. At this time the specimen should be protected from attack by ants etc. Peter Miller suggests killing specimens in the vapour of ethyl acetate or by freezing; that the colours are best preserved by freeze-drying or by leaving the killed specimens in acetone for 24 hours, though this makes the specimens brittle.

When captured in the field, and subsequently, if facilities for pinning are not available, the easiest way to keep specimens is in paper triangles made from 3.5" x 6.5" rectangles of oil paper or cellophane. The rectangle is folded over to form a triangle and the extra ends folded over to close the triangle. Self closing polythene envelopes of various sizes are available here and may be available in Sri Lanka. They are suitable and convenient. More advanced is the use of proper insect boxes as used in museums, but these need a lot of space. Clear plastic boxes of suitable size and depth can be used with cork or a special plastic material on the bottom to enable pinning.

Preserved specimens are liable to damage by fungus and insect attack. Protection from both can be obtained by naphthalene, crushed and spread liberally in the containers in which the specimens are stored.

Watkins & Doncaster, P. O. Box 5, Cranbrook, Kent, TN18 5EZ are a suitable source for the supply of entomological equipment.

# Sri Lankan Odonata in the National Museum, Colombo

## Calopterygidae

1. *Neurobasis chinensis chinensis*
2. *Vestalis apicalis nigrescens*

## Chlorocyphidae

3. *Libellago adami*
4. *Libellago finalis*
5. *Libellago greeni*
6. *Libellago indica*

## Euphaeidae

7. *Euphaea splendens*

## Lestidae

8. *Lestes elata*
9. *Lestes malabarica*
10. *Indolestes gracilis gracilis*

## Coenagrionidae

11. *Agriocnemis pygmaea*
12. *Aciagrion occidentale*
13. *Ischnura aurora aurora*
14. *Ischnura senegalensis*
15. *Ceriagrion cerinorubellum*
16. *Ceriagrion coromandelianum*
17. *Pseudagrion malabaricum*
18. *Pseudagrion microcephalum*
19. *Pseudagrion rubriceps ceylonicum*

## Platynemididae

20. *Copera marginipes*

## Platyystictidae

21. *Drepanosticta adami*
22. *Drepanosticta digna*
23. *Drepanosticta hilaris*
24. *Drepanosticta lankanensis*
25. *Drepanosticta montana*
26. *Drepanosticta nietneri*
27. *Drepanosticta subtropica*
28. *Drepanosticta tropica*

29. *Drepanosticta walli*
30. *Platysticta apicalis*
31. *Platysticta maculata*

## Protoneuridae

32. *Elatoneura caesia*
33. *Elatoneura leucostigma*; type as  
*Disparoneura leucostigma*
34. *Prodasineura sita*

## Gomphidae

35. *Megalogomphus ceylonicus*
36. *Paragomphus henryi*
37. *Heliogomphus lyratus*; type  
specimen.
38. *Heliogomphus walli*, including a  
type specimen.
39. *Macrogomphus lankanensis*; type  
with a damaged right wing.
40. *Gomphidia pearsoni*, including a  
type specimen.
41. *Ictinogomphus rapax*

## Aeshnidae

42. *Anax guttatus*
43. *Anax immaculifrons*
44. *Gynacantha subinterrupta* (det.  
Fraser).
45. *Anaciaeschna martini* (det.  
Laidlaw); =donaldi.

## Libellulidae

46. *Brachydiplax sobrina*
47. *Orthetrum chrysis*
48. *Orthetrum glaucum*
49. *Orthetrum luzonicum*
50. *Orthetrum pruinosum neglectum*
51. *Orthetrum sabina sabina*
52. *Orthetrum triangulare triangulare*
53. *Potamarcha congener*

- |  |   |
|--|---|
| 54. <i>Acisoma panorpoides panorpoides</i>   | 65. <i>Trithemis aurora</i>               |
| 55. <i>Brachythemis contaminata</i>          | 66. <i>Trithemis festiva</i>              |
| 56. <i>Bradinopyga geminata</i>              | 67. <i>Trithemis pallidinervis</i>        |
| 57. <i>Crocothemis servilia</i>              | 68. <i>Rhyothemis variegata variegata</i> |
| 58. <i>Diplacodes nebulosa</i>               | 69. <i>Pantala flavescens</i>             |
| 59. <i>Diplacodes trivialis</i>              | 70. <i>Tramea basilaris burmeisteri</i>   |
| 60. <i>Indothemis limbata sita</i>           | 71. <i>Tramea limbata</i>                 |
| 61. <i>Neurothemis intermedia intermedia</i> | 72. <i>Tholymis tillarga</i>              |
| 62. <i>Neurothemis tullia tullia</i>         | 73. <i>Zyxomma petiolatum</i>             |
| 63. <i>Rhodothemis rufa</i>                  | 74. <i>Urothemis signata signata</i>      |
| 64. <i>Sympetrum fonscolombei</i>            | 75. <i>Zygonyx iris ceylonicus</i>        |

## GLOSSARY

**Allotype**, the specimen of a species first described of the opposite sex to the type first described. This status is no longer in use.

**Anal appendages**, the processes at the end of the abdomen of the adult insect; see text pg.14 for a fuller description.

**Anal bridge**, (Ab). a short nervure from Ac parallel to the lower side of the discoidal cell which in the Zygoptera is continued as IA; it ends meeting the short nervure descending from the distal end of the discoidal cell; it is not always present (Fig. A10).

**Anal crossing**, (Ac). a short transverse nervure at the base of the wing running across the cubital space; it is the vestigial crossing of the anal nervure which is continued as IA; where the cubital space is traversed by many nervures, it cannot be identified (Fig. A10).

