

OCCASIONAL PAPER NO. 269

**ODONATA (INSECTA)**  
**OF KERALA**

**K.G. EMILIYAMMA**  
**C. RADHAKRISHNAN**  
**MUHAMED JAFER PALOT**



**ZOOLOGICAL SURVEY OF INDIA**

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**Odonata (Insecta) of Kerala**

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**Zoological Survey of India  
Kolkata**

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## **PREFACE**

Dragonflies (Odonata : Insecta) are one among the most fascinating and elegant groups of insects usually found near water bodies. However, many of them can be seen in our gardens, even in urban areas, a few even reaching our homes in the late evenings attracted to the light or following prey insects that get attracted to the light. Economically, odonates are most significant because they are predators of mosquitoes and other insects including agricultural pests and vectors of diseases that cause serious agricultural loss and health problems to the human beings. Besides, the odonate nymphs are biological indicators of aquatic pollution. Clearing up of forested areas, filling up of lowlands, particularly of water bodies in the name of development and polluting the water bodies lead to the elimination of these beautiful insects.

Odonate fauna of Kerala exhibits notable diversity and richness. The state is, currently, known to have an odonate diversity of 137 species (including subspecies) as detailed in the present account.

**AUTHORS**

# Records of the Zoological Survey of India Occasional Paper

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## INTRODUCTION

Odonates (Odonata : Insecta) have inhabited the world for about 245 million years along with Cockroaches and Mayflies. They are believed to be the descendants of the Protodonata that existed 300+ million years back. Among the Protodonates were members of the family Meganeuridae that included giant forms, which had a wingspan of 60 cm. to 1 meter, making them the largest hexapods ever to have existed. Fossil evidences indicate that dragonflies closely related to the modern ones have appeared in the Mesozoic Era.

The Odonates are distributed in all geographical realms, but their greatest numbers and diversity occur in the tropics. About 7000 species of Odonata belonging to 630 genera and 28 families are reported from the world over (Silsby, 2001).

Adult dragonflies are powerful fliers and have been recorded flying distances of several hundred kilometers. Some species of odonates, especially *Pantala flavescens*, are migratory in behaviour and can fly several hundred kilometers over land and sea. In many species, the mature males exhibit territorial behaviour establishing themselves along the stretches of water, which they defend from other males. Odonates exhibit an incomplete metamorphosis. The general life expectancy of species in the tropics may last a full year in the adult stage, and a few months in the larval stage.

The insect order Odonata is subdivided into three suborders viz. Zygoptera, Anisozygoptera and Anisoptera. The Zygoptera and Anisoptera are well-established groups and are represented in Kerala. The Anisozygoptera superficially resembles the Anisoptera, but several characters are intermediate between the Zygoptera and Anisoptera. Anisozygoptera is represented only by one species (*Epiophlebia laidlawi* Tillyard) in India, which is also endangered in nature. Our knowledge on the Indian odonata is mainly based upon the works of Fraser (1933, 1934 and 1936) who provided taxonomic descriptions of all the 536 species and subspecies known till then from "British India including Burma and Ceylon" Incorporating subsequent studies, Prasad and Varshney (1995) published a checklist of Odonata, which comprised of 499 species and subspecies of odonata known from India alone and in that study, only 20 species figured from Kerala. A scrutiny of Fraser's work (*op. cit.*) revealed 84 species recorded from Kerala mostly from the Malabar, Travancore and Wynad areas of the state. A perusal of literature (Fraser, 1931 and 1933-1936; Peters, 1981; Rao and Lahiri, 1982; Mathavan and Miller, 1989; Radhakrishnan, 1997; Emiliyamma and Radhakrishnan, 2000 and 2002; Emiliyamma *et al.*, 2005; Emiliyamma, 2005, Jafer *et al.*, 2002; Jafer and Soniya, 2004, Jafer *et al.*, 2005; Mitra, T.R, 2002, 2003 and 2006) revealed that 500 taxa of odonates occur in India, of which 137 species and subspecies are from Kerala.

In the present document, 137 species and subspecies of Odonata spread over 79 genera, 12 families and 31 subfamilies known till date from Kerala are dealt with. The taxonomic treatment followed here is after Prasad and Varshney (1995). In many of the scientific literature on Odonata published prior to India's independence, the distributional areas of several species found in Kerala are mentioned as *Malabar*, *Cochin* and *Travancore*, the formerly known princely states/provinces falling partly in the present day limits of the Kerala State. The *Malabar* area represents currently the northern districts of Kerala, falling north of the Palghat gap. Similarly, *Cochin* represents the present day districts of Trichur and Ernakulam, and *Travancore*, the districts south of Ernakulam district. Such distribution data being significant and unavoidable have also been incorporated in the present account, along with the corresponding data available in recent literature and those based on our own studies. Of these 137 species of Odonata, 7 species, *Agriocnemis keralensis* Peters, *Protosticta antelopoides* Fraser, *Caconeura risi* (Fraser), *Merogomphus longistigma tamaracherriensis* Fraser, *Davidioides martini* Fraser, *Onychogomphus malabarensis* (Fraser) and *Idionyx rhinoceroideus* Fraser are endemic to Kerala.

## BIOLOGY

Odonates are always found in the vicinity of waterbodies; (Fig. 9) the adults lead an aerial life while their nymphs are aquatic. All species of odonates are predaceous, both in their nymphal and adult stages.

Usually, copulation takes place during flight. The male curls its abdomen downwards to transfer the sperms from the genital pore to the accessory genitalia present on the ventral side of abdominal segments 2 and 3. During this process, the male zygopterans clasps the front of the female prothorax, while the male anisopteran clasps the female head. The pair then flies together in a 'tandem position' (Fig. 1). In the next stage, the female bends its abdomen round and forwards to bring its genitalia in contact with male genitalia, thus forming 'the wheel position' (Fig. 2). The copulation may last from a few seconds to many hours. Oviposition occurs soon after copulation. In most cases, the male remains associated with the female in tandem position while ovipositing. This behaviour ensures that the guarding male fertilizes the eggs laid.

The number of eggs laid by an ovipositing female varies from a few hundreds to several thousands, laid usually in batches in rows, or in a zigzag pattern or scattered at random. Eggs of endophytic species are elongate, and it is the characteristic of the Zygoptera and a few anisopteran families. In this method, the eggs are inserted into slits made by the ovipositor in the stems and leaves of plants or other objects near or under the water. In some cases, the female alone or with male descends below the water surface for egg laying. In exophytic species, the eggs are broad and elliptical, either dropped into the water or attached superficially to aquatic plants or laid in gelatinous strings attached to submerged twigs. This method is characteristic of the Anisoptera.



**Fig. 1 :** Tandem position of Damselflies

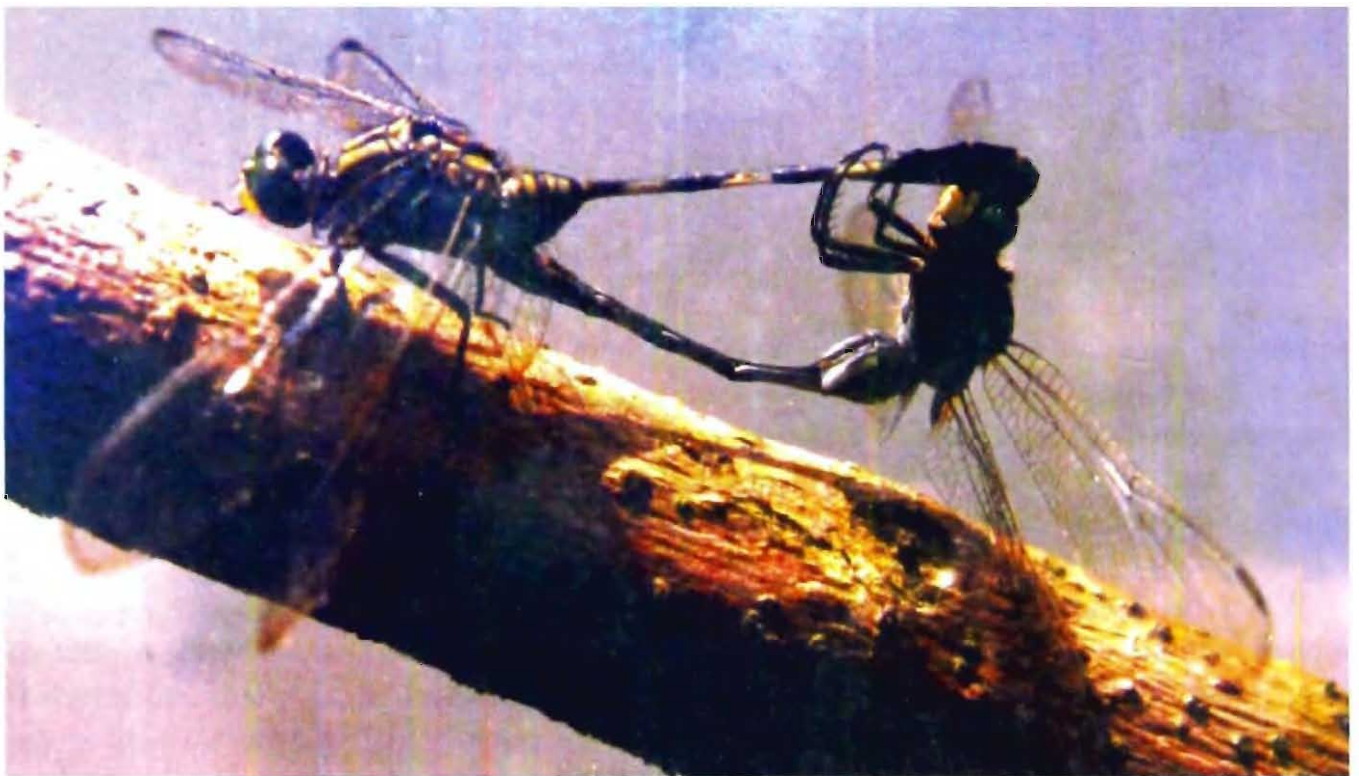


**Fig. 2 :** Wheel position of Dragonflies

The eggs hatch out into nymphs after a variable period, from a few days to several months depending on the species and the atmospheric temperature. For the first few days, the newly hatched nymph or pronymph live on the yolk retained in their bodies. There are several larval instar (the number varying - usually, 9 to 12 or 16 - from species to species according to temperature and food), before the final instar that leads to the emergence of the imago. The body of the nymph is divided into three parts as in the adult. The nymphs of *Zygoptera* (Fig. 8B) are slim and elongate, provided with three terminal caudal gills or lamellae, the two lateral ones called, paraprocts and the median one, the epiproct. The anisopteran larva (Fig. 8A) is much stout and flattened. They are

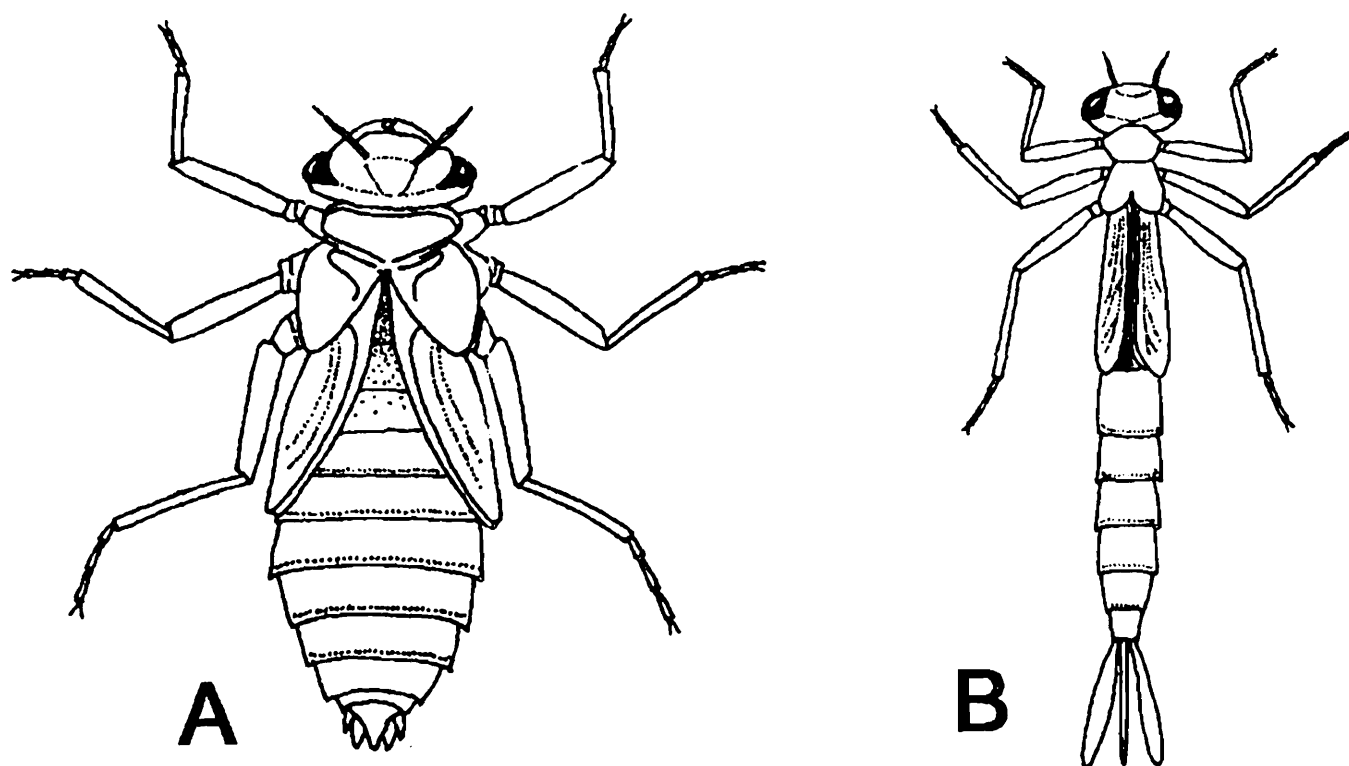


Fig. 8 : A. Nymph of a Dragonfly, B. Nymph of a Damselfly

bottom living, concealed under mud and have their bodies covered with hairs. They can change their colour according to the surroundings in which they live. Their food includes Protozoa, small crustaceans like *Daphnia*, *Cyclops* etc. As they grow, their food also changes and they consume larger preys like tadpoles, small fishes besides larvae of aquatic insects and even nymphs of their own species.

When the time for emergence of the imago arrives, the nymph stops eating, and appears swollen. The nymph leaves the water, climb up some suitable object or stem of water plant or even crawl up the banks and climb on stems of plants there and attach it supported by legs. After a while, the larval skin splits along the mid-dorsal line of the thorax, the fracture extending forwards to the head. The head, thorax, legs and wings are drawn out first, the abdomen remaining still within the larval skin. After a short while, the insect bends up and grasps the supporting object with the help of its legs and

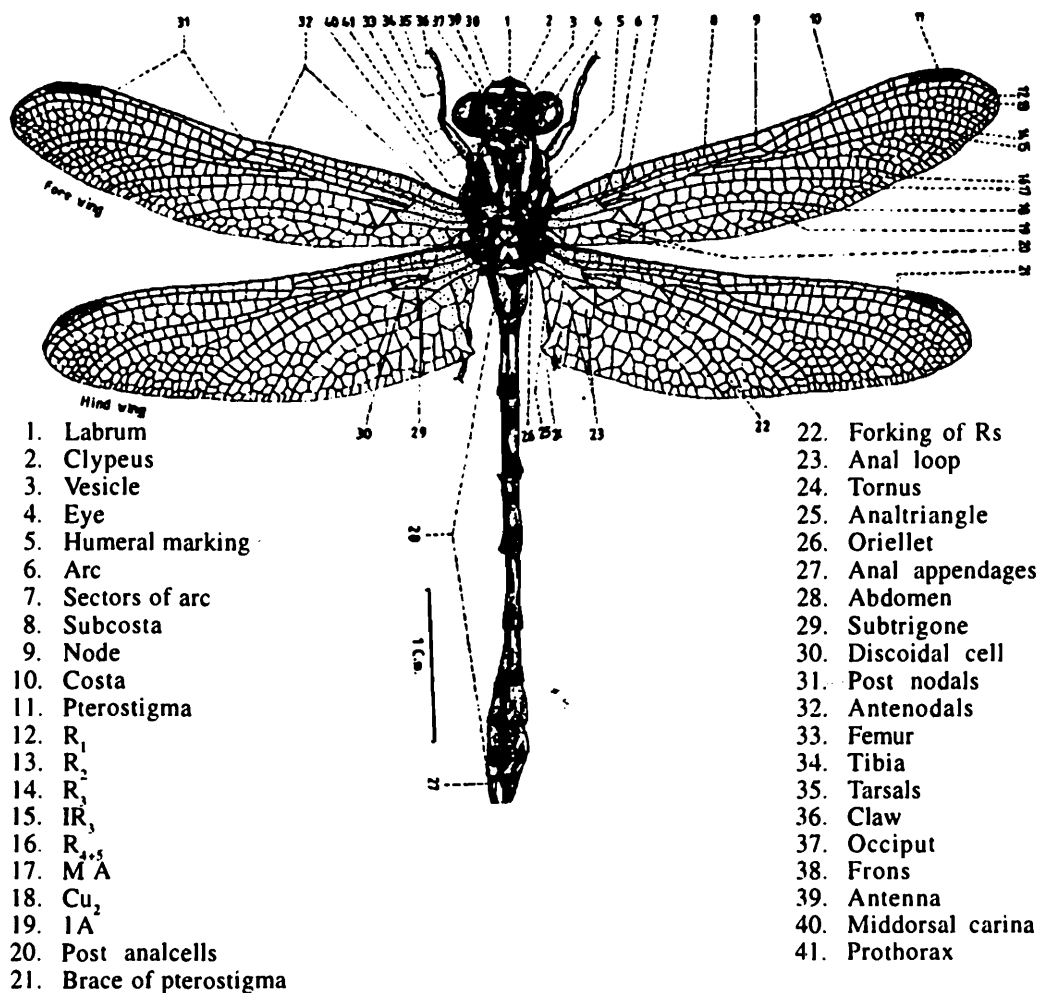


**Fig. 3 :** External Morphology of a Dragonfly (after Mitra, 2002)

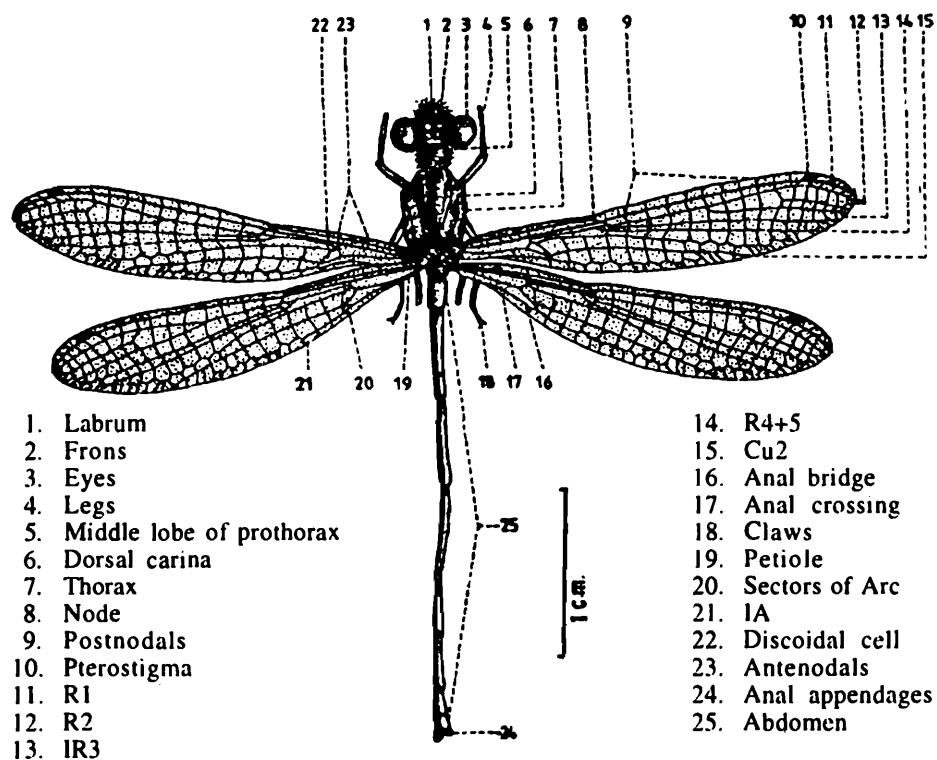


**Fig. 4 :** External Morphology of a Damselfly

draw out the remaining part of the body from the larval skin. The wings expand quickly, and once they are dry, the imago flies away.

## STRUCTURE OF AN ADULT ODONATE (IMAGO)

Like all insects, the body of an Odonate is divided into three parts, namely, the head, the thorax and the abdomen (Fig. 3 & 4). The external structure of an Odonate is a mixture of primitive yet, highly specialized characteristics.

**The Head :** The head is large, and can be rotated sideways, downwards, forwards and backwards. A pair of very large compound eyes covers almost the entire portion of the head. In Zygoptera, the eyes are widely separated, whereas in the Anisoptera except in members of the families Gomphidae and Cordulegasteridae they meet in the middle line. The ocelli or simple eyes are present on the vertex, the space between the eyes. The ocelli are used for very near vision. The antennae are very short, composed of 3 to 7 segments. The other parts of the head viz., labrum, labium, clypeus, frons or forehead occupy a very small area. The mouthparts are of biting type, adapted for predatory life. The mandibles are stout with very powerful teeth and the maxillae carry a lobe like unsegmented palp, while the labium modified as lateral lobes and hooks forms the labial palps.

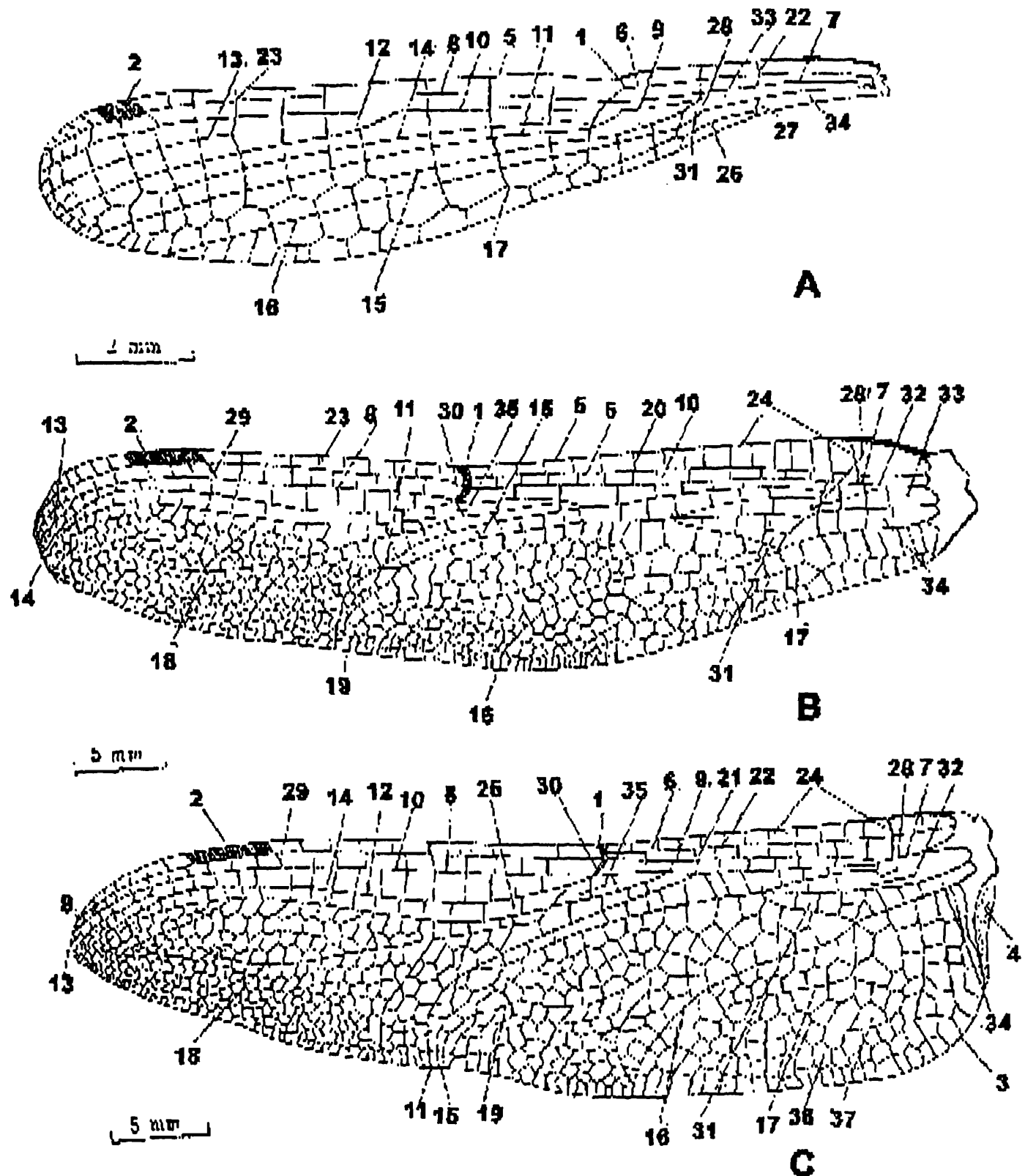
**The Thorax :** The middle part of the body, the thorax, consists of three segments. The first segment or prothorax is made up of anterior, middle and posterior lobes. The posterior lobe is involved in mating, and the shape will be different in various genera and species. The prothorax serving the function of a neck helps in rotating the head. The remaining two segments, the meso and meta thorax are fused together forming the synthorax or the pterothorax. The legs are attached anteriorly beneath the thorax to facilitate holding the prey close to the mouth. The wings are attached posteriorly. Markings on the thorax help in identifying the species.

**The Wings :** (Fig. 5 A-C) The damselflies have almost identical forewings and hind wings, which they hold together, vertically over the body when at rest, except in some members of the subfamily Lestinae, that hold their wings partially open. The dragonflies have forewings dissimilar to the hind wings, which are broad at basal part, and they spread their wings at right angles to their bodies when they rest. The wings can be hyaline (transparent) or coloured, either partly or entirely. The venation is highly specialized. The important parts of the wings are follows,

**Costa :** The anterior border of wing from base to apex.

**The Node :** An artificial joint on the costa, situated variably, either in the middle or proximally to the middle of the costa.

**Pterostigma :** A thickened, chitinised, and variably shaped cell situated on the costal margin near the apices of the wings. It may be absent in one or both wings, or in one of the sexes, or may differ in shape in fore wings and hind wings in the male.



1. nodus; 2. pterostigma; 3. tornus; 4. membrane; 5. costa; 6. subcosta; 7. R+M; 8. R1; 9. Rs; 10. R2; 11. R4+5; 12. R3; 13. IR2; 14. IR3; 15. MA; 16. Cu2; 17. IA; 18. Rspl; 19. Mspl; 20. costal cross vein; 21. subcostal cross vein; 22. antenodals; 23. postnodals; 24. primary antenodals; 25. O; 26. Anal bridge; 27. Anal cross vein; 28. Arc; 29. Br; 30. Sn; 31. Sn; 32. discoidal cell; 33. Ht; 34. median space; 35. cubital space; 36. Bg; 37. anal area; 38. anal loop.

**Fig. 5 :** A. Typical wing of a Damselfly, B & C. Left fore and hind wing of a Dragonfly

**Nervures** : The ribs, on which the membrane is built. It comprises of the costa, subcosta, radius, median, cubital and anal nervures.

**Discoidal cell** : A triangular or quadrilateral cell, from which other nervures originate, found near the base of each wing. This cell is triangular in shape and made up of two cells in Anisoptera, the triangle and hypertriangle, but in Zygoptera, it is a single quadrilateral cell, sometimes divided into two to five cells or reticulated as in the genus *Ictinogomphus*.

**Subnode** : The oblique nervure descending from the node.

**Antenodal and Postnodal nervures** : Nervures lying between the costa and the subcosta, before and after the node.

**Median space/Basal space** : An elongated space or cell at the base of the wings, which may be traversed by nervures or free of nervures.

**Arc** : A short, oblique, transverse nervure near the base of wings, which forms the outer boundary of the median space.

**Cubital space** : Found beneath and parallel to the median space, extending out as far as the base of the discoidal cell. It is traversed by one or many nervures called cubital nervures.

**Anal bridge** : A short nervure, running parallel to the hind border of the wing and passing below the discoidal cell, either complete or incomplete and even absent in certain genera of Zygoptera.

**Anal crossing** : A short nervure situated at the base of the wing extending from the Cubital and first Anal Veins to the anal bridge or up to the hind border of the wing.

**The Legs** : The leg is made up of five segments; starting from the base, they are the coxa, trochanter, femur, tibia and tarsus. The coxa is short and conical in shape; the trochanter is divided into two parts; the femur is long with two rows of spines, the number of spines varying between species and sex; the tibia is slender with bristles on the sides and is the longest segment and the tarsus is made up of three parts, the distal part being the longest and ending in two claws. The characters on the distal part of the tarsus are useful in the identification at genus level.

**The Abdomen** : Usually long and cylindrical or dorsoventrally flattened as in many anisopterans. It consists of ten segments. In male, the ventral side of segments 2 and 3 are modified to form secondary (accessory) genitalia, and in some anisopterans in addition to this, a ventrolateral process called auricle or oreillets are also present. In both sexes, paired, unsegmented superior anal appendages lie behind the tenth segment, which are the modified form of the cerci. Paired inferior anal appendages are present in male zygopterans (Fig. 6) where as only a single, median, inferior appendage is seen in

male anisopterans (Fig. 7) In male, the gonopore opens ventrally on segment 9; sperm is transferred from here to a storage vesicle on the secondary genitalia present on segment 3 by bending the abdomen. Penis extends from segment 2. On either side of the penis,

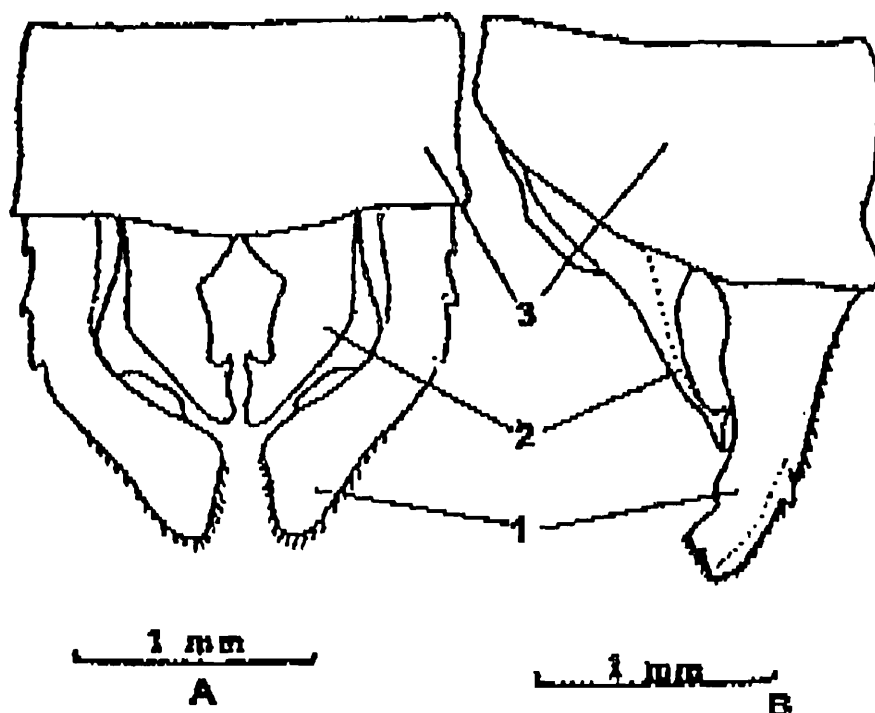


Fig. 6 : Male anal appendages of a Damselfly

A. Dorsal view, B. Lateral view

1. Superior anal appendage, 2. Inferior anal appendage, 3. Tenth abdominal segment

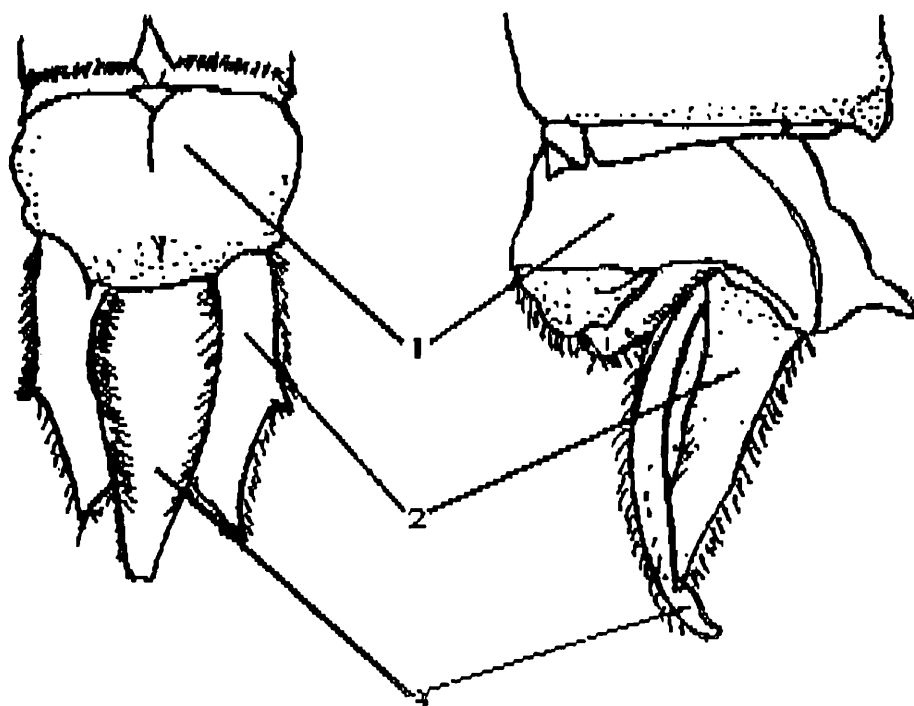


Fig. 7 : Male anal appendages of a Dragonfly

A. Dorsal view B. Lateral View

1) Tenth Abdominal segemnt, 2) Superior anal appendage, 3) Inferior anal appendage, 4) Paraproct



A Freshwater Habitat



A Backwater Swamp

**Fig. 9 : Breeding Environs of Odonates**

is a pair of hamules, used for holding and guiding the female genitalia during copulation. In female Zygoptera and in some female Anisoptera, a well-developed ovipositor and a terebra are present. The terebra is used for cutting, piercing and sawing the tissues of submerged aquatic plants enabling them to insert their eggs into the plant tissues, a process known as, endophytic oviposition. Most female anisopterans have a small, reduced ovipositor known as vulvar scale, but in some species, the sterna 9 and 10 are excavated to form a cavity for the temporary storage of egg masses extruded from the gonopore. Quite contrary to the egg laying habits seen in Zygoptera, the Anisoptera do not insert their eggs into the plant tissues.

## SYSTEMATIC LIST OF ODONATA KNOWN FROM KERALA

### Order ODONATA

#### Suborder ZYGOPTERA

#### Superfamily COENAGRIONOIDEA

#### Family COENAGRIONIDAE

#### Subfamily PSEUDAGRIONINAE

1. *Archibasis oscillans* (Selys)
2. *Ceriagrion cerinorubellum* (Brauer)
3. *Ceriagrion coromandelianum* (Fabricius)
4. *Ceriagrion olivaceum* Laidlaw
5. *Ceriagrion rubiae* Laidlaw
6. *Pseudagrion decorum* (Rambur)
7. *Pseudagrion indicum* Fraser
8. *Pseudagrion malabaricum* Fraser
9. *Pseudagrion microcephalum* (Rambur)
10. *Pseudagrion rubriceps rubriceps* Selys

#### Subfamily COENAGRIONINAE

11. *Cercion calamorum dyeri* (Fraser)

#### Subfamily ISCHNURINAE

12. *Aciagrion hisopa hisopa* (Selys)
13. *Aciagrion occidentale* Laidlaw
14. *Ischnura aurora aurora* (Brauer)
15. *Ischnura senegalensis* (Rambur)

## Subfamily AGRIOCNEMIDINAE

- 16. *Agriocnemis keralensis* Peters
- 17. *Agriocnemis pieris* Laidlaw
- 18. *Agriocnemis pygmaea* (Rambur)
- 19. *Agriocnemis splendidissima* Laidlaw
- 20. *Mortonagrion varralli* Fraser

## Subfamily ARGIINAE

- 21. *Onychargia atrocyana* Selys

## Family PLATYCNEMIDIDAE

## Subfamily PLATYCNEMIDINAE

- 22. *Copera marginipes* (Rambur)
- 23. *Copera vittata deccanensis* Laidlaw

## Family PLATYSTICTIDAE

## Subfamily PLATYSTICTINAE

- 24. *Platysticta maculata deccanensis* Laidlaw
- 25. *Protosticta antelopoides* Fraser
- 26. *Protosticta davenporti* Fraser
- 27. *Protosticta gravelyi* Laidlaw
- 28. *Protosticta hearseyi* Fraser
- 29. *Protosticta mortoni* Fraser
- 30. *Protosticta sanguinostigma* Fraser

## Family PROTONEURIDAE

## Subfamily CACONEURINAE

- 31. *Caconeura ramburi* (Fraser)
- 32. *Caconeura risi* (Fraser)
- 33. *Esme cyaneovittata* Fraser
- 34. *Esme mudiensis* Fraser
- 35. *Melanoneura bilineata* Fraser
- 36. *Phylloneura westermanni* (Selys)

Subfamily DISPARONEURINAE

- 37. *Elattoneura souteri* (Fraser)
- 38. *Elattoneura tetrica* (Laidlaw)
- 39. *Prodasineura verticalis annandalei* (Fraser)

Superfamily LESTOIDEA

Family LESTIDAE

Subfamily LESTINAE

- 40. *Lestes elatus* Hagen
- 41. *Lestes malabarica* Fraser
- 42. *Lestes praemorsus praemorsus* (Selys)

Subfamily SYMPECMATINAE

- 43. *Indolestes davenporti* (Fraser)

Superfamily CALOPTERYGOIDEA

Family CALOPTERYGIDAE

Subfamily CALOPTERYGINAE

- 44. *Neurobasis chinensis chinensis* (Linnaeus)
- 45. *Vestalis apicalis apicalis* Selys
- 46. *Vestalis gracilis gracilis* (Rambur)
- 47. *Vestalis gracilis montana* Fraser

Family CHLOROCYPHIDAE

- 48. *Rhinocypha (Heliocypha) bisignata* (Selys)
- 49. *Calocypha laidlawi* (Fraser)
- 50. *Libellago lineata indica* (Fraser)

Family EUPHAEIDAE

- 51. *Dysphaea ethela* Fraser
- 52. *Euphaea cardinalis* (Fraser)
- 53. *Euphaea dispar* (Rambur)
- 54. *Euphaea fraseri* (Laidlaw)

## Suborder ANISOPTERA

## Superfamily AESHNOIDEA

## Family GOMPHIDAE

## Subfamily GOMPHINAE

- 55. *Burmagomphus pyramidalis pyramidalis* Laidlaw
- 56. *Heliogomphus promelas* (Selys)
- 57. *Macrogomphus wynaadicus* Fraser
- 58. *Merogomphus longistigma longistigma* (Fraser)
- 59. *Merogomphus longistigma tamaracherriensis* Fraser
- 60. *Microgomphus souteri* Fraser

## Subfamily ONYCHOGOMPHINAE

- 61. *Acrogomphus fraseri* Laidlaw
- 62. *Davidioides martini* Fraser
- 63. *Megalogomphus hannyngtoni* (Fraser)
- 64. *Megalogomphus superbus* Fraser
- 65. *Onychogomphus acinaces* (Laidlaw)
- 66. *Onychogomphus malabarensis* (Fraser)
- 67. *Onychogomphus nilgiriensis nilgiriensis* (Fraser)
- 68. *Paragomphus lineatus* (Selys)

## Subfamily GOMPHOIDINAE

- 69. *Gomphidia kodaguensis* Fraser

## Subfamily LINDENIINAE

- 70. *Ictinogomphus rapax* (Rambur)

## Family AESHNIDAE

## Subfamily AESHNINAE

- 71. *Anaciaeschna jaspidea* (Burmeister)
- 72. *Anax guttatus* (Burmeister)
- 73. *Anax immaculifrons* Rambur
- 74. *Gynacantha dravida* Lieftinck
- 75. *Hemianax ephippiger* (Burmeister)

Superfamily CORDULEGASTEROIDEA

Family CORDULEGASTERIDAE

Subfamily CHLOROGOMPHINAE

- 76. *Chlorogomphus campioni* (Fraser)
- 77. *Chlorogomphus xanthoptera* (Fraser)

Superfamily LIBELLULOIDEA

Family CORDULIIDAE

Subfamily CORDULIINAE

- 78. *Hemicordulia asiatica* Selys

Subfamily IDIONYCHINAE

- 79. *Idionyx burliyaensis* Fraser
- 80. *Idionyx minima* Fraser
- 81. *Idionyx saffronata* Fraser
- 82. *Idionyx travancorensis* Fraser
- 83. *Idionyx rhinoceroides* Fraser
- 84. *Macromidia donaldi* (Fraser)

Subfamily MACROMIINAE

- 85. *Epophthalmia frontalis binocellata* (Fraser)
- 86. *Epophthalmia vittata* Burmeister
- 87. *Macromia annaimallaiensis* Fraser
- 88. *Macromia flavocolorata* Fraser
- 89. *Macromia indica* Fraser
- 90. *Macromia irata* Fraser

Family LIBELLULIDAE

Subfamily TETRATHEMISTINAE

- 91. *Tetrathemis platyptera* Selys
- 92. *Hylaeothemis fruhstorferi apicalis* Fraser

## Subfamily BRACHYDIPLACTINAE

- 93. *Brachydiplax chalybea chalybea* Brauer
- 94. *Brachydiplax sobrina* (Rambur)

## Subfamily LIBELLULINAE

- 95. *Cratilla lineata calverti* Foerster
- 96. *Epithemis mariae* (Laidlaw)
- 97. *Lathrecista asiatica asiatica* (Fabricius)
- 98. *Orthetrum chrysis* (Selys)
- 99. *Orthetrum glaucum* (Brauer)
- 100. *Orthetrum luzonicum* (Brauer)
- 101. *Orthetrum pruinosum neglectum* (Rambur)
- 102. *Orthetrum sabina sabina* (Drury)
- 103. *Orthetrum taeniolatum* (Schneider)
- 104. *Orthetrum triangulare triangulare* (Selys)
- 105. *Potamarcha congener* (Rambur)

## Subfamily SYMPETRINAE

- 106. *Acisoma panorpoides panorpoides* Rambur
- 107. *Brachythemis contaminata* (Fabricius)
- 108. *Bradinopyga geminata* (Rambur)
- 109. *Crocothemis servilia servilia* (Drury)
- 110. *Diplacodes trivialis* (Rambur)
- 111. *Diplacodes nebulosa* (Fabricius)
- 112. *Indothemis carnatica* (Fabricius)
- 113. *Neurothemis fulvia* (Drury)
- 114. *Neurothemis intermedia intermedia* (Rambur)
- 115. *Neurothemis intermedia atlanta* Ris
- 116. *Neurothemis tullia tullia* (Drury)
- 117. *Rhodothemis rufa* (Rambur)
- 118. *Sympetrum fonscolombeii* (Selys)

Subfamily TRITHEMISTINAE

- 119. *Trithemis aurora* (Burmeister)
- 120. *Trithemis festiva* (Rambur)
- 121. *Trithemis kirbyi* Selys
- 122. *Trithemis pallidinervis* (Kirby)

Subfamily ONYCHOTHEMISTINAE

- 123. *Onychothemis testacea ceylanica* Ris

Subfamily PALPOPLEURINAE

- 124. *Palpopleura sexmaculata* (Fabricius)

Subfamily TRAMEINAE

- 125. *Rhyothemis variegata variegata* (Linnaeus)
- 126. *Rhyothemis triangularis* Kirby
- 127. *Hydrobasileus croceus* (Brauer)
- 128. *Pantala flavescens* (Fabricius)
- 129. *Tramea basilaris burmeisteri* Kirby
- 130. *Tramea limbata similata* (Rambur)
- 131. *Tholymis tillarga* (Fabricius)
- 132. *Zyxomma petiolatum* Rambur

Subfamily UROTHEMISTINAE

- 133. *Aethriamanta brevipennis* (Rambur)
- 134. *Macrodiplax cora* (Brauer)
- 135. *Urothemis signata signata* (Rambur)

Subfamily ZYGONYCHINAE

- 136. *Zygonyx malabaricus* Fraser
- 137. *Zygonyx metallicus* Fraser

## SYSTEMATIC ACCOUNT

### Suborder ZYGOPTERA

Usually, these insects have slender body, and weak, fluttery flight. Head transversely elongate; eyes are separated by more than the width of an eye; vesicle absent; ocelli lying free in the middle of vertex; the mid lobe of labium deeply fissured; the two pairs of wings are of similar shape; the discoidal cell is not divided, which may be square in shape or acutely pointed outwards; pterostigma usually present, occasionally absent in one or all wings, variably shaped; antenodal nervures are numerous or reduced into two; wings usually held closed together over the abdomen or alongside the abdomen when at rest; male have a pair of superior and inferior anal appendages; females have well developed ovipositors; larvae are long and narrow and breathe through caudal gills, two or three in number, which are spine like, vesiculated or paddle shaped, situated at the tip of the abdomen. Breeding in still or running water.

### Key to the suborders of ODONATA

- 1 The forewings and hindwings are of the same shape and breadth, petiolate; eyes are well separated; slender body, male with two superior and two inferior anal appendages ..... ZYGOPTERA
- The forewings and hindwings are of variable shape and hindwing usually broad at base, not petiolate; eyes are usually confluent across the middle line or separated (as in Gomphidae); stout body, male with two superior and one inferior anal appendage ..... ANISOPTERA

### Key to the superfamilies of ZYGOPTERA

- 1 Wings with two antenodal nervures, petiolate; postnodal nervures are in line with the cross veins below ..... 2
- Wings with more than two antenodal nervures; slightly petiolated; postnodals are not in line with the cross veins below..... CALOPTERYGOIDEA
2. No intercalated sectors at apical end of wing, they rest horizontally with their wings pressed together just above the abdomen ..... COENAGRIONOIDEA
- A variable number of intercalated sectors at apical end of wing, they rest with their abdomen hanging down and wings held away from the body at varying angles ..... LESTOIDEA

### Superfamily COENAGRIONOIDEA

This Superfamily is the largest one in Zygoptera, with very high species diversity and diverse in colour, size and shape. The members include both the smallest and largest

damselflies. Their petiolate wings are uncoloured; there are two antenodal nervures and the arc is approximately in line with the second; postnodals are usually aligned with the crossveins below them; the anal vein is fused with the wing border at the base of the wing. The Superfamily is divided into 4 families and 9 subfamilies as far as concerned with the Odonata of Kerala.

### Key to the families of Superfamily COENAGRIONOIDEA

1. Anal vein (IA) always present; Anal bridge (*ab*) always present and complete ..... 2
  - Anal vein (IA) absent or rudimentary; Anal bridge (*ab*) vestigial or incomplete and reduced or absent ..... 3
2. Discoidal cell elongate, the costal or anterior side slightly shorter than the basal, the distal end subacute ..... PLATYCNEMIDIDAE
  - Discoidal cell short, the anterior side much shorter than the basal, the distal end very acute ..... COENAGRIONIDAE
3. Petiolation of wings beginning proximal to *ac*; an accessory basal post costal nervure absent ..... PROTONEURIDAE
  - Petiolation of wings beginning well distal to *ac*; an accessory basal postcostal nervure present and well proximal to *ac* ..... PLATYSTICTIDAE

### Family COENAGRIONIDAE

This is a large family, with worldwide distribution. Damselflies of small or medium sized, with characters of suborder, Zygoptera. They have short legs and the wings; discoidal cell entire, elongate, squared or acutely pointed. Abdomen long, narrow and sometimes pointed.