**Anal loop**, (Al). a group of cells at the base of the hind wing in many Anisoptera; it lies next to and behind the discoidal cell; it is absent in some species or reduced to 2 or 3 cells in others; in Aeschnidae, Cordulegasteridae and Corduliinae it is oval or squarish, but more elongated in the Libellulinae (Fig. A10).

**Anal triangle**, (At). an area of one or more cells at the base of the wing in males of the Anisoptera; and sometimes absent even there (Fig. A10).

**Andromorphic**, see polymorphism.

**Antealar sinus**, a small triangular area on the dorsum of the thorax just in front of the attachment of the wings.

**Anteclypeus**, the anterior or lower part of the clypeus; the labrum is attached to it.

**Antehumeral stripe**, a coloured stripe

on the dorsum of the thorax internal to the humeral suture; not to be confused with the humeral stripe which lies on the border of the humeral suture (Fig. A3).

**Antennae**, a pair of jointed processes just in front of and to the inner side of the eyes; usually of 4 to 7 segments in both larva and imago, but some segments may be rudimentary in the former.

**Antenodal nervures**, short transverse nervures from the costal or anterior border of the wing to the combined radius + medius proximal to the node; they vary in number from only 2 (Coenagriidae) known as primary ante-nodals to many, in which case the primaries may or may not, appear as thickened nervures; the anterior half of each antenodal in the costal space is usually continuous with the posterior half in the subcostal space (Zygoptera, Libellulidae), but not so in other genera of Anisoptera.

**Apical**, points furthest away from the thorax (as opposed to basal).

**Arc**, a short oblique transverse nervure at the base of the wing which forms the outer (distal) side of the basal (median)space.

**Auricle**, (oreillet) a small ear-shaped process on each side of the second abdominal segment, very small, rudimentary or absent in the females, most evident in the Gomphidae and Aeschnidae.

**Basal**, points nearest to the origin of a part, such as the abdomen or wing, as opposed to apical.

**Basal antenodal nervure**, an incomplete antenodal nervure found at the extreme base of the wings in some species, being an important generic

- or specific character when present. It runs from the subcostal nervure to the radius (Ri), its anterior half in the costal space being absent.
- Basal postcostal nervure**, an accessory transverse nervure at the extreme base of the wing in the cubital space proximal to Ac and present only in the more primitive Coenagriidae.
- Basal space**, an elongated space at the extreme base of the wing bounded distally by the arc, the radius anteriorly and CuP (Cuii) posteriorly; in some genera it is traversed by one or two nervures.
- Bifurcation of Rs**, the bifurcation of the superior sector of the arc into Rii and Riv+v: the point at which this takes place is an important character employed in classification.
- Bivoltine**, of species that have two generations of young in a year.
- Braced**, of the pterostigma - by a strong, oblique vein extending from the lower side of the pterostigma to the radius.
- Bridge**, a triangular space bounded outwardly by the oblique nervure descending from the node, anteriorly by Rii and posteriorly by IRii; present only in the Anisoptera.
- Carina**, a chitinous ridge on the dorsum of the thorax or of the abdominal segments.
- Caudal gills**, accessory respiratory organs at the end of the abdomen of the larvae of the Zygoptera, three except in the Libellaginae which have only two; of very variable shape - thin and acuminate, lamellate and obtuse, or triquetral or bladder shaped.
- Costa**, the nervure which forms the anterior border of the wing.
- Coxa**, the basal segment of the leg.
- Clypeus**, the lower or anterior part of the face, which is divided into the ante- and postclypeus, the labrum being attached to the former.
- Cubital nervure**, the anal crossing (Ac).
- Diapause**, a physiological state quite distinct from dormancy or quiescence in which growth and activity are suspended because of unfavourable environmental conditions e.g. low temperature and this could happen at any stage, whereas diapause occurs typically in one stage only, e.g. the egg stage or the final instar.
- Discoidal cell**, a triangular or quadrilateral space following the cubital space, always four-sided in the Zygoptera. In the Anisoptera it is divided by a longitudinal nervure into an upper or superior triangle, the hypertrigone, and an inferior triangle.
- Discoidal field**, the area distal to the discoidal cell bounded anteriorly by MA, posteriorly by Cuii and outwardly by the border of the wing.
- Divaricate**, diverging from the origin.
- Dorsal**, the upper surface.
- Dorsum**, the back or upper surface of any part.
- Endemic**, of a species- confined to a named country or region.
- Endophytic**, species laying their eggs within plant tissue.
- Enfumed**, smoky or brownish colour.
- Epimeron**, the posterior division of the side of the thorax.
- Epistome**, the postclypeus.
- Exophytic**, species that do not lay eggs in plant tissue.
- Exuviae**, the cast skin of a larva after its moult: this is the form used for the singular as well as for the plural.
- Foramen**, an opening or enclosed space.
- Forcinate**, like a pair of forceps.
- Frons**, the upper part of the head in front of the eyes, sometimes forming a transverse ridge.
- Fusiform**, spindle-shaped.
- Hamules**, two pairs of hooks found in the genitalia on segment 2 of the male and used in copulation.



Heteromorphic, see polymorphism.

Hirsute, covered with long hair.

Holotype, the specimen designated as the name-bearing type by the original author.

Humeral suture, a false joint of the thorax along the outer border of the dorsum and indicated by a fine, shallowly sunken line.

Hyaline, of wings – clear, transparent; opposite of opaque

Hypertrigone, see discoidal cell.

Jugal sutures, transverse sutures found on the abdominal segments of many Anisoptera.

Labium, the lower mouth-part, or lower lip, greatly developed in the larva of the Odonata.

Labrum, the upper lip.

Lectotype, one of a series of syntypes which after the original publication is designated as the type.