### Key to the genera of Family COENAGRIONIDAE

1. Arc situated at the level of the distal antenodal nervure ..... 2
  - Arc situated away from the distal antenodal nervure ..... 8
2. *ab* arising at the level of *ac* ..... 3
  - *ab* arising well proximal to *ac* ..... 6
3. A prominent ridge on the frons; postocular spots absent ..... *Ceriagrion* Selys
  - No ridge on the frons; postocular spot present ..... 4
4. Pterostigma in forewing larger than that in the hindwing; female with an apical ventral spine on segment 8 ..... *Aciagrion* Selys

- Pterostigma in forewing and hindwing equal in size; female without apical ventral spine on segment 8 ..... 5
- 5. Pterostigma diamond shaped, oblique at both ends; posterior lobe of prothorax simple in male, but in female with two small spines; claws of legs with spines ..... *Pseudagrion* Selys
- Pterostigma square shaped, proximal side oblique, distal side convex; posterior lobe of prothorax arched or crenate in male, in female with two small spines; claws without spines ..... *Archibasis* Kirby
- 6. Pterostigma different in shape and size in fore and hindwings of male; segment 10 of male with a pair of closely apposed dorsal apical tubercles ..... *Ischnura* Charpentier
- Pterostigma of the same shape and size in fore and hindwings of male; segment 10 of male usually without dorsal apical tubercles ..... 7
- 7. Postocular spots usually present, occasionally absent; posterior lobe of prothorax simple; segment 10 of abdomen without tubercle; wings with 8 to 11 postnodal nervures in forewings ..... *Cercion* Navas
- Postocular spots absent; the middle portion of posterior lobe of prothorax prolonged in the female; segment 10 deeply emarginated and with two tubercles at the apical border; wings with 11 to 18 postnodal nervures in forewings ..... *Onychargia* Selys
- 8. The junction of *ab* and *IA* (medio anal link) markedly angulated; only 6 to 8 postnodal nervures in forewings ..... *Agriocnemis* Selys
- The junction of *ab* and *IA* (medio anal link) not angulated; 8 to 10 postnodal nervures in forewings ..... *Mortonagrion* Fraser

### Subfamily PSEUDAGRIONINAE

This is the largest subfamily, containing 10 species and the members are found everywhere; arc situated at the level of the distal antenodal nervure; anal bridge (*ab*) arising from the hind border of the wing, where anal crossing (*ac*) meets with *ab*; other characters are similar with family characters.

#### *Archibasis* Kirby

Damselflies of small size and slender build; coloured blue marked with black; head very small, with or without postocular spots; eyes globate; posterior lobe of prothorax crenate or arched in male, while in the female furnished with two small spines; legs short, robust; claw hooks without spines; wings pale brownish in adults; pterostigma similar in both the wings, subquadrate; discoidal cell acutely pointed at the distal end. Superior anal appendages as long as segment 10, rounded or slightly notched at apex,

hollowed out on the inner side; inferior appendages half the length of superiors, small cone or club shaped organs.

### 1. *Archibasis oscillans* (Selys)

1924. *Pseudagrion praeclarum* Fraser, *Rec. Indian Mus.*, **36** : 428.

1936. *Archibasis mimetes praeclara* Fraser, *Fauna Brit. India Odon.*, **3** : 310-312.

1991. *Archibasis oscillans* Selys, *A distributional list of World Odonata*, 1991, : 32

**Diagnosis : Male :** Eyes blue above, pale greenish blue to yellow below; labium white; labrum, bases of mandibles, genae, anteclypeus, frons and vertex including middle ocellus and basal joints of antennae greenish blue; postclypeus black, with two blue basal spots; a broad black band crossing the head from eye to eye on top of vertex, behind this two large triangular blue postocular spots, connected by a blue stripe; beneath head black, broadly white against the eyes; prothorax black, the anterior lobe, the sides and two spots on middle lobe blue; thorax black on upper surface, marked with two broad azure blue antehumeral stripes; laterally blue, with a small round black spot on mesepimeron and another spot on upper part of postero lateral suture; beneath white, thinly pruinose; legs creamy white with black stripes and spines; wings hyaline or transparent, pterostigma subquadrate, blackish brown, framed in yellow; abdomen black on dorsum, blue or greenish yellow on the sides; segment 1 with a black spot; segment 2 with a black goblet shaped dorsal marking; 3 to 7 with broad black dorsal stripes; segment 8 and 9 with an apical ring of black spines only; segment 10 entirely blue. **Female :** More robust than male, eyes olivaceous green, paler below; labium greenish yellow with a black medio basal mark; genae, bases of mandibles and anteclypeus bluish green; postclypeus, frons, vertex and occiput black with greenish blue postocular spots; prothorax marked similarly to the male, posterior lobe with two short forwardly directed spines; thorax with the humeral black and margined diffusely with golden ochreous; wings evenly enfumed in adults; pterostigma violaceous brown; abdominal segment 2 with a narrow thistle shaped mark on dorsum; 3 to 7 as in male; segments 8 to 10 azure blue, 8 with a large heart shaped dorsal spot and 9 with two large triangular black spots, 10 entirely blue.

**Size :** Male : Abdomen 36 to 39 mm, Hind wing 24 to 27 mm. Female : Abdomen 38 mm, Hind wing 27 mm.

**Habits and Habitat :** Found in the dense forests.

**Breeding :** Breeds in small, fast flowing streams near sea level.

**Status :** Rare.

**Distribution :** South India: Kerala : Tamaracherry (Calicut) and Wayanad.

### *Ceriagrion* Selys

Dragonflies of small size and slender build coloured some shade of yellow, orange or olivaceous or more rarely blue and rarely marked with black. Head narrow, with a well defined frontal ridge; postocular coloured spots always absent; prothorax and thorax simple; wings hyaline; pterostigma diamond shaped, narrow, oblique at both ends; postnodal nervures 10 to 12 in forewings; discoidal cell acutely pointed at the distal ends; abdomen slender and cylindrical. Anal appendages variable in the species but generally the superiors short and hooked, the inferiors longer, conical and tapering to a point.

#### Key to the species of *Ceriagrion* Selys

- 1 Abdomen red or olivaceous, with or without black markings ..... 2
  - Abdomen bright citron yellow, without markings ..... *coromandelianum* (Fabricius)
2. Abdomen bright red at base and anal ends, black on dorsum in between .....
  - ..... *cerinorubellum* (Brauer)
  - Abdomen reddish orange or dull olivaceous ..... 3
3. Abdomen bright reddish orange, without markings in male; olivaceous in female .....
  - ..... *rubiae* Laidlaw
  - Abdomen uniform dull olivaceous in both sexes ..... *olivaceum* Laidlaw

#### 2. *Ceriagrion cerinorubellum* (Brauer) [Plate-I, Fig. 5]

1865. *Pyrrhosoma cerinorubellum* Brauer, *Verh. zool. bot. Ges. Wien.* **15** : 511.

1876. *Ceriagrion cerinorubellum* Selys, *Bull. Acad. Belg.*, (2) **42** : 526; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 326–328.

**Material examined** : 3 females, 3-iv-1998, Paighat (Thiruvananthapuram Dt.), Coll: P. T. Cherian; 2 males, 1 female, 18-iii-2001, Vithura-Chathankodu (Thiruvananthapuram Dt.); 1 male, 2 females, 7-xi-2002, Theckumbadu island (Kannur Dt.), Coll. K. C. Gopi; 3 male, 2 females, 22-ii-2001, Chathancode, (Kozhikode Dt.); 2 males, 1 female, 24-x-2002, Vadikkadavu (Malappuram Dt.); 2 males, 1 female, 27-x-2004, Kadalundi (Kozhikode Dt.); 4 males, 1female, 9-v-2001, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot; 1male, 3females, 29-x-2000, Kumarakom (Kottayam Dt.); 6 males, 2 females, 31-x-2000, Velloor (Kottayam Dt.); 4 males, 5-ix-2001, Kolavipalam (Kozhikode Dt.), Coll. P. M. Sureshan; 1 male, 22-ii-2000, Thanneermukkom (Alappuzha Dt.), Coll. C. Radhakrishnan.

**Diagnosis : Male** : Eyes dark olivaceous above, pale below; labrum dark olivaceous; anteclypeus and postclypeus dark greenish olivaceous; base of mandibles, genae and front of frons pale greenish yellow; frons above and vertex dark reddish brown; occiput

bright ochreous; prothorax and thorax green, changing to blue on the sides, yellow beneath; wings hyaline, pterostigma amber tinted, paler around the edges and framed in reddish brown nervures; abdominal segment 1 2 and basal half of 3 bright brick red; the apical half of segment 3 and segments 4 to 6 on the dorsum or upper surface black; segments 7 to 10 again bright brick red, the sides of segments 3 to 7 blue; anal appendages reddish brown, or the inferiors ochreous, tipped with black. **Female** : similar to the male in colour; labrum entirely ochreous; the dorsum of thorax often suffused with ochreous or golden brown, pruinose white beneath the thorax in adults; abdomen similar to the male, but the end segments usually a dull brownish red.

**Size** : Male : Abdomen 31 to 33 mm, Hind wing 20 to 21 mm. Female : Abdomen 31 to 35 mm, Hind wing 20 to 21 mm.

**Habits and Habitat** : Found in colonies, around ponds, tanks and slow running streams.

**Breeding** : Breeds in ponds, lakes and streams.

**Status** : Common.

**Distribution** : Throughout India : Kerala : Ernakulam, Kannur, Kottayam, Kozhikode, Malappuram and Thiruvananthapuram.

### 3. *Ceriagrion coromandelianum* (Fabricius) [Plate-I, Fig. 6]

1798. *Agrion coromandelianum* Fabricius, *Ent. Syst. Suppl.*, : 287.

1876. *Ceriagrion coromandelianum* Selys, *Bull. Acad. Belg.*, (2) **42** : 528; Fraser, 1933, *Fauna Brit. India* *odon.*, **1** : 315 – 316.

**Material examined** : 1 male, 14-iii-2001, Thenmalaiurukunnu (Thiruvananthapuram Dt.), Coll. P. T. Cherian; 1 male, 1 female, 14-iii-2001 Attingal (Thiruvananthapuram Dt.); 2 males, 18-iii-2001, Vithura-Chathankodu (Thiruvananthapuram Dt.); 4 males, 1 female, 17-iii-2001, Parassala (Thiruvananthapuram Dt.); 2 males, 1 female, 17-iii-2001, Neyyattinkara (Thiruvananthapuram Dt.); 1 male, 23-iii-1994, Bendadukka (Kasaragod Dt.), Coll. K. C. Gopi; 4 males, 2 females, 25-x-2000, Kanjirampara (Kottayam Dt.); 1 male, 20-ii-2002, Cheruvannur (Kozhikode Dt.); 2 males, 18-iii-1999, Walayar (Palakkad Dt.); 1 female, 21-iii-1999, Parli (Palakkad Dt.), Coll. P. M. Sureshan; 1 male, 1-ix-2001, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot; 1 male, 24-x-2002, Vadikkadavu (Malappuram Dt.); 1 male, 1 female, 23-ix-2004, Thusharagiri (Kozhikode Dt.); 5 males, 1 female, 27-x-2004, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma; 1 male, 24-xii-1994, Kurichiat R.F. (Wayanad Dt.), Coll. C. Radhakrishnan.

**Diagnosis** : **Male** : Eyes olivaceous above, pale greenish-yellow below; labrum, clypeus, genae, bases of mandibles and frons bright citron yellow; vertex olivaceous; prothorax and thorax uniformly olive-green, tinted with ochreous on dorsum, citron-

yellow on sides, thinly pruinose white beneath; wings hyaline, pterostigma golden yellow, framed in brown nervures; abdomen bright citron yellow, without markings; segment 10 deeply emarginate on dorsum. Anal appendages citron yellow or ochreous, the inferiors tipped with black. **Female** : more robust and dull coloured than male; vertex olivaceous brown, rest of head as in male; prothorax and thorax golden olivaceous brown, paler at the sides and beneath, usually thinly pruinose; wings similar to the male, but the pterostigma paler; abdomen uniformly olivaceous, with golden brown tint on dorsum, which deepens on the hinder segments.

**Size** : Male : Abdomen 28 to 30 mm, Hind wing 18 to 20 mm. Female : Abdomen 29 to 32 mm, Hind wing 20 mm.

**Habits and Habitat** : Commonly found near ponds, tanks and streams; also found in scrub jungles far away from the water bodies.

**Breeding** : Breeds in ponds and tanks filled with weeds or herbs.

**Status** : Common.

**Distribution** : Throughout India: Kerala: Cochin, Kannur, Kovalam, Kozhikode, Malampuzha, Thiruvananthapuram and Wayanad.

#### 4. *Ceriagrion olivaceum* Laidlaw [Plate-I, Fig. 8]

1914. *Ceriagrion olivaceum* Laidlaw, *Rec. Indian Mus.*, 8 : 345-346; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 324 - 325.

**Diagnosis** : **Male** : Eyes olivaceous brown, darker above; labium dull brown or pale yellow; labrum and whole of head pale olivaceous brown, a light ochreous or brownish yellow tint behind eyes and across occiput; beneath head whitish brown; prothorax and thorax pale olivaceous, pale on the sides and beneath, almost white beneath; legs yellow, with black spines; wings hyaline, palely enfumed in adults; pterostigma pale brown, pale yellow around edges and framed in dark brown nervures; abdomen uniform olivaceous brown, paling to yellowish beneath; anal appendages brown. **Female** : exactly similar to the male, nodal index slightly shorter; pterostigma paler; anal appendages brownish red. **Race** : *C. aurantiacum* : **Male and Female** : the general build, uniform colouration and the anal appendages are same as that of *olivaceum*; the differences are: the ground colour is dull mahogany red or reddish brown; eyes olivaceous green above, golden yellow laterally and beneath; labrum citron yellow or even orange in some adult specimens; anteclypeus and front of frons pale brown; vertex and occiput warm brown or dark olivaceous brown with reddish tinge; prothorax and thorax with a golden shining over the olivaceous; legs reddish orange, extensor surface of all femora with a black stripe; wings palely and evenly enfumed; pterostigma reddish yellow and low nodal index; abdomen orange with reddish tinge on the dorsum as far as segments 6 or 7, dark brown thereafter to the end.

**Size :** Male : Abdomen 34 to 38 mm, Hind wing 22 to 23 mm. Female : Abdomen 33 to 35 mm, Hind wing 22 mm.

**Habits and Habitat :** Found near the streams inside the jungle, in colonies, resting on short scrub vegetation or tall grasses.

**Breeding :** Breeds in slow running submontane streams.

**Status :** Uncommon.

**Distribution :** Arunachal Pradesh, Assam, Manipur, Maharashtra, Meghalaya, South Andaman, Uttar Pradesh, West Bengal and Western Ghats: Kerala: Silent Valley National Park and Wayanad.

### 5. *Ceriagrion rubiae* Laidlaw [Plate-I, Fig. 7]

1916. *Ceriagrion rubiae* Laidlaw, *Rec. Indian. Mus.*, 12 : 132-133; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 318-319.

**Material examined :** 3 males, 3 females, 7-iii-2006, Kasaragod, Coll. K. G. Emiliyamma; 2 males, 21- vii-2004, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot.

**Diagnosis :** **Male :** Eyes olivaceous, paler below; labrum, clypeus and frons bright ochreous; bases of mandibles and genae citron yellow; vertex warm reddish brown; occiput rich ochreous; beneath head yellow; prothorax and thorax bright orange, paling to yellow on the sides and beneath; legs pale ochreous; wings hyaline, pterostigma amber tinted, framed in pale yellow and reddish brown nervures; abdomen rich orange or with a vermilion tint on dorsum, paling to yellow beneath; anal appendages reddish brown. **Female :** more robust than the male, the reddish or orange colour replaced by olivaceous; labrum, anteclypeus and front of frons yellow; postclypeus and upper surface of frons olivaceous brown; prothorax with posterior lobe subtrilobate, broad and shallow, anterior lobe with a small hook on each side; thorax olivaceous, pruinose white beneath; abdomen olivaceous, the underside of 1<sup>st</sup> and 2<sup>nd</sup> segments pruinose white, other characters are similar to that of male.

**Size :** Male : Abdomen 26 to 29 mm, Hind wing 17 to 18 mm. Female : Abdomen 30 to 31 mm, Hind wing 20 mm.

**Habits and Habitat :** This species occurs in sunny wetland areas and usually preferred weedy ponds. It occurs before and after the south- west monsoon.

**Breeding :** Breeds in ponds and tanks filled with weeds.

**Status :** Uncommon.

**Distribution :** Orissa and Western Ghats : Kerala : Chalakkudi, Kannur and Kasaragod.

***Pseudagrion* Selys**

Dragonflies of small size and slender build, coloured bright blue, marked with black or red, orange or green etc., head narrow, usually bearing postocular spots, but these absent in some species; eyes globate; posterior lobe of prothorax of female with two small hooks or spines; wings hyaline, pterostigma similar in fore and hind wings, diamond shaped, narrow, oblique at both ends; postnodal cells 8 to 15 in the forewings; *ab* (anal bridge) arising at the point where *ac* (anal crossing) meets hinder border of wing; discoidal cell acutely pointed at the distal end; abdomen slender and cylindrical; anal appendages very variable, as long as or shorter than segment 10, superiors forked or notched at apex and with or without spines at base; inferiors very short, simple and conical.

**Key to the species of genus *Pseudagrion* Selys**

1. Face, frons, vertex and labrum bright reddish orange or dark ochreous; thorax golden green on dorsum, azure blue on sides, sparingly marked with black .....  
..... ***rubriceps rubriceps*** (Selys)
- Face, frons, vertex and occiput blue or green, marked with black ..... 2
2. Thorax greenish yellow on dorsum, with a broad black stripe on mid dorsal carina and rather two narrower black humeral stripes, laterally azure blue; superior anal appendages as long as segment 10 and bifid at apex as seen from the side view.... 3
- Thorax bluish green on dorsum, with three lines on mid dorsal carinal ridge and a narrow black humeral stripe; laterally azure blue ..... ***decorum*** (Rambur)
- Thorax azure blue on dorsum and sides, marked with a medial and two humeral black stripes; superior anal appendage shorter than segment 10, not bifid at apex as seen from the side ..... ***malabaricum*** Fraser
3. Abdominal segment 2 with a goblet shaped mark; superior anal appendage with 2 or 3 small spines on inner border ..... ***microcephalum*** (Rambur)
- Abdominal segment 2 with a goblet shaped mark; superior anal appendage with a robust curled spine at base ..... ***indicum*** Fraser

**6. *Pseudagrion decorum* (Rambur)**

1842. *Agrion decorum* Rambur, *Ins. Nevrop.*, : 258.

1876. *Pseudagrion decorum* Selys, *Bull. Acad. Belg.* (2), 42 : 504; Kirby, 1890, *Cat. Odon.*, 153; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 286–289.

**Diagnosis : Male :** Eyes with a semilunar patch of black at the upper back part changing to blue and bluish green beneath, pale green at the lower and back part; labrum,

genae, bases of mandibles, clypeus, frons and vertex pale bluish green; occiput with azure blue postocular spot bordered with black; a small black spot on each side of anterior ocellus; three small black points on the postclypeus; a transverse stripe across the vertex black; prothorax pale blue, with bluish green and black markings; thorax bluish green on dorsum; laterally azure blue; mid dorsal carina very finely black, and with an equally narrow black line running close and parallel to it on each side; a narrow black humeral stripe also present; beneath white; tergum azure blue; wings hyaline; pterostigma diamond shaped, narrow and braced; abdomen pale azure blue, with black markings; segment 2 bluish green on upper surface with a black mark shaped like the head of an arrow; 8 to 10 deep azure blue. **Female** : Differs markedly from the male; eyes pale green below, changing to olivaceous; labrum, bases of mandibles, genae and clypeus pale green, changing on the frons to a golden green on vertex and occiput; transverse black stripe on vertex absent; prothorax pale green with a diffuse golden yellow stripe on each side, black markings similar to the male; thorax pearl blue in colour, the mid dorsal carina and humeral stripe bordered with golden yellow; abdomen pale blue with greenish tinge at base and on end segments, the dorsum of segment 2 with a black marking shaped like the head of an arrow; 9 with a quadrate black dorsal spot; other segments with black spots or stripes.

**Size** : Male: Abdomen 28 to 30 mm, Hind wing 18 to 20 mm. Female : Abdomen 31 mm, Hind wing 20 mm.

**Habits and Habitat** : This species is found throughout the plains, involved in migration from northwest direction up to the west coast of India.

**Breeding** : Breeds in ponds or lakes.

**Status** : Uncommon.

**Distribution** : Throughout Continental India: Kerala: Cochin, Malabar and Periyar Tiger Reserve.

### 7. *Pseudagrion indicum* Fraser

1924. *Pseudagrion indicum* Fraser, *Rec. Indian Mus.*, **26** : 495-497; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 303-304.

**Material examined** : 1 female, 23-x-2001, Kannavam R.F. (Kannur Dt.), Coll. Md. Jafer Palot; 1 male, 17-ii-2004, Thusharagiri (Kozhikode Dt.), Coll. K. G. Emiliyamma; 3 males, 31-iii-2004, Kinalur estate (Kozhikode Dt.) Coll. K. C. Gopi; 1 male, 8-iii-2002, Kinalur estate (Kozhikode Dt.), Coll. C. Radhakrishnan.

**Diagnosis** : **Male** : Eyes black above, greenish at sides and beneath; labrum, face and cheeks pale yellowish green, marked with black; vertex and occiput black, marked with large azure blue postocular spots; prothorax azure blue, marked with fine black lines; posterior lobe blue; thorax green on dorsum, azure blue on sides, marked with medial

and humeral black stripes; beneath white; wings hyaline, pterostigma blackish brown, framed in pale yellow and thick black nervures, very narrow and acute at both ends; abdomen azure blue on segments 1,2 and basal half of 3; 3 to 7 greenish laterally; 8 to 10 azure blue; marked with black; segment 1 with a quadrate dorsal marking; 2 with a goblet shaped black mark; 3 to 7 with broad dorsal stripe. 8 and 9 azure blue, with broad apical dorsal annules crenate or bifid at mid dorsal carina; segment 10 black on dorsum. Anal appendage with superiors black, shorter than segment 10 and unequally bifid at apex, a robust, long spine near the base; inferiors paler, half the length of superiors and conical. **Female** : Differs from the male in colour and markings, head and thorax green, with the black markings surrounded by an areola of golden yellow. Eyes emerald green above, with or without a small black cap; the vertex and occiput tinted with golden yellow; postocular spots pale green; prothorax pale green, marked with black; thorax grass green on dorsum, pale yellowish green on sides; three fine parallel black lines on mid dorsal carina and a fine black humeral line; wings hyaline, pterostigma pale brown; abdomen azure blue, markings on segment 1 and 3 to 7 similar in male; segment 2 with a thistle head marking on dorsum; segments 8 and 9 are black with fine apical blue rings, segment 10 entirely blue.

**Size** : Male : Abdomen 34 mm, Hind wing 22 mm. Female : Abdomen 32 mm, Hind wing 22 mm.

**Habits and Habitat** : This species is found in mountain tracts or foothills of mountains.

**Breeding** : Breeds in montane and submontane streams.

**Status** : Uncommon.

**Distribution** : Tamil Nadu and Western Ghats : Kerala : Kannur and Kozhikode.

### 8. *Pseudagrion malabaricum* Fraser

1924. *Pseudagrion malabaricum* Fraser, *Rec. Indian Mus.*, **26** : 494–495; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 284–286.

**Material examined** : 5 males, 18-iii-2001, Vithura - Chathankodu (Thiruvananthapuram Dt.) Coll. K.C. Gopi.

**Diagnosis** : **Male** : Eyes turquoise blue, with a black cap above; labrum and epistome azure blue; vertex blue traversed by a broad black band from eye to eye; occiput black, marked with two very large postocular spots; in adult specimens the whole of upper surface of head posterior to epistome is black, with blue postocular spots; prothorax with blue spots on anterior collar, the posterior lobe and near the hind border; thorax azure blue, marked with three broad black stripes on dorsum, a medial and two humeral; and on the sides two blue spots; legs blue, femora with black stripes behind; wings hyaline, pterostigma dark brown; abdomen blue, marked with black as follows : segment 1 with

a broad quadrate basal spot; 2 with a goblet shaped mark, the stem of which joins the apical ring; segments 3 to 7 with broad dorsal stripes expanding apicalwards and connected with narrow apical rings; 8 and 9 with fine apical rings only; 10 broadly black on dorsum. Anal appendages black, superiors slightly shorter than segment 10, not bifid, diverging strongly, apices ends with a robust tooth, which curled strongly inwards; inferiors small, with a blunt end. **Female** : Eyes olivaceous with dark brown cap; labrum and epistome pale olive green, deepening to black on vertex; postocular spots peacock blue; thorax peacock blue, pale azure blue on the lower part of sides and beneath, marked similarly to the male, but the humeral stripe narrow and surrounded with a golden green areola; abdomen azure blue, broadly marked with black; segment 1 and 3 to 7 similar to the male; segment 2 with a dorsal marking shaped like a chess pawn; segments 8 and 9 broadly black, with a narrow apical blue annule only; segment 10 entirely blue.

**Size** : Male : Abdomen 33 mm, Hind wing 20 mm. Female : Abdomen 32 mm, Hind wing 22 mm.

**Habits and Habitat** : This species is found throughout the montane and submontane areas.

**Breeding** : Breeds in small streams and lakes.

**Status** : Uncommon.

**Distribution** : Bihar, Tamil Nadu and Western Ghats : Kerala : Kozhikode, New Amarambalam Reserve forest, Periyar Tiger Reserve and Thiruvananthapuram.

### 9. *Pseudagrion microcephalum* (Rambur) [Plate-I, Fig.2]

1842. *Agrion microcephalum* Rambur, *Ins. Nevrop* : 259.

1876. *Pseudagrion microcephalum* Selys, *Bull. Acad. Belg.*, (2) 42 : 504;

1890. Kirby, *Cat. Odon.*, : 153; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 278–280.

**Material examined** : 4 males, 2 females, 8-iii-2002, Kinaloor estate (Kozhikode Dt.); 1 male, 26-vi-2002, Thavanakkadavu (Kozhikode Dt), Coll. C. Radhakrishnan; 2 males, 24-iv-2002, Puthuppady (Kozhikode Dt.), 1 male, 1 female, 27-x-2004, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma; 1 female, 19-xi-1996, Chinnar WLS, (Idukki Dt.) Coll. P. M. Sureshan; 1 male, 2-x-2001, Kuniyan (Kasaragod Dt.), Coll. Md. Jafer Palot; 2 males, 20-ix-2001, Malampuzha (Palakkad Dt.), Coll. Dinesan Cheruvat; 1 male, 6-xi-2002, Payangadi (Kannur Dt.), Coll. K. C. Gopi.

**Diagnosis** : **Male** : Eyes pale sky blue beneath, dark azure blue above and with a small cap of brown; labrum, face, frons and vertex blue, marked with black; vertex with a fine transverse black stripe crossing from eye to eye; occiput blue behind and with large postocular blue spots, framed in black; basal joints of antennae blue; prothorax

azure blue, the anterior lobe and middle lobe with five parallel lines, all confluent in front and behind, black; thorax azure blue on dorsum and sides, marked with a broad medial stripe, and narrow humeral black stripes; wings hyaline, pterostigma gray, framed in black nervures; abdomen azure blue, marked with black, segment 1 with a quadrate black basal spot; segment 2 with a goblet shaped dorsal mark, the stem of which is confluent with narrow apical black ring; segments 3 to 7 with broad dorsal black markings, confluent with apical narrow rings; segment 8 with a thick apical dorsal ring; segment 9 unmarked; segment 10 with a saddle shaped dorsal mark. Anal appendages: superiors black, as long as segment 10 and bifid at apex, and with 2 or 3 small spines on inner border. **Female** : Eyes pale blue beneath, olive green in the upper half; postocular spots blue behind, olive green tinted with orange in front; whole of face and vertex olivaceous spread over with orange; the transverse black stripe on vertex absent or interrupted; prothorax bluish green with large mid dorsal and lateral spots; posterior lobe orange at its center, and a long spine like process on both side, shaped like the stalked eyes of a snail, ochreous in colour, tipped with black; thorax bluish green, richly suffused with golden orange on dorsum, azure blue laterally, black markings similar to the male, but the mid dorsal and humeral stripes interrupted and often a mere chain of fine dots; numerous blue spots on tergum; abdomen coloured similarly to the male, but the black markings differing as follows: segment 1, and 3 to 7 similar to male; segment 2 with a thick dumbbell-shaped dorsal mark extending from the base to apex; segment 8 with a broad dorsal stripe extending the whole length; segment 9 with a bifid spot at base; segment 10 unmarked, deeply and narrowly notched at apex.

**Size** : Male : Abdomen 27 mm, Hind wing 17 mm. Female : Abdomen 29 mm, Hind wing 20 mm.

**Habits and Habitat** : Found throughout the plains. Commonly found near lakes, drains and ponds filled with lily plants. Migrate in large numbers along with *Pseudagrion decorum* along the west coast, during October and September. Found in both temporary and permanent water bodies.

**Breeding** : Breeds in stagnant marshy waters and lakes. A spurt in population can be noticed during September and October.

**Status** : Common. Widely distributed.

**Distribution** : Throughout the plains of India, Burma, Sri Lanka and Australia: Kerala: Chinnar Wildlife Sanctuary, Kozhikode and Malampuzha (Palakkad).

#### 10. *Pseudagrion rubriceps rubriceps* Selys [Plate-I, Fig.1]

1876. *Pseudagrion rubriceps* Selys, *Bull. Acad. Belg.*, (2) **42** : 510; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 296-299.

1954. *Pseudagrion rubriceps rubriceps* Lieftinck, *Treubia*, **22** (suppl.) : 60 : Mitra, 1983, *Ent. mon. Mag.*, **119** : 29.

**Material examined** : 1 male, 2 females, 15-iii-2001, Kallar (Thiruvananthapuram Dt.), Coll. K. C. Gopi; 1 male, 19-xi-1996, Chinnar WLS, (Idukki Dt.) Coll. P. M. Sureshan; 3 males, 12-ix-2001, Malampuzha (Palakkad Dt.), Coll. Dinesan Cheruvat.

**Diagnosis** : **Male** : Eyes olivaceous green above, changing rapidly to bright rich orange and then golden yellow, and dim bluish beneath; labrum, face, clypeus and frons bright reddish-orange; vertex and occiput dark olivaceous, marked with a pair of large triangular blue post ocular spots at vertex; prothorax black, marked with pale blue; thorax golden green on dorsum, azure blue on sides, mid dorsal carina finely black and a some what thicker black line running close to and parallel with it on each sides; humeral stripe narrow and sinuous; beneath white; legs yellow with black markings; wings hyaline, pterostigma reddish brown, diamond shaped; abdomen marked broadly with black on dorsum; segments 1 and 2 olivaceous green above, azure blue laterally, with a quadrate dorsal black spot on segment 1; segment 2 with a goblet shaped marking on dorsum; segments 3 to 7 black, bronzed green on dorsum, pale greenish laterally, and with narrow blue basal annules; segment 8 with a broad black cone shaped mark on dorsum; segments 9 and 10 azure blue, unmarked. **Female** : Differs in colour and markings from the male as follows: eyes dark blue above, paling to azure blue below; labrum, face, vertex and occiput uniform dark olivaceous, with the postocular spaces finely margined in black; prothorax and thorax with markings similar to the male, but the ground colour of the dorsum a dull bluish green; posterior lobe of prothorax with two short forwardly directed spines at the base; abdomen with dorsal markings broader, that on segment 2 of equal width from base to apex; segment 8 with a broad band extending the whole length of segment; segment 9 with a basal bifid dorsal marking and segment 10 unmarked.

**Size** : Male : Abdomen 29 mm, Hind wing 18 to 20 mm. Female : Abdomen 29 mm, Hind wing 21 mm.

**Habits and Habitat** : Found throughout the plains and submontane areas near ponds, lakes, marshes, slow running streams and degraded habitats. Adults fly low down, amidst the vegetation.

**Breeding** : Breeds in the grassy banks of small streams. Eggs are laid above water level or in submerged vegetation, on twigs or the under surface of leaves, in transverse rows.

**Status** : Males are common, females rarely seen, except at the time of copulation.

**Distribution** : Widely distributed throughout the plains and submontane areas of Continental India : Kerala : Chinnar Wildlife Sanctuary (Idukki), Kannur, Kozhikode, Malampuzha (Palakkad), Periyar Tiger Reserve (Idukki) and Thiruvananthapuram.

#### Subfamily COENAGRIONINAE

The members of this subfamily occur in temperate and tropical parts of the world. They are small or moderate size and slender build. Wings are very slightly petiolated;

discoidal cell very short. The shape of the black mark on the second abdominal segment helps in identification, but it will be varying from individual to individual.

### *Cercion* Navas

Dragonflies of small size, colours non metallic, usually black marked with blue or blue marked with black; females always coloured differently from the males; head narrow, without frontal ridge; postocular spots usually present, occasionally absent; wings hyaline, discoidal cell acutely pointed at distal end; *ab* (anal bridge) present and complete, arising well proximal to the level of *ac*, which lies midway between the two antenodal nervures or near the proximal one; *ab* continued on as *IA*, but an angulation (medio anal link) present at the junction of two; abdomen slim and cylindrical, dilated very slightly at base and again at anal end.

#### 11. *Cercion calamorum dyeri* (Fraser)

1919. *Argiocnemis dyeri* Fraser, *Rec. Indian Mus.*, **16** : 451-452.

1923. *Coenagrion dyeri* Fraser, *J. Bombay nat. Hist. Soc.*, **29** : 748 ; Fraser, 1933, *Fauna Brit. India odon.*, **1** : 413-415.

1984. *Cercion calamorum dyeri* Lieftinck *et al.*, *Cat. Taiwanese Dragonflies* p.23.

**Diagnosis : Male :** Eyes deep blue above, pale below; beneath head black, with broad stripe of pale blue against the eyes; labrum, genae, clypeus, bases of mandibles and frons pale azure blue, the labrum with a medial basal black spot; the frons with a median transverse black stripe; vertex and occiput black, pyriform postocular blue spots on vertex. In old adults the blue markings on frons, vertex and postocular spots indistinct by pruinescence; prothorax black on dorsum with blue markings; thorax black on dorsum, marked with broad azure blue antehumeral stripes; laterally azure blue, with a fine black line on the upper part of each lateral suture. In old adults the whole of thorax densely white or violaceous with pruinescence; legs white, black on extensor surface of femora; wings hyaline, pterostigma yellow, framed in thick nervures; abdomen azure blue, marked with black as follows: segment 1 with a large dorsal black spot and a fine apical ring; 2 with a broad dorsal spot, shaped like a thistle head; segments 3 to 7 with broad dorsal stripes; 8 and 9 entirely blue, but with an apical row of fine black spines; segment 10 blue, with a narrow mid dorsal stripe of black. **Female : Subadult :** Markings of head similar to the male, but the ground colour of face greenish yellow; postclypeus black, enclosing two large yellow spots; postocular spots bluish green or green; ground colour of prothorax and thorax dove gray or pale olivaceous, with the mid dorsal carina and humeral sutures very finely outlined in black; a very narrow black line running parallel and close to the mid dorsal carina; legs yellow; abdomen similar to the male, the ground colour is greenish yellow and segments 8 and 9 black on dorsum, 10 bluish green and the base finely black. **Adult :** Labrum dark brown at center; postclypeus entirely black with a small median yellow spot; vertex and occiput entirely

black, without postocular spots, or very obscure; prothorax broadly black on dorsum, the markings obscure due to the pruinescence; thorax broadly black on dorsum, marked with narrow pale green antehumeral stripes and interrupted humeral stripes, the two confluent anteriorly; laterally bluish, with an interrupted stripe on antero lateral suture and a black spot on the upper part of postero lateral suture; the sides beneath pruinose white; abdomen similar to the subadult, but the segments 1, 2 and the sides of 8 and 9 pruinose white.

**Size :** Male : Abdomen 22 to 23 mm, Hind wing 16 mm. Female : Abdomen 21 to 23 mm, Hind wing 15 to 16 mm.

**Habits and Habitat :** Found both in submontane and plain areas, often rest flat on floating objects, such as lotus leaves and grasses.

**Breeding :** Breeds in stagnant waters, like ponds filled with weeds, tanks, or still waters.

**Status :** Uncommon.

**Distribution :** Throughout Peninsular India : Kerala : Malabar.

### Subfamily ISCHNURINAE

The members of this subfamily have cosmopolitan in distribution. It is noted for female dimorphism and polymorphism, one form is andromorph, similar to the male in colour, but generally the females are heteromorphs. In males, the pterostigma are of different shape and colour in fore and hind wings. In many species there is a coloured band or spots on the top of occiput present.

### *Aciagrion* Selys

Dragonflies of small size and slender build, coloured blue or violaceous, marked with black; eyes globate; head narrow, usually bearing triangular or elongate postocular spots or areas; prothorax and thorax simple, without hooks or spines; wings very narrow and subacute at apex; pterostigma differing in the fore and hindwings, that of forewing nearly double the size of the hindwing, narrow, diamond shaped, distal and proximal sides oblique; postnodal nervures 10 to 13 in forewings, 8 to 11 in the hindwing; *ab* arising at the point where *ac* meets hinder border of wing; discoidal cell acutely pointed at the distal end; abdomen usually very long and slender; female with an apical ventral spine on segment 8.

### Key to the species of genus *Aciagrion* Selys

1. Thorax black on dorsum, marked with narrow pale blue antehumeral stripes ..... *occidentale* Laidlaw

- Thorax black on dorsum, marked with narrow lilaceous violet antehumeral stripes  
 ..... *hisopa hisopa* (Selys)

## 12. *Aciagrion hisopa hisopa* (Selys)

1876. *Pseudagrion hisopa* Selys, *Bull. Acad. Belg.*, (2) 42 : 509.

1891. *Aciagrion hisopa* Selys, *Ann. Mus. Civ. Genova*, (2) 10 (30) : 511 – 512; Fraser, 1933, *Fauna Brit. India Odon.* 1 : 340 – 342.

1954. *Aciagrion hisopa hisopa* Lieftinck, *Treubia* 22 (suppl.) : 76.

**Diagnosis : Male :** Eyes capped with black above, pale greenish at sides and yellow below; labrum, bases of mandibles, genae, anteclypeus and frons broadly pale blue or greenish blue; postclypeus black; vertex and occiput black with a broad blue postocular area confluent across the mid occiput, a straight line from eye to eye on vertex; beneath head whitish; prothorax broadly black on dorsum, the anterior lobe and sides azure blue; thorax black on dorsum, marked with narrow lilaceous violet antehumeral stripes; laterally lilaceous violet, fading to pinkish beneath; legs creamy white, with black spines; wings hyaline, pterostigma considerably larger in the forewing than in the hindwing, its posterior side shorter than costal, outer side very oblique, black, framed finely in yellow and enclosed in thick black nervures; abdomen broadly black on dorsum, pale blue at the sides; segment 1 with dorsum broadly black; 2 with a dorsal marking and a narrow apical black ring; segments 3 to 7 with elongated stripes; segments 8 to 10 azure blue, 8 with a short narrow black stripe on each side, segment 10 with a small X-shaped dorsal marking. **Female :** Closely similar to the male in colour and markings; eyes greenish, broadly capped with black above; labrum narrowly black at base; postocular spots narrow, transversely elongate; thorax greenish blue at sides and the antehumeral stripes also; wings with pterostigma pale or olivaceous, more nearly equal in the two wings; abdominal segments 1 to 7 similar to the male, segment 8 and 9 broadly black on dorsum, with a narrow azure blue apical ring on 9; segment 10 azure blue, narrowly black at base.

**Size :** Male : Abdomen 24 to 26 mm, Hind wing 15 to 16 mm. Female : Abdomen 26 mm, Hind wing 17 mm.

**Habits and habitat :** Occurs in large colonies, at all altitudes, both in hills and plain areas.

**Breeding :** Breeds both in rivers and ponds.

**Status :** Uncommon.

**Distribution :** Eastern India, Karnataka, Maharashtra and Kerala: Munnar (Idukki), New Amarambalam Reserve Forest and Travancore.

13. *Aciagrion occidentale* Laidlaw [Plate-I, Fig.10]

1919. *Aciagrion hisopa* Selys, race *occidentalis* Laidlaw, *Rec. Indian Mus.*, 26 : 186.

1923. *Aciagrion occidentale* Fraser, *J. Bombay nat. Hist. Soc.*, 29 : 749.

1933. *Aciagrion occidentale*, Fraser, *Fauna Brit. India Odon.* 1 : 335-337.

**Material examined** : 1 male, 1 female, 27-iii-1998, Kallar River site (Thiruvananthapuram Dt.); 1 female, 1 male, 25-iii-1998, Kovalam (Thiruvananthapuram Dt.), Coll: P.T.Cherian; 1 female, 9-iii-2001, Kappil Road (Kannur Dt.); 1 male, 2 females, 22-vii-2004, Madayipara (Kannur Dt.) Coll.Md.Jafer Palot; 2 males, 3 females, 23-ii-1997, Muzhiyar (Kozhikode Dt.), Coll. P.M.Sureshan; 2 males, 6-xi-2002, Payangadi (Kannur Dt.), Coll. K.C.Gopi; 1male, 24-xii-1994, Kurichiat R.F. (Wayanad Dt), Coll. C.Radhakrishnan; 2 males, 3 females, 28-viii-2003, Thusharagiri (Kozhikode Dt.); 1 female, 10-v-2005, Chembra (Wayanad Dt.), Coll. K.G.Emiliyamma.

**Diagnosis : Male** : Eyes bottle green above, with a small black cap, pale blue beneath, changing through pale greenish yellow to the darker shade above; labrum pale blue with a median spot and its base narrowly black; genae, anteclypeus and frops pale azure blue; postclypeus glossy black, rest of head black; vertex with transversely elongate postocular blue spots, joined by a narrow blue stripe; prothorax black on dorsum, the sides and anterior lobe azure blue; thorax pale azure blue, dorsum black with a narrow greenish yellow antehumeral stripe on each side; beneath white; legs pale blue with narrow black stripes; wings very narrow, pterostigma of forewing nearly double the size of that of hindwing, coloured similarly in the two wings, blackish gray; abdomen very slender and long, pale azure blue at sides of segments 1 to 3, pale yellow from 4 to 7, blue from 8 to 10, broadly marked with black on segments 1 to 8; segment 8 with a black triangle mark on dorsum; segment 9 entirely blue; 10 with a small X-shaped black dorsal spot, blue on the sides. **Female** : somewhat similar to the male, but much more robust and with a stouter abdomen; markings entirely similar to those of males; eyes olivaceous, paling to yellow beneath, with a cap of black ringed outwardly with pale brown; ground colour of face, occipital stripe and antehumeral stripe pale yellow; abdominal segment 8 with the dorsal marking much broader and of almost even width throughout; 9 with a basal dorsal spot; 10 entirely blue or with a subdorsal apical black spot on each side.

**Size** : Male : Abdomen 23 to 24 mm Hind wing 15 to 16 mm. Female : Abdomen 24 mm, Hind wing 16 mm.

**Habits and Habitat** : A migratory species; widely distributed in montane, submontane and plain areas. Rests on open grass, weedy ponds and herbage.

**Breeding** : Breeds in ponds filled with weeds. Commonly found during post monsoon, in company with *Agriocnemis pygmae* and *Pseudagrion microcephalum*.

**Status** : Common.

**Distribution** : Maharashtra, Madhya Pradesh, Orissa and South India : Kerala : Kannur, Kozhikode, Thiruvananthapuram and Wayanad.

### *Ischnura* Charpentier

Dragonflies of small size and slender build, coloured bright reddish orange, marked with black, or blue or green marked with black; head narrow, without any frontal ridge; postocular spots always present; posterior lobe of prothorax simple, but sometimes prolonged at its center; anterior border of thorax usually with a pair of small horseshoe shaped hooks; wings hyaline; pterostigma of male as in subfamily; postnodal nervures 8 to 9 or 10 in the forewings, 6 or 7 in the hindwings; discoidal cell acutely pointed at the distal end; *ab* arising well proximal to the level of *ac*; abdomen moderately short, narrow and cylindrical; segment 10 with two prominent tubercles on dorso apical border; segment 8 in the female with a ventral apical spine.

### Key to the species of genus *Ischnura* Charpentier

1. Abdominal segments 1 to 7 citron yellow, 8 to 10 azure blue; pterostigma in forewing rose red for proximal half and hyaline for the distal half, that in hindwing uniform pale grey ..... ***aurora aurora*** (Brauer)
- Abdomen black, marked with yellow and blue, pterostigma in forewing black, the outer angle and costal border white, that in hindwing uniform pale brown, framed in black nervures ..... ***senegalensis*** (Rambur)

### 14. *Ischnura aurora aurora* (Brauer) [Plate-I, Fig. 9]

1858. *Agrion delicatum* Hagen, *Verh. zool.-bot. Ges. Wien*, **8** : 479.

1865. *Agrion aurora* Brauer, *Verh. zool.- bot. Ges. Wien*, **15** : 510.

1876. *Ischnura delicata* Selys, *Bull. Acad. Belg.*, (2) **41** : 281; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 360 – 362.

1915. *Ischnura aurora* Ris, *Nova Caledonia, Zool.*, **2** : 67.

1991. *Ischnura aurora aurora* Tsuda, *A distributional list of World Odonata* : 34.

**Material examined** : 1 male, 18-iii-2001 Vithura-Chathankodu (Thiruvananthapuram Dt.); 1 male, 24-ii-2000, Nedumudi (Alappuzha Dt.), Coll. K. C. Gopi; 1 male, 2 females, 1-ii-2002, Kadalundi (Kozhikode Dt.); 1 male, 11-v-2005, Kanthanpara (Wayanad Dt.), Coll. K. G. Emiliyamma; 1 male, 1 female, 27-ii-2002, Melur (Kannur Dt.); 3 males, 1 female, 22-iii-1999, Kanjirampuzha (Palakkad Dt.), Coll. P.M. Sureshan; 1 female, 11-v-2002, Vallamkulam (Pathanamthitta Dt.), Coll. Ashok Kumar; 1 male, 25-xii-1994, Kuruva island (Wayanad Dt.), Coll. C. Radhakrishnan; 1 male, 21-vii-2004, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot.

**Diagnosis** : **Male** : Eyes in both sexes olive-green, dark olive above, pale olive beneath; labrum citron yellow, base narrowly bordered with black; anteclypeus pale olive

green; postclypeus black; bases of mandibles, genae, frons and three basal joints of antennae pale grass green; vertex and occiput bronzed black, except along the hinder border of occiput pale greenish yellow; small postocular spots on each side of occiput, rounded, deep azure blue; prothorax black on dorsum, the sides and anterior lobe azure blue; thorax bronzed black on dorsum, marked with narrow grass-green ante humeral stripes; laterally grass green with a narrow, black stripe on upper part of postero lateral suture, beneath white; legs pale citron yellow with narrow black stripes; wings hyaline, pterostigma in the fore wing kite shaped, rose red for its proximal half, hyaline for the distal, inner and posterior borders thick, black, anterior border white, outer border yellow; in hind wing, much smaller, about half the size, uniform pale grey, all bordering nervures thick and black, costal border white; abdomen citron yellow, except segments 8 to 10, which are azure blue; segment 1 with a large dorsal black mark; segment 7 broadly black except at sides; segment 10 with a broad quadrate black dorsal spot, the bifid dorsal apical tubercle white at borders. **Female** : stouter than male; postocular spot small, blue; prothorax and thorax pale yellow on the sides, almost white beneath; antehumeral stripe citron yellow; wings hyaline, pterostigma pale pink, shape and size similar to that of the male; abdomen with a broad black dorsal stripe extending the whole length, but interrupted by narrow yellow annules; the sides broadly yellow, paling to greenish beneath.

**Size** : Male : Abdomen 16 to 20 mm, Hind wing 10 to 12 mm. Female : Abdomen 18 to 20 mm, Hind wing 14 to 15 mm.

**Habits and Habitat** : Multivoltine species, found near weedy banks of ponds and temporary monsoon pools.

**Breeding** : Breeds in ponds and temporary pools during monsoon.

**Status** : Common.

**Distribution** : Throughout India: Kerala: Cochin, Eravikulam National Park, Kannur, Kasaragod, Kozhikode, Palakkad, Pathanamthitta, Periyar Tiger Reserve, Silent Valley National Park, Thiruvananthapuram and Wayanad.

### 15. *Ischnura senegalensis* (Rambur)

1842. *Agrion senegalensis* Rambur, *Ins. Nevrop.* : 276.

1876. *Ischnura senegalensis* Selys, *Bull. Acad. Belg.*, (2) 41 : 273 : Fraser, 1933, *Fauna Brit. India odon.*, 1 : 348–351; Lieftinck, 1954, *Treubia* (suppl.) : 74.

**Material examined** : 1 male, 27-x-2004, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma; 3 males, 25-iii-1998, Kovalam (Thiruvananthapuram Dt.), Coll. P. T. Cherian.

**Diagnosis : Male :** Eyes black on the upper half, pale green to yellow on the lower side; labrum pale blue, black along the base; genae, bases of mandibles, anteclypeus and a broad band on the frons pale azure blue; postclypeus steely blue black; vertex and occiput black, with a small round blue postocular spot on each side; prothorax black, the anterior collar blue and sides pale green; thorax bronzed black on dorsum, marked with narrow citron yellow or pale green antehumeral stripes, sides pale green, pale yellow beneath; legs black, outer surfaces yellow; wings hyaline, pterostigma in forewing diamond shaped, black, the outer angle and costal border white, tinted with blue on the upper surface; that of hindwing smaller than forewing, uniform pale brown, framed in black nervures; abdomen black, marked with yellow and blue as: segment 1 azure blue at the sides and along apical border, metallic blue black on dorsum (upper surface); segment 2 metallic blue black on dorsum, azure blue laterally; segments 3 to 7 black on the dorsum, citron yellow at the sides with black inter segmental joints; segment 8 azure blue, black at base; 9 black on dorsum, azure blue laterally; segment 10 black on dorsum, broadly yellow on the sides, its apical border raised into two tubercles, beneath blue. **Female :** Three forms are found; one is teneral condition of a heterochromatic form and third is an isochrome. **Heterochromatic teneral :** Eyes emerald green, suffused with bright orange above; head bright orange; postclypeus and transverse band on vertex black; postocular spots absent; prothorax and thorax bright orange with a black X-shaped mark on dorsum of prothorax; legs yellow with black stripes; abdomen with segments 1 and 2 bright orange; segments 3 to the basal three fourth of 7 pale blue at the sides, dorsum marked as in male; segments 8 to 10 and apical third of 7 orange, yellow beneath, all segments broadly black on dorsum. **Adult :** Eyes olivaceous on the lower half traversed by a black equatorial ring; head with black markings similar to the male; postocular blue spots small and merged with olivaceous background of occiput; labrum olivaceous suffused with black; prothorax black on dorsum, pale greenish laterally; thorax black on dorsum, with or without antehumeral caraneous stripe; the sides pale caraneous; abdomen with the dorsum broadly black from segments 1 to 10, apical borders of 1, 8, 9 and 10 pale blue, the sides of all gray coloured. **Isochrome :** Exactly similar to the male, except the segments 1 and 2 are non metallic, while segment 9 is green laterally, segment 2 with two lateral blue spots,

**Size :** Male : Abdomen 21 to 23 mm, Hind wing 13 to 15 mm. Female : Abdomen 20 to 24 mm, Hind wing 14 to 16 mm.

**Habits and Habitat :** Found in a colony, often on the blade of grasses in the pond or nearby vegetation.

**Breeding :** Breeds in lakes and ponds.

**Status :** Uncommon.

**Distribution :** Throughout India: Kerala: Kozhikode, Malampuzha, Periyar Tiger Reserve and Thiruvananthapuram.

## Subfamily AGRIOCNEMIDINAE

The members of this subfamily include the smallest damselflies in the world. They have small, delicate body and short wings. They occurs throughout the old world; the arc is widely distal to the second antenodal nervure; pterostigma are similar or dissimilar in fore and hindwings.

*Agriocnemis* Selys

Damselflies of the smallest size and slender build; colours non-metallic, usually black marked with blue, and abdomen ends with bright ochreous; females polychromatic; head narrow, without frontal ridge; postocular spots almost always present; posterior lobe of prothorax simple, but slightly variable in the species; wings hyaline, pterostigma diamond shaped, similar or dissimilar in fore and hindwings; postnodal nervures 5 to 6 or very rarely 9; discoidal cell acutely pointed at distal end; arc situated distal to the level of the distal ante nodal nervure; *ab* arising well proximal to the level of *ac*; the junction of *ab* (anal bridge) and IA (medio-anal link) markedly angulated; abdomen slim and cylindrical.

Key to the species of genus *Agriocnemis* Selys

1. Labrum metallic blue ..... *pygmaea* (Rambur)
- Labrum non-metallic ..... 2
2. Thorax with narrow blue or pink antehumeral stripes ..... 3
- Thorax with pale green antehumeral stripes; segment 2 of abdomen with broad black marking along with a pair of small greenish eyespots like spectacles on the hood of a cobra` ..... *keralensis* Peters
3. Thorax with pinkish antehumeral stripes; abdomen pale blue, marked with black, segment 2 of abdomen with an anchor shaped dorsal marking ..... *pieris* Laidlaw
- Thorax with blue or pink antehumeral stripes; abdomen dark blue, with broad black marking, segment 2 of abdomen with a thistle-head shaped marking ..... *splendidissima* Laidlaw

16. *Agriocnemis keralensis* Peters [Plate-II, Fig. 3]

1981. *Agriocnemis keralensis* Peters, *Dtsch. Ent. Z., N. F.* 28, Heft I- III, Seite 93-108.

*Material examined* : 2 males, 3 females. 30. X.2000, Kidangur (Kottayam Dt.), Coll. P. M. Sureshan.

*Diagnosis* : **Male** : Closely similar to *Agriocnemis pieris* in many respects, the differences are follows: labrum non metallic, but base with black marking; bases of

mandibles, genae, clypeus and a stripe across the frons pale azure blue; postclypeus black at base, without black stripe; occiput with true postocular spots outside the comma like mark, which are not connected by the narrow median stripe; prothorax black on dorsum, pale blue at the sides, posterior lobe elevated at its middle and with lateral horns; thorax black on dorsum, marked by green antehumeral stripes; laterally blue with black spot on postero lateral suture; legs white, marked with black; wings hyaline, pterostigma pale yellow, with the center gray enclosed in thick black nervures; abdomen green on segments 1, 2 and anterior half of 3, posterior part of segment 3 and 4 to 7 pale ochreous, segment 8 to 10 bright pink; dorsal marking on segment 2 with broad black marking along with a pair of small greenish eye spots like spectacles on the hood of a cobra; all other segments marked with black. Anal appendages with superiors are longer than inferiors, a strongly inward directed ventral process on the superiors. Teneral are green and ochreous in colour, while adults are blue. **Female** : More robust than male, black markings on abdomen more extensive; labrum more broadly black at base; postclypeus without spots, but the black band of its base by a middle line across the frons linked with the metallic black colour of the vertex; prothorax with posterior lobe simple, produced squarely back at the middle; ground colour of abdomen pale green, segment 10 with its ventral and hind margins blackish.

All species described are tenerals.

**Size** : Male: Abdomen 13 mm, Hind wing 8 mm. Female : Abdomen 14 mm, Hind wing 9.3 mm.

**Habits and Habitat** : Found among grass in weedy pond surrounded by coconut plantations.

**Breeding** : Breeds in ponds filled with weeds.

**Status** : Rare. First described from Thiruvananthapuram by Peters (1981), subsequently the species was reported from Kottayam district.

**Distribution** : Kerala: Thiruvananthapuram and Kottayam district.

### 17. *Agriocnemis pieris* Laidlaw [Plate-II, Fig. 2]

1919. *Agriocnemis pieris* Laidlaw, *Rec. Indian Mus.*, 16 : 179 -180; Fraser, 1923, *J. Bombay nat. Hist. Soc.*, 29 : 747; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 384 – 385.

**Material examined** : 1 male, 22-ii-2001, Chathancode (Kozhikode Dt.), 1 female, Mathappuzha (Malappuram Dt.); 3 males, 9-v-2005, Kalpetta (Wayanad Dt.), Coll. K. G. Emiliyamma; 2 males, 30-v-2002, Kinalur estate (Kozhikode Dt.); 1 male, 1 female, 19-iii-1994, Kavadikanam (Kasaragod Dt.); Coll. K. C. Gopi; 2 males, 27-x-2000, Ponkunnam (Kottayam Dt.); 2 females, 24-ii-2000, Nedumudi (Alappuzha Dt.); 2 males, 18-xi-1999, Thundathil/Cherukadu (Ernakulam Dt.), Coll. P. M. Sureshan.

**Diagnosis : Male :** Upper surfaces of eyes black, pale blue at sides and below; labrum, bases of mandibles, genae, clypeus and a stripe across the frons pale azure blue; postclypeus black at base; vertex and occiput black; occiput with two comma like postocular pink spot, connected by a transverse stripe; prothorax black on dorsum, pale blue at the sides, posterior lobe square shaped at the middle, anterior lobe and borders of posterior lobe pink; thorax black on dorsum, marked with pink narrow antehumeral stripe; laterally blue with black spot on postero lateral suture; beneath white; legs white, marked with black; wings hyaline, pterostigma narrow and elongate, pale yellow or pink with the center black or gray enclosed in thick black nervures; abdomen pale blue, (china blue or pale blue of early morning sky) deepening on the distal four segments, marked with black; segment 1 broadly black on dorsum with a narrow apical annule; segment 2 with an anchor shaped dorsal marking, sometimes the flukes of anchor enclosed two small blue spots; segments 2 to 6 with well defined apical annules; 3 and 4 with triangular spots; 4 to 6 with fleur-de-lis or arrow head like spots, segment 7 with a dorsal stripe on its basal three fourths, and 8 to 10 unmarked. **Female :** More robust than male, black markings on abdomen more extensive; labrum more broadly black at base; postclypeus with three black spots; the band on frons interrupted at the middle by confluence of the black on postclypeus and vertex; prothorax as in the male; wings with pterostigma golden yellow, suffused with grayish at the center; abdomen broadly marked with black on dorsum from segments 1 to 9, segments 8 and 9 entirely black with a narrow blue lateral stripe on 8, segment 10 with a square shaped black mark at base.

**Size :** Male : Abdomen 16 to 18 mm, Hind wing 9 to 10 mm. Female : Abdomen 18 mm, Hind wing 11.5 mm.

**Habits and Habitat :** Found among grass in weedy ponds and sometimes far away from water, resting on the blades of grasses.

**Breeding :** Breeds in weedy ponds and marshes.

**Status :** Common.

**Distribution :** Eastern India, Maharashtra and South India: Kerala: Ernakulam, Kannur, Kozhikode, Silent Valley National Park and Wayanad.

### 18. *Agriocnemis pygmaea* (Rambur) [Plate-II, Fig. 1].

1842. *Agrion pygmaeum* Rambur, *Ins. Nevrop.* : 278.

1877. *Agriocnemis pygmaea* Selys, *Syn. Agr. 5me Legion : Agrion (suite fin)*, p.52 : Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 398–401; Lieftinck, 1954, *Treubia*, 22 (suppl.) 73.

**Material examined :** 1 male, 18-iii-1996, Karimala (Ernakulam Dt.) 7 males, 5 females, 30-x-2000, Kidangoor (Kottayam Dt.); 5 males, 3 females, 29-x-2000, Kumarakom (Kottayam Dt.); 1 female, 17-i-1992, Kuyilimala (Idukki); 1 male, 1 female, 20-ii-2002, Cheruvannur (Kozhikode Dt.); 2 males, 3 females, 19-iii-1999, Nenmara

(Palakkad Dt.), Coll. P.M. Sureshan; 4 females, 5 males, 25-iii-1998, Kovalam (Thiruvananthapuram Dt.); 1 female, 27-iii-1998, Kallar river site (Thiruvananthapuram Dt.), Coll: P.T.Chcrian; 1 female, 16-xii-1997, Vely (Thiruvananthapuram Dt.), Coll: M.B.Raghunathan; 1 male, 3 females, 14-iii-2001, Attingal (Thiruvananthapuram Dt.); 3 males, 2 females, 17-iii-2001, Parassala (Thiruvananthapuram Dt.); 1 female, 17-iii-2001, Neyyattinkara, (Thiruvananthapuram Dt.); 3 males, 1 female, 16-iii-2001, Kulasekaram (Thiruvananthapuram Dt.); 1 female, 30-v-2002, Kinalur estate (Kozhikode Dt.); 1 male, 19-iii-1994, Kavadikanam (Kasaragod Dt.), Coll: K.C.Gopi; 1 female, 22-ii-2000, Chathancode (Kozhikode Dt.); 2 males, 2 females, 24-x-2002, Vadikkadavu (Malappuram Dt.); 3 males, 3 females, 27-x-2004, Kadalundi (Kozhikode Dt.), Coll. K.G.Emiliyamma; 1 female, 2-x-2001, Kuniyan (Kasaragod Dt.), Coll. Md.Jafer Palot; 1 male, 24-xii-1994, Kurichiat R.F.(Wayanad Dt); 4 males, 3 females, 25-xii-1994, Kuruva island (Wayanad Dt.), Coll. C. Radhakrishnan.

**Diagnosis : Male :** Labrum metallic blue; eyes black above, pale apple green on the sides and beneath; anteclypeus, bases of mandibles, genae and frons pale apple green; postclypeus, vertex and occiput black with a narrow black stripe across the frons; occiput with very small round pale green postocular spots; prothorax black on dorsum with apple green markings, the posterior lobe trilobate, the middle lobe produced backwards; thorax black on dorsum, marked with narrow ante humeral apple-green stripes, laterally apple green, pale yellow below; wings hyaline, pterostigma pale yellow in the fore wings, black in the hind wings; abdominal segments 1 to 7 with the ground colour pale greenish yellow marked with bronzed black and confluent at apex with narrow apical ring; segment 2 with a broad thistle shaped mark dorsally and confluent at apex with a narrow apical ring; the segments 8 to 10 with dorsum clouded or not with black; anal appendages brick red; superiors longer than inferiors and lower angle produced as a short, blunt spine; inferiors with a small black upper spine. **Female :** more robust than male, and exhibiting a number of polychromatic forms due to the age of the specimens, although not entirely so. **Red form :** Head, prothorax, thorax and abdominal segments 1 to 7 dark salmon pink colour, a black stripe across vertex and the terminal segments of abdomen suffused with black. **Subadult form :** Eyes same as in male; labrum and face unmarked, yellowish or pale green; a broad black stripe across vertex; small round blue postocular spots connected by a narrow green stripe across occiput; prothorax brownish on dorsum, broadly blue at the sides; thorax with a broad black stripe on mid dorsum with pale blue antehumeral stripe; laterally pale green, yellowish green on the sides and beneath with a small black spot on postero lateral suture; wings with pterostigma similar in all wings, yellow framed in black nervures; abdomen pale apple green, changing to yellow on segments 8 to 10 with broad black stripes and markings, the end segments very broadly black on dorsum; the joints are bluish or yellow.

**Size :** Male : Abdomen 16 to 17 mm, Hind wing 9.5 to 10 mm. Female : Abdomen 18 mm, Hind wing 11 to 12 mm.

**Habits and Habitat :** Most common damselfly always found near the waterbody like ponds, tanks and streams amidst vegetation.

**Breeding** : Breeds in ponds, temporary ponds and also in slow running marshy streams; this species is multivoltine with three generations.

**Status** : Very common.

**Distribution** : Throughout the Oriental Region, Australia and Pacific Islands: Kerala: Ernakulam, Kannur, Kasaragod, Kottayam, Kovalam, Kozhikode, Palakkad, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Thiruvananthapuram and Wayanad.

### 17. *Agriocnemis splendidissima* Laidlaw

1919. *Agriocnemis splendidissima* Laidlaw, *Rec. Indian Mus.*, **16** : 180-182; Fraser, 1923, *J. Bombay nat. Hist. Soc.*, **29** : 47; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 392 – 394.

**Material examined** : 1 male, 24-iv-2002, Puthuppady (Kozhikode Dt.), Coll. K.G. Emiliyamma; 2 males, 1 female, 24-xii-1994, Kurichiat R.F. (Wayanad Dt.), Coll. P.M. Sureshan; 1 male, 1 female, 26-xii-1994, Noolpuzha (Wayanad Dt.), Coll. C. Radhakrishnan.

**Diagnosis** : **Male** : Labrum non metallic, pale blue; bases of mandibles, genae and anteclypeus blue; postclypeus, frons, vertex and occiput black, as well as upper surface of eyes; comma shaped blue postocular spots on occiput with a fine blue line connecting them; a fine brown equatorial line on circumference of eyes, which are bluish green below; prothorax black on dorsum, pale blue on the lower part of sides, posterior lobe quadrately produced at the center and slightly emarginated; thorax black on dorsum, marked with narrow blue or pink antehumeral stripes; laterally blue with a small black spot on the postero lateral suture; the sides and beneath pruinose white in adults; legs carneous, with black markings; wings hyaline, pterostigma black, framed finely in pale brown or yellow, enclosed in thick black nervures; abdomen blue, heavily marked with black; segment 1 with the whole of dorsum black; segment 2 with a broad thistle shaped mark dorsally which expand laterally to enclose an apical and a basal blue spot or a ventral stripe; segments 3 to 7 with broad dorsal black stripe and blue basal rings; segments 8 to 10 black, but 8 and 9 with small basal lateral blue spots, while the sides of all segments blue. **Female** : Closely similar to the male, but more robust. The differences are: labrum and genae pale green; eyes beneath olivaceous; prothorax with anterior lobe and a lateral spot on middle lobe greenish blue; thorax with black dorsum bordered with pale brownish, changing to bluish green on the sides, the colour as well as beneath thorax pruinose; pterostigma golden yellow; abdominal segment 2 with much narrower thistle shaped spot.

**Size** : Male : Abdomen 18 mm, Hind wing 10 mm. Female : Abdomen 17 to 18.5 mm, Hind wing 12 to 13 mm.

**Habits and Habitat :** Adults could be found near water bodies and visit regularly the beds of shallow streams, where the grass and plants are thrusting up above the water and is found only during the dry season.

**Breeding :** Breeds in weedy ponds, marshes and also in slow running streams.

**Status :** Common.

**Distribution :** Throughout India : Kerala : Chalakkudi (Cochin), Kozhikode, Silent Valley National Park, Thiruvananthapuram and Wayanad.

### ***Mortonagrion* Fraser**

Dragonflies of very small size and slender build; colours non metallic, usually black marked with green or blue or pale brown marked with very pale blue, females isochromatic; head without frontal ridge; postocular spots present or absent; posterior lobe of prothorax produced in a rounded arch at the middle portion; wings with pterostigma shaped like an orange pip; postnodal nervures 8 to 10 in forewings, 7 to 8 in the hindwing; discoidal cell acutely pointed at distal end; arc situated well distal to the level of the distal antenodal nervure; *ab* arising well proximal to the level of *ac*; the junction of *ab* and *IA* not angulated, continued on in the same straight line; abdomen slim and cylindrical.

#### **20. *Mortonagrion varralli* Fraser [Plate-II, Fig. 4]**

1920. *Mortonagrion varralli* Fraser, *J. Bombay nat. Hist. Soc.*, **27** : 148; Fraser, 1931, *Rec. Indian Mus.*, **33** : 464; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 409-411.

**Material examined :** 2 males, 2 females, 7-xi-2002, Theckumbadu island (Kannur Dt.), Coll. K.C.Gopi; 1 male, 1 female, 18-i-2004, Mathappuzha (Malappuram Dt.); 1 male, 4-ii-2004, Kadalundi (Kozhikode Dt.), Coll. K.G. Emiliyamma; 2 males, 22-vii-2004, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot.

**Diagnosis :** **Male :** Eyes dove gray, capped with reddish brown above; labrum, bases of mandibles, genae and clypeus pale morning sky blue; vertex and occiput pale reddish brown, with a pale blue postocular oval spot; head bluish white beneath; prothorax pale reddish brown, the anterior lobe and the sides pale blue, posterior lobe trilobate and strongly convex at the middle part; thorax pale reddish brown on dorsum with antehumeral stripe pale blue, beneath and sides pale blue marked with pale brown stripe on postero lateral suture; legs pale brown; wings hyaline, pterostigma pale golden brown, framed finely in yellow and thick black nervures; abdomen pale reddish brown with narrow reddish brown annule and black apical rings; the sides of segment 1 and 2 diffusely pale blue, segments 3 to 7 with narrow pale blue basal annules; segment 8 with a broad pale sky blue basal annules and a deep notch by the ground colour; segments 9 and 10 unmarked, with a small apical dorsal bifid tubercle on segment 10. **Female :** Exactly similar with male, except the segment 8, the basal annule is of even width, covering about one third of the segment.

**Size :** Male : Abdomen 23 to 25 mm, Hind wing 14 to 15 mm. Female : Abdomen 24 mm, Hind wing 14 mm.

**Habits and Habitat :** They are found from sea level to foothills, about 4000ft. altitude, usually in dark jungle and shady spots.

**Breeding :** Breeds in hill streams.

**Status :** Rare.

**Distribution :** North East India and Western Ghats: Kerala: Kozhikode, Malappuram, Vythiri ghat (Wayanad) and Thiruvananthapuram.

### Subfamily ARGIINAE

The wings are very shortly petiolate; postnodals converge posteriorly and females without vulvar spine. Under this subfamily there is only 1 species occurring in Kerala.

### *Onychargia* Selys

Dragonflies of small size and moderately robust build, colours black or bronzed purple, marked with bright citron yellow in the subadult, immaculate in the full adult; head narrow, frons rounded and rather prominent, face and frons covered with stiff black hairs; postocular coloured spots absent; prothorax with posterior lobe rounded in male, but the middle portion greatly prolonged in the female; legs with claw hooks equal in length; wings short and broad; discoidal cell acutely pointed at distal end; arc situated at the level of the distal antenodal nervure; *ab* arising far proximal to the level of *ac*; the junction of *ab* and *IA* markedly angulated; postnodal nervures 11 to 18 in forewings and 11 to 15 in the hindwing; abdomen short and robust.

#### 21. *Onychargia atrocyana* Selys [Plate–III, Fig. 7].

1865. *Onychargia atrocyana* Selys, *Bull. Acad. Belg.*, (2) 20 : 416; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 417–418; Lieftinck, 1954, *Treubia*, 22 (suppl.) : 53.

**Material examined :** 2 males, 3 females, 9-v-2005, Pookode Lake (Wayanad Dt.), Coll. K. G. Emiliyamma.

**Diagnosis :** Male : Eyes black above, brown below; labium, labrum and clypeus glossy black; rest of head black, unmarked in full adult, but with a narrow citron yellow stripe extending from eye to eye through the interocellar space and genae, bases of mandibles and labrum citron yellow in subadults, labrum bordered with black and a small median basal black point; prothorax and thorax velvet black with a deep purplish reflex on the dorsum of thorax; in the subadult and teneral stage the dorsum marked with narrow citron yellow antehumeral stripes, the sides bright citron yellow, marked with a broad oblique black stripe over the postero lateral suture; beneath thorax black, often

pruinose; legs black; wings hyaline, pterostigma olivaceous yellow, paler around the borders and framed in thick black nervures; abdomen black, unmarked in the adult, but with the sides of segment 1, a lateral stripe on segment 2 and 3 bright citron yellow; segments 3 to 6 also have narrow bluish basal rings broadly interrupted on the dorsum.

**Female :** Coloured exactly similar to the subadult male; the anteclypeus brownish, postclypeus black at its center, bright yellow laterally; prothorax with a small subdorsal and a very large lateral citron yellow spot; thorax always velvety black, but without purple reflex; abdomen marked with yellow spots in the subadult male, but with a yellow spot on the side of segment 8 and another on vulvar scale.

**Size :** Male : Abdomen 23 mm, Hind wing 18 mm. Female : Abdomen 23mm, Hind wing 18 mm.

**Habits and Habitat :** Usually found near water bodies, amidst the vegetation and grass near pond; scattered colonies occur throughout the wet submontane areas. Collected from Pookode Lake, Wayanad.

**Breeding :** Breeds in ponds filled with weeds.

**Status :** Rare.

**Distribution :** Assam, Bengal, Bihar, Orissa, Manipur, South India: Kerala: Malabar and Wayanad.

### Family PLATYCNEMIDIDAE

#### Subfamily PLATYCNEMINAE

Commonly known as featherlegs; members of this Old World family can be identified by the dilation of the tibiae, especially in male and in rare cases in female also; the degree of dilation varies according to species; wings narrow, rounded at apex, hyaline; petiolation beginning at or slightly proximal to ac; discoidal cell with costal side about one fifth shorter than lower side and outer angle subacute; abdomen of moderate length; segments 8, 9 and 10 decreasing gradually in length from 8 to 10.

#### *Copera* Kirby

Small or medium sized dragonflies and slender build, with abdomen less than twice the length of wings; coloured creamy white or brown marked with black or pale blue or greenish yellow; head narrow; 2<sup>nd</sup> segment of antennae as long as or even longer than the 3<sup>rd</sup> segment; wings hyaline, discoidal cell markedly elongate; costal and posterior sides nearly equal in length; petiolation beginning well proximal to ac; pterostigma small, very oblique and diamond shaped; abdomen cylindrical and even width throughout. In the early stages all species are pure white with brown markings.

### Key to the species of genus *Copera* Kirby

1. The two hind pairs of tibiae bright orange to dull reddish, moderately dilated; superior anal appendage only one fourth the length of inferiors; female with posterior lobe of prothorax without spines ..... *marginipes* Rambur
- The two hind pairs of tibiae bright citron yellow, very slightly dilated; superior anal appendages at least half the length of inferiors; posterior lobe of prothorax of female with a pair of divergent, slender and forwardly directed spines .....  
..... *vittata deccanensis* Laidlaw

### 22. *Copera marginipes* (Rambur) [Plate-I, Fig. 3]

1842. *Platycnemis marginipes* Rambur, *Ins. Nevrop.* : 240.

1890. *Copera marginipes* Kirby, *Cat. Odon.* p.129; Fraser, 1933, *Fauna Brit.*

*India Odon.*, 1 : 192–197; 1954 Lieftinck, *Treubia*, 22 (suppl.): 51–52.

**Material examined** : 6 males, 4 females, 16-iii-2001, Kulasekaram (Thiruvananthapuram Dt.); 2males, 2females, 30-v-2002, Kinalur estate (Kozhikode Dt.); 1male, 23-ii-2000, Parumala/Mannar (Alappuzha Dt.), Coll. K.C.Gopi; 1 female, 2-iv-1998, Anchuthengu (Thiruvananthapuram Dt.); 1 male, 9-iv-1998, Thenmalai urukunnu (Thiruvananthapuram Dt.), Coll. P.T.Churian; 2females, 25-iv-2000, Thiruvambadi (Kozhikode Dt.); 1male, 1female, 22-ii-2001, Chathancode (Kozhikode Dt.); 1male, 24-iv-2002, Puthuppady (Kozhikode Dt.); 3males, 30-xii-1998, Chalamattom (Kottayam Dt.); 1male, 11-v-2005, Kanthanpara (Wayanad Dt.), Coll.K.G.Emiliyamma; 1male, 6-ix-2001, Madayipara (Kannur Dt.); 1male, 1female, 22-x-2001, Meenmuttithodu (Kannavam R.F., Kannur Dt.), Coll.Md.Jafer Palot; 1female, 1-v-1999, Mayanad (Kozhikode Dt.), Coll. Ashok Kumar; 2males, 1female, 19-xi-1996, Chinnar WLS, (Idukki Dt.) Coll. P.M.Sureshan; 2males, 2females, 20-ix-2001, Malampuzha (Palakkad Dt.), Coll.Dinesan Cheruvat.

**Diagnosis : Male** : Eyes black above, greenish at sides and beneath, and with a narrow equatorial black band encircling them; labrum, genae, ante and postclypeus pale greenish yellow with black spot on each side of middle line of postclypeus; frons and vertex with a broad black fascia extending from eye to eye, followed by a greenish white stripe; similarly coloured stripe traverses the occiput behind the eyes, these two pale stripes enclosing a broadly elliptical stripe on the occiput; prothorax bronzed black on dorsum and lower parts of sides, marked with yellow or pale greenish yellow; thorax bronzed black on dorsum, with pale greenish yellow humeral stripes; black humeral spots present; small yellow spots on mesepimeron; the sides and below thorax marked with an irregular black stripe; legs variably bright orange to dull reddish, the posterior two pairs of tibiae moderately broadly dilated and about equal in length to the same femora; wings with pterostigma brown enclosed in a fine frame of yellow and thick black nervures; abdomen bronzed black as far as the middle third of segment 8, from

which to the end it is pale bluish white or pale creamy white, according to age; all segments from 1 to 6 marked with pale greenish white and remaining segments marked with black. Anal appendages pale yellow to white; the length of superior anal appendages only one-fourth the length of inferiors. **Female** : differs from the male in several respects. Labrum with a median basal black point; genae and clypeus pale brown; frons warm brown; vertex with a broken black line; a large bronzed black spot against the eyes; 2<sup>nd</sup> segment of antennae and distal end of 3<sup>rd</sup> segment creamy white; rest of upper surface of head and occiput pale brown or pale yellowish brown with a narrow black stripe behind the ocelli, second stripe on occiput behind the eyes, beneath head dull white; prothorax and thorax violaceous brown on dorsum, with a bronzed black fascia on the mid dorsum, pale brown laterally, the black markings reduced into lines or spots; legs brownish white or carneous, tibiae not dilated, femora with speckled band or striated black stripe; abdomen warm brown on dorsum, deepening to broad apical annules on segments 3 to 7; markings on segments 1 to 7 similar to the male; the apical half of segment 8 and whole of segments 9 and 10 pale brownish white or creamy white.

**Size** : Male : Abdomen 28 to 31 mm, Hind wing 16 to 18 mm. Female : Abdomen 29 to 30mm, Hind wing 20 mm.

**Habits and Habitat** : Usually found near slow moving streams, ponds and canals, overhanging the blades of grasses or leaves.

**Breeding** : Breeds in shallow waters and slow running streams.

**Status**: Common.

**Distribution** : Widely distributed throughout Southern Asia: Kerala: Chinnar Wildlife Sanctuary, Ernakulam, Kannur, Kasaragod, Kottayam, Kozhikode, Malampuzha, Silent Valley National Park, Thiruvananthapuram and Wayanad.

### 23. *Copera vittata deccanensis* Laidlaw [Plate-I, Fig. 4]

1863. *Psilocnemis vittata* Selys, *Bull. Acad. Belg.*, (2) 16 : 170.

1890. *Copera vittata* Kirby, *Cat. Odon.* p.129; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 198-201.

1923. *Copera vittata deccanensis* Laidlaw, *Rec. Indian Mus.*, 13 : 337-339; Fraser, 1923, *J. Bombay nat. Hist. Soc.*, 29 : 744.

**Material examined** : 1 male, 2 females, 18-iii-1996, Karimala (Ernakulam Dt.), Coll.C.Radhakrishnan; 1male, 3females, 31-iii-2004, Kinalur estate (Kozhikode Dt.) Coll. K.C.Gopi; 1male, 9-vii-2004, Thusharagiri (Kozhikode Dt.), Coll. K.G.Emiliyamma; 1male, 10-iii-2001, Valiyakarikkandam (Kannur Dt.), Coll. Md.Jafer Palot; 1male, 12-I-1992, Kudayuritty (Idukki Dt.), Coll. M.B. Raghunathan.

**Diagnosis** : **Male** : Eyes capped with black above, below this olivaceous green, marked with a narrow black equatorial belt; labrum bright greenish yellow; genae and

bases of mandibles pale bluish green; postclypeus, frons and vertex jet black; vertex with a pale bluish green stripe traversed from eye to eye; behind occiput a postocular creamy white stripe; prothorax black with a narrow ochreous stripe; thorax bronzed black on dorsum, the area between humeral suture and first lateral, dark chocolate brown or black; antehumeral stripe narrow, pale blue, sides bright greenish yellow, beneath thorax yellow; legs bright citron yellow, the two posterior pairs of tibiae very slightly dilated; wings hyaline, pterostigma dark reddish brown, paler at circumference, framed in black nervures; abdomen black on dorsum and sides as far as segment 10 pale blue; segment 1 and 2 warm reddish brown, with dorsum black on segment 1; segments 3 to 7 with narrow pale blue basal annules; anal appendages pale blue or creamy white; superior anal appendages at least half the length of inferiors. **Female** : Labrum bright yellow with a small median black spot; anteclypeus brown; genae and bases of mandibles greenish yellow; frons and vertex purplish brown with a broad black band extending from eye to eye, postocular stripe present; 2<sup>nd</sup> segment of antennae white, 3<sup>rd</sup> pale brown; prothorax blackish brown with a pale stripe on each side, posterior lobe with a pair of divergent, forwardly directed spines; thorax pale brown, marked similarly to the male, beneath thorax pale brown marked with three large black spots; legs yellow, all femora with the speckled beaded band on extensor surface; wings palely enfumed, pterostigma subquadrate, similar as in male; abdomen dark purplish brown, changing to black on segments 7 to 10; segments 3 to 7 with narrow basal pale yellow annules; segment 9 with a broad brownish white T-shaped marking on dorsum, segment 10 entirely brownish white.

**Size** : Male : Abdomen 28 to 34 mm, Hind wing 16 to 18 mm. Female : Abdomen 28 to 30mm, Hind wing 18 mm.

**Habits and Habitat** : Usually found near the slow running streams in submontane and montane areas.

**Breeding** : Breeds in slow-moving channels and shallow pools or streams in swampy forests.

**Status** : Common species near forest streams.

**Distribution** : Western Ghats: Kerala: Kannur, Kozhikode, New Amarambalam Reserve Forest, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Thiruvananthapuram and Wayanad.

### Family PLATYSTICTIDAE

#### Subfamily PLATYSTICTINAE

Commonly known as forest damselflies, the members of this family found within the tropical forest, possessing long, slender bodies and short wings. Wings very narrow, falcate at tips, hyaline or tipped with black; the nervure *ab* reduced or absent, when

present, extending from *ac* or to the posterior side of discoidal cell; *IA* absent; *Cuii* markedly reduced; discoidal cell elongate, the ends squared; abdomen of great length and very slender; the relative length of segments 8, 9 and 10 variable in individual species. They inhabit woodland streams, generally with mossy banks of streams in moist tropical rainforests and they fly far away from the breeding sites.

### Key to the genera of Family Platystictidae

- 1 Sectors of arc fused for a short distance from origin, and thus arising from a common stalk; the nervure *IRiii* straight, never zigzagged; *ab* entirely absent; abdomen double or more than double the length of hindwing, especially in male ..... *Protosticta* Selys
- Sectors of arc diverging from origin; the nervure *IRiii* zigzagged almost from origin; *ab* always present, but incomplete; abdomen less than double the length of wings ..  
..... *Platysticta* Selys

### *Platysticta* Selys

Dragonflies of slender build with the characteristics of the subfamily. Body colouring non-metallic black, brown or bright brick red marked with azure blue; wings long, narrow, falcate at apex, with a long petiole, hyaline or opaque at apices; sectors of arc arising at lower part of arc, but diverging from the origin; *ab* always present, but incomplete, meeting at or well away from the posterior margin of wing; abdomen less than double the length of wings.

#### 24. *Platysticta maculata deccanensis* Laidlaw

1915. *Platysticta deccanensis* Laidlaw, *Rec. Indian Mus.*, 11 : 388; Fraser, 1933, *Fauna Brit. India Odon.* 1 : 124–126.

1860. *Platysticta maculata* Selys, *Bull. Acad. Belg.*, (2) 10 : 437; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 121–123.

**Diagnosis : Male :** Eyes black above, olivaceous brown below; labrum and anteclypeus azure blue, bordered with black on labrum; postclypeus azure blue, bordered above with black; rest of head mat black; 3<sup>rd</sup> joint of antennae brownish at its distal end; prothorax dark reddish brown above, pale light red at the side and yellowish beneath; thorax bright brick red, changing to golden yellow low down on the sides and pale yellow beneath; mid dorsal carina and ante alar sinus marked out in black; legs reddish brown, proximal end of femora, coxae and trochanters golden yellow; wings palely enfumed, hyaline, pterostigma dark red framed in light yellow and black nervures; abdomen dark reddish brown, paling to golden yellow beneath at bases of segments 2 to 6; segments 8 to 9 azure blue; segment 8 with a narrow black basal annule; segment 10 blackish brown, very narrow. **Female :** Head similar to male: prothorax coloured

similarly, the posterior lobe very broad and rounded; thorax brick red, the dorsum and anterior half of mesepimeron black; the humeral suture finely delineated in reddish and upper and lower part of mesepimeron broadly so; antehumeral stripe narrow, pale blue and convex inwards; the black area of mesepimeron bordered with pale blue stripe; pale yellow beneath; legs and abdomen similar to the male, but segment 1 bright brick red at the sides, segment 8 only one fourth the length of 7, and blue without black mark; segment 9 with a large oval pale blue spot laterally and nearly twice the length of 8 and segment 10 very short, blackish brown.

**Size :** Male : Abdomen 45 to 47 mm, Hind wing 31 to 32 mm. Female : Abdomen 36 to 40 mm, Hind wing 28 to 29 mm.

**Habits and Habitat :** Found along the banks of montane streams clinging to mosses and ferns overhanging shady areas.

**Breeding :** Breeds in montane streams.

**Status :** Rare.

**Distribution :** Kerala and Tamil Nadu. In Kerala: Kavalai (Cochin) and Kovalam (Thiruvananthapuram).

### *Protosticta* Selys

Dragonflies of small size and slender build with characters of the subfamily, coloured steely black marked with creamy white and turquoise blue; wings hyaline, immaculate, long, narrow and falcate; sectors of arc fused for a short distance from origin and thus arising from a common stalk; *ab* entirely absent; abdomen of great length, especially in the male, double or more than double the length of hindwing, segments 3 to 7 very slim and very long, segments 8 to 10 varying in length in the species and sexes, 9 sometimes as long as 8, 10 very short. Anal appendages with superior segments chelate at apex, with an inner sub basal pointed spine, and furnished with a “finger-and-thumb” like structure; inferior appendage broad and conical at base.

### Key to the species of genus *Protosticta* Selys

1. Small species, with ground colour cupreous and abdomen of both sexes considerably less than 40 mm. in length; male and female of the same length ..... *hearseyi* Fraser
- Large species, with ground colour steely black and abdomen more than 40mm.in length; male always considerably longer than the female ..... 2
2. Pterostigma in both sexes blood red, ..... *sanguinostigma* Fraser
- Pterostigma in both sexes black; superior anal appendages chelate at apex ..... 3

3. Inferior anal appendages bifid at apex; posterior lobe of prothorax with a pair of long horn like processes ..... *antelopoides* Fraser
- Inferior anal appendages not bifid at apex, posterior lobe of prothorax without any horn like processes ..... 4
4. Basal half of segment 8 pale blue, with the mid dorsal carina finely black; superior anal appendages with the claw like arms narrow and of subequal length .....  
..... *gravelyi* Laidlaw
- Basal half of segment 8 pale blue, the mid dorsal carina not marked with black; superior anal appendages with the claw like arms not in sub equal length ..... 5
5. Outer fork of superior anal appendages thickened, obtuse at apex, but slightly longer than the inner ..... *davenporti* Fraser
- Outer fork of superior anal appendages very narrow, nearly four times the length of inner ..... *mortoni* Fraser

### 25. *Protosticta antelopoides* Fraser

1931. *Protosticta antelopoides* Fraser, *Rec. Indian Mus.*, **33** : 467–468 ; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 107 – 109.

*Material examined* : 1 female, 4-vi-2003, Thusharagiri (Kozhikode Dt.), Coll. Md.Jafer Palot; 1 male, 9-vii-2004, Thusharagiri (Kozhikode Dt.); 1 female, 10-v-2005, Vannathimala (Wayanad Dt.), Coll. K.G. Emiliyamma.

*Diagnosis* : **Male** : Eyes bottle green; labium pale yellow; labrum and anteclypeus turquoise blue, narrowly bordered with black on labrum; rest of head steely black; prothorax grayish black on dorsum, pale at sides, posterior lobe furnished with a short, robust spine at each outer end, and internal to these a pair of very long divaricate horn like process which extend half way up the dorsum of thorax, on which they lie; thorax steely blue black on dorsum, laterally black for the anterior half and remaining part pale blue marked with an oblique black stripe on mesepimeron; beneath unmarked; legs dull white with a broad pale blue ring followed by a narrow black ring towards the distal end of femora; wings hyaline; pterostigma black, with a fine yellow frame to the nervures; abdomen black, pale yellow beneath and on lower parts of sides, this colour extending on to dorsum at the base of segments 3 to 6 to form narrow basal rings; remaining segments unmarked. Anal appendages black, more than twice the length of segment 10, superior anal appendage chelate at apex and inferior anal appendages bifid at apex. **Female** : Exactly similar to the male in markings and wings, except the posterior lobe of prothorax without long medial horn like process, but lateral spines are present.

*Size* : **Male** : Abdomen 53 mm, Hind wing 30 mm. **Female** : Abdomen 40 mm, Hind wing 29 mm.

**Habits and Habitat** : Found along the banks of montane streams or inside the thick jungle, quite far away from water.

**Breeding** : Breeds in montane streams.

**Status** : Rare.

**Distribution** : Western Ghats: Kerala: Kozhikode, Munnar, Travancore and Wayanad.

## 26. *Protosticta davenporti* Fraser

1931. *Protosticta davenporti* Fraser, *J. Bombay nat. Hist. Soc.*, **35** : 70–71; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 105–107.

**Diagnosis** : **Male** : Closely similar to *P.gravelyi*, from which it differs by its much more robust build. Head, prothorax and thorax similar to *P.gravelyi*, but the markings are more definitely bluish and black markings of the prothorax restricted to the middle portion of the posterior lobe and ending as two points on the dorsum of the midlobe; legs with femora black, the two hind pairs white on extensor surface and middle pair with a white spot; tibiae dull white and tarsus black; wings broader and longer, 14 to 15 postnodals in forewings and 13 to 14 in the hindwings; abdomen black with the sides of segments 1, 2 and base of 3 bluish white; segments 4 to 7 with narrow white basal annules, which broaden apically on the sides; segment 8 with its basal third or half pale turquoise blue, which extend to apex of segment laterally and blue annules separated from the base by a small black triangle; segments 9 and 10 immaculate. Anal appendage: black, superior appendage chelate at apex, with an inner sub basal pointed spine, the distal end with “finger- and -thumb” like structure; inferior appendages broad at base. **Female** : Similar to the male, except the following characters: basal half of labrum and anteclypeus turquoise blue; rest of head glossy black; prothorax with the middle three fourth of posterior lobe and posterior half of dorsum of middle lobe black, remaining part creamy white; thorax steely blue black on dorsum, laterally pale blue, marked with a thick oblique black stripe and a short streak on metepimeron; beneath creamy white marked with a black spur shaped bifid streak; legs and wings similar as in male; abdominal segment 7 with a broad basal pale blue ring and notch at two points by the black, so that the hinder border serrated; segment 8 with a large basal lateral pale blue spot; segments 9 and 10 unmarked.

**Size** : Male : Abdomen 43 to 45 mm, Hind wing 23 to 24 mm. Female : Abdomen 35 to 37 mm, Hind wing 23 to 24 mm.

**Habits and Habitat** : Found among rocks and ferns or in the dark tunnels formed by trees and shrubs, which are overhanging above flowing water.

**Breeding** : Breeds in montane streams.

**Status** : Rare.

**Distribution** : Uttar Pradesh, Western Ghats: Kerala: Munnar and Travancore.

### 27. *Protosticta gravelyi* Laidlaw [Plate-III, Fig.10]

1915. *Protosticta gravelyi* Laidlaw, *Rec. Indian Mus.*, 11 : 389-390; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 103 - 105.

*Material examined* : 1 male, 2 females, 9-vii-2004, Thusharagiri (Kozhikode Dt.), Coll. K.G.Emiliyamma; 1 male, 30-v-2002, Kinalur estate (Kozhikode Dt.), Coll. K.C. Gopi; 1 female, 4-vi-2003, Thusharagiri (Kozhikode Dt.), Coll. Md. Jafer Palot; 1 male, 31-i-1995, Paripputhodu (Kannur Dt.), Coll. P.M. Sureshan.

*Diagnosis* : **Male** : Eyes dark bottle green, pale greenish beneath; labrum turquoise blue, bordered with black very broadly; clypeus pale turquoise blue; frons, vertex and occiput glossy black; prothorax creamy white, marked with a broad black triangle dorsally, with its base occupying the greater part of posterior lobe and its apex in the middle lobe; thorax steely glossy black, marked with a broad, oblique, creamy white stripe on each side extending to the middle pair of legs, and a similar stripe on the posterior part of metepimeron extending on to the hinder pair of legs; beneath marked with broad black stripes on each side which converge and fuse anteriorly; legs creamy white; wings hyaline, pterostigma black; 13 to 14 postnodal nervures in forewings, 12 to 13 in the hind; abdomen black, marked with white and turquoise blue: segment 1 and 2 white laterally, segment 3 black on the dorsum and with a narrow basal annule, segments 4 to 7 with broad basal annules and mid dorsal carina black, basal half of segment 8 turquoise blue, with the mid dorsal carina finely black, segments 9 and 10 unmarked; segment 9 double the length of 10 and 8 double the length of 9; anal appendages with superior segments chelate at apex and furnished with a "finger- and - thumb" like structure; inferior appendage broad and conical at base. **Female**: Similar to the male, but short and robust than male; black border of labrum broader; eyes in the living state with a diffuse white spot on outer side; wings with 13 to 14 postnodal nervures in all wings; abdomen shorter and stouter, especially from segment 7 to the anal end; segment 7 three times as long as 8; segment 9 three times longer than 10; the basal annule on segment 7 occupying only about one fifth of its length; segment 8 is unmarked and with large white spot on each side; segment 9 and 10 immaculate, but sometimes with a large lateral white spot on segment 9.

*Size* : Male : Abdomen 46 to 49 mm, Hind wing 20 to 22 mm.

Female : Abdomen 33 to 35mm, Hind wing 19 to 23mm.

*Habits and Habitat* : Found among rocks and ferns or in the dark tunnels formed by trees and shrubs, which are overhanging above torrential flowing water.

*Breeding* : Breeds in montane streams.

*Status* : Uncommon.

*Distribution* : Maharashtra and Western Ghats: Kerala: Cochin, Kannur, Kozhikode, Nilambur and Vythiri.

## 28. *Protosticta hearseyi* Fraser

1922. *Protosticta hearseyi* Fraser, *Rec. Indian Mus.*, 24 : 5–6; Fraser, 1933, *Fauna Brit. India Odon.* 1: 113–115.

**Diagnosis : Male :** Eyes olivaceous above, paling and changing to pale blue beneath; labrum turquoise blue narrowly bordered with black; the two basal joints of antennae blue; clypeus turquoise blue; frons, vertex and occiput black; prothorax pale blue; thorax cupreous or reddish brown in colour on dorsum, pale blue laterally, mid dorsal carina finely blue; laterally a broad black oblique stripe traverses the postero lateral suture and anterior part of metepimeron; beneath white marked with a black round spot between the legs and a pair of short stripes which converge and confluent with the spot; legs bluish white with black markings; wings hyaline, pterostigma black; 10 to 14 postnodals in forewings, 10 to 12 in the hindwing; abdomen enfumed brown or cupreous marked with pale blue; segments 1 and 2 with the sides bluish white and with a diffuse longitudinal stripe on the middorsum; segments 3 to 7 with narrow pale basal annules extending more broadly along the sides and with broad black apical annules; segment 8 turquoise blue, with a narrow black apical annule; 9 and 10 black, with a bluish arc shaped spot on each side of segment 9; segment 7 twice the length of segment 8; 8 half as long again as 9, which is more than twice the length of 10. **Female :** Very similar to the male and approximately of the same length and more robust in build; differs as follows: eyes olivaceous brown above, changing to pale green below; labrum more broadly bordered with black; mid dorsal carina of thorax obscurely white at its upper part only; abdominal segment 7 with a broad basal annule; segment 8 brownish black, marked with a baso lateral dull white quadrate spot; segment 9 pale brown, marked with a broad white spot on each side confluent with a small subdorsal spot of the same colour.