Lilaceous, pale purple.

MA, the anterior median nervure or the continuation of the lower sector of the arc.

Median space, the basal space.

Membrane, a narrow membrane bordering the base of the wing in some Anisoptera.

Mesinfraepisternum, that part of the second thoracic segment from which the second coxa on each side arises (mesokatepisternum) (Fig. A3).

Mesepimeron, the largest part of the second thoracic segment; it is on the side of the thorax and is followed on that side by the metepisternum, which is the corresponding part of the third thoracic segment, and from which it is separated by the first lateral suture. In front (or above as it appears) is the mesepi-sternum, which forms the false dorsum on that side and from which it is separated by the mesopleural or humeral suture (Fig. A3).

Metinfraepisternum, that part of the third thoracic segment from which the third coxa on each side arises. metakatepisternum).

Movable hook, apart of the larval labium (pg.16; Fig. A23).

Multivoltine, having more than one generation of young in a year.

Nodal index, a presentation of the number of ante- and postnodal nervures in the fore- and hind wings; the numbers nearest the vertical line indicate the number of antenodal nervures.

Node, nodus, a joint in the costa about midway along the wing (Fig. A10).

Oblique nervure, a nervure situated between Riii and IRiii slightly distal to the outer end of the bridge.

Ocellus, a simple eye as opposed to the compound eye; all Odonata possess three ocelli arranged in a triangle on a vertex between the compound eyes.

Occiput, the back of the head; when the eyes meet this may be a very small triangular area.

Opaque, of wings – not clear, cannot be seen through; opposite of hyaline.

Paratype, A specimen other than the holotype so designated by the original author at the time of his original description.

Polymorphism, the appearance in a species of many slightly differing forms, more commonly colour forms and more often of females; females which differ from the male pattern are called heteromorphic, while those which are similar to the males are called andromorphic.

Postanal cell, cells between the cubital nervure, Cuii, and the posterior border of the wing proximal to the level of the discoidal cell. Cells adjacent to the discoidal cell in the hind wing of the Anisoptera form the anal loop.

- Postclypeus, or epistome; the part of the clypeus lying between the anteclypeus below and the frons above.
- Posterior lobe of prothorax, the most variable of the three fused lobes of the prothorax, which for this reason is used extensively in differentiating genera and species.
- Postnodal nervures, transverse nervures between the costa and the radius, *Ri*, distal to the node.
- Primary antenodals, two thickened antenodal nervures found in many Anisoptera: one is always the nervure nearest the base of the wing; the other is about the 4th to the 7th from the base.
- Pruinescence, an exudation of the hypodermal cells that forms on the surface of the cuticle, most developed on mature males and sometimes on very old females. In Odonata it is either white or very pale blue, and when well developed considerably changes the appearance of the insect.
- Pterostigma, a small thickened area of the wing at the costal border near its apex, usually distinctively coloured in a species.
- Pubescent, covered with short hairs.
- Sectors [of arc], the origins of *Riv+v* and *MA*; these may have a common origin or be slightly separated.
- Semivoltine, a generation takes longer than one year to complete its cycle.
- Subtrigone, a triangular area of the wing in Anisoptera lying adjacent and proximal to the discoidal cell: it may be a single cell or be split by transverse nervures into three or more cells; it may be merged with the distal end of the cubital space.
- Synthorax, the fused meso- and metathorax bearing the wings and the middle and hind pair of legs.
- Syntype, one of a number of specimens part of the collection before the original author in cases where he did not designate a holotype.
- Teneral, freshly emerged specimen, immature and which has not attained its final colouration.
- Tornus, the angle formed by the meeting of the basal and posterior borders of the wing: it is only pronounced in the Anisoptera.
- Trigone = discoidal cell.
- Triquetral, triangular, having three sides.
- Univoltine, having only one generation of young in a year.
- Ventral, the undersurface of any part.
- Vesicle, a small eminence on the vertex of the head which either overhangs the ocelli or is situated between them.
- Vulvar scale, the protective sheath of the ovipositor formed of two plates attached to the sides of the ventral plates of the 8th and 9th abdominal segments of the female.