**Size :** Male : Abdomen 30 to 35 mm, Hind wing 18 to 21 mm. Female : Abdomen 32 to 33 mm, Hind wing 22 mm.

**Habits and Habitat :** This species prefer the habitat of rocky hillside in virgin forest, where small fresh water stream running through the ferns and mosses to the river below.

**Breeding :** Breeds in montane streams.

**Status :** Uncommon.

**Distribution :** Western Ghats: Kerala: New Amarambalam Reserve Forest and Travancore.

### 29. *Protosticta mortoni* Fraser

1924. *Protosticta mortoni* Fraser, *Rec. Indian Mus.*, **26** : 500–501; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 111–113.

*Material examined* : 4 males, 12-v-2005, Banasura foot hills (Wayanad Dt.), Coll. K.G. Emiliyamma.

*Diagnosis* : **Male** : Eyes brilliant deep blue colour capped with black above, paler blue beneath; labrum turquoise blue, moderately broadly bordered with black along its free margin; clypeus turquoise blue; vertex and occiput glossy steely or bronzed black; frons black; prothorax pale blue, except the posterior lobe, which is black; thorax steely black on dorsum, pale blue laterally, traversed along the postero lateral suture by a broad black stripe; beneath thorax yellowish marked by two thick black stripes, which converge and become confluent anteriorly; legs white with black markings; wings hyaline, pterostigma black, framed narrowly in pale brown and thick black nervures; abdomen black marked with turquoise blue and white as follows: segment 1 blue laterally, segment 2 with the basal two thirds of sides white, 3 with a narrow white basal annule extended along the sides and narrowly interrupted on the dorsum, segments 4 to 7 with broad white basal annules, segment 8 with the basal half turquoise blue, this colour prolonged up to the apical end of segment and separated from the base by a narrow black annule; segments 9 and 10 entirely black; segment 7 very long, 8 about one third the length of 7, 9 more than half the length of 8 and slightly more than twice the length of 10. **Female** : Similar to the male, but much shorter and more robust, markings differ only on abdomen, segment 7 with a blue basal annule occupying one third to one fourth the length of segment, segment 8 with a large baso lateral whitish spot on each side, 9 and 10 entirely black; segment 7 rather more than four times the length of 8, segment 8 is slightly shorter than 9 and 9 is four times the length of 10.

*Size* : Male : Abdomen 42 to 43 mm, Hind wing 20 mm. Female : Abdomen 32 to 33 mm, Hind wing 19 to 20 mm.

*Habits and Habitat* : Found along the banks of montane streams or inside the thick jungle.

*Breeding* : Breeds in montane streams.

*Status* : Uncommon.

*Distribution* : South India : Kerala : Wayanad.

### 30. *Protosticta sanguinostigma* Fraser

1922. *Protosticta sanguinostigma* Fraser, *Rec. Indian Mus.*, **24** : 6 – 7; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 109–111.

**Material examined** : 1 male, 11-v-2005, Chembra (Wayanad Dt.); 1 male, 28-viii-2003, Thusharagiri (Kozhikode Dt.), Coll. K.G. Emiliyamma; 2 males, 3 females, 4-vi-2003 & 13-vi-2003, Thusharagiri (Kozhikode Dt.), Coll. Md.Jafer Palot.

**Diagnosis : Male** : Eyes bottle green blue, pale greenish blue below, these two colours separated by an equatorial band of blackish brown; labrum turquoise blue, narrowly bordered with black along the free margin; clypeus turquoise blue; frons, vertex and occiput glossy black; occiput marked with a transverse coppery brown fascia; prothorax black on dorsum, whitish laterally, middle lobe with a large oval blue spot on each side of the middle line; thorax glossy black, pale blue on the sides, a narrow oblique black stripe bordered with brown traverses the metepimeron; beneath immaculate; legs pale yellow with dark brown markings; wings hyaline; pterostigma blood red, 15 to 18 postnodal nervures in forewings and 14 to 15 in the hind; abdomen blackish brown on dorsum, paler on the sides, marked with white and pale turquoise blue : segments 1 and 2 white laterally, segments 3 to 6 with broad distal black annules and a narrow white annule at the base of 3, segments 4 to 7 with broad annules, segment 8 turquoise blue, its apical border black, and this colour extend along the mid dorsal carina at the base, segments 9 and 10 entirely black; segment 7 very long and broadening apically, segment 8 only slightly longer than 9 and 9 is three times the length of 10. **Female** : Differs from the male as follows: prothorax dull white laterally and without mid dorsal blue spots; wings similar to the male, 16 to 17 postnodals in forewing, 14 to 15 in the hindwing; abdomen black marked with white and turquoise blue as follows : segment 1 with a blue spot on each side, 2 with a lateral blue spot at the base prolonged lateralwards, apically and ventrally, segment 3 with its middle two third laterally and beneath brownish white, 4 similar and with a narrow whitish basal annule, 5 and 6 with well marked white basal annules, segment 7 with its basal third turquoise blue, segments 8 to 10 entirely black.

**Size** : Male : Abdomen 42 to 45 mm, Hind wing 22 to 26 mm. Female : Abdomen 39mm, Hind wing 26 mm.

**Habits and Habitat** : Found among rocks and ferns or in the dark tunnels formed by trees and shrubs, which are overhanging torrential flowing water.

**Breeding** : Breeds in montane streams.

**Status** : Uncommon.

**Distribution** : South India : Kerala : Kozhikode, Nilambur ghats, and Wayanad.

Family PROTONEURIDAE

Subfamily CACONEURINAE

Protoneuridae is a large family, montane or submontane habitat, and are spread throughout the tropical forest of the world. All species of this family breed in hill

streams. Dragonflies of small size and slender build, coloured usually black marked with blue, less commonly black marked with red or yellow. Wings long, narrow and pointed at apex or shorter, broader and rounded at apex; petiolation beginning slightly proximal to the level of *ac*; the nervure *ab* variable in the genera, either present and vestigial or complete or entirely absent; *IA* absent or rudimentary; *Cuii* variable, often reduced; discoidal cell elongate, the ends more or less squared; pterostigma diamond shaped. Abdomen of moderate length, slender and usually considerably shorter than the wings; segments 8, 9 and 10 becoming progressively shorter from 8 to 10.

### Key to the genera of Family Protoneuridae

1. *ab* present and complete ..... 2
- *ab* present, but incomplete ..... 4
- *ab* entirely absent ..... *Melanoneura* Fraser
2. *Cuii* extending 8 to 9 cells in length; *IRiii* arising at level of subnode; posterior lobe of prothorax simple in both sexes ..... 3
- *Cuii* extending only 4 cells length; *IRiii* arising distal to the oblique nervure descending from subnode; posterior lobe of prothorax in female armed with 1 or 2 pairs of hooks ..... *Elattonneura* Cowley
3. Large species, forewings with about 30 postnodal nervures; abdominal segments 7 to 10 azure blue on dorsum ..... *Phylloneura* Fraser
- Small species, forewings with about 20 postnodal nervures; abdominal segments 8 to 10 azure blue ..... *Esme* Fraser
4. *Cuii* extending 8 to 9 cells in length; *IRiii* arising at the level of subnode; posterior lobe of prothorax simple in both sexes ..... *Caconeura* Kirby
- *Cuii* extending only 4 cells in length; *IRiii* arising distal to the subnode; posterior lobe of prothorax in female armed with 1 or 2 pairs of strongly curved hooks ..... *Prodasineura* Cowley

### *Caconeura* Kirby

Dragonflies of moderate size and slender build, with abdomen less than twice the length of wings; coloured black, marked with blue in both sexes; prothorax with posterior lobe simple in both sexes, but hook like processes on the anterior lobe of females; wings hyaline, narrow, very long and subfalcate at apices, moderately long and petiole; nervure *ab* always present but incomplete; *IA* absent; *Cuii* reduced, not extending to half the length of wings, usually 8 to 9 cells in length; pterostigma comparatively small, diamond

shaped; abdomen cylindrical, long, slim, broadened at base and again towards the terminal segments, about half as long again as the wings. Anal appendages very homogeneous, superiors shaped like the butt end of a revolver, obtuse at apex and with a long unguate ventral process; inferiors simple, broad at base, tapering rapidly to apex, which is obtuse or pointed, directed straight back or curled a little upwards.

### Key to the species of genus *Caconeura* Kirby

1. Large species, under surface of head black; pterostigma diamond shaped; abdominal segments 4 to 7 with large, complete blue baso dorsal annules; superior anal appendage without a basal spine..... ***ramburi*** (Fraser)
- Small species, under surface of head azure blue; pterostigma quadrate shaped; abdominal segments 3 to 7 with narrow blue basal annules; superior anal appendage with a tiny sub basal tooth or spine..... ***risi*** (Fraser)

### 31. *Caconeura ramburi* (Fraser) [Plate–III, Fig. 1]

1917. *Indoneura gomphoides* Laidlaw, (*ramburi*, nec. *Gomphoides*) *Rec. Indian Mus.*, 13 : 347–348 ; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 252–254.

1922. *Indoneura ramburi* Fraser, *Rec. Indian Mus.*, 24 : 2-3.

**Material examined** : 4 males, 2 females, 28-viii-2003 & 9-vii-2004, Thusharagiri (Kozhikode Dt.), Coll. K.G. Emiliyamma; 3 males, 1 female, 4-vi-2003 & 13-vi-2003, Thusharagiri (Kozhikode Dt.), Coll. Md. Jafer Palot; 1 male, 1 female, 12-viii-1997, Kattilapara (Kollam Dt.), Coll. P.M. Sureshan.

**Diagnosis** : **Male** : Eyes deep marine blue capped with black; labium pale yellow; labrum, anteclypeus, postclypeus and bases of mandibles steely bluish black; genae and a broad transverse stripe traversing frons azure blue, this blue area divided transversely by a black stripe which crosses the genae and confluent with black of clypeus; under surface of head black; prothorax black, the whole anterior lobe and a comma - shaped spot on middle lobe blue; thorax velvety black on dorsum, marked with narrow azure blue antehumeral stripes and azure blue on the sides, with a black stripe on postero lateral suture; beneath pale blue, unmarked; legs black, marked with blue; wings hyaline, palely enfumed in adults; pterostigma black or reddish brown, diamond shaped, longer than broad; 21 to 23 postnodal nervures in forewings, 19 to 20 in the hind; abdomen black, marked with blue as follows: segment 1 broadly at the sides; segment 2 with a broad stripe on each side, unmarked on dorsum; segment 3 with a pair of small baso dorsal spots; 4 to 7 with large, complete baso dorsal annules; segments 8 to 10 blue, apical border and sides of segment 10 black. Anal appendage with superiors has no basal tooth. **Female** : Closely similar to the male, but the markings more greenish blue or yellow, except in old specimens, where the colour similar to that of male; wings with pterostigma ochreous, framed in black nervures; 22 to 23 postnodal nervures in

forewings, 20 in the hind; markings of head and thorax similar to the male, those of abdomen differing as follows: the baso dorsal annules interrupted on all segments and form paired spots as on segment 3 of the male; segment 8 with a broad blue triangular spot; segment 9 with a T-shaped mark; segments 8 and 9 with the ventral border blue; segment 10 with a small saddle shaped marking on the dorsum.

*Size* : Male : Abdomen 43 to 44 mm, Hind wing 28 to 29 mm. Female : Abdomen 40 to 41mm, Hind wing 28mm.

*Habits and Habitat* : Gregarious in habits, large number of specimens found clinging on ferns or on leaves of big trees on the banks of small hill streams, flight short and weak.

*Breeding* : Breeds in montane streams.

*Status* : Uncommon.

*Distribution* : South India : Kerala : Kollam, Kozhikode and South of Palghat gap.

### 32. *Caconeura risi* (Fraser) [Plate-III, Fig. 2]

1931. *Indoneura risi* Fraser, *Rec. Indian Mus.*, **33** : 469-471; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 258-259.

*Material examined* : 3 males, 29-x-2000, Idamaruku (Kottayam Dt.), Coll. P.M. Sureshan; 1 male, 27-x-2001, Aralam WLS (Kannur Dt.), Coll. Md. Jafer Palot. 5 males, 16-iii-2001, Kulasekaram (Thiruvananthapuram Dt.); 1 male, 18-iii-2001, Vithurachathankodu (Thiruvananthapuram Dt.); 2 females, 30-v-2002, Kinalur estate (Kozhikode Dt.), Coll. K.C. Gopi; 1 male, 11-iv-2000, Adivaram (Kozhikode Dt.), Coll. K.G. Emiliyamma.

*Diagnosis* : **Male** : Eyes deep marine blue, capped with black; labium white; labrum, ante and postclypeus steely metallic blue black; bases of mandibles brownish; genae azure blue, marked with a large glossy black median spot; rest of head black, but the frons traversed by a broad azure blue stripe confluent with the blue of genae; head beneath occiput pale azure blue; prothorax black, the entire anterior lobe and sides of middle lobe azure blue; thorax velvety black on dorsum, marked with a pair of narrow, azure blue antehumeral stripes, the inner border of stripe slightly concave, the outer convex; laterally pale blue, marked with fusiform black stripe on mesepimeron; beneath thorax pale greenish blue, unmarked; legs pale brown or dull white, the extensor surface and distal ends of femora and tarsi black; extensor surface of tibiae, coxae and trochanters pale blue; wings hyaline, palely enfumed in adults, pterostigma black, subquadrate, not diamond shaped; 19 to 21 postnodal nervures in forewings, 19 in the hindwing; abdomen black, marked with blue as follows: segment 1 almost entirely blue, marked on the dorsum with a broad black band; segment 2 unmarked on dorsum, broadly blue at the sides; segments 3 to 7 with narrow blue basal annules; segments 8 to 10 entirely blue, the apical border and lower part of sides of segment 10 black.

Anal appendages longer than segment 10, superiors black, furnished with a tiny sub basal tooth. **Female** : unknown.

**Size** : Male : Abdomen 37 to 38 mm, Hind wing 23 to 24 mm.

**Habits and Habitat** : Found in the dense forest clinging on leaves or ferns on the banks of densely shaded streams.

**Breeding** : Breeds in hill streams.

**Status** : Rare.

**Distribution** : Western Ghats : Kerala : Kottayam, Kozhikode, (Tamaracherry) Thiruvananthapuram and Wayanad.

### *Esme* Fraser

Zygoterous members of moderate size and slender build, with same characters as the genus *Caconeura*, differing only in the neururation of the wings : nervure *ab* present and complete; *Cuii* not extending as far as middle of wing; only segments 8 to 10 marked with azure blue.

### Key to the species of Genus *Esme* Fraser

1. Labrum azure blue, anterior border and a small median point black; legs black, with small blue spots; abdominal segments 3 to 7 with very narrow complete baso dorsal annules ..... *cyaneovittata* Fraser
- Labrum glossy metallic blue black, without blue markings; legs black, coxae and trochanters azure blue; abdominal segments 3 to 6 with very small paired spots baso dorsally, segment 7 entirely black ..... *mudiensis* Fraser.

### 33. *Esme cyaneovittata* Fraser

1922. *Esme cyaneovittata* Fraser, *Mem. Dept. Agric. India (Ent.)*, 7 : 45–46 ; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 263–264.

**Diagnosis** : **Male** : Eye deep sea blue, capped above with black; labium with lateral lobe black, mid-lobe bluish white; labrum azure blue, anterior border and a small median point black; anteclypeus dull black; postclypeus glossy steely blue black; genae and a broad band on frons azure blue, this blue area traversed by a black band which is confluent with the black of clypeus; rest of head, including under surface black; prothorax black, the greater part of anterior lobe and lower part of sides of middle lobe azure blue; thorax velvety black on dorsum, marked with narrow antehumeral blue stripe extending up to ante alar sinus; laterally azure blue, traversed by a moderately broad oblique black stripe on postero lateral suture; beneath pale blue; legs black, coxae and

trochanters with small blue spots; wings hyaline, enfumed in adults; pterostigma black, finely framed in pale brown and thick black nervures; 20 to 21 postnodals in forewings, 18 in the hindwing; rarely a few double cells in the space between the costa and radius distal to the pterostigma; abdomen black, marked with azure blue as follows: segment 1 entirely blue except a small basal dorsal black spot; segment 2 with a broad stripe on each side; segments 3 to 7 with very narrow complete baso dorsal annules; segments 8 to 10 blue, the apical border of 10 narrowly and ventral borders of all segments broadly black. **Female** : closely similar to the male, differs as follows: labrum more broadly bordered with black; anterior lobe of prothorax with the blue area less extensive; wings with 20 postnodal nervures in forewings, 18 in the hindwings; abdomen more robust; only the apical third of segment 8 blue; segment 9 black, with a broad inverted T-shaped blue mark on dorsum; segment 10 blue, with its sides broadly black.

**Size** : Male : Abdomen 41 mm, Hind wing 30 to 31 mm. Female : Abdomen 40 mm, Hind wing 30 to 32 mm.

**Habits and Habitat** : Found in the dense forest clinging on leaves or ferns on the banks of densely shaded streams.

**Breeding** : Breeds in hill streams.

**Status** : Rare.

**Distribution** : Western Ghats: Kerala: South of Palghat gap and Travancore.

### 34. *Esme mudiensis* Fraser

1931. *Esme mudiensis* Fraser, *Rec. Ind. Mus.*, **33** : 472–473 ; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 264–266.

**Diagnosis** : **Male** : Eyes dark blue; labium white, palely tinted with blue; labrum metallic blue black, without blue markings; anteclypeus glossy black, postclypeus metallic blue black; genae pale azure blue, traversed by a broad black stripe which is continuous with the black of clypeus; rest of the head velvety black; frons with an interrupted pale blue middle line; antennae black; adjacent part of occiput and beneath head black; prothorax velvety black, the anterior lobe with a transversely oval blue spot, the lower lateral border of middle lobe azure blue; thorax velvety black on dorsum, marked with a narrow azure blue antehumeral stripe on each side; laterally azure blue, marked with an oblique black stripe on the postero lateral suture and mesepimeron; beneath pale blue, unmarked; legs black, coxae and trochanters azure blue; wings hyaline, palely enfumed in adults; pterostigma diamond shaped, blackish brown, framed finely in pale brown and thick black nervures; 23 postnodals in forewings, 21 in the hindwing; abdomen black, marked with azure blue as follows: segment 1 broadly blue at the sides; segment 2 with a broad stripe on each side; segments 3 to 6 with very small dorsal paired spots at base; segment 7 entirely black; segments 8 to 10 azure blue, but

the lower parts of sides black, with a narrow basal annule on segment 8. **Female** : Closely similar to the male, differing in the shape of blue markings on the terminal segments of abdomen; bases of mandibles blue as in male; the blue band traversing face broadly interrupted across the frons; wings with 20 postnodals in forewings, 18 in the hindwing; the sides of abdominal segments 1 and 2 with blue markings restricted; segment 3 with basal paired spots; segment 8 with three small apical spots, a median pyriform spot and oval spot subdorsally on each side; segment 9 with a broad triangular spot; segment 10 with a very small mid dorsal basal spot.

**Size** : Male : Abdomen 46 mm, Hindwing 32 mm. Female : Abdomen 44 mm, Hindwing 29 mm.

**Habits and Habitat** : Gregarious in habits, large colonies are found clinging to ferns on the banks of the small hill streams.

**Breeding** : Breeds in hill streams.

**Status** : Rare.

**Distribution** : South India.

### *Melanoneura* Fraser

Zygopterous dragonflies of moderate size and slender build, with the characteristics of the genus *Indoneura*, differing only in the neururation of the wings, in which the anal bridge is entirely absent, and a short nervure *Cuii* which is never more than 5 to 6 cells in length.

#### 35. *Melanoneura bilineata* Fraser

1922. *Melanoneura bilineata* Fraser, *Mem. Dept. Agric. India (Ent.)*, 7: 55; Fraser, 1933, *Fauna Brit. India Odon.* 1: 260 – 262.

**Material examined** : 1 female, 13-vi-2003, Thusharagiri (Kozhikode Dt.), Coll. K.G. Emiliyamma.

• **Diagnosis** : **Male** : Eyes azure blue for the lower two thirds, black for the upper third; labrum and anteclypeus metallic blue black; rest of head mat black, traversed by a moderately broad band across the postclypeus and cheeks; prothorax black, the sides broadly azure blue; thorax mat black, marked with a narrow antehumeral azure blue stripes and two broad blue stripes on the sides; legs black, coxae and trochanters blue; extensor surfaces of tibiae yellow; wings hyaline, pterostigma black; 19 to 22 postnodal nervures in forewings, 17 to 20 in the hindwing; anal bridge absent; *Cuii* only 5 to 6 cells long in all wings; abdomen black, marked with azure blue, segments 1 and 2 broadly blue on the sides, 3 to 6 with small basal lunules confluent over dorsum; 7 unmarked, 8 to 10 blue, with very narrow basal rings of black. **Female** : Very similar to the male, the

markings blue, only in very adult specimens, usually citron yellow or pale bluish green, especially the facial and antehumeral stripes, the sides of the thorax nearly always yellow; segments 8 and 9 with apical fleur-de-lis shaped markings, blue; pterostigma pale brown; 19 to 21 postnodal nervures in forewings, 17 to 18 in the hindwing.

**Size:** Male : Abdomen 41 to 45 mm, Hindwing 27 to 30 mm. Female : Abdomen 37 to 43 mm, Hindwing 27 to 31 mm.

**Habits and Habitat :** Gregarious in habits, large colonies are found clinging to ferns on the banks of the small hillstreams.

**Breeding :** Breeds in small hillstreams.

**Status :** Rare.

**Distribution :** Western Ghats: Kerala: Kozhikode and Wayanad.

### *Phylloneura* Fraser

Zygopterous dragonflies of moderate size, slender build and with the characteristics of the genus *Indoneura*, but differing in the neurulation of the wings, in which the network is denser, nodal index higher and the anal bridge complete as in *Esme*; the wings are longer and considerably narrower and rather more pointed and falcate at the apices; the azure blue markings are more extensive on the terminal abdominal segments.

#### 36. *Phylloneura westermanni* (Selys)

1860. *Alloneura westermanni* Selys, *Bull. Acad. Belg.*, (2) : 10 : 447.

1922. *Phylloneura westermanni* Fraser, *Rec. Indian Mus.*, 24 : 3-4; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 269-271.

**Material Examined :** 1 male, 2 females, 28-viii-2003, Thusharagiri (Kozhikode Dt.); 2 males, 23-ix-2004, Thusharagiri; 1 male, 10-v-2005, Vannathimala (Wayanad Dt.), Coll. K. G. Emiliyamma; 2 males, 1 female, 27-v-2003, Thusharagiri (Kozhikode Dt.), Coll. C. Radhakrishnan; 1 male, 2 females, 4-vi-2003 & 13-vi-2003, Thusharagiri (Kozhikode Dt.), Coll. Md. Jafer Palot.

**Diagnosis : Male :** Eyes deep sea blue, capped with black; labrum, ante and post clypeus steely blue black; bases of mandibles black, with a central blue spot; genae azure blue, traversed by a black band which is confluent with the black of clypeus; frons black, with blue on either side; rest of head velvet black, including under surface; prothorax black, the greater part of anterior lobe and a broad stripe on the middle lobe azure blue; thorax velvet black on dorsum, marked with very narrow antehumeral blue stripes; laterally azure blue, traversed by a moderately broad oblique black stripe over the postero lateral suture; a small pyriform posthumeral blue spot on each side; beneath bluish white; legs black, coxae and trochanters blue; extensor surfaces of tibiae yellow;

wings hyaline, deeply enfumed in adults; anal bridge arched at origin, but bend towards the hinder border of wing distally; pterostigma black or dark reddish brown, framed in black nervures; 28 to 31 postnodal nervures in forewings, 26 to 27 in the hindwing; *Cuii* 13 to 15 cells in length; many double cells between main nervures towards the apex of wings; abdomen black, marked with blue as follows: segment 1 broadly blue at the sides and narrowly along the apical border; segment 2 with the ventral border broadly blue; segments 3 to 5 with very narrow basal annules; segment 6 entirely black; segment 7 with its apical half azure blue; segments 8 and 9 entirely blue on dorsum, except for very narrow basal black annules; 10 blue on the dorsum, black laterally. **Female** : Exactly similar to the male, except for sexual differences and the blue markings on terminal segments of abdomen; abdomen shorter and more robust; segments 8 and 9 with large triangular dorsal blue spots; ventral border of segment 8 and dorsum of segment 10 blue.

**Size** : Male : abdomen 41 to 51 mm, Hindwing 28 to 37 mm. Female : Abdomen 45 to 46 mm, Hindwing 33 to 35 mm.

**Habits and Habitat** : Gregarious in habits, large colonies are found clinging to ferns on the banks of the small streams.

**Breeding** : Breeds in hillstreams.

**Status** : Rare.

**Distribution** : Western Ghats: Kerala: Kozhikode and Wayanad.

### Subfamily DISPARONEURINAE

Characters are same as that of family Protoneuridae.

### *Elattoneura* Cowley

Dragonflies of small size and slender build, with abdomen less than twice the length of wings; coloured black, marked with bright red, orange, yellow or blue, less rarely without markings or pruinose; head narrow; prothorax with the posterior lobe simple and rounded in the male, armed with one or two pairs of hooks in the female; wings hyaline, narrow, moderately rounded at apices; discoidal cell elongate, costal and posterior sides equal or slightly sub equal; nervure *ab* always present and always complete; *1A* absent; *Cuii* much reduced, rarely more than 4 cells in length; pterostigma diamond shaped; abdomen cylindrical, slim, broadened at base and terminal segments, about half as long again as the wings.

### Key to the species of genus *Elattoneura* Cowley

1. Black species, without markings, thorax thinly pruinose; superior anal appendages bifid at apex.....*tetrica* Laidlaw

- Black species, marked with bright red, extending on to abdomen as far as the base of segment 3 ..... *souteri* Fraser

### 37. *Elattoneura souteri* (Fraser)

1924. *Disparoneura souteri* Fraser, *Rec. Indian Mus.*, **26** : 521, 523; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 232–234.

**Diagnosis : Male :** Eyes reddish brown above, changing to greenish yellow beneath; head black, marked with bright cherry red; labrum and anteclypeus dark brown; postclypeus and cheeks pale red, a pale red band across the face from eye to eye and most intensely red on the clypeus; rest of head velvety black, vertex black, traversed by a broad band of bright cherry red; prothorax velvety black, with a fine point of cherry red at the center of posterior lobe, and a subdorsal stripe of same colour in continuation of the humeral stripes; thorax velvety black, marked with a broad cherry red humeral stripe on each side of dorsum along with a broad black band; laterally citron yellow stripe, with its anterior border bright cherry red; the hinder half of metepimeron primrose yellow; legs black, marked with yellow; wings hyaline, palely enfumed towards the tips in adults; pterostigma black, with a fine frame of yellow, enclosed in thick black nervures; abdomen black, segment 1 marked with bright cherry red at its base, and with an angulated yellow marking on the sides; segment 2 broadly cherry red on the dorsum, marked subapically with two large black spots and a narrow black apical ring, laterally and apically yellow, the sides entirely black below; segment 3 with its basal sixth cherry red, changing to yellow on the sides, the red part marked with a narrow sub basal black annule, and also a diffuse subapical yellowish spot on the sides and on segments 4 and 5; rest of abdomen black, unmarked. **Female :** Eyes dark brown above, greenish yellow in the lower half; labium, labrum and anteclypeus pale brown, cheeks greenish yellow and connected across the postclypeus by a golden yellow stripe; the red band on vertex with a golden yellow band; prothorax and thoracic markings similar to the male, but bright greenish yellow margined with golden yellow, instead of red; wings hyaline, pterostigma dark brown; legs black, the yellow markings brighter and more extensive; abdomen black, marked with golden brown and olivaceous; segment 1 with an olivaceous angulated mark on the sides; 2 with a fine golden yellow line on the mid dorsal carina, which is continued on to segment 3 up to its apical border; laterally segment 2 with a hasp-shaped mark of yellowish brown and a yellow streak beneath; segments 3 to 5 have the sides broadly golden brown, black at the basal part, apically diffuse olivaceous spots; 6 to 7 with very obscure markings; 8 to 10 have lateral greenish yellow stripe, the dorsal carina on these segments golden yellow.

**Size :** Male : Abdomen 30 mm, Hind wing 18 mm. Female : Abdomen 28 mm, Hind wing 18 mm.

**Habits and Habitat :** Due to the shy nature of this species it is hiding in shaded spots beneath overhanging bamboo, cane or bushes on the banks of submontane streams.

**Breeding** : Breeds in submontane streams.

**Status** : Rare.

**Distribution** : Western Ghats : Kerala : Tamaracherry (Kozhikode) and Malabar.

### 38. *Elattoneura tetrica* (Laidlaw)

1917. *Disparoneura tetrica* Laidlaw, *Rec. Indian Mus.*, 13 : 345–346; Fraser, 1923, *J. Bombay nat. Hist. Soc.*, 29 : 743; Fraser, 1933, *Fauna Brit. India Odon.*, 1: 235–236.

**Diagnosis** : **Male** : Eyes capped with black, pale blue beneath, marked with a black equatorial belt; labrum dark brown; genae and anteclypeus pale blue; rest of head velvety black; prothorax black, slightly pruinose at the sides and beneath; thorax velvety black, the front half of the anterior border of mesepimeron, the upper half of the hinder border of the postero lateral suture and lower border of metepimeron creamy white; beneath pale yellow, heavily bordered with black; legs black, the flexor surface of all tibiae bright yellow, the femora pruinose white; wings hyaline, palely enfumed apically; pterostigma dark blackish brown, 12 to 13 postnodals in forewings, 10 to 11 in the hindwing; abdomen black, thinly pruinose on the basal segments in adults; segment 1 with an obscure cordate lateral markings heavily pruinose; segment 2 with its ventral border narrowly pale yellow; segments 3 to 6 or 7 with minute baso dorsal paired pale bluish spots, the sides and beneath yellowish. **Female** : Eyes similar to the male, but pale olive green; labrum and anteclypeus pale ochreous; genae, anterior border of frons and postclypeus pale greenish blue, broadly bordered with blackish brown on postclypeus; rest of the head blackish brown, traversed by a narrow pale yellow stripe from eye to eye including basal segments of antennae; prothorax dark brown with large pale greenish white spots on middle lobe, below and behind which is a smaller yellowish spot; posterior lobe deeply and narrowly cleft, and with a robust bright yellow horn on each side of the cleft strongly sloped forwards; thorax dark blackish brown as far as antero-lateral suture, beyond this the sides are bright yellow with greenish tinge, marked with a narrow black stripe on the postero-lateral suture, and a chain of three spots on metepimeron; dorsum with a broad ochreous antehumeral stripe on each side, beneath pale yellow, heavily bordered with black; legs yellow marked with black; wings similar to the male and less enfumed, pterostigma paler, framed in fine yellow; abdomen black on dorsum, pale ochreous on the sides, paling to whitish near the apex of segments 3 to 6; baso-dorsal spots much larger than in the male and yellowish in colour; segments 3 to 6 with complete broad apical black rings round each segment; segment 9 with a small apico dorsal yellow diamond shaped spot; segment 10 with a short linear baso-dorsal yellow stripe.

**Size** : Male : Abdomen 27 to 28 mm, Hind wing 18 to 19 mm. Female : Abdomen 26 to 28 mm, Hind wing 18 mm.

**Habits and Habitat** : Due to the shy nature of this species it is hiding in shaded areas beneath overhanging bamboo, cane or bushes on the banks of submontane streams.

*Breeding* : Breeds in submontane streams.

*Status* : Rare.

*Distribution* : Western Ghats: Kerala: Malabar.

### *Prodasineura* Cowley

Zygopterous flies of small size and slender build, with abdomen less than twice the length of wings; coloured black, marked with bright red, orange, blue or yellow or rarely without markings. Head narrow; prothorax with the posterior lobe simple and rounded in the male, armed with one or two pairs of strongly curved hooks in the female; wings hyaline, narrow, moderately rounded at apices, never falcate, with a long petiole; discoidal cell elongate, costal and posterior sides equal; nervure *ab* absent, or present and then always incomplete, extending in a strong curve from *ac*, where the posterior margin of wing meets; *1A* absent; *Cu* much reduced, only 1 to 4 cells in length; pterostigma small, diamond shaped; abdomen cylindrical, slim, broadened at base and terminal segments.

#### 39. *Prodasineura verticalis annandalei* (Fraser)

1917. *Disparoneura tetrica* Laidlaw, *Rec. Indian Mus.*, **13** : 345–346; Fraser, 1923, *J. Bombay nat. Hist. Soc.*, **29** : 743; Fraser, 1933, *Fauna Brit. India Odon.*, **1** : 214–216.

*Material examined* : 1 male, 24-iv-2002, Puthuppady (Kozhikode Dt.); 3 males, 1 female, 11-iv-2000, Adivaram (Kozhikode Dt.), Coll. K.G. Emiliyamma; 4 males, 30-v-2002, Kinalur estate (Kozhikode Dt.); 1 male, 30-iii-1997, Pulickal (Parambikulam WLS, Palakkad Dt.); 1 male, 31-iii-2004, Kinalur estate (Kozhikode Dt.) Coll. K.C. Gopi.

*Diagnosis* : **Male** : Labium pale brown; labrum, genae, bases of mandibles and clypeus ochreous or reddish brown; rest of head velvety black, including upper half of eyes; (in teneral specimens the head is traversed by a pale yellowish band at the level of the anterior ocellus); prothorax velvety black, with a small comma like ochreous spot on each side of the middle lobe; thorax velvet black, marked with very narrow brick red antehumeral stripes; laterally two broad oblique stripes, one over the mesepimeron ochreous tinged with red along its anterior border, the second on the ventral border of metepimeron, pale yellow; beneath yellow, bordered with black, and pulverulent throughout in the adult stage; legs black, marked with yellow or greenish yellow; wings hyaline, enfumed palely at apices of hind wings, pterostigma dark reddish brown, acutely pointed at each end; *ab* vestigial, but always present; abdomen black, marked with pale yellow as follows: segment 1 with a small spot on each side; segment 2 with its ventral border narrowly yellow, and with a linear spot on the mid dorsal carina; segments 3 to 7 with small paired baso dorsal spots; the mid dorsal carina of segments 3 and 4, and sometimes 5, finely yellow. **Female** : More robust than the male, and markings pale creamy white instead of bright red or ochreous; eyes dark olivaceous above, pale gray.

below; labium pale yellow; labrum, genae, bases of mandibles and clypeus and anterior margin of frons narrowly pale yellow, postclypeus with a median groove and a small spot on each side dark brown; rest of head black, traversed by a yellow stripe at the level of anterior ocellus extending from eye to eye; prothorax black, traversed on each side by a broad yellow stripe; middle lobe with small geminate yellow spot on mid dorsum; posterior lobe deeply and narrowly cleft, furnished with a short and forwardly directed spine on each side; thorax black on dorsum with yellow antehumeral stripes extends up to the antealar sinus, which bears two small yellow spots; a small humeral spot on each side; laterally yellow, with oblique black stripe on the postero lateral suture; beneath similar to the male; legs yellow, marked with black; wings hyaline, pterostigma yellow, dark olivaceous at the center and framed in black nervures; abdomen similar to the male, but the sides of all segments rather broadly yellow, clouded with dark brown nearly as far as apex, and segment 2 with two parallel stripes on each side; segments 2 and 8 with the mid dorsal carina finely yellow and ventral surface bright yellow; segment 9 with a spear shaped stripe on the mid dorsal carina; segment 10 with a saddle shaped mark on dorsum.

**Size :** Male : Abdomen 29 mm, Hind wing 19 mm. Female : Abdomen 30 mm, Hind wing 20 mm.

**Habits and Habitat :** Found near submontane streams amidst vegetation in the dense forest.

**Breeding :** Breeds in submontane streams.

**Status :** Rare.

**Distribution :** Western Ghats: Kerala: Kozhikode, Parambikulam Wildlife Sanctuary (Palakkad), and Thiruvananthapuram.

### Superfamily LESTOIDEA

#### Family LESTIDAE

Damselflies of small size, with metallic or non - metallic markings on head, body and abdomen; resting with wings nearly wide open or more rarely with the wings closely apposed over the dorsum. Wings hyaline, uncoloured except for occasional enfumation; with a long petiole, petiolation begins at the postcostal nervure (*ac*) about midway between the two antenodal nervures, *ac* meeting *ab* (anal bridge) at the hinder border of the wing; discoidal cell elongate, narrow, similar or differing in the fore and hindwings, very acutely angulated at the distal end; sectors of arc arising from the middle of arc.

#### Key to the genera of Family LESTIDAE

1. Petiolation beginning a little before the level of *ac*; discoidal cell similar shape in fore wings and hindwings; pterostigma unicoloured ..... *Lestes* Leach

Petiolation beginning at the level of *ac*; discoidal cell differing in shape and size in fore and hindwings; pterostigma bicoloured ..... *Indolestes* (Fraser)

### *Lestes* Leach

Dragonflies of small size, with metallic or non-metallic markings on head, body and abdomen, always resting with the wings nearly wide open; wings with a long petiole, petiolation begins at the postcostal nervure; discoidal cell elongate, narrow, similar or differing in the fore and hind wings, very acutely angulated at the distal end; intercalated sectors usually present at apical end of wings; abdomen long and slender; superior anal appendages of male forcipate, spined outwardly.

### Key to the species of Genus *Lestes* Leach

1. Thorax with green metallic antehumeral stripes expanded outwardly at the upper ends; inferior anal appendage without white hairs ..... 2
- Thorax with green metallic antehumeral stripes deeply scalloped or crenulated on the outer sides; inferior anal appendage tipped with stiff whitish hairs .....  
..... *praemorsus praemorsus* (Selys)
2. Sides of thorax pale brown with a few black points; superior anal appendage tipped with yellow hairs ..... *elatus* Hagen
- Sides of thorax with two thick black bands enclosing a medial narrow brown stripe; superior anal appendage without yellow hairs ..... *malabarica* Fraser

### 40. *Lestes elatus* Hagen [Plate-II, Fig. 8].

1858. *Lestes elata* Hagen, *verh. zool.-bot. Ges. Wien*, 8 : 478; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 37–40.

1890. *Lestes elatus* Kirby, *Cat. Odon.* : 162.

*Material examined* : 1 female, 25-iii-1998, Kovalam (Thiruvananthapuram Dt.), Coll. P.T.Churian; 1 female, 22-ii-2001, Chathancode (Kozhikode Dt.); 1 male, 1 female, Mathappuzha (Malappuram Dt.), 11-iii-2006, Coll. K. G. Emiliyamma; 1 female, 4-ix-1995, Kottiyur R.F.(Kannur Dt.); 1 male, 26-xii-1994, Noolpuzha(Wayanad Dt.); 1 male, 25-xii-1994, Kuruva island (Wayanad Dt.), Coll. C. Radhakrishnan; 1 female, 20-vii-2004, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot.

*Diagnosis* : **Male** : Eyes turquoise blue; labrum, cheeks, bases of mandibles and anteclypeus turquoise blue; frons olivaceous green; vertex between the ocelli and bases of antennae black; thorax in tenerals warm brown on dorsum, changing to pale olivaceous and yellow on the sides, white beneath; in adults dark reddish brown to

almost black, heavily pruinose at the sides and chalky white beneath; dorsum marked with a pair of narrow antehumeral metallic green stripes expanded outwardly abruptly above; these stripes very brilliant and prominent in young specimens; wings hyaline, pterostigma black in adults, pale brown in teneral; abdomen pale yellow at the sides in teneral, pale bluish green in adults, marked broadly on dorsum with metallic green or bronze, changing to dull black on the terminal segments; anal segments creamy yellow, broadly tipped with black in teneral, entirely black in adults, the apices tipped with yellow hairs. **Female** : somewhat similar to the male, but always less melanotic, the markings always well defined and the ground colour pale brown.

**Size** : Male : abdomen 34-36 mm, Hindwing 23-24 mm. Female : Abdomen 34 mm, Hindwing 24 mm.

**Habits and Habitat** : Found both in plains and forest areas, near ponds and tanks during the monsoon months, and during the dry seasons it is hiding in the scrub jungle. During March, we collected specimens from scrub jungle and grassland, quite far away from water.

**Breeding** : Breeding in tanks and ponds.

**Status** : Common.

**Distribution** : Peninsular India. Kerala: Cochin, Kannur, Kozhikode, Periyar Tiger Reserve, Thiruvananthapuram and Wayanad.

#### 41. *Lestes malabarica* Fraser

1929. *Lestes malabarica* Fraser, *J. Bombay nat. Hist. Soc.*, 33 : 847-848; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 40-43.

**Material examined** : 1 male, 21-vii-2004, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot.

**Diagnosis** : **Male** : Adults: Eyes turquoise blue, paler beneath; labrum, bases of mandibles, cheeks and anteclypeus turquoise blue; postclypeus and vertex mat black; occiput and behind eyes dark brown to blackish; a large triangular spot on the inner side of each eye dark metallic green, extending forward as far as cheeks as a dark cupreous band; prothorax blackish brown, thinly pruinose laterally, posterior lobe dark brown; the mid dorsal carina and antehumeral stripe bright reddish brown, metallic stripe not at all expanded in its upper part; the anterior half of mesepimeron wholly black, the lower part of metepimeron and medio lateral stripe light brown; beneath black; legs yellow with black stripes; wings pale and evenly suffused; pterostigma black; abdominal sides azure blue, dorsum dull metallic, segment 1 with apical half of dorsum dull bronzed, the sides broadly azure blue; segment 2 with a thistle shaped stripe on dorsum; segments 3 to 6 with narrow blue basal rings and subapical yellow rings; segments 7 to 10 black, pruinose white on dorsum. **Female** : Very similar to the male, but the ground colour

more greenish than blue, the metallic antehumeral stripe dilated above as in *L. elata*, sides of thorax with five black spots; wings hyaline, enfumed in adults, pterostigma dark reddish brown to black, according to the age of specimen; abdomen with dorsum dull cupreous upto segment 6 and then dull mat black; apical half of segments 8, 9 laterally and segment 10 entirely yellow; in adults all these markings change to blue and finally mat black; anal appendages bluish. **Teneral : Male :** occiput and behind eyes ferruginous; prothorax pale yellow with warm reddish brown on dorsum, posterior lobe dark brown; thorax with dorsum bright metallic green, the mid dorsal carina narrowly and antehumeral stripe bright reddish brown, the metallic stripe slightly or not at all expanded in its upper part; the anterior half of mesepimeron blackish brown, with the rest of the sides and beneath thorax creamy white; wings hyaline; pterostigma pale brown; abdomen with the sides azure blue, dorsum dull metallic; segment 1 with apical half of dorsum metallic green; segments 3 to 6 with dorsum metallic green; segments 7 to 10 black, segments 9 and 10 with large subdorsal pale blue to pale brown spots. **Female :** Ground colour yellowish; abdomen with dorsum bright metallic green to cupreous; apical half of segments 8, 9 laterally and segment 10 entirely yellow; anal appendages yellow.

**Size :** Male : abdomen 24 to 25 mm, Hindwing 21 mm. Female : Abdomen 32 to 33 mm, Hindwing 22 to 23.5 mm.

**Habits and Habitat :** Found among scrub vegetations and grasslands.

**Breeding :** Breeding in tanks and ponds.

**Status :** Uncommon.

**Distribution :** Andaman Islands, Chandigarh and South India : Kerala : Cochin and Kannur.

#### 42. *Lestes praemorsus praemorsus* (Selys)

1862. *Lestes praemorsa* Selys, Bull. Acad. Belg., (2) 13 : 320

1890. *Lestes praemorsus* Kirby, Cat. Odon. : 162.

1933. *Lestes praemorsa praemorsa* Selys, Fauna Brit. India Odon., 1 : 30-33.

**Material examined :** 1 male, 21-vii-2004, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot.

**Diagnosis : Male :** Eyes deep sapphire blue; labrum, anteclypeus, cheeks and a streak on postclypeus turquoise blue; rest of head mat black; prothorax with yellow markings hidden by pruinescence; thorax black on dorsum, marked by a pair of dark green metallic antehumeral stripes, straight on the inner border, deeply crenulated or lobed on the outer side; laterally blue or pale greenish yellow; several irregular spots present on the sides in non-pruinosed specimens; wings hyaline or palely enfumed in adults;

pterostigma dark reddish brown; abdomen pale blue, marked with bronzed green or coppery metallic dorsally, mat black on the hinder segments; segment 1 with a broad quadrate metallic spot; 2 with an elongate thistle shaped spot; 3 to 7 with similar bands; segment 8 with a narrow basal ring and sometimes with an apico lateral blue spot; segment 9 with a very large lateral blue spot; segment 10 with a small ventro lateral spot.

**Female** : Very similar to the male; differs as follows: labrum and cheeks more olivaceous or greenish yellow; antehumeral stripes more distinct and more prone to variation; sides of thorax yellowish or pale greenish blue, heavily pruinose white beneath and lower parts of sides; legs ochreous, with two anterior pairs of femora striped with dark brown on the outer side; sides of abdomen greenish yellow, borders and apical ends of segments 9 and 10 narrowly blue.

**Size** : Male : abdomen 32 to 35 mm, Hindwing 21 to 22 mm. Female : Abdomen 30 to 32 mm, Hindwing 20 to 21 mm.

**Habits and Habitat** : Found among grasslands.

**Breeding** : Breeding in tanks and ponds.

**Status** : Uncommon.

**Distribution** : Andaman Islands, West Bengal and Western India: Kerala: Malabar and Kannur.

### Subfamily SYMPECMATINAE

The members of this subfamily rest with their wings closed at the side or on top of the abdomen; discoidal cell differing in shape and size in fore and hindwings; they are rarely coloured metallic and many are coloured in shades of dull brown.

### *Indolestes* Fraser

Dragonflies of slender build, resting with wings closed over dorsum; body non metallic, ground colour bright azure blue; wings hyaline, petiolated as far as *ac*, nervure *ab* meeting *ac* at hind border of wing; discoidal cell narrow, long and acutely pointed; pterostigma unicolorous, narrow; intercalated sectors present at apical end of wings; abdomen long and slender.

### 43. *Indolestes davenporti* (Fraser)

1916. *Lestes gracilis birmanus* Ris, nec Selys, *Suppl. Ent.*, 5 : 13–14. *Ceylonolestes davenporti* Fraser, 1930, *J. Bombay nat. Hist. Soc.*, 34 : 96–97; Fraser, 1933, *Fauna Brit. India Odon.*, 1 : 69–71.

**Diagnosis** : **Male** : Labium pale yellow, labrum, genae, bases of mandibles and clypeus turquoise blue; central part of postclypeus blue, outer border black; head above bronzed or cupreous black; occiput yellow at the median part; prothorax black on

dorsum, broadly blue laterally; anterior lobe blue with a small black spot on its mid dorsum; posterior lobe with a fine mid dorsal blue line; thorax black on dorsum, with cupreous reflex up to the middle of mesepimeron, the border of black crenulated or angulate, narrow antehumeral blue stripe on thorax; laterally azure blue with a small linear black spot on mesepimeron, and a second black spot on the postero lateral suture; beneath pale blue or yellow clouded with brown, two oblique spots on the paired sclerites, and a pair of pyriform spots at center; legs bluish green; wings hyaline, pterostigma black or dark reddish brown; abdomen azure blue laterally and black on dorsum, with a metallic green reflex as far as segment 5, then with cupreous reflex to the end of segment 8; the greater part of 9 and the whole of segment 10 azure blue; segment 1 black on dorsum from base to apex; 2 with a metallic green thistle shaped marking extending the whole length of segment; 3 to 6 with mid dorsal carina ochreous and with narrow blue basal rings; segments 7 and 8 entirely black; segment 9 with a broad triangular black spot on each side confluent over dorsum at base. Anal appendages blue, apices and inner border black or entirely black in old specimens, the apices thickly coated with white hairs. **Female** : Closely similar to the male, wings hyaline, palely enfumed in very old specimens; the abdominal markings differing on segments 8 and 9, where the sides are broadly blue; segment 9 with the whole dorsum cupreous black; segment 10 with two large triangular black spots confluent or not.