## LITERATURE CITED

- Ali Khan, B. 1973. The copulatory complex of *Neurobasis chinensis chinensis* (Linn.) (Agriidae, Zygoptera), J. Bombay Nat. Hist. Soc. 71: 124-130.
- Ameen, Mahmud-Ul., U. S. Rowshan Akhter and M. Fazle Rabbi. 1982. Final Instar larvae of common damselflies (Odonata: Zygoptera) of Dhaka City and their identification key. Bangladesh J. Zool. 10(2): 81-91.
- Attenborough, David. 1990. The trials of life. The British Broadcasting Corporation's television series.
- Bedjanić, Matjaz. 1996. Odonata collected in Sri Lanka during January and February 1995 (personal communication).
- Begum, Anwara, M. A. Bashar and B. R. Biswas. 1980. Life History of *Ictinogomphus rapax* (Rambur) (Anisoptera: Gomphidae) Bangladesh J. Zool. 8(1): 53-60.
- Begum, A., M. A. Bashar and B. R. Biswas. 1982. Life History and external egg and larval morphology of *Brachythemis contaminata* (Fabricius) (Anisoptera, Libellulidae). Odonatologica 11 (2): 89-97.
- Begum, A., M. A. Bashar & V. Biswas. 1991. Description of larval instars and some aspects on biology of *Urothemis signata signata* (Rambur) (Odonata: Libellulidae). Dhaka Univ. Stud. (E) 6 (2): 125-132.
- Begum, A., M. A. Bashar, M. U. Ahmed & V. Biswas. 1993. Studies on the life history of *Potamarcha congener* (Rambur) (Odonata: Libellulidae). Ann. Ent. 11 (1): 26-33.
- Butler, S. G. 1993. Key to the larvae of European *Orthetrum* Neuman. (Anisoptera: Libellulidae). Odonatologica 22 (2): 191-196.
- Cammaerts, R. 1975. The larva of *Orthetrum chrysostigma* (Burmeister 1839) (Anisoptera; Libellulidae) (in French). Odonatologica 4 (2): 73-80.
- Campion, H. 1923. A new form of *Indothemis limbata* from Ceylon (Odonata). Ann. Mag. Nat. Hist. 61 (9): 28-31, Fig.
- Campion, H and Laidlaw, F. F. 1928. Notes on Oriental Dragonflies and descriptions of new species. (*Merogomphus henryi* from Urugalla). Proc. Zool. Soc. April: 129-138.
- Carchini, G., M. J. Samways & M. Di Domenico. 1995. Descriptions of the last-instar larva of *Agriocnemis pinheyi* Balinsky, 1963 (Zygoptera: Coenagrionidae). Odonatologica 24(1): 109-114; Figs. 1,2.
- Chowdhury, S. H. and M. D. Akhteruzzaman. 1981. Dragonfly (Odonata: Anisoptera) larvae from Chittagong. Bangladesh J. Zool. 9 (2): 131-144.
- Chowdhury, S. H. and M. D. I. Miah. 1990. Description of four zygopteran larvae from the Chittagong University Campus. Chittagong Univ. Stud. (II) 14: 127-136.
- Corbet, P. S. 1953. A terminology for the labium of larval Odonata. Entomologist 86: 191-196.
- Corbet, P. S. 1962. A biology of dragonflies. Witherby, London.
- Corbet, Longfield & Moore. 1960. Dragonflies. The New Naturalist. Collins.
- Costa, H. H. & F. Starmuhlner. 1972. Results of the Austrian-Ceylonese Hydrobiological Mission 1970 of the 1st Zoological Institute of the University of Vienna and the Department of Zoology of the Vidyalandara University of Ceylon, Kelaniya. Part

- 1.-Preliminary Report: Introduction and Description of the Stations. Bull. Fish. Res. Stn., Sri Lanka (Ceylon) Vol. 23, Nos. 1 & 2, pp. 43-76, June & Dec., 1972.
- Cowley, J. 1934. Changes in the generic names of the Odonata. Entomologist, 67: (201, 201:Paragomphus n.n for Mesogomphus n. preocc.).
- Cowley, J. 1936. The Disparoneura-complex: Generic characters and Lists of species. (Odonata). Ann. & Mag. N. Hist. Soc. Ser. 10. Vol. 17: 509-526.
- Fraser, F. C. 1919a. The larva of *Micromerus lineatus*, Burm. Rec. Ind. Mus. 16: 197, 198, pl.33.
- Fraser, F. C. 1919b. Description of new Indian Odonate larvae and exuviae. Rec. Ind. Mus.16: 459-467.
- Fraser, F. C. 1921. Indian Dragonflies. Pt. 11. J. Bombay Nat. Hist. Soc. 28: 107-121.
- Fraser, F. C. 1922. Notes on new and rare Indian Dragonflies. J. Bombay. Nat. Hist. Soc. 28: 698-702.
- Fraser, F. C. 1923/24. Dragonfly collecting in India. Pt 2 pp.48-69; Pt. 3 pp. 474-491. J. Bombay Nat. Hist. Soc. 29 (1-2).
- Fraser, F. C. 1924a. Dragonfly collecting in India. Pt. 4 ,pp 741-756. J. Bombay Nat. Hist. Soc. 29 (3-4).
- Fraser, F. C. 1924b. A survey of the Odonate fauna of Western India with special remarks on the genera *Macromia* and *Idionyx* and descriptions of 30 new species with Appendices I & II. Rec. Ind. Mus. 26: 423-522.
- Fraser, F. C. 1925. Indian Dragonflies Part 23. J. Bombay Nat. Hist. Soc., 30.
- Fraser, F. C. 1926. Indian Dragonflies, Part 24. J. Bombay Nat. Hist. Soc., 31.
- Fraser, F. C. 1928. Indian Dragonflies, Part 30. J. Bombay Nat. Hist. Soc., 32:
- Fraser, F. C. 1929. Indian Dragonflies Part 32. J. Bombay Nat. Hist. Soc., 33.
- Fraser, F. C. 1930. Indian Dragonflies Part 33. J. Bombay Nat. Hist. Soc. 34.
- Fraser, F. C. 1931a. Indian Dragonflies Part 36. J. Bombay Nat. Hist. Soc. 34 (4).
- Fraser, F. C. 1931b. Rec. Ind. Mus. 33: Additions to the Survey of the Odonate (Dragonfly) fauna of Western India with descriptions of nine new species.
- Fraser, F. C. 1931c. Indian Dragonflies Part 36 (2). J. Bombay Nat. Hist. Soc. 35.
- Fraser, F. C. 1933a. The fauna of British India.Odonata. Vol. 1.
- Fraser, F. C. 1933b. The *Platystictas* of Ceylon. Ceylon J. Sci. (B). 17: 201-224, 13 Figs.
- Fraser, F. C. 1933c. A new species of *Disparoneura* from Ceylon. Ceylon J. Sci. 17: 225-226.
- Fraser, F. C. 1933d. The Gomphines of Ceylon. Ceylon J. Sci. 18: 19-36, 6 Figs.
- Fraser, F. C. 1934. The fauna of British India. Odonata. Vol. 2.
- Fraser, F. C. 1936. The fauna of British India. Odonata. Vol. 3.
- Fraser, F. C. 1939. *Libellago adami*, a new species of dragonfly from Ceylon. Proc. R. Ent. Soc. Lond. (B), 8: 23-24, Fig. 1.
- Fraser, F. C. 1943. New Oriental Odonate larvae. Proc. R. Ent. Soc. (Lond) (B) 12. Pts.5-6 (June 1943): 81-93. Figs. 1-8.
- Fraser, F. C. 1943. The status of *Anaciaeschna donaldi* Fraser and *A. montivagans* Lieftinck (Odonata). Ent. mon. Mag. 79: 87-88.
- Fraser, F. C. 1946. *Hylaeothemis indica*, a new species of Oriental Libelluline. Proc. R. Ent. Soc. Lond. Vol. 15: 97-100, Fig. 1, 2.
- Fraser, F. C. 1949. Handbooks for the identification of British Insects. Part 10. Odonata. R. Ent. Soc. Lond.
- Fraser, F. C. 1955. Description of the nymph of *Palpopleura lucia* (Drury).

- Rev. francaise Ent. (1): 51-52, Fig. 1.
- Fraser, F. C. & Dover, C. 1922. The Dragonflies of Barkuda Island. Rec. Ind. Mus. 24: 303-311.
- Gambles, R. W. 19-. The larval stages of Nigerian dragonflies, their biology and development. Jl. W. Afr. Sci. Assn. 8: 111-120.
- Gardner, A. F. 1954/55. The Biology of Dragonflies. Proc. South Lond. Entom. & Nat. Hist. Soc. 1954/55: 109-134. Pl. 9-15.
- Hagen, H. A. 1858. (Cinghalese Odonata) in Verhandlungen der k. k. zool. bot. Gesellschaft in Wien, 8: 478-481.
- Hagen, H. A. 1859. (Supplementary list) in Verhandlungen der k. k. zool. bot. Gesellschaft in Wien, 9: 206, 207.
- Hagen, H. A. 1885. Monograph of the earlier stages of Odonata, sub-families Gomphina and Cordulegastrina. Trans. Amer. Ent. Soc. 12.
- Hassan, A. T. 1977a. The larval stages of *Urothemis assignata* (Selys) (Anisoptera: Libellulidae). Odonatologica 6 (3): 151-161.
- Hassan, A. T. 1977b. Studies on the life history of *Palpopleura lucia lucia* (Drury) (Anisoptera, Libellulidae). Nig. J. Ent. 2.
- Hassan, A. T. 1978. Reproductive behaviour of *Acisoma panorpoides panorpoides* Selys (Anisoptera: Libellulidae). Odonatologica 7: 237-245.
- Kennedy, C. H. 1934. *Anax piraticus*, a new species of Dragonfly (Odonata) from Guam. Ann. Ent. Soc. Amer. 27: 346-356.
- Kerdpibule, V., S. Niharat & S. Sucharit. 1979. Descriptions of Odonate nymphs from Thailand. South East Asian J. trop. Medicine and Public Health. 10 (4): December 1979: 540-547. Figs., Plate.
- Khan, Ali. see Ali Khan.
- Kimmins, D. E. 1966. A List of the Odonata Types described by F. C. Fraser, now in the British Museum (Natural History). Bulletin of the British Museum (Natural History) Entomology. Vol. 18. No. 6.
- Kirby, W. F. 1891. On some Neuroptera Odonata (Dragonflies) collected by Mr. E. E. Green in Ceylon. Proc. Zool Soc. Lond. 1891: 203-206, Pl. 20.
- Kirby, W. F. 1894. (1893) Catalogue of the described Neuroptera Odonata (Dragon-flies) of Ceylon, with descriptions of new species. Journ. Linn. Soc. Zool. 24: 545-566, Pl. 41, 42.
- Kirby, W. F. 1905. List of a small collection of Odonata (Dragonflies) from Ceylon, collected by Mr. E. Ernest Green with notes on the genus *Zygonidia* and its allies, and descriptions of new species of *Zygonidia*, Kirby, and *Onychothemis*, Brauer, from Ceylon and Tonkin. Ann. Mag. Nat. Hist. 15, (2nd series): 270-278.
- Kumar, A. 1971. The larval stages of *Orthetrum brunneum brunneum* (Fonscolombe) with a description of the last instar larva of *Orthetrum taeniolatum* (Schneider) (Odonata: Libellulidae). J. nat. Hist. 5: 121-132.
- Kumar, A. 1972a. The life history of *Lestes praemorsa praemorsa* Selys (Odonata: Lestidae). Treubia, 28 (1): 3-20.
- Kumar, A. 1972b. Studies on the life history of *Trithemis festiva* (Rambur, 1842) (Odonata: Libellulidae). Odonatologica, 1(2): 103-112.
- Kumar, A. 1972c. The phenology of dragonflies in the Dehra Dun Valley, India. Odonatologica 1 (4): 199-219.
- Kumar, A. 1972d. Bionomics of *Orthetrum pruinosum neglectum* (Rambur) (Odonata: Libellulidae). Bull. Ent., 11 (1): 85-93.
- Kumar, A. 1973a. Descriptions of the last instar larvae of Odonata from the