**Size** : Male : Abdomen 30 to 33 mm, Hind wing 19 to 23 mm. Female : Abdomen 31 mm, Hind wing 24 mm.

**Habits and Habitat** : Found amongst scrub jungle near rivers, resting almost vertically with closed wings.

**Breeding** : Not known.

**Status** : Rare.

**Distribution** : Western Ghats: Kerala: Munnar, South of Palghat gap and Travancore.

### Superfamily CALOPTERYGOIDEA

#### Family CALOPTERYGIDAE

#### Subfamily CALOPTERYGINAE

**Diagnosis** : Damselflies of big size, coloured metallic blue or green; abdomen always longer than wings; eyes widely separated, frons sloping, occiput broad, depressed; prothorax robust, its posterior lobe large, tumid, triangular or crenate; middle lobe with a prominent boss or a round swelling on each side; thorax slender, flattened from side to side, elongate; legs long and slender; wings hyaline, opaque or partly so, coloured or uncoloured, often with a brilliant metallic colour or iridescent in male, uncoloured in females, hindwing broader than forewing, base narrow, but not petiolated; basal space

traversed, reticulated or entire; discoidal cell with costal border slightly convex or straight, traversed by several nervures; arc straight or markedly angulated, its sectors arising from a common point at its middle or below that level; ante and post nodal nervures numerous, costal and subcostal nervures coinciding; pterostigma present or absent, often rudimentary in one or both sexes, very variable in colour and shape, sometimes false in character, especially in females; abdomen very long, narrow and cylindrical, end segments very slightly broadened and depressed, segment 10 rarely keeled towards the apex; anal segments very similar in all genera.

### Key to the Families of Superfamily CALOPTERYGOIDEA

1. Wings petiolated, ending proximal to ac; epistome tumid and projecting like a nose in front of face; abdomen shorter than wings ..... CHLOROCYPHIDAE
- Wings not petiolated; epistome normal; abdomen longer than wings ..... 2
2. Sectors of arc arising from the middle or above middle of arc; basal space (median space) entire; discoidal cell straight and shorter than median space ....EUPHAEIDAE
- Sectors of arc arising from lower third of arc; basal space traversed or entire; discoidal cell convex costal wards and as long as median space  
CALOPTERYGIDAE

### Key to the Genera of Family CALOPTERYGIDAE

1. Arc angulated; basal space traversed; sectors of arc separated at origin, main sectors not forked; forewings of both sexes hyaline, hindwings opaque; pterostigma absent in male, false or absent in female ..... *Neurobasis* Selys.
- Arc oblique, not angulated; basal space entire; sectors of arc arising from a single point, most main sectors forked; pterostigma absent ..... *Vestalis* Selys.

### *Neurobasis* Selys

**Diagnosis :** Brilliant blue or green coloured damselfly, wings moderately rounded at apices; forewings of male hyaline, hindwings opaque and coloured partly with brilliant metallic green and blue; all wings of female hyaline but with an opaque whitish spot at node; pterostigma absent in male, false and whitish in female; basal space traversed by several nervures; sectors of arc angulated, arising from near middle of arc.

### 44. *Neurobasis chinensis chinensis* (Linnaeus) [Plate–III, Fig. 8]

1758. *Libellula chinensis* Linnaeus, *Syst. Nat.*, 1 : 545; Edwards, 1750, *Nat. Hist. Birds*, 3 : 112.

1842. *Calopteryx chinensis* Rambur, *Ins. Nevrop.* : 226.

1890. *Neurobasis chinensis* Kirby, *Cat. Odon.* : 102; Fraser, 1924, *Rec. Indian Mus.*, 26 : 428, 479.

1934. *Neurobasis chinensis chinensis* Fraser, *Fauna Brit. India Odon.*, 2: 121–124; Lieftinck, 1954, *Treubia*, 22 (suppl.) : 23.

**Material examined** : 2 males, 2 females, 11-v-2005, Kanthanpara (Wayanad Dt.); 2 males, 1 female, 17-ii-2004, Thusharagiri (Kozhikode Dt.), Coll. K.G. Emiliyamma; 1 female, 27-x-1995, Venkoli (Parambikulam WLS, Palakkad Dt.); 1 male, 7-xi-1996, Thanikudy (Periyar Tiger Reserve, Idukki Dt.); 1 male, 1 female, 15-xi-1999, Evergreen (Ernakulam Dt.), Coll. P.M. Sureshan; 1 female, 22-x-2001, Meenmuttithodu (Kannavam R.F., Kannur Dt.), Coll. Md. Jafer Palot; 1 male, 1 female, 24-xii-1994, Kurichiat R.F. (Wayanad Dt.); 1 male, 25-xii-1994, Kuruva island (Wayanad Dt.), Coll. C. Radhakrishnan.

**Diagnosis : Male** : Labrum turquoise blue, with a large triangular medio basal black spot; cheeks and bases of mandibles pale blue; anteclypeus and postclypeus glossy metallic green; a small median yellow spot on anteclypeus and a large spot of yellow on each side of postclypeus; rest of head metallic green with a coppery reflex on occiput and vertex; antennae with basal and second joints pale blue; upper two thirds of eyes blackish brown, lower third bluish green; prothorax bronze green; thorax brilliant metallic green with stripes and sutures black or brown; forewings longer than hindwings, hyaline, tinted with pale yellowish green, especially along costa and at apex, venuration brilliant emerald green, especially the costa and main nervures, node thickened and clouded with brown; hindwings opaque, basal two thirds appearing brilliant metallic green or peacock blue, apical third blackish brown with violaceous reflections and green metallic nervures; pterostigma absent in all wings; discoidal cell traversed 7 to 13 times in forewings 11 to 13 in hindwings; abdomen narrow and cylindrical, much longer than wings, metallic bronzy green above and at sides, intersegmental joints bright emerald green, finely bordered with black; beneath black, segments 9 and 10 whitish. **Female** : Labrum, cheeks, bases of mandibles, lower third of eyes and two basal segments of antennae greenish yellow, labrum with a small medio basal black mark; postclypeus metallic green with small oval pale yellow spot on each side; upper two thirds of eyes brownish black; rest of head brilliant metallic green; prothorax and thorax as in male, but all sutures and stripes pale yellow or white; thorax beneath grayish white, unmarked; wings tinted with yellow, palely suffused with brown, especially at apices and along costa from base to node in forewing and generally deeper in tint throughout the whole of hindwings, all wings with an opaque creamy yellow patch at node; a creamy white pterostigma in hindwings, reduced or entirely absent in forewings, covering 7 to 14 cells, the nervures traversing it often incomplete and often missing in places; abdomen dull metallic bronzy green, with golden reflections on dorsum, black beneath, but thinly pruinose; all segments with a stripe on each side, rather obscure on segments 5 to 7, broad and conspicuous on 9 and 10; segment 10 ends with a distinct keel and a fine apical spine; laterally segment 10 has a small tubercle on each side surmounted by some minute teeth.

**Size** : Male: Abdomen 45 to 50 mm, Hindwing 32 to 38 mm. Female : Abdomen 44 to 50 mm, Hind wing 36 to 40 mm.

**Habits and Habitat** : Usually found near the densely shaded streams, males are commonly seen moving up and down over the stream, very close to the surface of the water rapidly, the colourful display of emerald green and peacock blue of hindwing is a wonderful sight; commonly they rest with closed wings on a rock in the mid stream or overhanging ferns and herbage near the stream.

**Breeding** : Breeds in montane and submontane streams.

**Status** : Locally common.

**Distribution** : Throughout India: Kerala: Cochin, Kannur, Kasaragod, Kottayam, Kozhikode, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Silent Valley National Park and Wayanad.

### *Vestalis* Selys

Ground colour of head, thorax and abdomen metallic green or blue; characters are same as that of subfamily, wings of both sexes rounded at apex, entirely hyaline or partly opaque or metallic; pterostigma absent in both sexes; basal space entire; sectors of arc arising from lower part of arc, not angulated; discoidal cell equal in length to basal space, traversed by several nervures; nervures *IA*, *Cuii*, *Riv+v* and *Riii* branched and pectinate at the distal ends; legs long and thin; abdomen cylindrical, slim and longer than wings.

#### Key to the species of Genus *Vestalis* Selys

1. Tips of wings black ..... *apicalis apicalis* Selys
- Tips of wings hyaline ..... 2
2. Two rows of cells between origins of *Cuii* and *IA* ..... *gracilis gracilis* (Rambur)
- Only a single row of cells between *Cuii* and *IA* ..... *gracilis montana* Fraser

#### 45. *Vestalis apicalis apicalis* Selys [Plate–III, Fig. 6].

1873. *Vestalis apicalis* Selys, *Bull. Acad. Belg.*, (2) 36 : 612; Kirby, 1890, *Cat. Odon.* p. 102.

1934. *Vestalis apicalis apicalis* Fraser, *Fauna Brit. India Odon.*, 2 : 128-130.

**Material examined** : 1 male, 1 female, 25-iv-2000, Thiruvambadi (Kozhikode Dt.); 2 males, 24-iv-2002, Puthuppady (Kozhikode Dt.); 1 male, 1 female, 11-iv-2000, Adivaram (Kozhikode Dt.), Coll. K.G.Emiliyamma; 1 male, 30-x-1995, Kamathalachi (Parambikulam WLS, Palakkad Dt.); 1 female, 28-x-2000, Bharanganam (Kottayam Dt.); 2 males, 1 female, 15-xi-1999, Evergreen (Ernakulam Dt.); 1 female, 8-viii-1997, Parakkadavu (Kollam Dt.); 1 female, 13-viii-1994, Begur R.F.(Wayanad Dt.); 2 males, 7-iv-1995, Karimkappu (KannurDt.); 1 male, 8-viii-1997, Parakkadavu (Kollam Dt.), Coll. P.M. Sureshan; 3 males, 16-iii-2001, Kulasekaram (Thiruvananthapuram Dt.); 1 male, 4

females, 30-v-2002, Kinalur estate (Kozhikode Dt.); 2 males, 23-iii-1994, Bendadukka (Kasaragod Dt.), Coll. K.C.Gopi; 1 male, 15-ix-2001, Kasaragod; 1 male, 23-x-2001, Kannavam R.F. (Kannur Dt.), Coll. Md. Jafer Palot; 1 male, 15-xii-1985, Kurichiyad (Wayanad Dt.), Coll. K.N.Nair.

**Diagnosis : Male :** Labrum, labium, bases of mandibles, cheeks, anteclypeus, two basal segments of antennae and an oblique oval spot on frons bright yellow, rest of head metallic emerald green; upper two thirds of eyes brown, the rest olivaceous or yellow; labrum sometimes with a broad quadrate basal spot or broad blackish brown line; prothorax metallic emerald green on dorsum and sides, yellowish on lower part of sides and beneath; posterior lobe truncate, conspicuously bordered with yellow; thorax brilliant metallic emerald green, mid dorsal carina finely black, humeral and anterolateral sutures finely yellow; metepimeron yellow, except for a narrow elongate metallic green triangle at its center; under surface and ventrolateral borders yellow, unmarked; legs blackish brown, flexor surfaces of femora, extensor surfaces of tibiae and coxae yellow; wings hyaline, apices of all wings broadly tipped with blackish brown for about the distal 5mm; discoidal cell traversed 4-5 times in forewings, 2-4 in hindwings; 10 cubital nervures in forewing, 8 to 9 in hindwing; abdomen metallic emerald green, marked with yellow, narrow interrupted basal yellow ring on segments 2 to 6 and sides of 1,2 and base of 3 yellowish; intersegmental nodes black; beneath black, often pruinose. **Female :** closely similar to male; labrum usually with a basal line in continuation with the medio-basal black spot; thorax with humeral and anterolateral narrowly bordered with brown; wings with the apical marking usually paler and less sharply defined; abdomen more coppery and less metallic than in male.

**Size :** Male : Abdomen 49-55 mm, Hindwing 36-39 mm. Female : Abdomen 46-50 mm, Hindwing 38-40 mm.

**Habits and Habitat :** This species is found in open spaces of forests, and along shaded pathways, occupying almost every twig in the vicinity of water or well away from water.

**Breeding :** Breeds in montane and submontane streams; the female oviposits in blades of grass or juicy stems overhanging a stream, often several feet above the water surface, the newly hatched larva dropping from there into the water.

**Status :** Locally common.

**Distribution :** Eastern Ghats, North East India and Western Ghats: Kerala: Ernakulam, Kannur, Kasaragod, Kottayam, Kozhikode, Malampuzha, New Amarambalam Reserve Forest, Parambikulam Wildlife Sanctuary and Thiruvananthapuram.

#### 46. *Vestalis gracilis gracilis* (Rambur) [Plate-III, Fig. 5]

1842. *Calopteryx gracilis* Rambur, *Ins. Nevrop.*, : 224.

1854. *Vestalis gracilis* Selys & Hagen *Mem. Soc. Sci. Liege*, 9 : 84. *Vestalis gracilis gracilis* Fraser, 1934, *Fauna Brit. India Odon.*, 2 : 126-128.

**Material examined** : 1 male, 1 female, 7-xii-2004, Kinalur estate (Kozhikode Dt.); 3 males, 16-iii-2001, Kulasekaram (Thiruvananthapuram Dt.), Coll. K.C.Gopi; 1 male, 1 female, 25-iv-2000, Thiruvambadi (Kozhikode Dt.), Coll. K.G. Emiliyamma; 1 male, 18-iii-1996, Cheechali (Parambikulam WLS, Palakkad Dt.); 1 male, 25-ii-1996, Chimony WLS (Thrissur Dt.); 1 female, 24-xii-1994, Kurichiat R.F.(Wayanad Dt); 2 females, 25-xii-1994, Kuruva island (Wayanad Dt.); 2 males, 4 females, 4-ix-1995, Kottiyur R.F.(Kannur Dt.) Coll. C. Radhakrishnan; 1 male, 15-xii-1997, Kovalam (Thiruvananthapuram Dt.); 3 males, 2 females, 18-i-1992, Painavu (Idukki Dt.), Coll. M. B. Raghunathan; 1 male, 2-viii-1995, Mavoor/Pallikadavu (Kozhikode Dt.); 1 female, 8-ii-1996, Kakkayam (Kozhikode Dt.); 3 males, 2 females, 17-i-1995, Peruvannamuzhi (Kozhikode Dt.); 1 male, 20-iii-1999, Mangalam Dam (Palakkad Dt.); 1 male, 1 female, 29-x-2000, Idamaruku (Kottayam Dt.), 1 male, 12-xi-1996, Mullakudy (Periyar Tiger Reserve, Idukki Dt.); 1 female, 15-xi-1999, Evergreen (Ernakulam Dt.); 1 female, 16-viii-1997, Amakulam (Kollam Dt.); 4 males, 2 females, 31-i-1995, Paripputhodu (Kannur Dt.), Coll. P.M.Sureshan; 1 male, 23-iii-1994, Bendadukka (Kasaragod Dt.); 2 females, 15-xii-1985, Kurichiyad (Wayanad Dt.), Coll. K.N.Nair.

**Diagnosis : Male** : Eyes with upper two thirds dark brown, the rest greenish yellow; labium, labrum, cheeks, bases of mandibles and basal joints of antennae coloured as in *V.apicalis*, rest of head brilliant metallic green, sometimes with golden reflections; prothorax, thorax and legs coloured similarly to *V.apicalis*, but posterior lobe of prothorax truncate, bordered finely with yellow; wings hyaline, iridescent with colours of mother of pearl or blue in some lights, especially in the central part of forewings; the whole of hindwings, the base of forewings as far as discoidal cell, whole length of costal margin between costa and nervure Riii, and extreme apex of wings tinted variably with greenish yellow; two rows of cells between *Cuii* and *IA*; discoidal cell traversed 4-6 times in forewing, 3-5 in hindwing; there are 3 to 4 rows of cells between *IA* and the posterior margin of wing; abdomen metallic green or blue, usually peacock-blue in teneral specimens, emerald green when mature, marked with yellow as in *V.apicalis*. **Female** : exactly similar to male in colour and markings, but abdomen usually more dull metallic and segments 8-10 yellow laterally.

**Size** : Male : Abdomen 45-56 mm, Hind wing 34-38 mm. Female : Abdomen 43-50 mm, Hind wing 36-39 mm.

**Habits and Habitat** : Same as that of *V. apicalis*, this species can be found along with *V.apicalis*.

**Breeding** : Same as that of *V. apicalis*

**Status** : Common.

**Distribution** : Eastern Ghats, North East India and Western Ghats: Kerala: Cochin, Idukki, Kannur, Kasaragod, Kottayam, Kozhikode, Parambikulam Wildlife Sanctuary and Thiruvananthapuram.

#### 47. *Vestalis gracilis montana* Fraser

1929. *Vestalis gracilis amoena* Fraser, *J. Bombay nat. Hist. Soc.*, 33 : 583.

1934. *Vestalis gracilis montana* Fraser, *Fauna Brit. India Odon*, 2 : 128 (1934)

**Material examined** : 1 male, 1 female, 26-i-1997, Peruvaripallam (Palakkad Dt.); 1 female, 16-iii-2001, Kulasekaram (Thiruvananthapuram Dt.); 1 female, 24-ix-1993, Santhimala (Kasaragod Dt.), Coll. K. C. Gopi; 1 female, 29-x-2000, Idamaruku (Kottayam Dt.), Coll. P.M.Sureshan; 1 male, 13-vi-2003, Thusharagiri (Kozhikode Dt.), Coll. Md. Jafer Palot; 1 female, 10-v-2005, Vannathimala (Wayanad Dt.), Coll. K. G. Emiliyamma.

**Diagnosis** : **Male and Female** : measurements, colouring and markings exactly similar to *V. gracilis gracilis*, but the venational character is different, only a single row of cell between *Cu<sub>ii</sub>* and *1A* nervure in hindwing; this subspecies is smaller than *V. gracilis gracilis*.

**Size** : Male: Abdomen 45-56 mm, Hind wing 34-38 mm. Female : Abdomen 43-50 mm, Hind wing 36-39 mm.

**Habits and Habitat** : Same as that of *V. gracilis*.

**Breeding** : Same as that of *V. gracilis*.

**Status** : Locally common.

**Distribution** : Arunachal Pradesh and South India: Kerala: Kottayam, Kozhikode, New Amarambalam Reserve Forest, Parambikulam Wildlife Sanctuary, Thiruvananthapuram and Wayanad.

### Family CHLOROCYPHIDAE

#### Key to the genera of Family CHLOROCYPHIDAE

1. Sectors of arc separated at origin; pterostigma present in all four wings of both sexes ..... 2
- Sectors of arc arising from a common point; forewings of male without a pterostigma ..... *Libellago* Selys
2. Wings petiolated to the proximal to nervure ac; tips of forewings in male opaque black ..... *Rhinocypha* Rambur

- Wings petiolated far distal to nervure ac; tips of both wings in male opaque black ..  
 ..... *Calocypha* Fraser

### *Calocypha* Fraser

Moderately small, but robust insects; head robust, triangular; eyes oval, large, projecting posteriorly, moderately separated from one another; epistome tumid and projecting like a nose; frons horizontal, rather longer than broad; occiput narrow; face projecting, ante and post clypeus very tumid and projecting, rounded and vesiculated; labium longer than broad, split into two narrow triangular parts; labrum oval; antennae with first segment rudimentary, second segment cylindrical and third segment longer and slender, its apex tumid; prothorax elongate; thorax robust, compressed, elongate, dorsum flattened, mid thoracic carina often bifid; the mesothoracic triangle, variable in length; legs long and slender; wings hyaline or opaque, petiolation of wings absent, or ending far proximal to level of arc; arc very oblique; discoidal cell straight and shorter than median space; abdomen broad, depressed and shorter than wings; anal appendages slender, superior pair twice the length of segment 10, curving in at apices which are bluntly pointed, furnished with a few hairs; inferior pair much shorter, half the length of superior, broad at base, backwardly directed and parallel with one another, furnished with a few minute spines on upper surface.

#### 48. *Calocypha laidlawi* (Fraser) [Plate–II, Fig. 6]

1924. *Rhinocypha laidlawi* Fraser, *Rec. Indian Mus.*, **26** : 482-483.

1928. *Calocypha laidlawi* Fraser, *J. Bombay nat. Hist. Soc.*, **33** : 457-458; Fraser, 1934. *Fauna Brit. India Odon.*, **2** : 53-55.

**Diagnosis : Male :** Head black, marked with bright vermilion red as follows: a large oval spot on epistome; a pair of large sub triangular spots on frons, two large tongue shaped spots on vertex; eyes dark brown; labium pale yellow; labrum glossy black; prothorax black, marked with creamy yellow, a narrow anterior collar, an oval spot on each side of middle lobe, a spot on each side of posterior lobe creamy yellow; thorax black, mesothoracic triangle very narrow and elongate, extending whole length of dorsal carina, bright vermilion red; central part of alar sinus creamy yellow, lower parts of sides azure blue; six large rounded yellow spot on underside, anterior pair confluent; wings hyaline, bases tinted with yellow, apical third of each wing opaque black with dark violet metallic reflections; pterostigma black, swollen outwardly, oblique at both ends; discoidal cell of forewings traversed once, rarely twice in both sexes, 2 to 3 times in hindwings; legs black, the flexor surfaces of two hind tibiae pruinose white; abdomen black, marked with bright azure blue on segments 1 to 8, 1 to 3 broadly blue on sides, 4 to 8 with broad wedge shaped spots and 2 to 8 with narrow paired basal subdorsal blue lunules. **Female :** Differs from the male in colouration and markings, the markings pale brownish yellow instead of vermilion red and azure blue, and its forewings entirely hyaline; head black, marked with pale ochreous as follows: two large oval spots covering

greater part of labrum; spots on upper surface of epistome and frons; bases of mandibles and a narrow stripe adjacent to each eye; basal segments of antennae; a small spot on each side of epistome and post ocular spots are pale ochreous; thorax black, marked with greenish yellow: two small spots on antealar sinus; a fine line on middorsal carina; a fine antehumeral stripe; a short post humeral stripe; a long stripe traversing whole length of sides; wings hyaline, hind pair with apices broadly brown as far proximal to inner end of pterostigma; centers of anterior cells hyaline; pterostigma with inner half black, outer half whitish, margined with black; abdomen black, marked with bright ochreous and greenish yellow.

*Size* : Male : Abdomen 17-18 mm, Hind wing 20 mm. Female : Abdomen 17 mm, Hind wing 24 mm.

*Habits and Habitat* : This insect is fond of shaded areas; it is found resting on half submerged logs in water, or on twigs overhanging the river.

*Breeding* : Not known.

*Status* : Extremely rare. No recent report of the species in Kerala.

*Distribution* : Karnataka and Kerala : Tamaracherry (Kozhikode)

### *Libellago* Selys

Characters similar to that of *Calocypha*, but differs in the following as: epistome more projecting, so that a deep fissure in between the frons and nasal; fore and hindwings similarly shaped, very long and narrow, reticulation moderately open; forewings of male in most species tipped with black, otherwise all wings of both sexes completely hyaline; antenodal nervures 4 to 7; sectors of arc arising from a common point, where the arc is strongly angulated at a little above its middle; nervure 1A undulated from its origin; petiolation ends proximal to the first antenodal nervure; intercalated nervures found near tips of wings; *Riii* arising widely distal to node; pterostigma absent in forewings of male except in those species where the apices are not tipped with black, present and very elongate in hindwings of male and in both pairs of wings of female; mesothoracic triangle absent or reduced, uncoloured; legs long and slim, usually all femora and tibiae pruinose white on flexor surface; abdomen short and stout, much shorter than the wings, fusiform, depressed and narrowing gradually towards the tenth segment; anal appendage with superior segment twice the length of segment 10, pincer like, cylindrical and pointed at apices; inferiors obtuse, less than half the length of the superiors.

### *Libellago lineata indica* (Fraser) [Plate-II, Fig. 7]

1919. *Micromerus lineatus* Fraser, *Rec. Indian Mus.*, **16** : 197-198, (larva); Laidlaw, 1924, *Spolia Zeylanica*, **12** : 354, 355.

1928. *Micromerus lineatus indica* Fraser, *J. Bombay nat. Hist. Soc.*, **33** : 686–687.

1934. *Libellago lineata indica* Fraser, *Fauna Brit. India Odon.*, **2** : 63–65.

**Material examined** : 1 male, 21-iii-1999, Mangalam dam (Palakkad Dt.), Coll. P.M.Sureshan; 2 males, 1 female, 24-iv-2002, Eengappuzha (Kozhikode Dt.), Coll. K.G.Emiliyamma; 2 females, 30-v-2002, Kinalur estate (Kozhikode Dt.), Coll. K. C. Gopi; 1 female, 26-viii-1982, Naduvattur (Kozhikode Dt.), Coll. K.N.Nair; 1 male, 23-ix-2001, Madayipara (Kannur Dt.); 1 male, 7-xii-2002, Aralam WLS (Kannur Dt.); 1 male, 23-x-2001, Kannavam R.F. (Kannur Dt.), Coll. Md.Jafer Palot.

**Diagnosis : Male** : Eyes brown, with bluish metallic luster; labium ochreous; labrum dark brownish yellow, black at base; epistome black with two spots on either side, anterior facet of epistome metallic blue; frons and vertex black, with reniform shaped spots on frons and a second pair of small round spots behind them; occiput black with a crown shaped mark with an elongate median point; prothorax black marked with citron yellow; thorax black, marked with citron or greenish yellow as follows: the whole of antealar sinus; mid dorsal carina finely; a narrow irregular shaped incomplete antehumeral stripe above; a small upper ante humeral spot, a narrow curved, incomplete post humeral stripe below; whole mesepimeron; the whole metepimeron, except anterior suture line and narrow ventral border; beneath yellow; legs black, flexor surfaces of tibiae and basal halves of anterior pair of femora pruinose white; wings hyaline, the bases of all wings palely tinted with amber colour up to node or even beyond node; apices of forewings tipped with black (absent in teneral specimens); pterostigma absent in forewing, black, tumid and elongate in hindwing; discoidal cell traversed once; abdomen with segment 1 bright golden yellow, the base narrowly black and a small quadrate black spot; segments 2 to 6 bright citron yellow, dorsum green, 2 with a thick mid dorsal dumbbell shaped black mark confluent with narrow basal ring; segments 3 to 5 with broad mid dorsal stripes confluent with narrow basal ring; 6 and 7 with basal subdorsal wedge shaped yellow spots; segments 8 to 10 black. **Female** : Eyes brown; labium yellow; labrum yellow with a small median basal point or tongue of black; epistome entirely yellow in front, metallic blue above, edged with black anteriorly and posteriorly; frons with an anchor shaped mark; markings of rest of head similar to those of male, but an additional pair of spots between ocelli; prothorax and thorax similar to that of male, but lateral markings on thorax more broad; legs yellow, femora lined with dark brown; wings hyaline, pale with amber tint; pterostigma present in all wings, creamy white in a black frame; abdomen yellow, with black markings as follows: segment 1 with a large quadrate spot on dorsum; 2 to 8 with the dorsum very broadly black, bisected by a narrow mid dorsal carinal yellow line; segment 9 with a large rounded sub dorsal yellow spot; segment 10 black, with two transversely elongate subdorsal yellow spots.

**Size** : Male : Abdomen 14 to 16mm, Hind wing 15 to 18mm. Female : Abdomen 13 to 17mm, Hind wing 17 to 20mm.

**Habits and Habitat** : Usually found on the blades of grasses or twigs near slow running streams.

*Breeding* : Breeds in montane and submontane streams.

*Status* : Uncommon.

*Distribution* : South India : Kerala : Kannur, Kozhikode and Palakkad.

### *Rhinocypha* Rambur

Characters similar to that of *Calocypha*, but differs in certain respects as: wings of male, less rarely of female also, coloured very brightly with metallic blues, violet, green or metallic coppery, at least in hindwings, often with clear vitreous spots and stripes on hindwings; antenodal nervures numerous; petiolation ending proximal to *ac*; shape of wings very variable, either all four wings very long and narrow, or hindwing considerably dilated at its middle; mesothoracic triangle always present and brightly coloured in most species, of variable length; legs long and slim, hind pairs of tibiae always pruinose white or yellow on the flexor surface.

#### 50. *Rhinocypha (Heliocypha) bisignata* (Selys) [Plate-II, Fig. 5]

1855. *Rhinocypha bisignata* Selys, *Syn. Cal.* 62; Kirby, 1890, *Cat. Odon.* p. 113; Laidlaw, 1917, *Rec. Indian Mus.*, 13 : 38; Fraser, 1934, *Fauna Brit. India Odon.*, 2 : 49-52.

*Material examined* : 1 male, 28-iii-1998, Golden Valley; 1 male, 29-iii-1998, Way to Chankiri (Thiruvananthapuram Dt.), Coll. P.T.Churian; 2 females, 25-iv-2000, Muthappanpuzha (Kozhikode Dt.), 1 male, 2 females, 30-xii-1998, Chalamattom (Kottayam Dt.); 1 female, 24-iv-2002, Poolode (Kozhikode Dt.); 1 male, 11-v-2005, Kanthanpara (Wayanad Dt.), Coll. K.G.Emiliyamma; 1 male, 1 female, 29-x-1995, Sirkarpathy (Parambikulam WLS, Palakkad Dt.); 1 female, 29-x-2000, Idamaruku (Kottayam Dt.); 1 male, 1 female, 28-x-2000, Bharanganam (Kottayam Dt.); 1 female, 30-x-2000, Kidangoor (Kottayam Dt.); 4 males, 1 female, 6-xi-1996, Karadikkavala; 1 male, 10-xi-1996, Karikkavu (Periyar tiger Reserve, Idukki Dt.); 1 male, 15-xi-1999, Evergreen (Ernakulam Dt.); 1 male, 23-xii-1994, Kurichiyat (Wayanad Dt.); 1 female, 9-viii-1997, Kazhuthuruthi (Kollam Dt.), Coll. P.M.Sureshan; 2 males, 15-iii-2001, Ponmudi (Thiruvananthapuram Dt.); 1 male, 1 female, 30-v-2002, Kinalur estate (Kozhikode Dt.), Coll. K.C.Gopi; 1 male, 1 female, 9-iii-2001, Aralam WLS (Kannur Dt.); 2 males, 3 females, 4-vi-2003, Thusharagiri (Kozhikode), Coll. Md.Jafer Palot.

*Diagnosis* : **Male** : Eyes brown; rest of head velvety black; a small spot external to each posterior ocellus, a postocular spot on each side, and an occasional occipital spot, all bright ochreous; prothorax black, with a large yellow spot on each side of middle lobe, a large rose pink spot on dorsum and a large yellow spot on outer end of posterior lobe; thorax black, mesothoracic triangle large and pink coloured, extending from one-third to half way up dorsum of thorax; a large spot of the same colour in between humeral suture and mesothoracic triangle; a small upper yellow antehumeral spot; a broad, very broken stripe on posterior half of mesepimeron and metepimeron golden

yellow; beneath three pairs of yellow spots; legs black, the two posterior pairs of tibiae and femora pruinose white on flexor surfaces; wings: bases of all wings hyaline, tinted with yellow, opaque blackish brown in apical area only; fore wings with outer fourth or more opaque with brilliant coppery colouration; hind wing with apical third opaque, and marked with two series coppery or violaceous vitreous spots; pterostigma black in all wings; abdomen black, marked with yellow as follows: segment 1 with a sub triangular lateral spot on each side; 2 with a mid lateral stripe, an apical spot and ventro lateral stripes; 3 and 4 similar to 2, but the mid lateral spot obsolete; 5 with apico lateral spot; all other segments unmarked. **Female** : Labium bluish green, tipped with black; labrum black, with a large oval yellow spot on each side; cheeks, border of the eye and posterior ocellus yellow; basal segments of antennae, two large triangular spots on upper surface of frons, a postocular spot on each side, mid occipital spot, all bright ochreous; prothorax black, a large spot on each side and borders of posterior lobe laterally, finely yellow; thorax as in male, but the large antehumeral spot replaced by a fine antehumeral line, while the mesothoracic triangle black, finely outlined in yellow, as also the mid dorsal carina; legs not pruinose; wings entirely hyaline, tinted palely with yellow, apices narrowly enfumed; pterostigma black, with pale creamy center; abdomen black, marked with yellow as in male, but rather extensively.

**Size** : Male : Abdomen 20 mm, Hind wing 24 to 26 mm. Female : Abdomen 16 mm, Hind wing 22 mm.

**Habits and Habitat** : Found on the twigs and leaves of plants near streams or on rocks in the midstream; sometimes, the females found far away from water, inside the forest, settling on twigs and leaves of plants.

**Breeding** : Breeds in hill streams with rocky boulders.

**Status** : Locally common.

**Distribution** : Eastern, Southern and Peninsular India: Kerala: Cochin, Kannur, Kasaragod, Kollam, Kozhikode, New Amarambalam Reserve Forest, Palakkad, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Thiruvananthapuram and Wayanad.

### Family EUPHAEIDAE

#### Key to the Genera of Family EUPHAEIDAE

1. Discoidal cell traversed; tenth abdominal segment without a carinal spine; both wings are similarly shaped and pointed at apex; wings hyaline throughout in both sexes; abdomen black ..... *Dysphaea* Selys
- Discoidal cell entire; tenth abdominal segment with one dorsal spine; hindwings of male usually much shorter than forewings and markedly rounded at apex; the apical

half or less of hindwing opaque black and sometimes bearing a brilliant metallic blue spot; abdomen in some species bright red, otherwise black ..... *Euphaea* Selys

### *Dysphaea* Selys

Head robust, transversely elongate; eyes globular, large and much more widely separated than in Chlorocyphidae; epistome normal, face depressed and sloping; other characters of head; prothorax and thorax normal; wings of male usually marked with opaque black, hyaline in the female, apices rather pointed, narrow; petiolation entirely absent; discoidal cell traversed at least once, short, about half or one third as long as the median space; sectors of arc arising from middle of arc and well separated at origin; usually 3 cubital nervures to all wings; 4 or more intercalated nervures between *IA* and posterior border of wing; only 2 intercalated sectors between *Cuii* and *IA*; pterostigma present in all wings of both sexes; abdomen always longer than wings; segment 10 notched at its apical border, its dorsum flat, not raised into a keel like spine.

#### 51. *Dysphaea ethela* Fraser

1924. *Dysphaea ethela* Fraser, *Rec. Indian Mus.*, **26** : 480–482; Fraser, 1934, *Fauna Brit. India Odon.*, **2** : 92 – 94.

**Diagnosis : Male :** Velvety black, two triangular yellow marks below and behind occiput; eyes dark brown above, pearly grey beneath; prothorax black with a dark ochreous rounded spot on each side of middle lobe; thorax velvety black, marked with fine antehumeral and humeral greenish yellow stripes, confluent above, separated below, but indistinct or absent in fully matured specimens; laterally greenish yellow, shaded with olivaceous brown; legs black, coxae with a spot and femora in subadult specimen with an inner stripe of yellow; wings evenly enfumed with pale greenish brown or darker brown, this varying according to the age of specimen, in some specimens, the tint is rich golden brown throughout the whole breadth and length of wings; pterostigma black, very long, covering 7 to 8 cells; discoidal cell traversed once; abdomen black, marked with greenish yellow as follows: segment 1 with a narrow apical annule and its ventral border; 2 with a broad lateral stripe; 3 to 6 with baso lateral half rings confluent with a lateral stripe; 7 and 8 with only the basal ring; 9 and 10 black. **Female :** eyes dark olivaceous brown, bluish grey beneath; rest of head black with citron yellow stripes on cheeks, frons, bases of mandibles and spots on labrum; prothorax black, with citron yellow spot on middle lobe and a small spot on outer side of posterior lobe; thorax black, marked with bright citron yellow as: antehumeral and humeral narrow stripes; laterally three stripes; a small spot of yellow beneath, partially obscured by pruinescence; legs as in male, but the yellow marking broad; wings hyaline, more or less enfumed according to age; discoidal cells traversed twice; abdomen black with markings similar to those of the male, but more clearly defined.

**Size :** Male : Abdomen 38 mm, Hind wing 33 mm. Female : Abdomen 32 mm, Hind wing 33 mm.

**Habits and Habitat :** The males are resting on prominent rocks or twigs projecting from the water in midstream and very difficult to catch them; the females are rarely seen, perching inside the jungle, near the stream.

**Breeding :** Breeds in fast flowing montane and submontane streams.

**Status :** Rare.

**Distribution :** Karnataka and Kerala: Malabar.

### ***Euphaea* Selys**

Head robust, transversely elongate; eyes globular, large and much more widely separated than in Chlorocyphidae; epistome normal, face depressed and sloping; other characters of head; prothorax and thorax normal; hindwings of male with (tips) opaque black; forewings hyaline and also all wings of female; forewings with pointed tip, where as hindwings rounded and considerably shorter than forewings; node situated nearer to the base of wing; usually the discoidal cell traversed once, but occasionally entire and occasionally three times; sectors of arc arising from middle of arc and well separated at origin; usually 3 cubital nervures to all wings; 3 or 4 intercalated nervures between 1A and posterior border of wing; pterostigma present in all wings of both sexes; abdomen cylindrical, very long and narrow, usually much longer than hindwings, but of the same length or shorter in the female; segment 10 with a very robust dorsal keel.

#### **Key to the species of genus *Euphaea* (Selys)**

1. Hind wings conspicuously shorter than fore wings; ante humeral stripes on thorax bright azure blue ..... *fraseri* (Laidlaw)
- Hind wings only slightly shorter than fore wings; ante humeral stripes on thorax ochreous ..... 2.
2. Labrum and cheeks bright ochreous; legs dull reddish throughout; nearly the apical half of hind wing black..... *cardinalis* (Fraser)
- Labrum bright azure blue; cheeks glossy black; legs bright yellow; only the apical third of hind wing black ..... *dispar* (Rambur)

#### **52. *Euphaea cardinalis* (Fraser)**

1924. *Pseudophaea cardinalis* Fraser, *Rec. Indian Mus.*, 26 : 512–513.

1929. *Indophaea cardinalis* Fraser, *J. Bombay nat. Hist. Soc.*, 33 : 295–296; Fraser, 1934, *Fauna Brit. India Odon.*, 2 : 108–110.

**Material examined :** 1 male, 12-xi-1996, Mullakudy (Periyar Tiger Reserve, Idukki Dt.); 1 male, 15-xi-1999, Evergreen (Ernakulam Dt.), Coll. P.M.Sureshan; 1 male, 26-x-2001, Aralam WLS (Kannur Dt.), Coll. Md.Jafer Palot.

**Diagnosis : Male :** Labrum bright ochreous, narrowly bordered with reddish brown, and a mediobasal tongue of dark brown; labium dull yellow, brown at its middle; anteclypeus dark blackish brown; postclypeus, bases of mandibles and cheeks bright ochreous; frons reddish ochreous, clouded with reddish brown at its middle and with a crenulated black basal line; four black points projecting into the base of postclypeus; sides of posterior ocellus and basal joints of antennae bright ochreous; rest of head black; eyes dark reddish brown; frons with long black hairs; prothorax black, with a large knob or swelling on each side of middle lobe, posterior border of posterior lobe and sides bright ochreous; thorax bright reddish ochreous and black, antehumeral and humeral ochreous stripe joined as a loop above and below; humeral suture narrowly outlined in black; laterally entirely ochreous except a long black oval spot; beneath thorax bright ochreous; legs entirely reddish, tarsi dark reddish brown; wings with forewings hyaline, slightly enfumed with a greenish tinge, tinted with yellow at extreme base; hindwings with outer half opaque black, this part dull coppery above, dull or steely bluish black below; pterostigma long, black, covers 10-12 cells; discoidal cell entire in all wings of some specimens, or traversed once in forewing or twice or thrice in hindwing, very variable; 2 cubital nervures in forewings, 2 to 4 in hindwings; hindwing 2 to 3mm. shorter than forewing and markedly rounded; abdomen bright vermilion red as far as the basal two third of segment 6, the remaining segments black; segment 8 and 9 with tufts of long ventral hairs; segment 10 with a very prominent carinal spine. **Female :** Labrum coloured similarly to male; labium black; cheeks, bases of mandibles, a broad fascia on frons and a small spot on outer side of posterior ocellus bright ochreous; rest of head black; prothorax and thorax bright yellow, marked with black as in male, but lateral stripes on sutures complete; legs blackish brown, flexor surfaces of femora yellow; wings hyaline, uniformly enfumed with pale greenish brown, hindwings more deeply than forewings and apices clouded with dark brown; pterostigma black, narrow; discoidal cell traversed once in all wings; abdomen black, marked with yellow, sides of segments 1 to 3 broadly yellow; segments 4 to 7 with longitudinal lateral stripe; 8 and 9 with sub quadrate apico lateral spots, segment 10 unmarked.

**Size :** Male : Abdomen 41–45 mm, Forewing 39–42 mm Hind wing 36–40 mm.  
Female : Abdomen 36 mm, Hind wing 37 mm.

**Habits and Habitats :** Usually, the males are found resting on prominent rocks projecting from the water in midstream or the twigs of trees near the stream; the females are rarely seen, perching inside the jungle near the stream or far away from the stream.

**Breeding :** Breeds in hill streams.

**Status :** Not common.

**Distribution :** Eastern and Southern India: Kerala: Kannur, Kozhikode, South of Palghat gap, Travancore (Though Fraser recorded only from South of Palghat gap, we have collected the species from Kannur and Kozhikode, north of Palghat gap)

53. *Euphaea dispar* (Rambur) [Plate–III, Fig. 4]

1842. *Euphaea dispar* Rambur, *Ins.Nevrop.* p.230;

1890. *Pseudophaea dispar* Kirby, *Cat.Odon.* p.109; Laidlaw 1917, *Rec. Indian Mus.*, 13 : 32.

1929. *Indophaea dispar* Fraser, *J. Bombay nat. Hist. Soc.*, 33 : 294–295; Fraser, 1934, *Fauna Brit. India Odon.*, 2 : 105–108.

**Material examined** : 1 male, 2 females, 9-vii-2004, Thusharagiri (Kozhikode Dt.); 1 male, 28-viii-2003, Thusharagiri (Kozhikode Dt.); 1 male, 12-v-2005, Banasura foothills (Wayanad Dt.); 1 male, 10-v-2005, Vannathimala (Wayanad Dt.), Coll. K.G.Emiliyamma; 1 male, 1 female, 8-iii-2002, Aralam WLS (Kannur Dt); 4 males, 4-vi-2003, Thusharagiri (Kozhikode Dt.), Coll. Md. Jafer Palot.

**Diagnosis** : **Male** : Labrum turquoise blue, finely bordered with black and with a black mediobasal tongue; labium dark reddish brown, paler at the borders of lateral lobes; bases of mandibles with a spot of turquoise blue; cheeks and epistome glossy black, rest of head mat black, unmarked; prothorax black, with a large knob or swelling on each side of middle lobe, a small reniform spot below it and posterior border of posterior lobe reddish ochreous; thorax black, marked with reddish ochreous as in *E.cardinalis*; legs bright yellow, the extensor surfaces of femora and tibiae dark reddish; wings hyaline, palely enfumed with greenish brown; tips of forewings blackish brown; tips of hindwings broadly black to as far proximal to pterostigma, nearly half way from tip to node; the black area of wings has steely blue or coppery bronze reflections; tips of hindwing rounded and only about 3mm.shorter than forewing, about 7mm.shorter than abdomen; pterostigma black, covering about 12 cells; 3 cubital nervures to all wings; discoidal cell usually traversed once, or sometimes twice or entire; abdomen bright vermilion red, segmental joints and entire abdomen from the apical third of segment 6 to the end black; segment 8 with a tuft of short black hairs on its ventral surface and about 8 long, stiff black hairs beneath the base of segment 9; segment 10 with a very prominent dorsal keel. **Female** : Labrum and bases of mandibles turquoise blue, a fine black border and a mediobasal black tongue on labrum as in male; labium dull yellow; cheeks, postclypeus, a round spot on outer side of posterior ocellus and a broad transverse band across frons bright ochreous; prothorax and thorax marked similarly to male, but yellow instead of bright reddish ochreous; legs as in male, but more black; wings hyaline, uniformly enfumed with greenish brown, and hindwings in old specimens with well marked brownish black tips; pterostigma similar to male; sometimes cubital nervures 2 to 4 in number; abdomen black, marked with bright yellow or ochreous, segment 1 almost entirely greenish yellow, 2 to 7 with longitudinal stripe on either side; 8 and 9 with quadrate apical lateral spot, 10 unmarked.

**Size** : **Male** : Abdomen 39–47 mm, Forewing 35–42 mm, Hind wing 32–40 mm. **Female** : Abdomen 35 to 38 mm, Hind wing 34 to 39 mm.

**Habits and Habitat** : Usually the males can be found perched on twigs some feet above the water, often at a great height especially towards nightfall, when they rise to

the tops of neighbouring trees; females can be seen in the nearby jungle, short distance away from the streams.

**Breeding :** Breeds in hill streams.

**Status :** Uncommon.

**Distribution :** Western Ghats : Kerala : Kannur, Kozhikode and Wayanad.

#### 54. *Euphaea fraseri* (Laidlaw) [Plate-III, Fig. 3]

1920. *Pseudophaea fraseri* Laidlaw, *Rec. Indian Mus.*, **21** : 23-27;

1929. *Indophaea fraseri* Fraser, *J. Bombay nat. Hist. Soc.*, **33** : 296-298; Fraser, 1934, *Fauna Brit. India Odon.*, **2** : 110-112.

**Material examined :** 3 males, 30-v-2002, Kinalur estate (Kozhikode Dt.), Coll. K.C.Gopi; 1 male, 11-iv-2000, Adivaram (Kozhikode Dt.), Coll. K.G. Emiliyamma; 1 male, 1 female, 26-x-2001, Aralam WLS (Kannur Dt.); 1 male, 23-x-2001, Kannavam R.F., (Kannur Dt.); 1 male, 13-vi-2003, Thusharagiri (Kozhikode Dt.); 1 male, 5-iv-1995, Uppukunnu (Kannur Dt.); 1 male, 21-ix-2003, Periya R.F (Wayanad Dt.), Coll. Md. Jafer Palot; 1 male, 12-viii-1994, Thirunelli (Wayanad Dt.); 1 male, 23-xii-1994, Kurichiyat (Wayanad Dt.); 2 males, 13-viii-1994, Irumpupalam, Begur R.F.(Wayanad Dt.), Coll. P.M.Sureshan.

**Diagnosis : Male :** Labrum pale azure blue, with its anterior border broadly black, no mediobasal black tongue; labium pale yellow; bases of mandibles azure blue, cheeks yellowish white; epistome glossy black; rest of head mat black with an oval yellow spot on outer side of posterior ocellus; eyes dark brown; prothorax black, with a large pale blue spot on each side of middle lobe; thorax black, antehumeral stripe bright azure blue; humeral stripe yellow, turning to reddish ochre below, very fine throughout; laterally bright ochreous with reddish tinge posteriorly and marked with a large oval black spot; beneath bright reddish ochreous; legs as in *E. cardinalis*, but brighter red, anterior pair dark reddish brown or almost black; wings hyaline, palely enfumed with greenish brown; hindwing very markedly shorter than forewing and with outer part opaque black, it extends from tip to halfway to node, with coppery reflection above and bluish violet below, the opaque black area less extensive in specimens taken from low altitude, more extensive in higher altitude; forewings hyaline, extreme apex tipped with brown; discoidal cell traversed once in forewing, twice or thrice in hindwing; 6 cubital nervures in all wings; pterostigma black, long and narrow, covers 8 to 12 cells; abdomen bright vermilion red from segment 1 to apex of segment 6; segment 7 dark reddish brown to black at apex; rest of abdomen black, with a prominent carinal spine on segment 10.

**Female :** Labrum, labium, mandibles and cheeks as in male; ante and postclypeus glossy black with transversely oval blue spot on postclypeus; frons black, the creamy white of cheeks extending on either side; rest of head black; posterior ocellus with greenish yellow spot; prothorax black, with a large oval spot on each side of middle lobe and

posterior border of posterior lobe greenish yellow; thorax black on dorsum, bright yellow on the sides, marked as in male; legs yellow, femora blackish on extensor surface, tibiae reddish; wings hyaline, palely enfumed, in many specimens the tips of both wings dark brown; 3 cubital nervures in all wings; abdomen black, marked with bright greenish yellow, segment 1 and 2 broadly on sides; dorsal carina throughout, broadening on segments 8 to 10 and 10 with a well defined spot; a longitudinal stripe on sides of 3 to 6, broad on 3; apical lateral spot on 8; a large lateral spot on 9 and sides of 10 entirely yellow.