- Dehra Dun Valley (India), with notes on Biology. I. (Suborder Zygoptera). *Oriental Insects* 7 (1): 83-118.
- Kumar, A. 1973b. The life history of *Bradinopyga geminata* (Rambur) (Odonata: Libellulidae). *G. K. V. J. Sci. Res.* 5 (1-2): 50-57 (Gurukul Kanga Vishva Vidyalaya).
- Kumar, A. 1973c. Descriptions of the last instar larvae of Odonata from the Dehra Dun Valley (India) with notes on Biology. II. (Suborder Anisoptera). *Oriental Insects*.
- Kumar, A. 1976. Biology of Indian Dragonflies with special reference to seasonal regulation and larval development. *Bull. ent.* 17: 37-47.
- Kumar, A. 1977. Field notes on the Odonata around a fresh water lake in Western Himalayas. *J. Bombay Nat. Hist. Soc.* 74: 506-510.
- Kumar, A. 1979a. Studies on the Life History of Indian Dragonflies. *Pseudagrion rubriceps* Selys (Coenagrionidae: Odonata). *Rec. zool. Surv. India*, 75: 371-381.
- Kumar, A. 1979b. On the occurrence of multivoltine generations in some Indian dragonflies. *Science and Culture* 45 (3): 126, 127.
- Kumar, A. 1980. Studies on the Life History of Indian Dragonflies, *Ceriatrion coromandelianum* (Fabricius) (Coenagrionidae: Odonata). *Rec. zool. Surv. India* 76: 249-258, Figs. 1-3.
- Kumar, A. 1984a. Studies on the Life History of Indian -22; Figs. 1-34.
- Kumar, A. 1984b. Studies on the Life History of Indian Dragonflies, *Acisoma panorpoides panorpoides* Rambur, 1842 (Libellulidae: Odonata). *Rec.zool. Surv. India*, 81 (3 & 4) :203-213. Figs. 1-37
- Kumar, A. 1984c. On the life history of *Pantala flavescens* (Fabricius) (Libellulidae:). *Ann. Entomol.* 2(1): 43-50.
- Kumar, A. 1984d. Studies on the life history of Indian dragonflies. *Anax immaculifrons* (Rambur). (Aeshnidae: Odonata). *Entomol.*, 9(2): 127-133.
- Kumar, A. 1985. Studies on the life history of Indian dragonflies; *Ictinogomphus rapax* (Rambur). (Gomphidae: Odonata). *Ann. Entomol.*, 3(1): 29-38.
- Kumar, A. & V. Khana. 1979. Taxonomy and Ecology of Odonata larvae in India. Workshop on advances in Insect taxonomy in India. V. K. Gupta (Ed.) Oct. 9-10. *Oriental Insects* (Assn. for the study of Oriental Insects: 42-43.
- Kumar, Arun & Prasad, M. 1977a. On the larvae of *Rhinocypha* (Odonata: Chlorocyphidae) from Garhwal Hills. *Oriental Insects*, 11 (4): 547-554; Fig. 38.
- Kumar, Arun & Prasad, M. 1977b. Reproductive behaviour in *Neurobasis chinensis chinensis* (Linn.) (Zygoptera: Calopterygidae). *Odonatologica*, 6(3): 163-171.
- Kumar, A. & Prasad, M. 1977c. Odonata of ponds, tanks and paddy fields at and around the Dehra Dun Valley, India, (W. Himalaya). *News I, Zool. Surv. India*, 3(5): 270-273.
- Kumar, A. & Prasad. M. 1977d. On the larva of *Tramea virginia* (Rambur, 1842) from India, with notes on the larvae of Indian representatives of the genus *Tramea* Hagen, 1861 (Libellulidae: Odonata). *J. Bombay Nat. Hist. Soc.* 74: 199-202, Figs. 1-10.
- Kumar, A. & Prasad, M. 1978. On a new species of *Agriocnemis* Selys, 1869 (Coenagrionidae: Odonata) with description of its larva from Dehra Dun Valley, India. *J. Bombay Nat. Hist. Soc.* 75: 174-179.
- Kumar, A. & Prasad, M. 1981. Field ecology, zoogeography and taxonomy of the Odonata of Western Himalaya,

- India. Rec. Zool. Surv. India, Misc. Publ. Occ. Pap. No. 20: 1-118. Text Figs. 1-12, Pl. 1.
- Laidlaw, F. F. 1902. On a Collection of Dragonflies made by members of the "Skeat Expedition" in the Malay Peninsula in 1899-1900. Part 2. Proc. Zool. Soc. Lond.
- Laidlaw, F. F. 1915. Fauna of the Chilka Lake; Aquatic Insects. Rec. Indian Mus. V: 178-180. Fig. 1.
- Laidlaw, F. F. 1916a. Notes on Indian Odonata. 13. Subfamily Agriocneminae Selys. Rec. Indian Mus. 12: 129-136.
- Laidlaw, F. F. 1916b. Notes on Oriental Dragonflies in the Indian Museum. No. 4. The genus *Pseudagrion*. Rec. Ind. Mus. 12: 21-25.
- Laidlaw, F. F. 1917. A list of Dragonflies recorded from the Indian Empire. Parts I & II. Rec. Ind. Mus. 13.
- Laidlaw, F. F. 1920. A list of the Dragonflies recorded from the Indian Empire with special reference to collections of the Indian museum. Part 3. Rec. Ind. Mus. 14: 153-158.
- Laidlaw, F. F. 1921. Indian Dragonflies. A list of the dragonflies recorded from the Indian Empire with special reference to the collections of the Indian Museum. Part 4. Suborder Anisoptera. Rec. Ind. Mus. 22: 75-91.
- Laidlaw, F. F. 1922. Indian Dragonflies. Rec. Ind. Mus. 24: (412, 413, Fig. 21. male appendages of *Heterogomphus ceylonicus*).
- Laidlaw, F. F. 1924. A catalogue of the dragonflies (Odonata) recorded from Ceylon, based on material collected by Mr. E. E. Green, with description of a new species. *Spolia Zeylanica*, 12 (47/48): 335-374, Figs. 1-15.
- Laidlaw, F. F. 1951. A note on the derivation of the Odonate fauna of the island of Ceylon. Ent., News 62: 77-83.
- Lieftinck, M. A. 1932. Notes on the Larvae of two Interesting Gomphidae (Odon.) from the Malay Peninsula. Bull. Raffles Mus. Singapore 7: 102-115, Pl. 2-4.
- Lieftinck, M. A. 1934. Notes on the genus *Drepanosticta* Laid., with descriptions of the larvae and of new Malaysian species (Odon., Zygoptera). *Treubia* 14 (4): 463-476, Pl. 9, 10.
- Lieftinck, M. A. 1940a. On some Odonata collected in Ceylon, with descriptions of new species and larvae. Ceylon J. Sci. (B), 22: 79-117, Figs. 1-11, Pl. I.
- Lieftinck, M. A. 1940b. Revisional notes on some species of Copeia. *Treubia* 17: 281-306.
- Lieftinck, M. A. 1941. Studies on Oriental Gomphidae (Odon.) with descriptions of new or interesting species. *Treubia* 18 (2): 235-253, Pl. 9-15.
- Lieftinck, M. A. 1942. The Dragonflies (Odonata) of New Guinea and neighbouring islands. Part 6i. (1. Anisoptera). *Treubia* 18 (3): 441-608, Pls. 23-41.
- Lieftinck, M. A. 1952. On the Papuanian representatives of the genus *Macromia* Rambur with descriptions of five new species and some larval forms (Odon.). *Treubia* 21 Part 2, 437-468. Figs. 1-22.
- Lieftinck, M. A. 1931. A Revision of the genus *Epophthalmia* Burm (Odon., Corduliinae) with notes on habits and larvae. *Treubia* 13, Livr. 1: 21-80. Figs. 1-29. Pl. 1.
- Lieftinck, M. A. 1955. Synopsis of the dragonflies (Odonata) of Ceylon. Zool. Meded. 34 (5): 67-87, Figs. 4.
- Lieftinck, M. A. 1965. The species group of *Vestalis amoena* Selys, 1853 in Sundaland (Odonata: Calopterygidae). *Tijdschr. V. Ent.* 108: 325-364.
- Lieftinck, M. A. 1971. Odonata from Ceylon. Report No. 4 from the Lund

- University Ceylon Expedition in 1962. Ent. scand. Suppl. 1. 16, 17, 22-36: 188-207; Figs. 1-10.
- Lieftinck, M. A. 1977. New and little known Corduliidae (Odonata: Anisoptera) from the Indo-Pacific Region. Oriental Insects. 11(2): 157-179; Figs. 1-14.
- Longfield, Cynthia. 1946. The larva of *Sympetrum fonscolombei* (Selys) (Odonata: Libellulidae). Proc. R. Ent. Soc. Lond. (A) 21 (7-9): 47-48.
- Mahmud-Ul Ameen, U. S. Rowshan Akhter & M. Fazle Rabbi. 1982. Final instar larvae of common damselflies (Odonata: Zygoptera) of Dhaka City and their identification key. Bangladesh J. Zool. 10 (2): 81-91.
- Marmels, J. de. 1975. The larva of *Hemianax ephippiger* (Burmeister 1839) (Anisoptera: Aeshnidae). Odonatologica 4 (4): 259-263. Fig. 1-9.
- Mathur, A. C. 1956. Studies on *Brachythemis contaminata* Fabricius. Ind. J. Ent. 18 (4): 372-388.
- Matsuki, K. 1983. Oviposition behaviour of *Orthetrum pruinosum neglectum*. Nature & Insects 18 (14) (in Jap.) (Odonatological Abstracts 5612-Odonatologica).
- Matsuki, K. 1986. Description of the possible larva of *Gynacantha hyalina* Selys from Taiwan (Odonata, Aeshnidae). Gekkan-Mushi 182, Apr. 1986: 26, 27, Figs. 1-7. (in Jap.).
- Matsuki, K. & K. Kitigawa, 1986. Description of the possible larva of *Zygonyx iris malayanum* (Laidlaw) from Thailand (libellulidae: Odonata). Gekkan-Mushi 183 May 1986: 24, 25, Figs. 1-7 (in Jap.).
- Miller, P. L. 1991. Note on the reproductive behaviour of *Zyxomma petiolatum* Rambur in India. (Anisoptera; Libellulidae). Odonatologica, 20 (4): 438-440.
- Miller, P. L. 1987 Dragonflies. Naturalists' Handbooks 7. CUP.
- Mitra, T. R. 1985 (1987). Note on *Tholymis tillarga* (Fabr.) (Odonata: Libellulidae) with special reference to its breeding habits. J. Bengal Nat. Hist. Soc. N. S. 4 (2): 144-146.
- Nasiruddin, M. & A. Begum. 1985. Description of the final instar nymph of *Crocothemis servilia* Drury (Anisoptera: Libellulidae) with notes on its emergence pattern. Chittagong Univ. Stud (II) 9 (1): 27-34.
- Needham, J. G. 1911a. Descriptions of the dragonfly nymphs of the subfamily Calopteryginae (Odonata). Ent. News 22 (4): 145-154. pl. iv, v.
- Needham, J. G. 1911b. Notes on a few nymphs of Agrioninae (Order Odonata) of the Hagen Collection. Ent. News 22 (10): 342-345, pl. 11, 395, pl. 14, Fig. 8, 9.
- Needham, J. G. 1911c. Notes on some nymphs of Gomphinae (Order Odonata) of the Hagen Collection. Ent. News xxii(11): 392-396. pl. xiv.
- Needham, J. G. 1932. A key to the dragonflies of India. Records of the Indian Museum. Vol. 34: 195-228.
- Nirmala Kumari & N. Balakrishnan Nair. 1981. On the predaceous naid of *Rhodothemis rufa* (Rambur) (Insecta: Odonata). Entomon. 6 (1): 57-60.
- Nirmala Kumari & N. Balakrishnan Nair. 1983. Final instar nymph of *Urothemis signata signata* (Rambur) from South-West coast of India. Entomon. 8 (2): 193-197.
- Pinratana, Bro. A., B. Kiauta & M. Hamalainen. 1988. List of the Odonata of Thailand and Annotated Bibliography. Viratham Press, Bangkok.
- Prasad, M. 1978. Studies on the male accessory genital structures of *Neurothemis fulvia* (Drury), *Neurothemis intermedia intermedia* (Rambur) and *Neurothemis tullia tullia*