**Size :** Male : Abdomen 36–41 mm, Forewing 34–38 mm, Hindwing 29–35 mm.  
Female : Abdomen 33 to 34 mm, Hind wing 31 to 33 mm.

**Habits and Habitat :** The males are seen near the streams, same as that of *E.cardinalis*, and can be seen at lower and higher elevation also.

**Breeding :** Breeds in hill streams.

**Status :** Locally common.

**Distribution :** South India: Kerala: Idukki, Kozhikode, Kannur and Wayanad.

### Suborder ANISOPTERA

Eyes separated, meeting only at a point or broadly confluent on vertex; labium with or without a median fissure; wings usually dissimilar; hindwing generally broadly dilated at base; discoidal cell split into two triangular cells, the discoidal cell similar or dissimilar in shape and size in fore and hindwings; pterostigma always present; antenodal nervures usually numerous, the costal and subcostal nervures are coinciding or not; primary antenodal nervures present in some genera; tenth abdominal segment with a pair of superior anal appendages present, but only a single inferior anal appendage, which may be triangular or bifurcated into two branches.

### Key to the super families of suborder Anisoptera

1. Discoidal cell in fore and hind wings more or less identical in shape .....  
..... AESHNOIDEA
- Discoidal cell in fore and hind wings differ in shape ..... 2
2. Eyes broadly confluent ..... LIBELLULOIDEA
- Eyes meeting at a point or more or less separated ..... CORDULEGASTEROIDEA

## Superfamily AESHNOIDEA

### Key to the families of Superfamily Aeshnoidea

1. Eyes widely separated ..... GOMPHIDAE
- Eyes more or less broadly confluent on vertex ..... AESHNIDAE

### Family GOMPHIDAE

Dragonflies of large or medium size, coloured yellow or black, marked with yellow or green, never metallic. Eyes well separated; vesicle not well defined; wings moderately broad, never petiolate and coloured, hyaline; hindwings in male strongly angulated at tornus, base more or less deeply excavated, in female rounded; costal and subcostal nervures not coinciding, the two primary robust antenodals always present; discoidal cell traversed or entire, that of forewing sub equilateral, that of hindwing elongate in length of wing; median space never traversed; anal loop absent or rudimentary; membrane more or less rudimentary. Anal appendages highly specialized, the inferior strongly bifid, with its branches closely apposed or strongly divaricated; male genitalia very variable in different genera and species.

Most Gomphidae on emerging, they leave the place immediately into heavy jungle, often to a great distance from the streams and come back only for oviposition. Thus the collection of these species is very difficult and most collections contain few examples.

### Key to the genera of family GOMPHIDAE

1. Discoidal cell, hypertrigone and subtrigone of fore wings entire; anal loop absent and anal triangle 3 celled ..... 2
- Discoidal cell, hypertrigone and subtrigone of fore wings traversed; anal loop present and anal triangle 5 celled ..... 7
- Discoidal cell, hypertrigone and subtrigone of both wings entire, anal loop present and anal triangle usually 4 celled ..... 8
2. Post anal cell in hind wing not extending proximal to the base of subtrigone ..... 3
- Post anal cell in hind wing extending to the middle/ proximal to the middle of base of subtrigone; ..... 5
- Post anal cell in hind wing extending nearly to the proximal end of base of subtrigone; discoidal cell in fore wing entire, traversed by a nervure in hind wing; abdominal segment 8 with wing like lateral projection ..... *Davidioides* Fraser
3. Frons and tornus rounded, basal incomplete ante nodal nervure absent; IA not pectinate; superior anal appendage lyrate, forcipate and curled like the horn of a cow ..... *Heliogomphus* Laidlaw

- Frons and tornus angulated; basal incomplete ante nodal nervure usually present; *IA* pectinate; superior anal appendage variable ..... 4
- 4. Abdominal segment 9 very long, as long as segments 8 and 9 together; superior anal appendage conical and acutely pointed, furnished with long, medial inner spine, strongly divaricate ..... *Macrogomphus* Selys
- Abdominal segment 9 normal in length; superior anal appendage lyrate or curled like the horn of a bull, or in some species simple and conical..... *Merogomphus* Martin
- 5. 2 transverse nervures between the sectors of arc from the arc to bifurcation of *Rs* in fore wing, 1 in hind wing; *IA* pectinate ..... 6
- 5 to 6 transverse nervures between the sectors of arc from the arc to bifurcation of *Rs* in fore wings, 3-4 in hind wings; *IA* not pectinate, flatly curved; superiors conical, pointed with a medial spine; inferior anal appendage triangular, bifid at apex, 2 branches curled upwards ..... *Microgomphus* Selys
- 6. Anal triangle 4 celled; abdominal segments 8 and 9 with wing like lateral expansion; superior anal appendage long, curled and very closely apposed; inferiors very short, less than half the length of superiors, strongly curled and closely apposed .....  
..... *Paragomphus* Cowley
- Anal triangle 3 celled; abdominal segments 8 and 9 without wing like lateral expansion; superior anal appendage conical, widely divaricate; inferiors bifurcated into two equally long divaricate branches ..... *Burmogomphus* Williamson
- 7. Abdominal segment 8 markedly expanded and bearing lateral wing like projection on each side; superior anal appendage half as long again as segment 10, narrow and pointed at apex; inferiors widely divaricate ..... *Ictinogomphus* Cowley
- Segment 8 without lateral wing like projection; superiors twice the length of segment 10, flattened laterally, forcipate and blunt at apex; inferiors slightly divaricate .....  
..... *Gomphidia* Selys
- 8. Abdominal segments 8 and 9 with short, but distinct lateral wing like projections; post anal cell extending well / widely proximal to the base of subtrigone ..... 9
- Abdominal segments 8 and 9 without or with pseudo lateral dilations; post anal cell extending slightly proximal to the base of subtrigone; superior anal appendage much straighter and curled only at apices; inferiors very closely apposed and curled strongly upto meet the superiors ..... *Onychogomphus* Selys
- 9. 3 to 5 transverse nervures between sectors of arc from arc to bifurcation of *Rs* in forewings; superior anal appendage simple, curved and slightly forcipate, tapering to the end; inferior bifid and its branches slightly divaricate ..... *Acrogomphus* Laidlaw

- 2 to 3 nervures between the sectors of arc from arc to bifurcation of Rs in fore wings; superiors projecting straight backwards, tapering finely to the end; inferior deeply bifid into two long narrow branches, which are themselves deeply bifid at the apex and slightly divaricate ..... *Megalogomphus* Campion

### *Burmagomphus* Williamson

Medium sized dragonflies, black colour, marked with bright citron yellow; frons angulated, rounded above; base of hindwings very oblique; tornus angulated and prominent; anal triangle 3 celled; only 2 transverse nervures between the sectors of arc from arc to bifurcation of Rs in forewings, only 1 in hindwings; anal loop absent; the first post anal cell in hindwing extending near the middle of base of subtrigone; basal incomplete antenodal nervure always absent; the first and fifth nervures are primary antenodals; discoidal cell in fore and hindwings entire; pterostigma relatively short, dilated and braced; IA in forewing pectinate; 1 cubital nervure in all wings; abdomen swollen at basal segments, then narrow and cylindrical as far as segment 7, from 8, it again expands and terminal segments gradually decreasing in length.

#### 55. *Burmagomphus pyramidalis pyramidalis* Laidlaw

1922. *Burmagomphus pyramidalis* Laidlaw, *Rec. Indian Mus.*, **24** : 371, 399–401; Fraser, 1923, *J. Bombay nat. Hist. Soc.*, **29** : 62, 33; Fraser, 1934, *Fauna Brit. India Odon.*, **2** : 213–215.
1991. *Burmagomphus pyramidalis pyramidalis* Tsuda, *A distributional list of world Odonata* 1991, p.92.

**Diagnosis : Male :** Labium yellow, outer edge black; labrum greenish yellow, anterior border narrowly and base more broadly black, and a short, middle black prolongation from base; bases of mandibles, genae, anteclypeus and postclypeus black, on postclypeus, a greenish yellow spot at the middle and a triangular spot at the side; frons greenish yellow, its base black; prothorax black with greenish yellow spot on each side; thorax black, marked with greenish yellow as follows: a complete mesothoracic collar, a small spot on the alar sinus, a sinuous dorsal stripe running from the alar sinus to the second pair of legs, the bayonet shaped stripe on humeral part and sides broadly yellow; legs black, coxae and inner surface of anterior femora yellow; wings hyaline, often slightly tinted with saffron at bases; pterostigma yellow between black nervures; 4 rows of postanal cells in hindwing; abdomen black, marked with yellow as follows: segment 1 with a triangular mark on dorsum and a broad baso lateral spot; 2 with a lanceolate shaped dorsal stripe and broad spot on sides; 3 to 8 with narrow basal rings, broader on 7; 3<sup>rd</sup> segment is also with baso lateral triangular spot confluent with dorsal ring; 8 with apicolateral spot; apical half of segment 9 yellow, mid dorsum with a robust spine; 10 entirely black. **Female :** Similar to the male, differing as follows: the baso lateral spot on segment 2 more fixed and unvarying, and the yellow on its sides more extensive; sides of 3 with an elongate spot, not confluent with basal triangular spot; 9 with apical fourth yellow; 10 with a pair of small dorso apical spots.

**Size :** Male : Abdomen 30 mm, Hindwing 23 to 24 mm. Female : Abdomen 33 mm, Hind wing 27 mm.

**Habits and Habitat :** Settled on rocks in mid stream or at height on plants near the hill streams.

**Breeding :** Breeds in hill streams only.

**Status :** Rare.

**Distribution :** Southern and Western India : Kerala : Malabar.

### ***Heliogomphus* Laidlaw**

Medium sized dragonflies, colour black, marked with greenish yellow; superior anal appendages lyrate in shape and pale in colour; head broad; frons rounded; occiput small, concave or straight at the posterior border; the base of hindwings very oblique and shallowly excavate; anal triangle 3 celled; arc situated opposite the second or between the second and third antenodal nervures; 6 or 7 transverse nervures between the sectors of arc from arc to bifurcation of *Rs* in forewing, 4 or 5 in hindwing; a single row of postanal cell in forewing, 3 to 4 rows in hindwing; basal incomplete antenodal nervures absent; anal loop absent; primary antenodals, the first and fifth; discoidal cell entire in all wings; pterostigma very short and swollen, without brace, or if present, very poorly developed; *IA* in forewing not pectinate and with 1 or 2 rows of cells between it and the posterior margin of wing; 1 or 2 cubital nervures in forewing, only 1 in hindwing; abdomen swollen at base, narrow and cylindrical from segments 3 to 7, the apical end of 7 and segments 8 to 10 again dilated; superior anal appendages lyrate, forcipate, curled strongly like the horns of a cow and with a robust outer spine near the base; inferior with the two branches very widely divaricate and almost in line, they project outwardly from beneath the superiors.

### **56. *Heliogomphus promelas* (Selys)**

1873. *Gomphus promelas* Selys, *Bull. Acad. Belg.*, **36** : 498; Fraser, 1923, *J. Bombay nat. Hist. Soc.*, **29** : 62, 330.

1925. *Heliogomphus promelas* Fraser, *J. Bombay nat. Hist. Soc.*, **30** : 848 – 849; Laidlaw, 1930, *Trans. Ent. Soc. Lond.*, **78** : 182; Fraser, 1934, *Fauna Brit. India Odon.*, **2** : 327 – 329.

**Diagnosis :** **Male :** Head black, marked with yellow; eyes bottle green; labrum black, marked with two basal greenish yellow spots; labium yellowish brown; mandibles greenish white; face black; frons marked above with a greenish white transverse stripe; occiput black, flattened; prothorax black, the posterior lobe, a pair of spot in front of it and an anterior collar yellowish green; thorax black on dorsum, greenish yellow on sides; a complete yellow mesothoracic collar, short yellow antehumeral stripe parallel to the mid dorsal carina; undersurface pruinose white, especially in fully matured specimens;

wings hyaline, occasionally slightly enfumed; pterostigma blackish brown, very rarely braced; only 1 cubital nervure in all wings; abdomen black, marked with pale greenish yellow as follows: a narrow mid dorsal stripe extending from segments 1 to 5, broad on segment 2 and having two lobes; a large lateral spot on segment 1 and similar spot on 2 which surround the oreillets; small baso lateral spots on segments 3 to 6; segment 7 with a broad ring on its base; an irregular dorsal spot on 8; remaining segments entirely black.

**Female** : Very similar to the male, but more robust; the differences are as follows: the antehumeral stripes rather longer and sometimes confluent with the mesothoracic collar; wings usually distinctly tinted with yellow at the extreme base, broader; abdomen with yellow spots on the sides more extensive; spots on segments 3 to 6 more elongate; on 6, a vestigial mediolateral spot.

**Size** : Male : Abdomen 42 mm, Hindwing 32 mm. Female : Abdomen 39 to 42 mm, Hind wing 35 to 38 mm.

**Habits and Habitat** : It occurs in colonies, found near small mountain streams or occasionally restricted to small freshwater streams or seepages on the hillside.

**Breeding** : Breeds in mountain streams.

**Status** : Rare.

**Distribution** : South India: Kerala: Malabar and Travancore.

### *Macrogomphus* Selys

Dragonflies of large size and robust build; colour black, marked with bright citron yellow; eighth and ninth abdominal segments are of great length. Head moderately large; frons strongly angulated; wings with its tornus strongly angulate; base of hindwing deeply excavate; anal triangle 3 celled; arc situated opposite the second antenodal or between second and third nervure; 5 to 6 transverse nervures between the sectors of arc in forewing from arc to bifurcation of *Rs*, 3 to 4 in hindwing; anal loop absent; 2 rows of postanal cells in forewing, 4 to 5 in hindwing; first postanal cell not extending near the base of subtrigone; a basal incomplete antenodal nervure present in all wings; primary antenodals are the first and fifth, sixth or seventh; discoidal cells entire; *IA* in forewing markedly pectinate; *Cu<sub>1</sub>* and *IA* in hindwing parallel to wing border; 3 or more rows of cells between *IA* and the posterior margin in forewings; abdomen swollen at base, then slim and cylindrical from segment 3 to base of segment 7; dilating on the apex of 7; 8 very broad, 9 tapering from base to apex, and as long as segments 7 and 8 together; 10 very small and short. Anal appendages with superiors longer than segment 10; conical and acutely pointed at apex, furnished with a long, medial inner spine, strongly divaricate; inferior appendage broadly and deeply bifid, its two branches sinuous, long and tapering.

### 57. *Macrogomphus wynaadicus* Fraser

1924. *Macrogomphus wynaadicus* Fraser, *Rec.Ind.Mus.*, 26 : 471–472; Fraser, 1934, *Fauna Brit. India Odon.*, 2 : 344–345.

**Diagnosis :** **Male** : unknown **Female** : Labrum black, yellow spots on labrum obsolete; head black, marked with citron yellow as follows: lateral lobes of labium, bases of mandibles; a large spot on each side of postclypeus; upper surface of frons and an indistinct spot on the vertex yellow; face entirely black; occiput a little emarginated with a dark brown line anteriorly; prothorax entirely black; thorax black, with two thick wedge shaped citron yellow ante humeral stripes, confluent with mesothoracic collar; humeral markings absent; a single broad black stripe is marked with a medial yellow interrupted line on sides; legs black, coxae and trochanters with large yellow spot; wings hyaline, with pale yellow ray in the cubital space; in old specimens, rather darkly and evenly enfumed; 2 cubital nervures in all wings; pterostigma dark brownish black, covers 6 – 7 cells; abdomen black, marked with paired citron yellow spots as: segment 1 with the sides and dorsum broadly; 2 with a dorsal stripe broadly broken at its center; the oreillets broadly marked with citron yellow spots, and a latero basal stripe; 3 with a large baso lateral dorsal spot, widely separated by the black dorsal carina; 4 to 6 similar, but the spots smaller; 7 with yellow basal half split upto its base by black dorsal carina; 8 and 9 with a baso lateral triangular spot; spots on 10 longer and narrow.

**Size :** Female : Abdomen 53 mm, Hindwing 45 mm.

**Habits and Habitat :** The general habit of *Macrogomphus* observed is, great numbers of adults perched on trees, in heavy evergreen jungle, far away from the streams, so it is very rarely seen by the collector; copulation takes place in these jungles and female is returning to the streams to oviposit only.

**Breeding :** Breeds in montane streams.

**Status :** Rare.

**Distribution :** Western Ghats : Kerala : Tamaracherry, South Malabar.

### *Merogomphus* Martin

Dragonflies of large to medium size, coloured mat black with bright greenish yellow. Head rather small and wide, frons markedly angulated; wings long and broad; tornus angulate; base of hindwing excavated, oblique; anal triangle 3 celled; arc situated at the second antenodal or between second and third antenodal nervure; 3 transverse nervures between the sectors of arc from arc to bifurcation of *Rs* in forewing, only 1 in hindwing; anal loop absent; 1 or 2 rows of postanal cells in forewing, 4 to 5 in hindwing; first postanal cell not extending near the base of subtrigone; an incomplete basal antenodal nervure usually present, but occasionally absent in one or more wings; primary antenodals are the first and fifth, sixth or seventh; discoidal cells entire in all wings; pterostigma

braced, short; *IA* in forewing markedly pectinate; *Cu* and *IA* in hindwing divergent near border of wing; only 1 cubital nervure in all wings; abdomen broad at base, then narrow and cylindrical as far as the base of segment 7, from the apical end of segment 7 again expands broadly, especially at segment 8; segment 9 as long as 8, 10 very small and short. Anal appendages with superiors lyrate or curled like the horns of a bull, or in some species, simple short divaricate structures; inferiors deeply and broadly notched, the two branches usually widely divaricate.

The genus is characterized by the long, narrow thorax and abdomen and also by the very distinctive armature of the legs.

### Key to the species of genus *Merogomphus* Martin

1. Occiput greenish yellow, fringed with long, black hairs; segment 3 of abdomen with a baso lateral triangular spot, a latero ventral stripe and two narrow mid dorsal stripes; segments 4-6 with similar markings; segment 8 with only the mid dorsal carina fine yellow ..... *longistigma longistigma* (Fraser)
- Occiput entirely black; mid dorsal spot on segment 3 isolated, spots on segments 4 to 6 entirely absent; segment 8 variable, in some specimens the basal half yellow, in others the yellow area is reduced to a mid dorsal basal diamond shaped spot ..... *longistigma tamaracherriensis* Fraser

### 58. *Merogomphus longistigma longistigma* (Fraser)

1922. *Indogomphus longistigma* Fraser, *Rec. Indian Mus.*, 24 : 422 & 424; *Merogomphus longistigma* Laidlaw, 1930, *Trans. Ent. Soc. Lond.*, 78 : 185; Fraser, 1931, *Rec. Indian Mus.*, 33 : 448 & 460.

1934. *Merogomphus longistigma longistigma* Fraser, *Fauna Brit. India Odon.*, 2 : 311 – 313.

**Diagnosis : Male :** Eyes bottle green in colour; labium, labrum and face glossy black; frons black, with a broad greenish yellow stripe above and a fine black line at its base; occiput greenish yellow, black at either end, simple, fringed with long, black hairs; prothorax black, posterior lobe, a small oval spot and a transverse anterior band yellow; thorax black, marked with bright yellow as follows: a complete mesothoracic collar with a prolongation along the mid dorsal carina up to alar sinus, a narrow dorsal stripe parallel to the mid dorsal carina, a humeral spot and a fine line below yellow; laterally greenish yellow, traversed by two closely parallel medial black stripes; underside black, marked by a fine 'V' shaped spot; legs long and slim, anterior femora greenish yellow on flexor surface, or all femora entirely black; wings hyaline, long and narrow; pterostigma pale brownish yellow, that of hindwing considerably larger than that of forewing; an incomplete basal antenodal usually present in one or all wings, rarely absent in all wings; abdomen black, marked with bright yellow as follows: segment 1 with a broad stripe on dorsum and a large quadrate spot on each side, 2 with an 'L' shaped spot on each side, the underside of the oreillets, a short stripe on their upper surface and a trilobed mid

dorsal band yellow; segment 3 with a baso lateral triangular spot, a latero ventral stripe, and a mid dorsal stripe yellow; 4 to 6 with similar markings, but the lateral stripe absent and mid dorsal stripe well separated; 7 with its basal half broadly yellow; 8 to 10 with mid dorsal carina finely yellow; superior anal appendage yellow, strongly curled and lyrate; inferior black.. **Female** : Very similar to the male, differing as follows: occiput simple, with short hairs fringing it; wings slightly enfumed, pterostigma light brown, the difference in size more marked than in male; abdomen with segment 9 about the same length as 8, which is slightly dilated, and also the apical half of segment 7, 9 dilated, but tapering rapidly to segment 10, which is very short and narrow.

**Size** : Male : Abdomen 44 mm, Hindwing 35 mm. Female : Abdomen 44 to 46 mm, Hind wing 37 mm.

**Habits and Habitat** : This species is found in high altitude areas.

**Breeding** : Breeds in hill streams.

**Status** : Rare.

**Distribution** : South India : Kerala : Chinnar, Malabar, Travancore, Vythiri ghat (Wayanad).

#### 59. *Merogomphus longistigma tamaracherriensis* Fraser

1931. *Merogomphus longistigma tamaracherriensis* race or sp.? Fraser, *Rec. Indian Mus.* 33: 460; Fraser, 1934, *Fauna Brit. India Odon.*, 2 : 313.

**Diagnosis** : **Male** : A subspecies and smaller than *Merogomphus longistigma*, differs from it as follows: occiput entirely black; mid dorsal spot on segment 3 of abdomen isolated, on 4–6 entirely absent; segment 8 variable, in some specimens with the basal half yellow, the extreme base of segment finely black, and the apical border of the yellow area markedly crenate, in others the yellow area is reduced to a mid dorsal basal tiny diamond shaped spot; segments 9 and 10 usually unmarked, but occasionally a fine mid dorsal streak on 9 and a tiny mid dorsal apical point of yellow on 10. **Female** : unknown.

**Size** : Male : Abdomen 40 mm, Hindwing 30 mm.

**Habits and Habitat** : Species is reported from high altitude forests.

**Breeding** : Breeds in hill areas.

**Status** : Rare.

**Distribution** : Kerala : Tamaracherry (Kozhikode).

### *Microgomphus* Selys

Dragonflies of very small size, the genus containing the smallest species of the family; colour black, marked with greenish yellow; superior anal appendage branched. Head comparatively large, broad; frons angulated; occiput flat, ridged, concave posteriorly; base of wings oblique, slightly excavated, tornus angulated, membrane obsolete, anal triangle 3 celled; arc situated opposite the second antenodal nervure; 5 to 6 transverse nervures between the sectors of arc from arc to bifurcation of *Rs* in forewings, 3 to 4 in hindwings; anal loop absent; only 1 row of postanal cell in forewing, 2 to 3 in hindwing; first postanal cell extending near the base of subtrigone; incomplete basal antenodal nervure absent; primary antenodals the first and fifth; discoidal cells entire in all wings, that of forewing equilateral triangle; pterostigma usually braced, short and stout; *IA* in forewing not pectinate, very flatly curved, and with only a single row of cells between it and the border of wing; *Cuii* and *IA* in hindwing divergent only at the border of wing; legs short, the hind femora extending up to the apical border of first abdominal segment; abdomen short, swollen at base, slim and cylindrical from segment 3 to the base of 7, then markedly expanded again, especially segment 8 and 9. Anal appendages with superiors rather longer than segment 10, conical, pointed at apex and with a slim medial spine or hook; inferiors triangular, bifid only at apex, the two short branches curled upwards.

#### 60. *Microgomphus souteri* Fraser

1924. *Microgomphus torquatus souteri* Fraser, *Rec. Indian Mus.*, **26** : 427 & 474 *Microgomphus souteri* Fraser, 1925, *J. Bombay nat. Hist. Soc.*, **30** : 853–854; Laidlaw, 1930, *Trans. Ent. Soc. Lond.*, **78** : 182; Fraser, 1934, *Fauna Brit. India Odon.*, **2** : 355–356.

**Diagnosis : Male :** Eyes bottle green in colour; labrum glossy black, with two large triangular greenish white spots nearly confluent at the middle and separated from the anterior border by a narrow black stripe; labium pale yellow; anteclypeus greenish white; postclypeus and front of frons glossy black; the greenish white colour of anteclypeus continuing as a transverse stripe, which traverses the whole face; upper surface of frons greenish white; vertex black; occiput black, slightly concave, fringed with yellow hairs; prothorax black, with a broad greenish yellow anterior collar; thorax black, marked with yellow as follows: mesothoracic collar yellow, interrupted in the middle, confluent with the mid dorsal carina; antehumeral stripe narrow and short; laterally greenish yellow, with a broad, black stripe on the posterior suture usually confluent with the short, oblique stripe, so that the enclosed yellow ground colour is blotted out; beneath pruinose white; legs entirely black; wings hyaline, with closer reticulation; pterostigma pale brown between black nervures; abdomen black, marked with greenish yellow as follows: segment 1 with a narrow apical border; 2 with a broad basal ring, which includes the oreillets and a short apico lateral spot; 3 to 6 with narrow basal rings occupying about one sixth of the segments greenish yellow; 7 similar, but the ring occupying the basal third and laterally overlapping the transverse suture; 8 to 10

unmarked. **Female** : Closely resembling male, but more robust and larger. Occiput shallowly concave, with 4 to 5 minute black spines on either side of middle line; wings tinted at the base; 2 rows of cells between IA and hinder border of forewing; abdomen with lateral oval spots on segments 4 to 6; no markings on segments 8 to 10; the basal marking on segment 7 is behind the transverse suture.

**Size** : Male : Abdomen 29 mm, Hindwing 24 mm. Female : Abdomen 28 mm, Hind wing 25 mm.

**Habits and Habitat** : Fraser observed that the male specimens are resting on stones or rocks in the midstream or settled on evergreen forests near the water.

**Breeding** : Breeds in deep pools of submontane streams flowing through the thick jungle.

**Status** : Rare.

**Distribution** : Western Ghats : Kerala : Malabar.

### Subfamily ONYCHOGOMPHINAE

#### *Acrogomphus* Laidlaw

Dragonflies of rather large size, robust build and glossy black, marked with greenish yellow. Head large, triangular, frons well angulated, shallowly grooved above; occiput simple; wings palely tinted at base; reticulation very close; tornus angulated; base of hindwing oblique moderately excavated; anal triangle 4 celled; arc situated between the first and second or second and third antenodal nervures; 3 to 5 transverse nervures between the sectors of arc from arc to bifurcation of *Rs* in forewings, 2 to 3 in hindwings; 1 to 2 rows of post anal cells in forewings, 3 to 4 in hindwings; anal loop present; first postanal cell in hindwing divided and extending up to the end of subtrigone; basal incomplete antenodal nervures absent; nodal index high; primary antenodals the first and fifth or sixth; discoidal cells, subtrigones and hypertrigones entire in all wings; pterostigma short, stout and braced; *IA* in forewing markedly pectinate; *Cu<sub>1</sub>* and *IA* in hindwing parallel to the border of wings; legs short, hind femora extending as far as base of first abdominal segment, abdomen swollen at base, narrow and cylindrical from segment 3 to the middle of segment 7, from there it is wider again, segment 8 and 9 with short, wing like prolongation laterally. Anal appendages with superior segment simple, curved and slightly forcipate, tapering to the end; inferiors bifid and its branches divaricated.

#### 61. *Acrogomphus fraseri* Laidlaw

1925. *Acrogomphus fraseri* Laidlaw, *Proc. Zool. Soc. Lond.* pp. 441–443; Fraser, 1926, *J. Bombay nat.Hist. Soc.*, **31** : 740–741; Needham, 1932, *Rec.Indian Mus.*, **34** : 217–218; Fraser, 1934, *Fauna Brit. India Odon.*, **2**: 337–339.

**Diagnosis : Male :** Labrum black, with a greenish yellow semilunar spot on either side of the middle line; bases of mandibles, anteclypeus, upper part of frons and its anterior border yellow; lower part of frons and vertex black; occiput black, simple, emarginated and with a minute notch at its center; prothorax black; thorax black, marked with bright citron yellow: a narrow interrupted mesothoracic collar, a pair of wedge shaped antehumeral stripes pointed and divergent below, laterally a broad stripe on the mesepimeron, three fourth of the metepimeron and a small spot of yellow above and between them; legs black, inner surface of anterior femora, a spot on the outer side of mid femora and a large spot on the hind femora bright yellow; wings pale saffron throughout, this colour deepening gradually to a golden yellow near the base; pterostigma black, braced, covering 5 cells; 1 cubital nervure in all wings; anal loop present, formed of 2 cells; membrane black; abdomen black, marked with bright citron yellow as follows: segment 1 with a triangular dorsal spot and a large spot laterally; 2 with a linear mid dorsal stripe and two spots on each side, one of which includes oreillets and other apical; 3 to 6 each with a pair of subdorsal basal spots decreasing in size from 3 to 6; 3 also with a small mid dorsal subbasal spot; 7 with the basal half yellow; 8 and 9 with subbasal spot on each side; 10 unmarked; anal appendage with superior segment dark reddish brown, almost black; inferiors black. **Female :** similar to the male, occiput with a large conical spine at each end, situated well behind the inner corner of eyes; the wings broader, rather less deeply tinted than in the male; 1 cubital nervure in forewings, 1 to 2 in hindwings; abdomen broader, stouter and cylindrical throughout; markings a little broader; the two spots on sides of segment 2 confluent to form a complete lateral stripe; the carinal spot on 3 larger; lateral spots on 8 and 9 absent.

**Size : Male :** Abdomen 44 mm, Hindwing 38 mm. **Female:** Abdomen 43 mm, Hind wing 40 mm.

**Habits and Habitat :** Fraser observed this species were often roosting at great heights on trees, females coming down to breeding only; they drop their eggs in clean water where the current is swift and the bottom sandy or gravelly.

**Breeding :** Breeds in turbulent mountain streams.

**Status :** Rare.

**Distribution :** South India : Kerala : Travancore.

### *Davidioides* Fraser

Dragonflies of moderate size; colour mat black, marked with bright citron yellow. Head small, triangular, frons well angulated; occiput simple, concave; wings broad and long, nearly as long as abdomen, base of hindwings deeply excavated; tornus markedly angulated; anal triangle 3 celled; arc situated between the second and third antenodal nervures; 3 transverse nervures between the sectors of arc from arc to bifurcation of Rs in forewings, only 1 in hindwings; anal loop absent; only 1 row of post anal cells in

forewing, but occasional double cells, 4 rows in hindwing; first post anal cell in hindwing is very broad, extending proximal end of base of subtrigone; basal incomplete antenodal nervure absent; the first and sixth nervures are primary antenodals; discoidal cell in forewing equilateral and entire; that of hindwing traversed by a nervure; pterostigma short and swollen at its middle, braced; *IA* in forewing pectinate; only 1 cubital nervure in all wings; legs moderately long, hind femora extending to base of abdominal segment 2, furnished with short, closely set spines on proximal end of flexor surface and long, robust spines at the distal end; abdomen swollen at base, then narrow and cylindrical from segment 3 to apical end of 7, where it again broadened, segment 8 especially broad and almost winged.

## 62. *Davidioides martini* Fraser [Plate-IV, Fig. 6]

1924. *Davidioides martini* Fraser, *Rec. Indian Mus.*, 26 : 427, 472-473; Laidlaw, 1930, *Trans. Ent. Soc. Lond.*, 78 : 188; Fraser, 1931, *Rec. Indian Mus.*, 33 : 447; Needham, 1932, *Rec. Indian Mus.*, 34 : 226; Fraser, 1934, *Fauna Brit. India Odon.*, 2 : 227-228.

**Diagnosis : Male :** Eyes pale bottle green; labrum black, with a pair of large yellow basal spot on each side widely separated from each other; labium dull yellow; bases of mandibles and anteclypeus yellow; frons black on the lower part, yellow on the upper part and above; postclypeus, vertex and occiput black; prothorax black, marked with yellow as follows: a small spot on the center of the posterior lobe; a large lateral spot on each side of the middle lobe; a pair of spots on the mid dorsum and on anterior collar; thorax black on dorsum, yellow on the sides, a slightly interrupted mesothoracic collar; an oblique antehumeral stripe separated widely from the mesothoracic collar below; a small upper humeral spot on each side; laterally two narrow parallel black stripes enclosing an equally narrow yellow line; posterior border of metepimeron narrow black, confluent above and below with the posterior black stripe; yellow beneath; legs black, anterior and middle pairs of femora yellow on the inner side, armed with short spines; wings hyaline, pterostigma blackish brown, covering 3 to 4 cells; abdomen black, marked with yellow as follows: segment 1 with a large spot on the dorsum and the sides broadly; 2 with a mid dorsal fusiform spot, the ventral and lower part of apical borders narrowly; 3 to 7 with basal rings, narrow on 3 to 6, occupying the basal half of 7 and also with a small apico lateral spot on each side yellow; 8 to 10 unmarked. Anal appendage with superior segments as long as segment 10, bright yellow, narrowly black at base, widely divaricated, conical and tapering to a point, with 5 or 6 minute black spines on the ventral surface; inferior deeply cleft, its branches widely divaricated, conical, tapering but shorter, curled slightly up at apex, black. **Female :** unknown.

**Size :** Male: Abdomen 38mm, Hindwing 33mm.

**Habits and Habitat :** Found in high altitude forests.

**Breeding :** Breeds in hill streams.

*Status* : Rare.

*Distribution* : Western Ghats : Kerala : Kunnoth (Kannur).

### *Megalogomphus* Campion

Dragonflies of very large, robust flies, coloured glossy black marked with bright citron yellow. Head large, triangular; frons angulated; occiput low and simple in male, sometimes spined in the female; wings hyaline, tornus markedly angulated; base of hindwing deeply excavate; anal triangle 4 celled, very rarely 3 celled; arc situated usually between the first and third antenodal nervures; 2 to 3 nervures between the sectors of arc from arc to bifurcation of *Rs* in forewings, only 1 in hindwing; 2 rows of postanal cells in forewings, 5 in hindwings; rudimentary anal loop present, consist of two cells; incomplete basal postcostal nervures very rarely present; nodal index very high; primary antenodal nervures the first and seventh; discoidal cells of similar shape in the fore and hindwings, entire; pterostigma equal in length, braced; IA in forewing markedly pectinate; only 1 cubital nervure in all wings; legs short, hind femora extending to hinder border of thorax; abdomen swollen at base, narrow and cylindrical from segment 3 to the base of 7, then expanded markedly so on segments 8 and 9 which have narrow lateral wing like projections. Anal appendage with superiors twice the length of segment 10, projecting straight backwards, tapering finely to the end; inferiors deeply bifid into two long narrow branches, and each branches themselves deeply bifid at the apex and slightly divaricated.

### Key to the species of Genus *Megalogomphus* Campion

- 1 Occiput citron yellow; humeral stripes very narrow; abdominal segments 3 to 6 with the medial third and 8 to 10 bright reddish brown ..... *superbus* Fraser
- Occiput black; humeral stripes rudimentary, represented by a small spot on upper side; ground colour of all abdominal segments black, marked with citron yellow ..... *hannyngtoni* (Fraser)

### 63. *Megalogomphus hannyngtoni* (Fraser)

1923. *Heterogomphus hannyngtoni* Fraser, *J. Bombay nat. Hist. Soc.*, **29** : 674–676.

1924. *Megalogomphus hannyngtoni* Fraser, *Rec. Indian Mus.*, **26** : 428, 478–479; Fraser, 1934, *Fauna Brit. India Odon.*, **2** : 296–298.

*Diagnosis* : **Male** : Eyes bottle green; labrum bright greenish yellow margined narrowly with black; labium chrome yellow; face black, the lower part of epistome citron yellow and an apple green spot on either side against the eyes; frons apple green above and in front with two small black points in front of the vesicle; vertex and occiput black, the hinder border of occiput raised and with a small rounded tubercle, fringed with long, black hairs; prothorax black with a postero lateral yellow spot and two small

spots on mid dorsum; thorax black, marked with bright greenish yellow (in some specimens bright citron yellow above, changing to bright apple green below) as follows: the outer angle of alar sinus, a broad sub triangular oblique dorsal stripe separated from the mesothoracic collar, which is interrupted or entire, a humeral upper spot; laterally two broad apple green stripes separated by a broad black band, the upper part with a small yellow spot and the whole metepimeron apple green colour; wings hyaline, long and rather broad; pterostigma long, blackish brown; only 1 cross nervure between the sectors of arc in all wings; legs short and robust, black; fore coxae and trochanters yellow; abdomen black, marked with bright citron yellow as follows: segment 1 with a small apical dorsal triangle and the whole sides below; 2 with a dorsal stripe and laterally a broad stripe covering the oreillets and lastly a narrow stripe bordering the genitalia; segment 3 with a trilobed dorsal stripe and lateral wedge shaped spot at the base; 4 and 5 with a chain of three dorsal spots; 6 with a single basal dorsal spot; 7 with the basal half yellow; 8 and 9 with small lateral basal triangular spots; 10 entirely black. Anal appendages black. **Female** : Very similar to the male, but more robust than male and the wings are unusually long and broad. Labrum bright citron yellow; frons with a black semicircle at the base of upper surface; occiput flat with a robust spine at either end against the eyes; the lateral spot of prothorax much larger than in the male; thorax with metepimeron citron yellow; abdomen with markings much broader than in male, the dorsal marking on segment 2 trilobed; that on 3 is partially constricted to form four lobes and laterally a broad black stripe; 4 and 5 have an additional lateral basal spot and 6 has three lateral basal spot; 9 has a small lateral basal spot.

**Size** : Male : Abdomen (with appendages) 58 mm, Hindwing 48 mm. Female : Abdomen 56 mm, Hind wing 55 mm.

**Habits and Habitat** : Fraser observed this species is reluctant to leave the banks of forest mountain streams, perching on twigs or more rarely settling on rocks.

**Breeding** : Breeds in swift flowing mountain streams.

**Status** : Rare.

**Distribution** : South India : Kerala : Malabar, Vythiri (Wayanad).

#### 64. *Megalogomphus superbus* Fraser

1931. *Megalogomphus superbus* Fraser, *Rec. Indian Mus.*, **33** : 448, 460- 463, figs. 3&4; Needham, 1932, *Rec. Indian Mus.* **34** : 222; Fraser, 1934, *Fauna Brit. India Odon.* **2** : 300-302.

**Diagnosis** : **Male** : Eyes bottle green above, paling to greenish yellow below; labium citron yellow; labrum, bases of mandibles, clypeus and frons bright grass green colour; vertex black; occiput citron yellow, behind black, except for a citron yellow spot at the center; prothorax black, middle lobe with a medial geminate yellow spot on posterior border; posterior lobe small, swollen, and its posterior border rounded and covered with

long black hairs; thorax velvety black, marked with tender foliage green colour as follows: thick inverted figure of '7' formed by the joining of oblique antehumeral stripe and an interrupted mesothoracic collar; humeral stripe narrow, upper end swollen and separated from the lower part; a broad stripe on mesepimeron and the whole of metepimeron green; a large triangular spot between these two stripes on upper side and an yellowish spot at lower side; the hinder part of antealar sinus and a stripe crossing the tergum between the origin of wings green; legs short, robust, black and marked with bright citron yellow; wings hyaline; pterostigma black, covering 6 cells; abdominal segments 3 to 6 with medial third bright reddish brown and with very narrow dorso medial markings on segments 1 to 6; 7 with basal two thirds citron yellow; 8 dark reddish brown changing to black on dorsum; 9 similar, but the lateral spot much larger and brighter yellow; 10 reddish brown. Anal appendages reddish brown. **Female :** Similar to the male, but more robust and with a thick, cylindrical abdomen. Labrum with a black spot at center; citron yellow spot on vertex; posterior lobe of prothorax with two small ochreous spots on dorsum; thorax with the antehumeral stripe well separated from the mesothoracic collar; a complete humeral stripe present; wings broader and longer, pterostigma covering 7 to 9 cells; abdomen with markings broad and extensive; lateral spots on 2 fused to form a broad stripe; basal spots on 4 to 6 larger and more conspicuous.

**Size :** Male : Abdomen 53 to 56 mm, Hindwing 42 to 43 mm. Female : Abdomen 52 mm, Hind wing 46 mm.

**Habits and Habitat :** Fraser found this species is reluctant to leave the banks of jungle mountain streams, perching on twigs or more rarely settling on rocks.

**Breeding :** Breeds in swift flowing mountain streams.

**Status :** Rare.

**Distribution :** South India : Kerala : Malabar, Walayar forest (Palakkad Dt.).

### *Onychogomphus* Selys

Dragonflies of large size, body glossy black, sparingly marked with bright greenish yellow; anal appendages highly curled. Head large, triangular; frons markedly angulated; wings with very close reticulation; tornus markedly angulated; base of hindwing deeply excavated; anal triangle 4 celled; only 2 nervures between the sectors of arc from arc to bifurcation of *Rs* in forewings, only 1 in hindwing; 2 rows of postanal cells in forewings, 4 in hindwings; a rudimentary anal loop present; primary antenodal nervures the first and fifth; discoidal cells entire; *IA* in forewing markedly pectinate, 3 rows of cells between it and margin of wing; *Cuii* and *IA* in hindwing divergent at wing border; only 1 cubital nervure in all wings; legs short, hind femora extending to the base of abdominal segment 1, furnished with numerous spines; abdomen robust, variable in length as compared to the length of wings, swollen at base, moderately narrow and cylindrical as far as the

base of segment 7, then expanded as far as segment 10. Anal appendage with superiors forcipate, markedly curled, so that the tips are directed forwards; the inferiors bifid at base, the two branches very closely apposed and curled almost as in superiors, which overlap at the apices, so that the two sets of appendages come to enclose a large heart shaped space.

### Key to the species of *Onychogomphus* Selys

1. Labrum black, marked with a pair of transverse yellow spots; frons greenish yellow, black at the base; vertex and occiput black, with or without yellow spot behind the occiput, which is not raised into a tubercle; 2 to 3 rows of cells between *Rii* and *IRii* ..... 2
- Labrum yellow, broadly edged with black, without spots; frons black, traversed by a broad yellow stripe; vertex and occiput black, with a yellow spot at the middle of occiput, which is raised into a small tubercle; only one row of cells between *Rii* and *IRii* ..... *malabarensis* Fraser
2. Antehumeral stripe connected with mesothoracic collar; wings with yellow rays to the costal and subcostal spaces; abdominal segment 2 with a dorsal longitudinal stripe; in female, the occiput with a pair of very long, robust spines at the center ..  
..... *nilgiriensis nilgiriensis* (Fraser)
- Antehumeral stripe not connected with mesothoracic collar; wings without yellow rays; abdominal segment 2 with a pair of large yellow lateral spots; in female, occiput fringed with long black hairs; without spines ..... *acinaces* (Laidlaw)

### 65. *Onychogomphus acinaces* (Laidlaw)

1922. *Onychogomphus acinaces* Laidlaw, *Rec. Indian Mus.*, 24 : 407–408.

1924. *Lamellogomphus acinaces* Fraser, *J. Bombay nat. Hist. Soc.*, 29 : 988–990; Fraser, 1934, *Fauna Brit. India Odon.*, 2 : 280–282.

**Diagnosis : Male :** Labrum black, marked with a pair of oval greenish yellow spots; anteclypeus yellow; frons greenish yellow above, black in front; postclypeus, vertex and occiput black; thorax black, marked with greenish yellow as follows: the lower part of middorsal carina; a complete mesothoracic collar; antehumeral stripe oblique, not connected with the collar; sides greenish yellow with a broad median black stripe; a small yellow spot present near the insertion of wings; legs black with a broad greenish yellow stripe on the flexor surface of anterior femora; wings hyaline with rays of yellow colour in the subcostal and cubital spaces; pterostigma black; abdomen black, marked with greenish yellow as: segment 1 with an apical triangular spot and an apical lateral spot; segment 2 with two large yellow lateral spots; 3 with a large basal spot; 4 to 6 with smaller spots; basal half of 7<sup>th</sup> segment yellow; 8 with a basal spot on the sides; 9

and 10 unmarked. Anal appendages black : superiors with upper and outer surface bright yellow, in some specimens entirely yellow and upper surface of inferior also; superiors truncate, tapering sinuously backwards and sloping downwards towards the apices; inferiors slightly longer than superiors, divided into two closely parallel branches, the distal halves curved gently upwards. **Female** : occiput fringed with long black hairs, slightly notched in the middle; legs as in male, but the hind femora with long, robust and widely spaced spines; abdomen swollen at base, stout, parallel sided and cylindrical as far as the tip; black, marked exactly as in male, the whole side of second segment is bright yellow; segment 8 unmarked; segment 7 with two basal yellow spots.

**Size** : Male : Abdomen (with appendages) 39 mm, Hindwing 30 mm. Female : Abdomen 39 to 40 mm, Hind wing 32 to 35 mm.

**Habits and Habitat** : Fraser observed this species is frequently visit the shady mountain streams, generally those with clean gravelly bottoms, and is found settled on rocks or twigs in midstream.

**Breeding** : Breeds in swift flowing mountain streams, drops the eggs perpendicularly into the swirling stream.

**Status** : Rare.

**Distribution** : Western Ghats : Kerala : Malabar.

#### 66. *Onychogomphus malabarensis* (Fraser)

1922. *Onychogomphus bifaceps* Fraser (nec Selys), *Rec. Indian Mus.*, **24** : 424–425.

1924. *Lamellogomphus malabarensis* Fraser, *J. Bombay nat. Hist. Soc.*, **29** : 990–991; Laidlaw, 1930, *Trans. Ent. Soc. Lond.*, **78** : 193; Needham, 1932, *Rec. Indian Mus.*, **34** : 224.

1934. *Lamelligomphus malabarensis* Fraser, *Fauna Brit. India Odon.*, **2** : 279–280.

**Diagnosis** : **Male** : unknown. **Female** : Labrum yellow, with black broad edges; labium pale yellow; anteclypeus yellow, postclypeus black with a large spot on each side close against the eyes; frons black traversed by a broad yellow stripe on the crest; vertex and occiput black, with a yellow spot on the middle of occiput which is raised into a small tubercle; prothorax black with a large yellow spot on each side; thorax black, marked with greenish yellow as follows: mesothoracic collar interrupted in the middle line; antehumeral stripe oblique, not connected with mesothoracic collar; humeral stripe absent; sides greenish yellow, traversed by a broad black stripe confluent at one or two points only; legs: femora yellow mottled with black; wings hyaline; pterostigma black, well braced; abdomen black, marked with yellow as follows: segment 1 with a dorsal spot and its sides; 2 with a dorsal bilobed stripe and its sides; 3 with a broad basal ring and a spot on the mid dorsal carina; 4 to 6 with subdorsal basal spots and mid dorsal spots; 7 with the basal half yellow; 8 with a large baso lateral spot; 9 and 10 unmarked; a shallow depression on segment 9 beneath the vulvar scale; anal appendages yellow,

small and pointed; vulvar scale small, deeply cleft into two small triangular leaf like processes.

**Female** : Abdomen 42 mm, Hind wing 35 mm.

**Habits and Habitat** : Not much is known about this species.

**Breeding** : Breeds in swift flowing mountain streams.

**Status** : Rare.

**Distribution** : Kerala : Malabar.

### 67. *Onychogomphus nilgiriensis nilgiriensis* (Fraser)

1922, *Onychogomphus bforceps nilgiriensis* Fraser, *Rec. Indian Mus.*, **24** : 425–426.

1924, *Lamelligomphus nilgiriensis* Fraser, *J. Bombay nat. Hist. Soc.*, **29** : 986–988; Fraser, 1934, *Fauna Brit. India Odon.*, **2** : 276–279.