- (Drury) from Western Himalaya. (Odonata: Libellulidae: Sympetridae). Bull. zool. Surv. India. 1 (1): 87-90.
- Prasad, M. & Ghosh. 1982. Studies on the estuarine Odonata from the Parganas district of West Bengal, with a note on the reproductive behaviour in *Urothemis signata signata* (Rambur) (Odonata). (Insecta). J. Bombay Nat. Hist. Soc. 79: 290-295.
- Ramachandra Rao & Lahiri. 1982. First record of Odonates (Arthropoda: Insecta) from the silent valley and new Arnarambalam reserved forests. J. Bombay Nat. Hist. Soc. 79: 557-562.
- Ris, F. 1912. Über Odonaten von Java und Krakatau. Tijdschr. Voor. Entomol. LV: 157-183
- Samways, M. J., M. Di Domenico & G. Carchini. 1993. Last instar larvae of *Trithemis wernerii* Ris, 1912 and comparison with other *Trithemis* species (Anisoptera: Libellulidae). Odonatologica 22 (2): 223-228.
- Sahni, D. N. 1965. Studies on the Odonata (Zygoptera) of Nainital. Indian J. entomol. 27: 205-216, Figs. 1-15.
- Sahni, D. N. 1965. Studies on the Odonata (Anisoptera) of Nainital. Indian J. entomol. 27: 217-228, Figs. 1-14.
- Saini, R. S. and Y. P. Singh. 1984. Comparative Studies on the Larval Forms of Odonata. Head and its Appendages. Rec. zool. Surv. India, 81 (3 & 4): 185-201. Fig. 36.
- Saini, R. S. & Y. P. Singh. 1990. Comparative anatomy of the thorax of larval Odonata. Prothorax. Rec. zool. Surv. India. 86 (1): 145-154.
- Sangal, S. K. 1961. Morphology and biology of *Crocothemis servillia servillia* (Drury) (Odonata: Libellulidae). Thesis Univ. Agra.
- Sangal, S. K. & Kumar, A. 1970a. Studies on the taxonomy of larvae of Doon Valley Odonata. J. nat. Hist. 4: Pt. I: 33-38, Figs. 1-116; Pt. II: 305-313, Figs. 1-28.
- St. Quentin, Douglas. 1972. Results of the Austrian-Ceylonese Hydrobiological mission 1970 of the 1st Zoological Institute of the University of Vienna (Austria) and the Department of Zoology of the Vidyalankara University of Ceylon, Kelaniya. Part 6: A new *Drepanosticta* from Ceylon (Order: Odonata: Insecta). Bul. Fish. Res. Stn., Sri Lanka (Ceylon) Vol. 23, Nos. 1 & 2: 137-139, June & Dec. 1972.
- St. Quentin, Douglas. 1973. Results of the Austrian-Ceylonese hydrobiological mission 1970 of the 1st Zoological Institute of the University of Vienna (Austria) and the Department of Zoology of the Vidyalankara University of Ceylon, Kelaniya. Part 12: Contributions to the ecology of the larvae of some Odonata from Ceylon. Bull. Fish. Res. Stn., Sri Lanka (Ceylon) 24 (1/2): 113-124, Figs. 1-13. [This has to be read with Part I: Preliminary Report: Introduction and description of the stations. Costa, H.H. & Starmuhlner, F. Bul. Fish. Res. Stn., Sri Lanka (Ceylon) 23(1/2): 43-76; June/December, 1972.]
- Snogdrass, R.E. 1954. The dragonfly larva. Smithson. misc. Collns. 123: 1-38
- Thompson, D. and Dunbar, R. 1988. Sex for dragons and damsels. New Scientist, 25 Feb. 1988: 45-48, Figs. and cover plate.
- Tillyard, R.J. 1917. The biology of dragonflies (Odonata or Paraneuroptera). Cambridge.
- Wilson, K. D. F. 1995. The Gomphid dragonflies of Hong Kong with descriptions of two new species (Anisoptera: Gomphidae). Odonatologica 24 (3), 1995: 319-340.

## POSTSCRIPT

Having completed this compilation of the available information relevant to the Odonata of Sri Lanka, I think I should look back on what I have done and ask myself whether I have achieved the objectives I had in mind when I started.

I did find out that much of the information was inadequate and did not lead to easy identification of species unless the characteristics of the species were very distinctive. Many of the Sri Lankan species do not fall into this category. Yet, I feel certain that for many of the species distinctive characters do exist and what is needed is a discerning observer who will list them.

I hope such an observer will find this work useful and enable him or her to select and emphasise those qualities of behaviour, form and colour that will make identification of species in the field easy and possible without capturing specimens. At this time however, most specimens will have to be taken to enable a positive identification to be made.

I also hope this work will help those interested in natural history find, identify and describe the many new species that I am certain are present in the odonate fauna of the island. This Guide will have to be worked on and written up as more information becomes available. I hope someone in Sri Lanka will undertake to do this.

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