**Diagnosis** : **Male** : Eyes deep bottle green in adult, bluish green in younger specimens; labrum black, marked with two oval transverse yellow spots; anteclypeus greenish yellow; postclypeus black; frons greenish yellow with its base broadly black; vertex and occiput black with a round yellow spot behind the occiput; prothorax black, usually with a small geminate yellow spot at the center of posterior lobe and another spot outside; thorax black, marked with greenish yellow as follows : mesothoracic collar interrupted in the middle line; oblique antehumeral stripe connected with the mesothoracic collar; humeral stripe absent; laterally two broad stripes separated by an equally broad black stripe, the posterior one is the broadest and covering the whole metepimeron, the black stripe always with a linear yellow spot close to the insertion of the wings; wings hyaline; pterostigma black; 2 to 3 rows of cells between *Rii* and *IRii*; abdomen black, marked with bright citron yellow as follows : segment 1 with a triangular apical spot on the dorsum and a large apico lateral spot; 2 with a dorsal longitudinal stripe and an apico lateral spot; 3 with a large baso dorsal spot; 4 to 6 with two dorsal triangular spots; 7 with its basal half yellow; 8 with a basal spot, when this spot is very large, accompanied by a small apico lateral spot; 9 and 10 unmarked. Anal appendages black, the outer and upper surfaces of the superiors bright citron yellow. **Female** : Similar to the male, abdomen stout and cylindrical; occiput armed with a pair of very long robust spines at its center, the apices of which curl outwards; antehumeral stripe separated from the mesothoracic collar; wings enfumed and saffronated at the base; yellow markings on abdominal segment 2 confluent; basal spots on 3 and 7 separated by the black on dorsal carina; baso lateral spot of segment 8 very minute and apical spot never present. Anal appendages rather longer than segment 10, tapering, black with a bright yellow tip, a long triangular protuberance between them; vulvar scales cleft into two leaf like processes, which projects backwards and downwards.

**Size** : **Male** : Abdomen (with appendages) 36 to 41 mm, Hindwing 30 to 34 mm. **Female** : Abdomen 36 mm, Hind wing 33 mm.

**Habits and Habitat :** Fraser observed this species is frequently visit the shady, clean gravelly bottom mountain streams, and is found settled on rocks or twigs in midstream. When disturbed it immediately rises vertically to trees overhanging the stream.

**Breeding :** Breeds in swift flowing mountain streams, drops the eggs vertically into the swirling stream.

**Status :** Rare.

**Distribution :** South India : Kerala : Travancore hills.

### ***Paragomphus* Cowley**

Dragonflies of medium size, coloured greenish yellow or sandy yellow marked with shades of brown and black, more rarely black marked with bright yellow; characterized by the long curled superior anal appendages and the short inferior appendage having its branches very closely apposed. Head moderately large, triangular; frons angulated; occiput simple, slightly and shallowly concave; wings with tornus angulated and base of hindwing moderately excavated; anal triangle 4 celled; arc situated midway between the first and second antenodal nervures; only 2 nervures between the sectors of arc from arc to bifurcation of *Rs* in the forewings, 1 in the hindwing; 2 rows of postanal cells in forewings, 5 in hindwings; anal loop absent, the first postanal cell extending to the middle of base of subtrigone; the first and fifth are the primary antenodal nervures; discoidal cells entire in all wings, that of forewing equilateral; *1A* in forewing pectinate, 4 rows of cells between it and margin of wing; *Cu<sub>1</sub>* and *1A* in hindwing parallel to the margin of hindwing; legs short, hind femora extending to posterior margin of thorax and furnished with short spines; abdomen of male swollen at base, narrow and cylindrical from segment 3 to base of 7, then expanded again especially at segment 8 and 9. Anal appendage with superiors nearly double the length of segment 10, tapering to apex, the terminal half curled downwards and closely apposed; inferior less than half the length of superiors, strongly curled in a downward and upward direction, bifid nearly to base, the two branches closely apposed like the superiors.

#### **68. *Paragomphus lineatus* (Selys) [Plate-IV, Fig. 4]**

1850. *Gomphus lineatus* Selys, *Rev. Odon.* : 386.

1854. *Onychogomphus lineatus* Selys, *Bull. Acad. Belg.*, 21 : 36; Williamson, 1907, *Proc. U. S. Nat. Mus.* 33 : 309-310.

1924. *Mesogomphus lineatus* Fraser, *Rec. Indian Mus.*, 26 : 427 & 477; Fraser, 1934, *Fauna, Brit. India Odon.* 2: 230-234.

**Material examined :** 1 male, 7-xii-2004, Kinalur estate (Kozhikode Dt.), Coll. K. C. Gopi.

**Diagnosis : Male :** Eyes bluish green in colour; labrum, face and frons sandy yellow,

with a black line across the crest of frons; labium pale yellow; vesicle and occiput yellow with a transverse dark brown streak in the middle; occiput yellow, raised into a slight point at its center and usually bearing a line of 2 to 4 minute spines on either side of this point; prothorax blackish brown, posterior lobe narrowly and a large spot on either side yellow; thorax sandy yellow, marked with dull or dark brown or blackish brown (according to age of specimens) as follows : a dorsal line bordering the mesothoracic collar on either side of the mid dorsal carina; an oblique antehumeral stripe connecting with dorsal line, enclosing a stripe of yellow color; a line on the humeral suture and two lateral lines close together crosses spiracle and postero-lateral suture; legs yellow, marked with black; wings hyaline; costa yellow as far as pterostigma, which is pale reddish brown, bordered with black, covering 4-6 cells; other characters as that of genus; abdomen black, marked with yellow, or yellow marked with black; in old specimens the yellow reduced to basal rings, in young specimens, the black present as apical rings; segment 1 with the sides broadly yellow and a large dorsal apical spot; 2 with subdorsal black line on each side enclosing bilobed yellow spot; 3 to 7 with broad black apical rings and a lateral black line extends from ring to the base; 8 and 9 with wide dilations at their sides, black on the dorsum and with irregular spots on the mid dorsum; 10 sandy yellow with the basal half or two thirds of the dorsum black. The segments 8,9 and 10 shows considerable variation; the foliate lateral process may be broadly edged with black, or entirely blackish brown and the dorsal surface may be entirely black with a fine basal ring on segment 9 and an apical ring on 10. **Female** : Closely resembles the male except for shape of abdomen; colour much paler than in male and less marked with brown or black; occiput with 4 spines on either side of the middle line; wings palely enfumed or saffronated at the base and very palely along the costal margin; costal and many of the nervures, especially the nodal, light yellow; abdominal segments 3 to 6 ventral to the lateral black stripes are pure shining silvery white; 8 and 9 are usually deep black and unmarked, in some specimens the segments 8, 9 and 10 are entirely yellow.

**Size** : Male : Abdomen (with appendages) 32 to 37 mm, Hindwing 24 to 27 mm. Female : Abdomen 31 to 36 mm, Hind wing 24 to 27 mm.

**Habits and Habitat** : This species is a shy and wary insect, difficult to catch; the males usually settled on the sandy shore or on plants near the water, occasionally rising and patrolling backwards and forwards over the shallow water.

**Breeding** : Breeds both in still and running waters; usually in open rocky streams.

**Status** : Uncommon.

**Distribution** : Throughout India: Kerala: Kozhikode, Palakkad, Periyar Tiger Reserve and Wayanad.

## Subfamily GOMPHOIDINAE

*Gomphidia* Selys

Dragonflies of large size, robust build, coloured black marked with bright citron yellow. Head large and triangular, frons strongly angulated, occiput simple or concave and fringed with short hairs; wings with tornus strongly angulated and base of hindwing excavated; membrane long and narrow; anal triangle 5 celled; arc situated between the second and third antenodal nervures or opposite the second; 8 transverse nervures between the sectors of arc from arc to bifurcation of *Rs* in forewings, 4 to 6 in hindwing; 2 rows of post anal cells in forewings, 4-6 in hindwings; anal loop present and very irregular; basal incomplete antenodal nervures absent; primary antenodal nervures the first and sixth or seventh; discoidal cells reticulated, 3-4 cells in forewings and 3 cells in hindwings; subtrigones and hypertrigones also reticulated; *Cu<sub>1</sub>* and *1A* in hindwing parallel to margin of hindwing; 3 to 4 cubital nervures in forewing, 2 in hindwing; legs robust, hind femora extending to posterior margin of thorax; abdomen dilated at base, then narrow and cylindrical as far as segment 7, then expanded again, segment 8 without wing like lateral projections. Anal appendages with superiors nearly double the length of segment 10, flattened laterally, forcipate and blunt at apex; inferiors very short, deeply bifid, and two branches divaricated slightly.

69. *Gomphidia kodaguensis* Fraser

1923. *Gomphidia kodaguensis* Fraser, *J. Bombay nat. Hist. Soc.*, **29** : 671-672; id., 1924, *Rec. Indian Mus.*, **26** : 427, 470; Laidlaw, 1930, *Trans. Ent. Soc. Lond.*, **78** : 179; Fraser, 1931, *Rec. Indian Mus.*, **33** : 447; Fraser, 1934, *Fauna Brit. India Odon.*, **2** : 389-391.

**Diagnosis : Male :** Eyes bottle green in colour; face and frons bright citron yellow with black markings; labium yellow; labrum yellow, split into two large spots by a medial vertical black stripe; occiput black, raised, fringed with very short pale yellow hairs; vertex black, the vesicle elevated into two very acute prominent points; prothorax black with a narrow anterior yellow collar; thorax black, marked with yellow as follows: a mesothoracic collar broken in the middle line; two broad oval, greenish yellow dorsal stripes not connected with mesothoracic collar; a small upper spot representing the rudimentary humeral stripe; laterally two broad yellow stripes separated by a broad black stripe, with an upper and lower yellow spots; tergum with yellow spots; legs black; coxae, trochanters and fore femora yellow; wings hyaline, costa black, the apices and posterior borders pale and evenly suffused with warm brown; discoidal cell in forewing with 3-4 cells; hindwing with 3 cells; 5 cells in the anal triangle; 5 cubital nervures in forewing; 3 in hindwing; subtrigone in forewing traversed once; in hindwing free; hypertrigones traversed once or twice; abdomen black, marked with yellow as follows: segment 1 with a fine apical dorsal ring; 2 with a dorsal spot basally, a small lateral spot which enclose the oreillets; 3 to 6 with dorsal basal elongate spots; 3 also with a basal streak along the ventro lateral border; apices of genital lobe and external

hamules also tipped with yellow; 7 with basal half yellow; 8 with an elongate transverse basal spot; 9 unmarked; 10 with a dorsal yellow spot covering the entire dorsum.  
**Female** : Unknown.

**Size** : Male : Abdomen (with appendages) 53 mm, Hindwing 42 mm.

**Habits and Habitat** : Found in submontane areas.

**Breeding** : Breeds in clean submontane streams.

**Status** : Rare.

**Distribution** : South India: Kerala: South of Palghat gap, Vythiri (Wayanad).

### Subfamily LINDENINAE

#### *Ictinogomphus* Cowley

Gomphidae dragonflies of large size and robust build, coloured black, marked with bright citron yellow or greenish yellow. Head large and triangular, frons strongly angulated, occiput simple or concave and fringed with short hairs; wings with tornus strongly angulated and base of hindwing deeply excavated; membrane long and narrow; anal triangle 5 celled; arc situated between the first and second antenodal nervures; 10-12 transverse nervures between the sectors of arc from arc to bifurcation of *Rs* in forewings, 6 in hindwings; 2 rows of postanal cells in forewings, 5-6 in hindwings; a distinct anal loop present, made up of 4 to 5 cells; basal incomplete antenodal nervures absent; primary antenodal nervures the first and seventh; discoidal cells reticulated, 2-4 cells in forewings and 3 cells in hindwings; *IA* in forewing slightly or not pectinate; *Cuii* and *IA* in hindwing parallel to margin of hindwing; 2 to 4 cubital nervures in forewing, 2 in hindwing; subtrigone in forewings 2celled, in hindwings entire or rarely 2 celled; hypertrigones with 2 traversing nervures; legs robust, hind femora extending beyond the end of posterior border of thorax; abdomen dilated at base, then narrow and cylindrical from segment 3 to the base of segment 7, dilated from 7 to 9, segment 8 widely dilated and with wing like lateral projections; segment 10 short and small. Anal appendages with superiors half the length of segment 10, narrow and pointed at apex; inferior very short, deeply bifid, and two branches widely divaricated.

#### 70. *Ictinogomphus rapax* (Rambur) [Plate-IV, Fig. 3]

1842. *Diastatomma rapax* Rambur, *Ins. Nevrop.* : 169.

1854. *Ictinus rapax* Selys, *Bull. Acad. Belg.*, 21(2) : 90; Fraser, 1934, *Fauna Brit. India Odon.*, 2 : 373-376; Kirby, 1890, *Cat. Odon.* : 77; Martin, 1904, *Mision Pavie Indo-China*, : 217.

1983. *Ictinogomphus rapax*, Mitra, *En. Mon. Mag.*, 119 : 30.

**Material examined** : 1 male, 25-x-2002, Kadalundi (Kozhikode Dt.), Coll. K.G. Emiliyamma; 3 males, 27-x-2000, Kanjirappally (Kottayam Dt.), Coll. P.M. Sureshan;

1 male, 1-ix-2001, Madayipara (Kannur Dt.); 1 male, 22-x-2001, Kannavam R.F., (Kannur Dt.), Coll. Md. Jaffer Palot; 1 male, 12-ix-2001, Malampuzha (Palakkad Dt.), Coll. Dinesan Cheruvat; 1 male, 8-x-1995, Asurankundu (Thrissur Dt.), Coll. K.C. Gopi; 1 female, 11-v-2002, Vallamkulam (Pathanamthitta Dt.), Coll. Ashok Kumar.

**Diagnosis : Male :** Eyes bluish grey in colour; labrum yellow, with a heavy black border and a black median prolongation; face and frons greenish yellow with black markings, front of frons with two large triangular yellow spots and a black spot at base; anteclypeus yellow; postclypeus black, with a large lateral yellow spot on either side; vertex black; occiput greenish yellow, fringed with short yellow hairs; prothorax black, marked with yellow; thorax black, marked with greenish yellow as: a complete mesothoracic collar; oblique dorsal spots widely separated from the mesothoracic collar; a large central spot at alar sinus; spots on tergum; a humeral stripe represented by a humeral spot; laterally yellowish green, with a median broad black stripe and posterior border of metepimeron yellow; wings hyaline, or in fully adult specimens, slightly enfumed; discoidal cells with 4 cells in forewing, 3 cells in hindwings; subtrigone in forewing with 2 cells, 1 in hindwing; membrane white; discoidal field begins with a row of 4 cells and is continued as row of 2 cells; legs black, marked with yellow; abdomen black, marked with bright yellow as follows: segment 1 with an apical dorsal stripe confluent with a triangular spot on dorsum of segment 2, and a lateral apical stripe confluent with a broad lateral spot on 2; 3 with nearly the basal half yellow; 4 to 6 with large dorsal basal spots; 7 with basal half, 8 with more than basal half yellow; the wing like lateral projection black; 9 with a lateral basal stripe and a small apical lateral spot; segment 10 unmarked or with yellow markings. **Female :** Similar to the male; the yellow markings more extensive; the abdomen much stouter, laterally compressed and shorter; occiput raised, a robust spine situated at its middle; the humeral stripe is nearly always almost complete; wings with a dark brown basal marking extending up to the first antenodal nervure; segment 10 of abdomen entirely black; vulvar scale black, deeply cleft into 2 narrow tongue like process which extend nearly to the base of segment 10.

**Size :** Male: Abdomen (with appendages) 52 mm, Hind wing – 40 mm. Female : Abdomen 50 mm, Hind wing 42 to 44 mm.

**Habits and Habitat :** This species is a fast flier, but can be seen resting on prominent twigs facing water, head sloping downwards and abdomen held upwards; when disturbed, it dives gracefully towards the surface of the water, and then flies and turns, swiftly off along the borders of the pond or stream or usually returning to the initial resting place again and again; pairing takes place over water, the insect then rising and disappearing high over the top of trees; the males frequently engage in fierce combats especially if females are nearby.

**Breeding :** Breeds both in running and still waters.

**Status :** Common.

**Distribution** : Throughout India : Kerala : Cochin, Kannur, Kottayam, Kozhikode, Malampuzha, Pathanamthitta and Periyar Tiger Reserve.

### Family AESHNIDAE

#### Subfamily AESHNINAE

Dragonflies of very large or medium size, homogeneous in shape and variable in colour and markings. Eyes broadly contiguous; wings long, moderately broad, base of hind wing in male more or less excavate; in males, abdomen as long as or longer than the wings, swollen at base, often constricted at segment 3, then of more or less even width and cylindrical to the end; tumid at base and tapering gradually to the end in females.

#### Key to the genera of family Aeshnidae

1. Base of hind wing without a notch; tornus of hind wing rounded in both sexes; anal triangle absent ..... 2
- Base of hind wing more or less deeply notched; tornus of hind wing angulated in the male, rounded in the female; anal triangle always present. .... 3
2. 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 *cuii* and *IA* of hind wing.....**Anax** Leach
- Segments 4 to 8 of abdomen without longitudinal supplementary ridges on the sides; superior anal appendages acuminate at apex; 3 rows of cells between the origins of *cuii* and *IA* in the hind wing. .... **Hemianax** Selys
3. The nervure *IRiii* forked into two equal branches near inner end of pterostigma; 2 rows of cells between origins of *cuii* and *IA* in hind wing; wings with membrane well developed; 4 to 6 cubital nervures in all wings; superior anal appendages with apex prolonged and curled downwards abruptly. ....**Anaciaeschna** Selys
- The nervure *IRiii* forked a little to proximal end of pterostigma; only one row of cells between origins of *cuii* and *IA* in hind wing; wings with membrane short; 6 to 10 cubital nervures in all wings; anal appendages very long, narrow and coated with long hairs on the inner side of apical half. .... **Gynacantha** Rambur

#### **Anax** Leach

Dragonflies of very large size and robust build; eyes broadly contiguous; frons with sharply angled crest; wings hyaline but often partly tinted with yellow or pale brown, tornus rounded in both sexes, anal triangle absent; anal loop made up of 10 to 12 cells, quadrate or subquadrate; *IRiii* not forked; cubital space traversed and made up of 4 to 7

nervures; 2 rows of cells between origins of Cuii and IA in hind wing; discoidal cells very long, narrow, that of forewing more narrow and elongate, traversed, usually 6 cells in forewing and 5 in the hindwing; subtrigone absent; abdomen slightly constricted at segment 3, oreillets absent on segment 2. Superior anal segments of male broadly lanceolate and inferior appendage quadrate, much shorter than superiors. Female anal appendage shorter, lanceolate or knife shaped.

### Key to the species of genus *Anax* Leach

1. Thorax pale bluish green on dorsum, turquoise blue on sides with a very broad black stripe; 1<sup>st</sup> abdominal segment entirely jet black, segments 2 & 3 turquoise blue, remaining segments black on apical half, pale reddish brown towards base of segments. .... *immaculifrons* Rambur
- Thorax pale green, unmarked; 1<sup>st</sup> abdominal segment pale green, base narrowly reddish brown; segments 2 & 3 turquoise blue on dorsum, pale green laterally, segments 4 to 9 with bright orange spots, segment 10 entirely yellow ..... *guttatus* (Burmeister)

### 71. *Anax guttatus* (Burmeister) [Plate–IV, Fig. 7]

1839. *Aeshna guttata* Burmeister, *Handb. Ent.*, 2 : 840.

1842. *Anax magnus* Rambur, *Ins. Nevrop.* : 188; Brauer, 1866, *Reise d. Novara, Neur.* : 62.

1867. *Anax guttatus* Hagen, *Verh. zool.-bot. Ges. Eien*, 16 : 39; Kirby, 1890, *Cat. Odon.* : 84; Martin, 1908, *Cat. Coll. Selys, fasc.*, 18 : 23; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 140–142.

**Diagnosis : Male :** Eyes blue during life, labrum brownish yellow, face and frons golden or greenish yellow; occiput bright yellow, black behind; prothorax reddish brown, bordered with yellow; thorax pale green with reddish brown lines beneath; legs black, proximal ends of femora dark reddish brown, inner surface of anterior femora citron yellow; wings hyaline, with an amber yellow spot on hind wing, costal border of wings citron yellow; discoidal cell very narrow and elongate, containing 5 or 6 cells in the forewing and 3 to 5 in the hindwing; 5 cubital nervures in forewing, 4 in the hindwing; membrane black; basal cell adjacent to the membrane dark brown; abdominal segment 1 pale green, base narrowly reddish brown, dorsum coated with long, grey hairs; segment 2 pale green on lower part of sides and narrow basally, turquoise blue on dorsum; segments 3 pale green at base on sides, turquoise blue spots subdorsally, bright orange or greenish yellow spots apically; 4 to 9 with bright orange spots; segment 10 entirely yellow with a basal reddish brown annule prolonged mid dorsally; anal appendages reddish brown. **Female :** Closely similar to the male, the differences are: hind wings often without the amber colored spot or if present it is paler; the turquoise blue on dorsum of segment 2 of abdomen broken up into four quadrangular patches; orange spots of abdomen more confluent and separated by narrow black jugal sutures; segment 10 is entirely yellow or with a minute mid dorsal basal spot of reddish brown.

**Size** : Male : Abdomen 56-62 mm., Hind wing 50-54 mm. Female : Abdomen 56-58 mm., Hind wing 52-54 mm.

**Habits and habitat** : Open habitats with standing water, including drains, ponds, swamps and lakes; common in disturbed habitats and along the landward margin of mangroves or paddy fields.

**Breeding** : Breeds in small weedy tanks and jheels, never wandering away from water.

**Status** : Uncommon.

**Distribution** : Common throughout the plains of India, Coorg, Nilgiri, Anamalai hills, Madras, Maharashtra, Andaman & Nicobar Islands, Waltair, Assam, Burma, Java and Sumatra. Kerala: Malabar, Periyar Tiger Reserve.

## 72. *Anax immaculifrons* Rambur [Plate-IV, Fig. 8]

1842. *Anax immaculifrons* Rambur, *Ins. Nevrop.* : 189; Brauer, 1866, *Reise d-Novara, Neur.* : 60; Kirby, 1890, *Cat. Odon.* : 84; Martin, 1908, *Cat. Coll. Selys (Aeschnines), fasc.* 18 : 18-19; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 145-146.

**Diagnosis** : **Male** : Eyes sapphire blue during life; labrum greenish yellow bordered with blackish brown; face and frons pale bluish green; prothorax dark reddish brown, posterior lobe fringed with long hairs; thorax pale bluish green on dorsum, mid dorsal carina fine blackish brown; turquoise blue laterally with black stripes on humeral and postero laterally, beneath black. Wings hyaline, tinted with amber yellow from apex to base of discoidal cell; pterostigma reddish brown; discoidal cell of forewing with 5 or 6 cells and 4 or 5 in the hindwing; 5 or 6 cubital nervures in forewing, 4 in the hindwing; abdominal segment 1 entirely jet black; segment 2 turquoise blue with black sutures and a mid dorsal transverse mark shaped like a sea gull in flight, segment 3 with its base laterally broadly turquoise blue, segments 4 to 8 with apical half black, this gradually changing to pale reddish brown towards base of segments and finally pale dirty blue; segment 9 black on dorsum and base, reddish brown laterally; segment 10 black on dorsum or reddish brown, black basally. **Female** : similar to the male, but the turquoise blue replaced by pale greenish yellow on thorax and base of abdomen; segment 1 warm reddish brown instead of black; dorsum of thorax pale brown; wings palely tinted or not at all.

**Size** : Male : Abdomen 52-55 mm, Hind wing 55 mm. Female : Abdomen 56 mm, Hind wing 58-60 mm.

**Habits and habitat** : Fast flier dragonfly. Flying above the open habitats like backwaters or paddy fields and also frequent the fast flowing hill streams. Highly territorial and chases away other dragonflies from their territory.

*Breeding* : Breeds in slow moving montane streams.

*Status* : Locally common.

*Distribution* : Bihar, Chandigarh, Maharashtra, West Bengal, Kerala : Malabar, Travancore.

### *Hemianax* Selys

Dragonflies of large size and robust build, coloured yellow and blue marked with brown and black; eyes broadly contiguous; frons with sharply angled crest; wings pointed at apices, base straight, tornus rounded in both sexes; discoidal cell very long and narrow; no incomplete antenodal nervure present at base of wings; anal triangle absent; anal loop elongate, quadrangular, made up of 3 rows of cells, about 15 in number, 3 rows of cells between origin of Cu<sub>1</sub> and IA; 4 or 5 cubital nervures in all wings; abdomen tumid at base, slightly constricted at segment 3, then cylindrical and even width to the end; oreillets absent; other characters are similar to those of *Anax*.

#### 73. *Hemianax ephippiger* (Burmeister)

1839. *Aeschna ephippiger* Burmeister, *Handb. Ent. Band*, 2 : 840; Calvert, 1898, *Trans. Amer. Ent. Soc.*, 25 : 55.

1867. *Anax ephippiger* Hagen, *Verh. zool.-bot. Ges. Wien*, 17 : 31.

1890. *Hemianax ephippiger* Kirby, *Cat. Odon.* : 85; Karsch, 1891, *Ent. Nachr.*, 17 : 278; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 147-149.

1921. *Anax (Hemianax) ephippiger* Laidlaw, *Rec. Indian Mus.*, 22 : 87.

*Diagnosis* : **Male** : Eyes olivaceous during life, paler below; labium, labrum and face bright golden or citron yellow; prothorax and thorax pale brown, paling to yellow beneath; legs black, bases of femora reddish brown, inner side of anterior femora bright yellow; wings hyaline or palely enfumed, hind wing with a patch of amber yellow at base, some yellow tinting at extreme base of wings in the subcostal and cubital spaces; costal border of wings bright yellow; membrane white, with black outer border; abdomen bright ochreous, marked with azure blue and reddish or blackish brown; segment 1 and base and sides of 2 pale olivaceous green or yellow, dorsum reddish brown; dorsum and sub dorsum of segment 2 azure blue; 3 with subdorsal basal azure blue spots, pearly white ventrally; segments 4 to 7 bright olivaceous yellow with an irregular reddish brown stripe on mid dorsum; a triangular yellow spot on segments 8 and 9; segment 10 bright yellow, its base and mid dorsum black. **Female** : Similar to the male except for sexual characters. Upper surface of frons more greenish in colour and the crest more broadly black; wings more broadly coloured, amber colour along costal half of both wings distal to node in old specimens, the nervures in the area between MA, IA and posterior border of wings surrounded with an areola of bright reddish brown; azure blue on abdominal segment 2 restricted to a small area; the sides of segment 2 and

base of segment 1 laterally glistening white; dorsum of segments 3 to 7 more broadly reddish brown.

**Size :** Male : Abdomen 42 mm, Hind wing 44 mm. Female : Abdomen 40 mm, Hind wing 46 mm.

**Habits and Habitat :** Not known.

**Breeding :** Breeds in still waters such as marshes and shallow tanks filled with weeds.

**Status :** Rare

**Distribution :** Throughout India. Kerala : Malabar, Cochin.

### *Anaciaeschna* Selys

Dragonflies of large size, variably coloured; wings, atleast in the female, tinted with yellow; eyes broadly contiguous; occiput small; thorax robust; wings long and moderately broad, pointed at apex, tornus angulated in the male, rounded in the female; incomplete basal ante nodal nervure absent; anal triangle always present; anal loop made up of 2 rows of cells, long and narrow; IRiii always forked near inner end of pterostigma; 2 rows of cells between Cu<sub>ii</sub> and IA; 4 to 6 cubital nervures in all wings; abdomen tumid at base, constricted at segment 3, then of even breadth, narrow and cylindrical to the end; oreillets present on segment 2; superior anal appendages lanceolate, inferiors long, triangular and pointed at apex.

#### 74. *Anaciaeschna jaspidea* (Burmeister) [Plate–IV, Fig. 10]

1839. *Aeschna jaspidea* Burmeister, *Handb. Ent.*, 2 : 840.

1890. *Anaciaeschna jaspidea* Kirby, *Cat. Odon.* : 86; Martin, 1908, *Cat. Coll. Selys (Aeschnines)*, fasc., 17 : 30–31; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 152–154.

**Diagnosis :** **Male :** Eyes violaceous during life, paler yellow below; labrum olivaceous yellow; face variably uniform pale ochreous or dull olivaceous brown; sides of face and upper surface of frons golden yellow; vesicle and occiput yellow; prothorax and thorax warm reddish brown, with two broad greenish yellow stripes on each side covering anterior half of mesepimeron and whole of metepimeron; legs black, femora dark reddish brown; wings hyaline, suffused with pale amber yellow or limited to subcostal space of fore wings and costal and central area of hind wings; anal triangle deep amber yellow; costal border yellow, most of the neuration is reddish brown coloured; 4 or 5 cells in discoidal cells; anal loop 8 celled; anal triangle very long and narrow, 3 celled; 5 cubital nervures in forewings, 4 in the hind; abdomen warm reddish brown, marked with azure blue, pearly white and yellow as follows : segment 1 with a large quadrate yellow spot on each side; segment 2 with sides glistening pearly white, dorsum and sub dorsum

azure blue with reddish brown spot on mid dorsum; base of segment 3 with blue and white, dorsum reddish brown with a pair of yellow spots; segments 4 to 7 similar, but without blue at base; 8 with pale spots at base and apically; segments 9 and 10 darker on dorsum and with large apical spots. **Female** : Exactly similar to the male, wings usually more deeply tinted with amber yellow, and in old specimens, often enfumed with pale brown.

**Size** : Male : Abdomen 43-48 mm, Hind wing 41-46 mm, anal appendages 5-6 mm. Female : Abdomen 43-46 mm, Hind wing 41-43 mm.

**Habits and Habitat** : A crepuscular species. Occasionally flies during cool or cloudy weather.

**Status** : Rare.

**Breeding** : Breeds in tanks filled with weeds and marshes.

**Distribution** : West Bengal, Western Ghats. Kerala : Travancore.

### *Gynacantha* Rambur

Dragonflies of large size, characterized by their homogenous coloring of dull brown and green, by the long, thin, anal appendages of the male and the forked character of the dentigerous plate of the female and by their crepuscular habits. Eyes very broadly contiguous; occiput not well developed; thorax small; legs short; wings long and broad, very closely reticulated; tornus angulated in male, rounded in the female; discoidal cell elongate, narrow, 5 to 7 celled; anal triangle 3 celled; anal loop oval, made up of numerous cells; 4 to 7 rows of cells between *IRiii* and *Rspl*; 1 row of cells between *Cuii* and *IA*; 6 to 10 cubital nervures in all wings; abdomen of variable shape in the male, usually swollen at base, more or less constricted at segment 3, not constricted in the female; anal appendages very long and narrow, coated with long hairs on the inner side of apical half; female with very long lanceolate shaped anal appendages (which are rarely present in adults, due to autotomy, this happens when the female deposit her eggs forcefully in dry soil in gullies or narrow grooves, it invariably breaks off her long, slender anal appendages).

#### 75. *Gynacantha dravida* Lieftinck [Plate-IV, Fig. 2]

1882. *Gynacantha hyalina* Selys, *An. Soc. Espan. Hist. Nat.*, **11** : 19; Karsch, 1891, *Ent. Nachr.*, **17** : 228; Kruger, 1898, *Stett. Ent. Zeit.*, **59** : 275; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 97-100.  
1960. *Gynacantha dravida* Lieftinck, *Mem. Soc. ent. ital.*, **38** : 252-253.

**Material examined** : 1 male, 29-i-2003, Ponnani (Malappuram Dt.), 2 males, 3-xi-2001, Kadalundi (Kozhikode Dt.); 2 males, 3 females, 25-iv-1999, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma; 1 male, 1 female, 7-xii-1998, Chevayur (Kozhikode Dt.); 2 males, 1 female, 19-ii-2002, Chevayur (Kozhikode Dt.), Coll. C. Radhakrishnan.

**Diagnosis : Male :** Eyes olivaceous; labrum ochreous brown; face and frons olivaceous brown with a broad black T-shaped mark on the upper surface of frons; occiput yellow; prothorax and thorax violaceous brown; wings palely tinted with pale brown or reddish brown throughout, especially towards the apices; discoidal cells with 6 or 7 cells; 7 to 9 cubital nervures in forewing, 6 or 7 in the hind; 12 to 17 cells in anal loop; abdomen with segment 3 markedly constricted, palest brown, marked with blackish brown; apical half of segment 1 blackish brown; segment 2 with a broad area on dorsum blackish brown; segments 3 to 8 with dark brown triangular markings, and remaining segments are pale brown; anal appendages reddish or blackish brown, inferior anal appendage considerably less than half the length of superiors. Very old adults are having blue markings. **Female :** Exactly similar to the male in color and markings, which are dull; anal appendages very long and lanceolate.

**Size :** Male : Abdomen 50-58 mm, Hind wing 43-50 mm. Female : Abdomen 48-55 mm, Hind wing 44-50 mm.

**Habits and habitat :** Crepuscular in habits, flies at dusk; usually this dragonfly comes to light at night. Commonly found in wooded swampy areas and weed covered ponds and tanks; during daytime they are in a roosting stage, hang under the leaves in thick vegetation.

**Status :** Common.

**Breeding :** Breeds in ponds and tanks covered with weeds.

**Distribution :** Assam, Bihar, Meghalaya, West Bengal and Western Ghats : Kerala : Kannur, Kozhikode, Malappuram, Travancore and Wayanad.

### Superfamily CORDULEGASTEROIDEA

#### Family CORDLEGASTERIDAE

#### Subfamily CHLOROGOMPHINAE

#### *Chlorogomphus* Selys

Dragonflies of large size, eyes slightly separated in the male, moderately or widely separated in the female; occiput small, swollen in the male, low and excavate in the female; wings long and broad, especially the hind wings of females, both wings broadly tinted with golden-yellow, but with no opaque area; base of hind wing shallowly excavate in the male, rounded in the female; discoidal cells of fore and hind wings differing in shape in both sexes; basal space traversed by 1 to 5 nervures; cubital nervure numerous; anal loop pentagonal in shape, made up of 10 to 34 cells; anal triangle 3 celled; basal incomplete antenodal nervure always present in the subcostal space of all wings; abdomen slim and cylindrical in the male, laterally compressed in the female.

### Key to the species of Genus *Chlorogomphus* Selys

1. Antehumeral and humeral stripe of thorax confluent on upper end only, lower end of humeral stripe confluent with a spot on the coxae; discoidal cell traversed 2 or 3 times in all wings; abdominal segments 1 to 3 with spots and rings; 2 without hairs; segment 8 in female with a U-shaped spot at base ..... *campioni* (Fraser)

Antehumeral and humeral stripe of thorax confluent by a transverse stripe; discoidal cell traversed once in all wings; abdominal segments 1 to 3 with a continuous stripe; 2 with dense, rough black hairs on upper surface; segment 8 in female without U-shaped spot ..... *xanthoptera* (Fraser)

### 76. *Chlorogomphus campioni* (Fraser) [Plate-IV, Fig. 9]

1924. *Orogomphus campioni* Fraser, *Rec. Indian Mus.*, 26 : 427, 467-469.

1931. *Chlorogomphus campioni* Fraser, *Rec. Indian Mus.*, 33 : 447, 457; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 9-13.

**Material examined** : 1 male, 21-iii-1995, Pakshipadalam (Wayanad), Coll. P.M. Sureshan.

**Diagnosis** : **Male** : Eyes brilliant emerald green; frons, labrum, anteclypeus and postclypeus black, with a citron yellow stripe traversed through postclypeus; frons black, its crest above and a spot on both sides citron yellow; margins of face and frons fringed with coarse black hairs; prothorax black with a large yellow spot on each side; thorax black, marked with bright citron yellow, underside is black; legs black, coxae, trochanters and a stripe on anterior femora yellow; wings hyaline, extreme tips dark brown; discoidal cell traversed in all wings by a single nervure; supratrangles traversed 3 times in all wings; 7 cubital nervures in the forewings and 6 in the hindwing; abdomen black, marked with citron yellow, equal in length to hind wings or slightly longer; segment 1 with a spot on dorsum and sides; 2 with an apical ring, a pair of dorsal semicircular marks, basal and apical sides; segment 3 similar; segments 4 to 7 with narrow paired apico-dorsal semicircular marks citron yellow; remaining segments black; anal appendages black; superiors as long as segment 10. **Female** : Eyes much more widely separated than in the male; colour and markings of body very similar to the male, but the markings of the abdomen more restricted, segment 8 with 'U' shaped yellow spot at the base; apices of wings diffusely tipped with blackish brown, entire surface of wings tinted with golden brown, in full grown adult the tinting is pale and limited to the costal areas of wings, but extending towards the posterior borders at level of discoidal cell, especially in the fore wing; discoidal cell traversed, 3 or 4 cells in the forewings, 4 or 5 in the hind wings; supratrangles traversed 4 to 6 times; 8 to 10 cubital nervures in all wings.

**Size** : **Male** : Abdomen 53 mm, Hind wing 45 mm. **Female** : Abdomen 52-55 mm, Hind wing 50 mm.

**Habits and Habitat** : Found in high altitude forests.

**Breeding** : Breeds in montane streams and the larva is to be found buried deep in the sand at the foot of small water streams.

**Status** : Locally common.

**Distribution** : Western Ghats. Kerala : Vythiri ghat (Wayanad), Aralam Wildlife Sanctuary (Kannur).

### 77. *Chlorogomphus xanthoptera* (Fraser)

1919. *Orogomphus xanthoptera* Fraser, *J. Bombay nat. Hist. Soc.*, **26** : 874–875.

1924. *Chlorogomphus xanthoptera* Fraser, *Rec. Indian Mus.*, **26** : 427, 469; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 8–9.

**Diagnosis** : **Male** : Eyes brilliant green during life; labrum blackish brown; anteclypeus pale brownish yellow and post clypeus greenish yellow; occiput black, fringed with dark brown hairs; frons dark brown, traversed along the crest by a broad greenish yellow stripe; prothorax black, border of anterior lobe and a spot on the middle lobe greenish yellow; thorax black, marked with bright grass green colour as follows: narrow antehumeral stripe, a broad humeral stripe confluent with antehumeral above; a posthumeral spot and two stripes on each side, covering the posterior half of metepimeron; legs black, anterior pair of femora bright yellow on basal part; wings hyaline, palely enfumed, all tips narrowly bordered with burnt brown; discoidal cell traversed 2 or 3 times; 7 or 8 cubital nervures in forewings, 7 in the hindwings; anal loop with 15 or 16 cells; abdomen black, marked with greenish yellow as: segments 1 to 3 with a continuous stripe; dorsum of segment 2 covered with dense coarse black hairs; segments 3 to 7 with yellow spots; superior anal appendages slightly shorter than segment 10. **Female** : colored and marked very similarly to male, but some slight differences; wings longer and much broader, uniformly colored throughout with dark golden-amber, the apices slightly darker; discoidal cell in forewing 3 celled, that of hindwing 4 or 5 celled; anal loop with 20 – 24 cells.

**Size** : Male : Abdomen 55 mm, hind wing 48 mm. Female : Abdomen 59-60 mm, Hind wing 60 mm.

**Habits and Habitat** : Fast flier, flies high above forest canopy and over waterbody.

**Breeding** : Breeds in torrential mountain streams.

**Status** : Rare

**Distribution** : South India. Kerala : South of the Palghat gap, Travancore, Munnar.

## Superfamily LIBELLULOIDEA

### Key to the Families of Superfamily Libelluloidea

1. Eyes with a small sinuous projection at the middle of the posterior border; usually the base of hindwing of male strongly angulated; thorax metallic green or blue in colour; tibiae of male with a long membranous keel on the flexor surface ... **CORDULIIDAE**
- Eyes without a projection at the posterior border; base of hindwing in both sexes always rounded; thorax rarely metallic coloured; tibiae of male without a membranous keel on flexor surface ..... **LIBELLULIDAE**

### Family CORDULIIDAE

Dragonflies of large or medium sized, thorax coloured dark metallic green or blue marked with bright yellow; eyes always broadly contiguous, globular with a sinuous projection; vesicle prominent, highly specialized in the female; wings long, hindwing is much broader than the forewing, its base strongly angulated and emarginate in the male, always rounded in the female; legs long, tibiae of male always with a long membranous keel on the flexor surface; abdomen cylindrical or compressed in the female, as long as or longer than the wings.

### Key to the genera of Family CORDULIIDAE

1. Base of hindwing rounded in both sexes; discoidal cell of hindwing at or slightly proximal to the level of arc ..... **Hemicordulia** Selys
- Base of hindwing strongly angulated in the male, rounded in the female; discoidal cell of hindwing distal to the level of arc ..... 2.
2. Discoidal cell of forewing always and that of hindwing nearly always traversed ..... **Epophthalmia** Burmeister
- Discoidal cells of forewings and hindwings always entire ..... 3
3. Discoidal field of forewing commencing with 2 or more rows of cells ..... 4
- Discoidal field of forewing commencing with a single row of cells; discoidal cell of forewing with costal border straight; arc situated at the second or between the second and third antenodal nervures; abdomen of female strongly compressed at the anal segments ..... **Idionyx** Hagen
4. Legs long and slender; bifurcation of superior sector of arc even; the second space from anterior border of wing, immediately distal to node, without a long space free of traversing nervures; pterostigma very short ..... **Macromia** Rambur

- Legs short and robust; bifurcation of superior sector of arc markedly uneven, superior branch curving up towards the costa; the second space from anterior border of wing, immediately distal to node, with a long space free of traversing nervures; pterostigma much more elongated ..... ***Macromidia* Martin**

### Subfamily CORDULIINAE

#### Hemicordulia Selys

Dragonflies of medium size, coloured metallic green, sparingly marked with yellow; vesicle simple in both sexes; thorax robust, coated with fine hairs; legs long and slim, the anterior and posterior pairs of tibiae with membranous keels; wings short, moderately broad, rather pointed at apices, base of hind wings rounded in both sexes; only a single cubital nervure in all wings; anal triangle absent; abdomen of the same length or slightly longer than the wings, slightly dilated at the base, then narrow and cylindrical and gradually dilated to the end.

#### 78. *Hemicordulia asiatica* Selys

1878. *Hemicordulia asiatica* Selys, *Bull. Acad. Belg.*, (2) **45** : 186; Kirby, 1890, *Cat. Odon.* : 47; Martin, 1906, *Cat. Coll. Selys (Cordulinos)*, *fasc.*, **17** : 13; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 213-215.

**Diagnosis : Male** : Eyes emerald green during life; labium and labrum bright yellow; vesicle metallic green; frons metallic emerald green, lower part and sides bright yellow, upper part bright orange; thorax dark metallic green, marked with yellow on the sides only; a large posthumeral spot, a linear spot between lateral sutures and posterior part of metepimeron yellow; beneath pale yellow with a brown transverse stripe and two large brown spots; legs black, femora reddish brown at proximal end; coxae and trochanters yellow; keel present on the half part of the anterior tibiae and extending the whole length in the hind tibiae; wings hyaline, enfumed in adult specimens only; anal loop with 16 cells; abdomen glossy black, with a metallic dark green reflex on dorsum, laterally with bright brownish yellow colour as follows: sides of segments 1 to 3; segments 4 to 8 with wedge shaped stripes on each side; paired spots under all segments except 1 and 10. **Female** : Closely similar to the male, the yellow markings on thorax rather more extensive, the whole of the side bright yellow; the markings on abdomen reduced; wings darkly enfumed at apices, base of hind wing with yellow colour at the extreme base.

**Size : Male** : Abdomen 33 mm, Hind wing 35 mm. **Female** : Abdomen 33-37 mm, Hind wing 31-35 mm.

**Habits and Habitat** : Males are usually found near waterbody and is found to be patrolling the borders of lakes or flying rapidly along open roads and open areas of forests, on the hill sides above the lakes. The females are rarely seen near the waterbody, except for oviposition.

**Breeding** : Breeds in montane lakes or in deep still pools of mountain streams.

**Status** : Rare.

**Distribution** : Assam, Meghalaya, Maharashtra, and Western Ghats. Kerala : Travancore.

### Subfamily IDIONYCHINAE

#### *Idionyx* Hagen

Dragonflies of medium size; head very large, eyes, frons and vesicle metallic green or blue in all species; the characteristic shape of vesicle in the female helped in the identification of species; thorax small, metallic blue or green, marked with yellow; legs long and slim, in male, all tibiae with a membranous keel on the flexor surface, keels absent in the females; wings hyaline, often saffronated at the bases in the females, bases shallowly notched in the male, broadly rounded in the female; anal loop with 4 to 7 cells in male, 8 to 10 in the female; discoidal cells of fore and hind wings always entire, discoidal field in forewing made up of a single row of cells; abdomen cylindrical in the male, compressed in the female.

#### Key to the species of Genus *Idionyx* Hagen (Male)

1. Labrum bright citron yellow narrowly bordered with black ..... 2
  - Labrum entirely black ..... *minima* Fraser
2. Superior anal appendages with a row of teeth beneath basal half ..... 3
  - Superior anal appendage simple at apices and shorter than inferiors .....  
..... *corona burliyarensis* Fraser
3. Inferior anal appendage trifid, the apical portion broad and shallowly emarginated, directed straight back in line with the basal portion ..... *saffronata* Fraser
  - Inferior anal appendage trifid, the apical portion very narrowly and deeply emarginated, directed straight back in line with the basal portion .....  
..... *travancorensis* Fraser

#### Key to the species of Genus *Idionyx* Selys (Female)

1. Vesicle produced and occasionally complex ..... 2
  - Vesicle simple, rounded or slightly notched at apex ..... 3
2. Vesicle produced as an elongate bluntly pointed curved cone; wings have amber tinted rays in the subcostal and cubital spaces ..... *corona burliyarensis* Fraser

- Vesicle produced as a short blunt horn; wings amber coloured throughout, base saffronated or golden yellow ..... *travancorensis* Fraser
- Vesicle prolonged and blunt at apex, from the back of which projects a very long, straight, tapering spine ..... *rhinoceroides* Fraser
- 3. Labrum entirely black; bases of wings are deep golden amber as far as 2 cells beyond the trigones ..... *minima* Fraser
- Labrum bright citron yellow narrowly bordered with black; bases of wings broadly tinted with golden amber to or beyond the level of distal end of discoidal cells ..... *saffronata* Fraser

### 79. *Idionyx corona burliyarensis* Fraser

1922. *Idionyx corona* race *nilgiriensis* Fraser, *Mem. Dept. Agric. India, ENT*, 7 (7) : 65–66.

1924. *Idionyx corona burliyarensis* Fraser, *Rec. Indian Mus.*, 26 : 461–462.

1936. *Idionyx burliyarensis* Fraser, *Fauna Brit. India Odon.*, 3 : 227–229.

**Material examined** : 1 female, 4-vi-2003, Thusharagiri (Kozhikode), Coll. Md. Jafer Palot.

**Diagnosis : Male** : Labrum bright citron yellow heavily bordered with dark brown; thorax metallic emerald green, humeral stripe absent; laterally a broad citron yellow stripe traversing the spiracle and lower border of metepimeron; beneath yellow, the sclerites black with a bluish reflex; legs black, extensor surface of tibiae pale; a keel present on the outer third of anterior pair of tibiae and a complete keel on the hind pair of tibiae; wings hyaline, enfumed in adults; 2 cubital nervures in forewings, 1 in the hindwing; abdomen black, the ventral borders of segments 1 to 3 yellow and also the intersegmental joints of 2 and 3; anal appendages black, superiors shorter than the inferior, subcylindrical, flattened towards the apex and furnished with a tuft of long rough golden hairs; inferior very massive, its apex curled strongly up and narrowly emarginated, its lateral spines very small, finely pointed and directed straight up. **Female** : Closely similar to the male, the minor differences are: the eyes are emerald green capped with brown; the labrum entirely yellow; vesicle shaped like the horn of a rhinoceros, its apex prolonged, curling back and bluntly pointed; wings with amber tinted streaks or rays in the subcostal and cubital spaces, enfumed according to the age.

**Size** : Male : Abdomen 35 mm, Hind wing 33 mm. Female : Abdomen 35mm, Hind wing 35mm.

**Habits and Habitat** : Fraser observed, the males fly after dusk over the riverbed, while the females are fly around the areas where carts rest at the night to consume small flies and midges that found on the cattle shed.

**Breeding** : Breeds in torrential mountain stream.

**Status :** Rare

**Distribution :** Western Ghats. Kerala : Kozhikode and Travancore.

#### 80. *Idionyx minima* Fraser

1931. *Idionyx minima* Fraser, *Rec. Indian Mus.*, **33** : 447, 453–455; id., 1934, *J. Bombay nat. Hist. Soc.*, **37** : 558, 562.

1936. *Idionyx minima* Fraser, *Fauna Brit. India Odon.*, **3** : 225–226.

**Diagnosis :** **Male :** Labrum, labium, clypeus and genae black, unmarked; thorax metallic green, humeral stripe absent, a narrow oblique citron yellow stripe on each side of the spiracle and one stripe on the posterior border of metepimeron; beneath brownish black surrounded with yellow; legs black, extensor surface of tibiae with yellow stripe; wings hyaline, the bases very palely tinted with brownish yellow colour; abdomen black, unmarked; anal appendages black, superiors longer than segment 10, the ventral surface of superior anal appendage with a row of minute teeth; inferior appendage deeply trifid. **Female:** marked similarly to the male. Differs in sexual characters and colouring of the wings, the bases with deep brownish yellow coloured as far as 2 cells beyond the trigones; vesicle simple, rounded and very slightly notched above.

**Size :** **Male :** Abdomen 27 mm, Hind wing 30 mm. **Female :** Abdomen 29-31 mm, Hind wing 30 mm.

**Habits and Habitat :** Weak flight, always found near the forests, appearing on wing only during sunshine, even a passing cloud is sufficient to force them to take shelter in the forest.

**Breeding :** Breeding in torrential mountain streams.

**Status :** Rare.

**Distribution :** Western Ghats. Kerala: Travancore and Munnar.

#### 81. *Idionyx rhinoceroide*s Fraser

1934. *Idionyx rhinoceroide*s Fraser, *J. Bombay nat. Hist. Soc.*, **37** : 559, 565.

1936. *Idionyx rhinoceroide*s Fraser, *Fauna Brit. India Odon.*, **3** : 230–231.

**Material examined :** 2 males, 4-vi-2003, Thusharagiri (Kozhikode Dt.), Coll. Md. Jafer Palot.

**Male :** unknown. **Female :** Labrum yellow, narrowly bordered with brown; the base of vesicle prolonged and blunt at apex, from the back of which projects a very long, straight, tapering spine; thorax densely covered with long, yellow hairs on dorsum, humeral stripe absent; laterally a narrow oblique citron yellow stripe traversing the

spiracle and another bordering the lower part of metepimeron; beneath yellow, with oblique bluish black stripes and spots; legs black, coxae and extensor surfaces of all tibiae yellow; wings hyaline, enfumed with warm reddish brown, deepest at the apices of hind wings; extreme bases of wings tinted with golden yellow.

**Size :** Abdomen 32 mm, Hind wing 35 mm.

**Habits and Habitat :** Same as that of *I. minima*.

**Breeding :** Breeds in torrential mountain streams.

**Status :** Rare.

**Distribution :** Western Ghats. Kerala : Dhoni. (South Malabar)

## 82. *Idionyx saffronata* Fraser [Plate-IV, Fig. 8]

1924. *Idionyx saffronata* Fraser, *Rec. Indian Mus.*, 26 : 427, 458–460.

1936. *Idionyx saffronata* Fraser, *Fauna Brit. India Odon.*, 3 : 222–223.

**Material examined :** 1 female, 27-v-2003, Thusharagiri (Kozhikode Dt.), Coll. C. Radhakrishnan; 1 male, 10-v-2005, Vannathimala (Wayanad Dt.), Coll. K.G. Emiliyamma.

**Diagnosis :** **Male :** Labrum bright chrome yellow bordered with black; vesicle swollen, nearly as broad as frons and rounded above; thorax brilliant metallic green, laterally yellow oblique stripe and the posterior half of the metepimeron yellow; humeral stripe absent, beneath striped alternately black and yellow; legs black, middle and anterior pairs of femora yellow on the inner sides; wings hyaline, very palely enfumed or saffronated as far as a little beyond the tornus, more deeply in the subcostal, cubital spaces and anal triangle; abdomen black, ventral borders of segments 1 and 2 citron yellow; segments 7 to 10 bordered with bright yellow beneath; the inferior anal appendage directed straight back and deeply trifurcate, the lateral lobes robust, slightly upturned, widely divaricated spines, the middle lob excavate, broad at apex and with a slight projection at the middle. **Female :** closely similar to the male, but differing as: wings hyaline or more or less deeply enfumed, especially towards the tips, the bases of wings deeply tinted with golden yellow beyond the level of distal end of discoidal cells, especially towards the apices and the whole breadth of forewings.

**Size :** Male : Abdomen 33 mm, Hind wing 34 mm. Female : Abdomen: 34 mm, Hind wing 35 mm.

**Habits and Habitat :** This species fly only during sunlight, even a cloud passing over, they immediately take shelter in the forest.

**Breeding :** Breeding in torrential mountain streams.

*Status* : Rare.

*Distribution* : Western Ghats. Kerala: Kozhikode, Wayanad and Travancore.

### 83. *Idionyx travancorensis* Fraser

1931. *Idionyx travancorensis* Fraser, *Rec. Indian Mus.*, 33 : 447, 455–456.

1936. *Idionyx travancorensis* Fraser, *Fauna Brit. India Odon.*, 3 : 223–225.

*Material examined* : 2 males, 4-vi-2003, Thusharagiri (Kozhikode Dt.), Coll. Md. Jafer Palot.

*Diagnosis* : **Male** : Labrum citron yellow, broadly bordered with black; clypeus and genae black; thorax metallic green; humeral stripe absent; laterally a narrow yellow oblique stripe and another on the posterior half of the metepimeron; beneath black, bordered with yellow, and with a stripe of paler yellow at its middle; legs black, extensor surface of tibiae yellow; wings hyaline, very pale and uniformly tinted with yellow; anal loop made up of 7 or 8 cells; abdomen black, segment 2 with a narrow apical stripe yellow; the inferior anal appendage with its apex tapering to an obtuse emarginated point, less than half the breadth of that of *I. saffronata*, the lateral robust spines are much stouter and turned more abruptly outward. **Female** : Resembles the male closely, but differs in the colour of wings and sexual characters, vesicle produced as a blunt cone shaped process; wings burnt brown throughout, the bases deeply saffronated or golden yellow as far as the level of trigones; abdomen depressed and fusiform in shape towards the anal segments.

*Size* : Male : Abdomen 32 mm, Hind wing 32 mm. Female : Abdomen 32-35 mm, Hind wing 34-35 mm.

*Habits and Habitat* : Same as that of *I. saffronata*.

*Breeding* : Breeding in torrential mountain streams.

*Status* : Rare.

*Distribution* : Western Ghats : Kerala : Kozhikode, Munnar and Cochin (Travancore)

### *Macromidia* Martin

Dragonflies of medium size, coloured metallic green, marked sparingly with citron yellow; vesicle simple in both sexes; legs short, robust, tibiae in male furnished with membranous keels; wings of moderate length and breadth, apices rounded, base of hind wing in male obtusely angulated, emarginate; anal loop oval, made up of 7 or 8 cells, anal triangle 2 celled, the first three proximal postnodal nervures not continued into the adjacent space between Ri and Rii; 1 or 2 cubital nervures in forewings, 2 to 4 in the hindwings; abdomen longer than the wings, cylindrical, segment 2 furnished with small oreillets on its sides; anal appendages apposed, simple.

84. *Macromidia donaldi* (Fraser)

1924. *Indomacromia donaldi* Fraser, *Rec. Indian Mus.*, **26** : 515–516.

1931. *Macromidia donaldi* Fraser, *Rec. Indian Mus.*, **33** : 447, 456; Needham, 1932, *Rec. Indian Mus.*, **34** : 210; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 206–208.

**Diagnosis : Male** : Eyes emerald green, changing to yellow below; frons and vesicle dark metallic green; labrum dark brown; anteclypeus dull yellow; postclypeus black; thorax brilliant metallic emerald green, marked with citron yellow; antehumeral stripe absent; three lateral yellow stripes on thorax; legs black, coxae, trochanters and proximal end of anterior femora yellow; wings hyaline, or with pale yellow rays in the subcostal, cubital and anal triangular spaces; only 1 cubital nervure in the fore wing and 2 in the hind wing; discoidal field commencing with a row of single cells; abdomen black, marked with citron yellow as: segment 1 with 2 spots; 2 with a dorsal stripe, oreillets and ventral border; 3 to 6 with stripe on mid dorsal carina; segment 7 with a broad subbasal spot on mid dorsum; remaining segment black, unmarked; superior anal appendage as long as segments 9 and 10 taken together, closely apposed. **Female** : similar to the male, but differing in the marking of abdomen and colour of wings; wings hyaline or usually palely tinted with brown; bases of all wings with a golden yellow marking which extends fanwise to as far as distal end of discoidal cell and in costal space, the colour deepened in the cubital and subcostal spaces; abdominal segment 2 with a diamond shaped stripe; 3 to 6 with a continuous mid dorsal stripe; spots on segments 7 and 8.

**Size** : Male : Abdomen 34 mm, Hind wing 30 mm. Female : Abdomen 31 mm, Hind wing 28-30 mm.

**Habits and Habitat** : This species appear on the wing only on cloudy days, and are crepuscular or flight at early dawn and dusk for a short time. During the daytime they hide out in the leafy tunnels formed by overhanging trees and jungle or water reeds over streams.

**Breeding** : Breeds in hill streams.

**Status** : Rare.

**Distribution** : Western Ghats : Kerala : Tamaracherry (Kozhikode Dt.)

## Subfamily MACROMIINAE

*Epophthalmia* Burmeister

Dragonflies of very large size and robust build, coloured ochreous, dark reddish brown or blackish with cupreous dark green or dark green metallic reflex, marked with bright yellow spots or stripes. Head very large; eyes globular, moderately contiguous; frons with deeply notched superior surface; legs long and robust; all tibiae in the male

furnished with membranous keels. Wings long and very pointed at apices; base of hind wing expanded, the basal angle prolonged or angulated and with a short notch above it in male, rounded in the female; discoidal cells always traversed by one nervure; anal triangle 2 celled; the proximal postnodals continuous with nervures in the adjacent space between *Ri* and *Rii*. Abdomen is longer than wings, triquetral, slightly constricted at segment 3, basal segments dilated, segment 10 with a dorsal keel or obtuse spine.

### Key to the species of *Epophthalmia* Burmeister

1. Superior surface of frons with a rounded yellow spot on each side of the notch; abdomen black, segments 3 to 6 with paired dorsal spots; segments 7 and 8 with basal yellow rings; segment 9 black, unmarked; segment 10 yellow ..... *frontalis binocellata* (Fraser)
- Superior surface of frons with a single medial yellow spot in the floor of the notch; abdomen dark reddish brown with broad yellow annules on segments 2 to 9, segment 10 brighter yellow on dorsum ..... *vittata vittata* Burmeister

### 85. *Epophthalmia frontalis binocellata* (Fraser)

1924. *Macromia binocellata* Fraser, *Rec. Indian Mus.*, **26** : 451–452.

1936. *Epophthalmia frontalis binocellata* Fraser, *Fauna Brit. India Odon.*, **3** : 199–201.

**Diagnosis : Male :** Eyes bluish green; labium, labrum and anteclypeus dark reddish brown or black, with two small citron yellow spots on labrum; frons and vesicle dark metallic blue, superior surface of frons with a rounded yellow spot on each side of the notch; thorax dark blue, metallic, changing to very dark reddish brown on lower parts of dorsum and on metepimeron; yellow markings restricted, antehumeral stripes narrow, oblique stripe on sides narrow, bordered before and behind with black; legs black; wings hyaline, tornus palely tinted with yellowish brown in hind wing; abdomen black, marked with citron yellow as: segment 2 with a small ring; segments 3 to 6 with paired dorsal spots (in teneral specimens, these spots may be continued laterally and basally to the base of segment); segments 7 and 8 with basal yellow rings; segment 9 black, unmarked; segment 10 with a large yellow spot. **Female :** closely similar to the male, the differences are: in teneral specimens, sometimes in adults, the yellow spots on frons much reduced and spots on superior surface often entirely absent; in wings, the apices tinted with yellowish brown as far as the node in fore and hind wing (in adults this tinting is absent, appearing to fade with age); a dark blackish brown ray in the costal, subcostal and basal spaces of hindwing; abdominal segment 9 with a small yellow basal ring; segment 10 entirely yellow.

**Size : Male :** Abdomen 50-53 mm, Hind wing 44-46 mm. **Female :** Abdomen 55 mm, Hind wing 50 mm.

**Habits and Habitat** : After emergence, the adults leave the place very faraway. In the forest they prefer open places for flying, occasionally they flies very high, or very slowly at a few feet from the ground.

**Breeding** : Breeding in still waters, usually preferred small weedy tanks and pools; rarely they may be preferred deep pools of mountain streams.

**Status** : Rare.

**Distribution** : Western Ghats. Kerala : Tamaracherry (Kozhikode).

### 86. *Epophthalmia vittata vittata* Burmeister

1839. *Epophthalmia vittata* Burmeister, *Handb. Ent.*, 2 : 845.

1936. *Epophthalmia vittata vittata* Burmeister, *Fauna Brit. India Odon.*, 3 : 194–196.

1953. *Epophthalmia vittata vittata*, Bhasin, *Indian For. Leaf.*, 121 (3) : 73.

**Diagnosis** : **Male** : The colour of eyes, labium, clypeus and colour and spots of labrum, frons and vesicle same as that of *E. frontalis binocellata*; but the superior surface of frons with a rounded spot on each side in front and a crown shaped spot in the middle of the notch; thorax dark reddish brown with metallic reflex on upper part of dorsum and darker areas on the side and marked with citron-yellow; legs black, femora dark reddish brown; wings hyaline with extreme tips slightly enfumed, tornal angle of hind wing with a patch of bright yellowish brown colour; abdomen dark reddish brown to dark brownish yellow marked with bright ochreous rings; segment 10 bright yellow on dorsum, its sides and apical border dark reddish brown. **Female** : Closely similar to the male, differing in sexual characters and the colour of wings; wings tinted with yellowish brown in the costal, subcostal and cubital spaces; dark blackish brown rays in costal and subcostal spaces; apex of fore wing, especially in tenerals, rich golden yellowish brown.

**Size** : Male : Abdomen 50-57 mm, Hind wing 48-52 mm. Female : Abdomen: 56-60 mm, Hind wing 50-51 mm.

**Habits and Habitat** : Same as that of *E. frontalis binocellata*.

**Breeding** : Breeds in still water, small weedy tanks and pools found in the plains.

**Status** : Rare.

**Distribution** : Peninsular India : Kerala : Malabar, Cochin and Walayar forest.

### *Macromia* Rambur

Dragonflies of large size, coloured dark metallic green or blue marked with citron yellow; head very large, eyes globular, very broadly contiguous; legs very long and spidery; wings long and pointed at tips, base of hind wing rather deep, emarginated and

markedly angulated in male, rounded in the female; discoidal cell always entire, that of hind wing with its base widely distal to the level of arc; pterostigma narrow, very short; sectors of arc shortly fused in forewings, longer fusion in the hindwings; 2 or 3 cubital nervures in all wings; anal loop made up of 6 to 12 cells; anal triangle 2 celled; abdomen longer than the wings, cylindrical; small oreillets present on the sides of segment 2; anal appendages simple.

### Key to the species of *Macromia* Rambur

1. Humeral or antehumeral stripe absent on thorax, or only a vestige of same not extending half way up dorsum; two short, dark, reddish brown rays at the bases of wings in both sexes ..... 2
  - Humeral or antehumeral stripe present on thorax, well defined, and extending beyond half way up dorsum; wings without dark rays at the bases of wings ..... 3
2. Abdominal segments 3 to 6 with paired mid dorsal spots; basal third of segment 7 yellow; segments 8 to 10 unmarked ..... *annaimallaiensis* Fraser
  - Abdominal markings more broad, segments 3 to 6 with mid dorsal yellow rings; segment 8 with a well-defined yellow spot; 9 and 10 unmarked ..... *indica* Fraser
3. Thorax dark metallic blue, marked with citron yellow, beneath black with a Y-shaped marking; abdomen with paired dorsal spots on segments 3 to 6; basal half of segment 2 yellow; segment 10 without dorsal spine ..... *flavocolorata* Fraser
  - Thorax dark green metallic at sides and upper part, dark reddish brown at lower part, marked with citron yellow, beneath uniform pale brown; abdomen with paired spots on segments 2 to 6, the spot on segment 2 is diamond shaped; segment 10 with a carina which ends in a robust, pointed spine ..... *irata* Fraser

### 87. *Macromia annaimallaiensis* Fraser

1931. *Macromia annaimallaiensis* Fraser, *Rec. Indian Mus.*, **33** : 447, 452–453 ; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 168–169.

**Diagnosis : Male** : Eyes emerald green; labrum and face dark ochreous; frons brown with a metallic blue reflex; thorax dark metallic blue at sides and upper part of dorsum, dark reddish brown at lower part of dorsum; humeral or antehumeral stripe absent on thorax or only a vestige of same not extending half way up dorsum; wings with only a vestige of short, dark rays at base of hind wings, absent in the forewing; anal loop with 8 to 10 cells; abdomen black, marked with citron yellow, segment 2 with broadly interrupted subbasal ring; 3 and 7 with basal rings; 4 and 5 with a pair of small dorsal spots; segment 6 immaculate and the remaining segments unmarked; segment 10 with a mid dorsal keel and very robust spine. **Female** : More robust than male, wings with

basal dark rays more obvious and extensive; anal loop with 12 to 18 cells; abdomen compressed; the annule on segment 2 is never interrupted and with two crescent shaped spots.

**Size :** Male : Abdomen 56-59 mm, Hindwing 45-47 mm. Female : Abdomen 53-58 mm, Hindwing 48-50 mm.

**Habits and Habitat :** This species have a strong, continuous flight and may be found patrolling roads or following the course of rivers.

**Breeding :** Breeds in submontane streams at an altitude of 2000 to 4000 feet.

**Status :** Rare

**Distribution :** Western Ghats. Kerala : South of Palghat gap.

### 88. *Macromia flavocolorata* Fraser

1922. *Macromia flavocolorata* Fraser, *J. Bombay nat. Hist. Soc.*, 28 : 702; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 186-189.

**Diagnosis :** **Male :** Eyes emerald green, black behind; face black, marked with yellow, or citron yellow marked with black; labrum black, with a small bright chrome-yellow spot at base; frons and vesicle black; thorax dark metallic blue, marked with citron yellow; antearlar sinus, a distinct humeral stripe, an oblique stripe on the mesepimeron and another on the metepimeron; beneath black, with a yellow Y-shaped marking; legs black, anterior coxae and trochanters yellow; wings hyaline, variably tinted with pale brown according to age; anal loop with 6 to 8 cells; abdomen black, marked with citron yellow; the basal half of segment 2 with a black quadrate spot just above the oreillets; segments 3 with paired dorsal spots and a baso lateral triangular spot; 4 to 6 with dorsal spots only; 7 with a basal ring; segment 8 with a large triangular basal dorsal spot; 9 and 10 unmarked and segment 10 without a mid-dorsal spine. **Female :** More robust than the male, labrum nearly always marked with yellow at base, either a single large basal spot or a pair of spots; tips of wings usually enfumed with brown, and in adult specimens, the whole wings tinted with brown; extreme base of all wings coloured reddish brown; anal loop with 12 to 18 cells; the end segments of abdomen compressed and with yellow markings rather more extensive, markings on segment 2 extremely variable; remaining segment similar as in male, except 8, which has the dorsal spot absent.

**Size :** Male : Abdomen 44-47 mm, hind wing 36-37 mm. Female : Abdomen 45-48 mm, Hind wing 38-42 mm.

**Habits and Habitat :** Same as that of *M. annaimallaiensis*.

**Breeding :** Breeds in submontane streams at an altitude of 2000 to 4000 feet.

*Status* : Rare.

*Distribution* : North Bengal, Western Ghats : Kerala : Malabar, West coast to north of Palghat gap.

#### 89. *Macromia indica* Fraser [Plate-IV, Fig. 1]

1924. *Macromia indica* Fraser, *Rec. Indian Mus.*, **26** : 427, 447-449; Needham, 1932, *Rec. Indian Mus.*, **34** : 211-212; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 166-167.

*Diagnosis* : **Male** : Eyes emerald green; labrum ochreous, broadly edged with black; frons with metallic reflex not clear; thorax reddish brown, black on the upper part and anterior sides with metallic reflex; ante alar sinus and oblique stripes on each side citron yellow; humeral or antehumeral stripe absent on thorax; wings with a dark reddish brown ray at base, reduced in the fore wing, but extending up to the first antenodal nervure in costal space in hind wing; abdomen black, with yellow annules brighter and broader; segment 2 with a broad yellow ring covering half the length of segment; 3 to 6 with yellow rings combined over dorsum and below with abdominal spots; basal spot on segment 8 always well developed; segment 10 with a strong mid dorsal keel and a robust spine. **Female** : Labrum bright ochreous, broadly bordered with black; thorax same as in male; wings with dark reddish brown rays at costal, subcostal and extending into the median space and upto the second antenodal nervure; abdomen with very broad bright citron yellow annules on segments 2 to 8.

*Size* : Male : Abdomen 58 mm, Hindwing 45 mm. Female : Abdomen 52-53 mm, Hindwing 46-49 mm.

*Habits and Habitat* : This species engaged in long patrolling flights along the banks of rivers, it is always found near the water.

*Breeding* : Breeding in submontane streams.

*Status* : Rare.

*Distribution* : Western Ghats: Kerala: North of Palghat gap.

#### 90. *Macromia irata* Fraser

1924. *Macromia irata* Fraser, *Rec. Indian Mus.*, **26** : 427, 454-455; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 190-191.

*Diagnosis* : **Male** : Eyes emerald green, black behind, with an elongate citron yellow spot below; labium and labrum bright reddish brown and ochreous at base; face dull chrome yellow; frons black along the crest with a large oval yellow spot; thorax dark metallic green at sides and upper part, dark reddish brown at lower part, marked with citron yellow; beneath uniform pale brown; legs black, coxae and trochanters reddish

brown; wings hyaline, extreme tips very palely enfumed; 8 or 9 cells in anal loop; abdomen black, marked with citron yellow as: segment 2 with a pair of mid dorsal diamond shaped spots; segment 3 with a pair of mid dorsal triangular spots and a large triangular spot on each side at base; segments 4 to 6 with paired mid dorsal spots; 7 with the basal third to half yellow; 8 with a narrow basal ring; 9 and 10 unmarked; 10 with a well developed carina and a robust spine. **Female** : more robust than male, wings with the extreme base tinted with reddish brown; anal loop with 12 to 16 cells; abdomen laterally compressed, markings similar to the male.

**Size** : Male : Abdomen 47-50 mm, Hindwing 43 mm. Female : Abdomen 46-48 mm, Hindwing 42-44 mm.

**Habits and Habitat** : It is found that a large number of this species are flying over the open forest roads in the vicinity of the streams.

**Breeding** : Breeds in submontane streams.

**Status** : Rare.

**Distribution** : Western Ghats : Kerala : Malabar, Wyanad.

### Family LIBELLULIDAE

Dragonflies of small, medium or large size and robust build, frequently bright coloured, rarely metallic, the sexes differing strongly in colour and markings. Eyes more or less contiguous. Wings usually rather short, pointed at the tips, occasionally differing in shape in both sexes; hindwings always rounded at the base in both sexes; abdomen variable in shape, usually shorter than the wings, often depressed, cylindrical, triquetral or dilated; the 8<sup>th</sup> segment of the female frequently dilated or with wing like expansions laterally; segment 2 without oreillets and segment 10 without a dorsal spine or keel.

### Key to the genera of Family Libellulidae

1. Base of discoidal cell in hindwing widely distal to the level of arc; costal side of discoidal cell in forewing markedly angulated; anal loop absent or very small; discoidal field beginning with only 1 row of cells..... 2
- Base of discoidal cell in hindwing at level of arc or but a shade distal; costal side of discoidal cell in forewing not angulated; anal loop elongate; discoidal cell beginning with 2 or more row of cells ..... 3
2. Discoidal cell entire in forewings and hindwings; *Cuii* and *IA* arising together from the posterior angle of discoidal cell in the hindwing; no supplementary nervures to bridge ..... *Tetrathemis* Brauer
- Discoidal cell in forewing entire, that of hindwing traversed; *Cuii* in hindwing widely

- separated from the posterior angle of discoidal cell; supplementary nervures to bridge always present ..... *Hylaeothemis* Ris
3. Claws without hooks; thorax metallic ..... *Onychothemis* Brauer
- Claw hooks equal in length to claws, which thus appear bifid; thorax metallic ..... *Zygonyx* Selys
- Claw hooks shorter than claws and arising from about middle; thorax rarely metallic ..... 4
4. Anal loop open ..... 5
- Anal loop closed ..... 6
5. Abdomen broad at base, then tapering gradually to the end; male with an opalescent white spot in the center of hindwing ..... *Tholymis* Hagen
- Abdomen swollen at base, then suddenly narrowed and very slim and cylindrical to the end; wings without opalescent white spot ..... *Zyxomma* Rambur
6. Distal antenodal nervure in forewing complete ..... 7
- Distal antenodal nervure in forewing incomplete ..... 14
7. Posterior lobe of prothorax large and fringed with long hairs ..... 8
- Posterior lobe of prothorax small, without long hairs ..... 10
8. Upper surface of frons metallic ..... *Brachydiplax* Brauer
- Upper surface of frons non-metallic ..... 9
9. Small sized dragonflies, abdominal segments 1 to 6 dilated, 7 to 10 slim and cylindrical; frons rounded and with shallow groove; usually 6 antenodal nervures ..  
..... *Acisoma* Rambur
- Large sized dragonflies, shape of abdomen variable; frons with sharply defined crest in both sexes; never less than 12 antenodal nervures in forewing .....  
..... *Orthetrum* Newman
10. Sectors of arc in forewing arising from a common and long stalk; frons metallic above ..... 11
- Sectors of arc in forewing separated at their origin; frons non-metallic ..... 12
11. Small sized, 1 cubital nervure in forewings, 2 or 3 in the hindwings; discoidal cell of forewing broad, its costal side angulated, never traversed; anal loop short, made up of 6 cells ..... *Epithemis* Laidlaw

- Medium sized, only 1 cubital nervure in all wings; discoidal cell of forewing narrow, traversed, not angulated; anal loop long, made up of more than 6 cells ..... *Cratilla* Kirby
- 12. Subtrigone in forewing a single celled; hindwing with a conspicuous black and golden yellow basal marking, neuration black ..... *Aethriamanta* Kirby
- Subtrigone in forewing 3 celled; discoidal cell entire in all wings ..... 13
- 13. Sectors of arc separated in all wings; base of discoidal cell of hindwing at the level of arc; pterostigma long, equal in the fore and hindwings ..... *Urothemis* Brauer
- Sectors of arc separated in forewings, shortly fused in the hindwing; base of discoidal cell in hindwing distinctly proximal to the arc; pterostigma short, that of hindwing slightly shorter than that of forewing ..... *Macrodiplax* Brauer
- 14. Lobe of prothorax large and fringed with long hairs ..... 15
- Lobe of prothorax small, without hairs ..... 18
- 15. Frons with a deep narrow sulcus dividing it into two horse-shoe shaped surfaces anteriorly; vesicle high, apex with two sharp points; legs long and very robust, with robust spines ..... *Rhodothemis* Ris
- Frons without a sharply defined crest but moderately prominent and with deep sulcus; vesicle rounded or slightly notched above; legs rather slim and with small spines... ..... 16
- 16. Borders of discoidal field in forewing with its sides converging strongly at wing border ..... *Sympetrum* Newman
- Borders of discoidal field in forewing diverging widely at wing border ..... 17
- 17. Costal border of forewing straight; frons non metallic above; *Cuii* widely separated from the posterior angle of discoidal cell in hindwing ..... *Diplacodes* Kirby
- Costal border of forewing sinuous near base; frons metallic above; *Cuii* arising from the posterior angle of discoidal cell in hindwing ..... *Palpopleura* Rambur
- 18. Sectors of arc in forewing separated and diverging at origin; body very dark metallic; frons metallic above; wings generally broadly coloured black or black and golden amber ..... *Rhyothemis* Hagen
- Sectors of arc in forewing arising from a common and rather long stalk; frons and body non- metallic; wings variable in colour ..... 19
- 19. Discoidal field with borders converging strongly at wing margin ..... 20
- Discoidal field with wing borders parallel or widely divergent at wing margin ..... 21

20. Discoidal cell in forewing very narrow, its costal side only one-third the length of basal; pterostigma small, that of hindwing distinctly smaller than in the forewing ..  
..... *Pantala* Hagen
- Discoidal cell in forewing broad, its costal side about one-half the length of basal; pterostigma short and equal size in fore and hind wings ..... *Trithemis* Brauer
- 21 Discoidal field in forewing adjacent to discoidal cell only 2 cells wide .....  
..... *Indothemis* Ris
- Discoidal field in forewing adjacent to discoidal cell 3 or more cells wide ..... 22
22. Pterostigma very short and unequal in fore and hind wings; hindwing very broad at base and tapered at apex; cells at base of hindwing becoming arranged into straight rows of closely packed narrow cells; genital hamules very long, projecting and conspicuous in profile ..... 23
- Pterostigma usually of equal size in fore and hind wings; hindwing not markedly wide at base and apex not markedly tapered; cells at base of hindwing not closely packed in straight rows; genital hamules small and inconspicuous in profile ..... 24
23. Pterostigma in fore and hind wings of almost equal size; *Riii* markedly undulated; distal and apical angles of anal loop equal ..... *Hydrobasileus* Kirby
- Pterostigma smaller in hindwing, than in forewing; *Riii* evenly curved, not undulated; apical angle of anal loop much more acute than the distal *Tramea* Hagen
24. Pterostigma bicolorous, black with white ends; 2 or 3 rows of cells between *IRiii* and *Rspl* ..... *Bradinopyga* Kirby
- Pterostigma unicolorous; 1 or 2 rows of cells between *IRiii* and *Rspl* ..... 25
25. 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 in all wings ..... *Neurothemis* Brauer
- Wings usually uncoloured or with a small basal yellow marking in hindwing; no secondary reticulation in the wings; only 1 cubital nervure in all wings ..... 26
26. Red or ochreous species with yellow markings to wings ..... 27
- Dark coloured species, only partly red or ochreous; without yellow markings to wings ..... 28
27. Wings with small basal yellow markings; big size, with  $7\frac{1}{2}$  to  $14\frac{1}{2}$  antenodal nervures in forewings; face and frons red ..... *Crocothemis* Brauer
- Wings with broad basal yellow markings; small size, with  $6\frac{1}{2}$  to  $7\frac{1}{2}$  antenodal nervures in forewings; face and frons never red ..... *Brachythemis* Brauer

28. Upper surface of frons steely black or metallic blue black; thorax metallic with yellow markings; abdomen reddish ..... *Lathrecista* Kirby
- Upper surface of frons black, never metallic; thorax and abdomen black with or without yellow marking ..... *Potamarcha* Karsch

### Subfamily TETRATHEMISTINAE

#### *Tetrathemis* Brauer

Dragonflies of rather small size; abdomen shorter than wings; coloured black, marked with citron yellow; the wings coloured partly with yellow; base of discoidal cell in hind wing widely distal to level of arc; costal side of discoidal cell in fore wing markedly angulated, so that the cell is four sided; discoidal field beginning with only 1 row of cells; anal loop made up of 3 or 4 cells.

#### 91. *Tetrathemis platyptera* Selys [Plate-V, Fig. 6]

1878. *Tetrathemis platyptera* Selys, *Mitt. Mus. Dresden*, : 316; Kirby, 1890, *Cat. Odon.*, : 44; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 250–251.

**Material examined** : 1 male, 1 female, 16-xi-1998, Chalamattom (Kottayam Dt.), Coll. K. G. Emiliyamma; 1 male, 2-x-2002, Edakkad (Kozhikode Dt.), Coll. Ashok Kumar; 1 female, 26-x-2000, Mundakayam (Kottayam Dt.), Coll. P. M. Sureshan; 1 male, 23-ix-2001, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot.

**Diagnosis** : **Male** : Vesicle, upper part and sides of frons brilliant metallic greenish blue; eyes emerald green during life; labrum black, with two triangular, bright yellow basal spots; thorax black with a bronze-green reflection, marked broadly with citron-yellow; beneath yellow, with a broad black triangle; wings hyaline, the fore wings slightly tinted with yellow at base, the hind wing very broadly and deeply tinted upto one or two cells distal to node, the outer half or less of this area much deeper tinted than the basal, and in some specimens, the subcostal and cubital spaces also deeper tinted; (the depth of the colour depends on the age of the specimen and locality); abdomen black, marked with citron-yellow as: segment 1 and 2 with lateral spots; 3 to 6 with latero basal spots; segment 7 with a large mid dorsal basal spot covering its basal half; segments 8 to 10 black, unmarked. **Female** : exactly similar to the male, but the wings, with a much strong and deeper tint of yellowish brown colour over the basal area.

**Size** : Male : Abdomen 15 to 18 mm, Hind wing 18 to 21 mm. Female : Abdomen 14 to 16 mm, Hind wing 19 to 24 mm.

**Habits and Habitat** : Active during rainy season, often found on vegetation adjoining ponds and wells.

**Breeding** : Breeds in stagnant waters, often in wells or pools; female deposits eggs on objects overhanging water.

**Status :** Uncommon.

**Distribution :** Throughout India. Kerala: Cochin, Kannur, Kottayam and Kozhikode.

### ***Hylaeothemis* Ris**

Dragonflies of medium sized, coloured black, marked with blue or yellow; eyes shortly contiguous; wings uncoloured or tipped with black; base of discoidal cell in hind wing widely distal to level of arc; costal side of discoidal cell in forewing markedly angulated and entire, that of the hindwing traversed; *Cu<sub>1</sub>* in hind wing widely separated from the posterior angle of discoidal cell; discoidal field beginning with only 1 row of cells; anal loop made up of 3 or 4 cells.

#### **92. *Hylaeothemis fruhstorferi apicalis* Fraser**

1889. *Tetrathemis fruhstorferi* Karsch, *Ent. Nachr.*, **15** : 321; Kirby, 1890, *Cat. Odon.* : 44.

1909. *Hylaeothemis fruhstorferi* Ris, *Cat. Coll. Selys, fasc.*, **9** : 64-65; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 261-262.

1991. *Hylaeothemis fruhstorferi apicalis* Tsuda, *A distributional list of world Odonata*, : 157.

**Material examined :** 1 female, 28-viii-2003, Thusharagiri (Kozhikode Dt.); 1 male, 10-v-2005, Vannathimala (Wayanad Dt.); 1 female, 11-v-2005, Chembra (Wayanad Dt.), Coll. K. G. Emiliyamma.

**Diagnosis :** **Male :** Eyes bottle green during life, yellowish green beneath; frons and vesicle brilliant metallic blue or bluish green; labrum bright brownish yellow or greenish yellow, bordered with black; thorax black, marked with pale blue as follows: two fine, closely apposed stripes on mid dorsum, ante alar sinus and humeral stripes broad, laterally blue, with a broad black Y-shaped stripe; wings hyaline, with occasional short yellow rays in the subcostal and cubital spaces; 1 or 2 cubital nervures in forewings; 2 in the hind; abdomen slim, the end segments narrowly fusiform, black, marked with pale blue as: segment 1 with a large lateral spot and a triangular apical mid dorsal spot; segment 2 with a mid dorsal narrow stripe, a large subdorsal apical spot and a large ventro lateral spot; segments 3 to 6 with incomplete lateral stripe; segment 7 with a large mid dorsal spot extending nearly whole length of segment; segments 8 to 10 black. **Female :** more robust than the male; the markings are entirely similar, but they are bright greenish yellow instead of blue, as in the subadult male.

**Size :** Male : Abdomen 23-32 mm, Hindwing 28-32 mm. Female : Abdomen 24-26 mm, Hindwing 29-33 mm.

**Habits and Habitat :** Occurs in large colonies, flight is short and weak like that of Gomphines. Usually found settled on plants at about 2000ft. and above altitudes.

**Breeding :** Breeds in the marshy areas along the banks of mountain streams at about 2000ft. altitudes.

**Status :** Rare.

**Distribution :** West coast of India. Kerala : Cochin, Kozhikode and Wayanad.

### Subfamily BRACHYDIPLACTINAE

#### *Brachydiplax* Brauer

Eyes broadly confluent on vertex; frons metallic above; prothorax with a large posterior lobe and fringed with long hairs; wings with discoidal cells of both wings entire, differing in size and shape in fore and hind wings, that of forewing situated far distal of the arc; base of discoidal cell in hindwing at level of arc; distal antenodal nervure in forewing complete; abdomen rather short, broad at base, then tapered gradually to the end.

#### Key to the species of Genus *Brachydiplax* Brauer

1. Bases of all wings with burnt brown or golden brown colour; dorsum of thorax densely pruinose; sides of thorax and basal segments of abdomen ferruginous .....  
.....*chalybea chalybea* Brauer
- Bases of wings uncoloured or very palely coloured, dorsum of thorax not pruinose; sides of thorax dark metallic or yellow marked with black .....*sobrina* (Rambur)

#### 93. *Brachydiplax chalybea chalybea* Brauer [Plate–VI, Fig. 7]

1868. *Brachydiplax chalybea* Brauer, *Verh. zool.- bot. Ges. Wien*, **18** : 173, 725; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 328–329.

1954. *Brachydiplax chalybea chalybea* Lieftinck, *Treubia*, **22** (suppl.) : 143.

**Material examined :** 1 male, 25-viii-2003, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma.

**Diagnosis :** **Male :** Labrum, face and anterior surface of frons pale brownish yellow; frons above and vesicle metallic blue; occiput black, with a geminate spot behind yellow; thorax brownish yellow or reddish brown laterally, pruinose white on dorsum, with metallic black vestiges of lines on upper parts of humeral and postero lateral sutures; wings hyaline, bases of all wings with burnt brown or golden brown in colour; abdomen black on dorsum, pruinose nearly white; segments 1 to 3 reddish brown on dorsum and laterally. **Female :** Resembles the subadult male. Thorax ochreous (brownish yellow), with similar lateral markings as that in male; wings only palely tinted with yellow at base; abdomen brownish yellow with sutures and intersegmental joints finely black.

**Size :** **Male :** Abdomen 21-25 mm, Hindwing 26-30 mm. **Female :** Abdomen 21-23 mm, Hindwing 27-29 mm.

**Habits and Habitat :** Found on the vegetations near ponds or tanks, always alert and very difficult to catch. Subadult males and adult females can be seen perching on twigs in scrub-jungle, near the larval habitat.

**Breeding :** Breeds in small tanks and ponds filled with weeds.

**Status :** Locally common.

**Distribution :** Assam, West Bengal, Kerala : Kozhikode and Thiruvananthapuram.

#### 94. *Brachydiplax sobrina* (Rambur) [Plate-VI, Fig. 8]

1842. *Libellula sobrina* Rambur, *Ins. Nevrop.* : 114.

1893. *Brachydiplax sobrina* Kirby, *J. Linn. Soc. Zool.*, **24** : 551; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 325-327.

**Material examined :** 1 male, 1 female, 10-vi-2001, Chemballikundu (Kannur Dt.); 1 female, 20-vii-2004, Madayipara (Kannur Dt.) Coll. Md. Jafer Palot; 4 males, 29-x-2000, Kumarakom; 1 male, 31-x-2000, Velloor (Kottayam Dt.), Coll. P. M. Sureshan.

**Diagnosis : Male :** Labrum bright yellow bordered with black; face and frons creamy white; frons above and vesicle metallic blue; occiput dark brown, with a geminate spot behind yellow; thorax olivaceous brown to greenish-yellow, with black or metallic markings, pruinose on dorsum and sides; in subadult males, markings steely metallic black on a pale yellow background as follows: mid dorsal and humeral stripe confluent on dorsum and formed a M-shaped marking; three stripes on each side, one on humeral suture, one on postero lateral suture and third one between these two stripes crossing the spiracle; wings hyaline, uncoloured; abdomen black, pruinose blue in old adults, but marked with yellow in subadults and teneralis as follows: whole of segment 1, sides of segment 2 and 3 yellow; segments 4 to 7 with broad lateral spots, extending from base to half the length of segments 6 and 7. **Female :** similar to the teneral male but ground colour of thorax bright yellow and the metallic black stripes broad; W-shaped black marking on each sides of thorax.

**Size :** Male : Abdomen 20 to 24 mm, Hind wing 25 to 28 mm. Female : Abdomen 16 to 22 mm, Hind wing 22 to 26 mm.

**Habits and Habitat :** Found on the vegetations near ponds or tanks, always alert and very difficult to catch. Subadult males and adult females can be seen perching on twigs in scrub-jungle, near the larval habitat.

**Breeding :** Breeds in small tanks and ponds filled with weeds.

**Status :** Locally common.

**Distribution :** Assam, Bihar, Kerala, Uttar Pradesh, Himachal Pradesh, Punjab, Maharashtra, Meghalaya, Orissa, Rajasthan, West Bengal and Western Ghats. Kerala: Kannur, Kottayam, and Kozhikode.

## Subfamily LIBELLULINAE

*Cratilla* Kirby

Dragonflies of moderate size, coloured black marked with yellow or metallic and wings hyaline or partly opaque; frons with angulated crest in male, rounded in the female, with a deep sulcus; vesicle rounded or with two spines; thorax robust; wings long and rather narrow; abdomen moderately broad or narrow, depressed or subcylindrical.

95. *Cratilla lineata calverti* Forster [Plate-IV, Fig. 11]

1770. *Orthemis lineata* Brauer, *Sitzungsber. Akad. Wien*, 77 : 9.

1903. *Cratilla lineata* Forster, *Ann. Mus. Hungar* : 537; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 286–288.

1949. *Cratilla lineata calverti*, Lieftinck, *Verh. NaturaiGes. Basel.*, 64 (1) : 201–202.

**Material examined** : 1 female, 5-xi-1995, Muthuvanchal (Wayanad Dt.); 4 females, 18-xii-1998, Thunnilokadavu (Wayanad Dt.); 1 female, 11-xi-1994, Rampur R.F. (Wayanad Dt.), Coll. P. M. Sureshan; 1 female, 26-x-2001, Payangadi (Kannur Dt.), Coll. Md. Jaffer Palot; 1 female, 26-i-1994, Manjucholamala (Kasaragod Dt.), Coll. K. C. Gopi; 2 females, 28-viii-2003, Thusharagiri (Kozhikode Dt.), K. G. Emiliyamma.

**Diagnosis** : **Male** : Eyes dark bluish black; upper surface of frons dark metallic blue or green; labrum, face and sides of frons creamy yellow; occiput black or yellow; back of occiput and head marked with yellow; prothorax black, anterior collar and border of posterior lobe yellow; thorax steely or bronzed black, non metallic, marked with yellow; beneath thorax yellow; wings hyaline, sometimes tips are brown, adults wings are smoky brown, especially towards tips; anal loop very long and overlapping with the distal end of discoidal cell; abdomen black, marked with bright ochreous as follows: segments 1 and 2 with broad lateral and mid dorsal stripes; segments 3 to 8 with fine stripes on mid dorsal carina and ventral borders; remaining segments black; pale beneath. **Female** : closely similar to male, but abdomen relatively shorter and more robust; eyes reddish brown above, pale beneath; labrum with black border or with a large black spot.

**Size** : Male : Abdomen 26 to 31 mm, Hind wing 34 to 40 mm. Female : Abdomen 29 to 30 mm, Hind wing 39 to 41 mm.

**Habits and Habitat** : This dragonfly can be found in high elevations of forests, is commonly seen perched on dead twigs with its wings sloped to the sides and body held close to and parallel with the twig.

**Breeding** : Breeds in marshy areas near the hillstreams.

**Status** : Locally common.

**Distribution** : Orissa, Uttar Pradesh, Western Ghats and Kerala: Kannur, Kozhikode, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve and Wayanad.

*Epithemis* Laidlaw

Dragonflies of rather small size and slight build, coloured black, marked with yellow, and the basal segments of abdomen bright red or pruinose white; eyes shortly contiguous; frons prominent, with wide shallow sulcus; wings narrow, costal side of discoidal cell in forewing angulated; the base of discoidal cell in hindwing slightly distal to level of arc; 1 cubital nervure in forewing, 2 or 3 in the hindwing; anal loop short, made up of about 6 cells; abdomen as long as or much longer than wings, slim and cylindrical, but dilated at basal segments.

96. *Epithemis mariae* (Laidlaw) [Plate-V, Fig. 4].

1915. *Amphithemis mariae* Laidlaw, *Rec. Indian Mus.*, **11** : 337-339; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 258-259.

**Material examined** : 2 males, 30-iii-1997, Pulickal (Parambikulam WLS, Palakkad Dt.); 2 males, 24-ix-1993, Santhimala (Kasaragod Dt.), Coll. K. C. Gopi; 1 female, 6-xi-1995, Muthalakayam (Parambikulam WLS); 3 males, 1 female, 14-xi-1996, Vellayikkamalai (Idukki WLS, Idukki Dt.), Coll. P. M. Sureshan.

**Diagnosis** : **Male** : Labrum, face and front of frons creamy white; upper surface of frons and vesicle brilliant metallic bluish green; prothorax and thorax blackish brown dorsally, laterally and upto the anterior half of mesepimeron; laterally yellow with dark brown on posterior half of mesepimeron and upper part of sides; yellowish brown below; legs black, inner side of anterior femora bright yellow; wings hyaline, extreme base with yellowish brown colour; discoidal field beginning with a single row of cells; abdomen with segments 1, 2 and major part of segment 3 ruby red, apical border of 3 and rest of abdomen black. **Female** : Labrum, face and frons similar to the male; prothorax and thorax golden yellow with dark reddish brown humeral stripe and a broad mid dorsal area; wings hyaline, bases of both fore and hind wings deep yellowish brown upto the distal side of discoidal cells; abdominal segments 1 to 3 golden yellow, instead of ruby red with sutures finely black; segments of 4 to 7 with broad basal bright yellow annules; segment 8 with narrow annule; remaining segments black.

**Size** : Male : Abdomen 19 to 22 mm, Hind wing 20 to 21 mm. Female : Abdomen 19 to 21 mm, Hind wing 21 mm.

**Habits and Habitat** : occurs in small colonies, usually found near water in thick forest.

**Breeding** : Breeds in marshy areas at the foothills.

**Status** : Uncommon. Mainly observed during September and October.

**Distribution** : Western Ghats. Kerala: Cochin, Idukki, Kannur, Kasaragod, Parambikulam Wildlife Sanctuary, Tamaracherry and Vythiri ghat.

*Lathrecista* Kirby

A genus of moderately large dragonflies with hyaline wings, bronzed thorax marked with yellow, and abdomen reddish; head moderately large; eyes broadly confluent; frons angulated at crest, vesicle rounded; prothorax with small posterior lobe; thorax robust; wings long and narrow; node situated nearer pterostigma than base; antenodal nervures numerous and the distal one incomplete.

97. *Lathrecista asiatica asiatica* (Fabricius) [Plate-VII, Fig. 6]

1798. *Libellula asiatica* Fabricius, *Ent. Syst., Suppl.* : 283.

1909. *Lathrecista asiatica asiatica* Ris, *Cat. Coll. Selys, fasc.*, 9 : 129–132; Fraser, 1918, *J. Bombay nat. Hist. Soc.*, 26 : 147–149; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 281–284.

**Material examined** : 1 male, 25-x-2001, Aralam WLS (Kannur Dt.); 1 male, 27-xii-2003, Nelliampathy hills (Wayanad Dt.); 1 male, 5-ix-2005, Pazhayangadi (Kannur Dt.) Coll. Md. Jafer Palot; 2 males, 20-x-2003, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma; 1 male, 4-viii-2001, Edakkad (Kozhikode Dt.), Coll. Ashok kumar.

**Diagnosis** : **Male** : Upper surface of frons steely black or metallic blue-black; eyes reddish brown above, bluish grey below; face, lower border of frons and sides creamy yellow; behind head a geminate yellow spot on occiput and a small round spot at each side; thorax dark coppery-brown above, bright yellow on sides; in subadults, the dorsum or above, bright coppery brown with a pair of narrow parallel yellow stripes, on sides, two black 'Y' shaped markings with a narrow black stripe between; in old adults all these markings obscured by pruinescence; wings hyaline with tips usually brownish; abdomen red, segments 1 and 2 with broad lateral and fine mid dorsal yellow stripes; segments 3 to 8 bright crimson red with apical sutures finely black (all these markings completely obscured by thick bluish white pruinescence in old adults); segments 9 and 10 black. **Female** : Resembles the male closely, except for the colour of abdomen, which is rich olivaceous-brown; the mid dorsal greenish yellow stripe present on segments 1 to 8; in andromorph females, the abdomen is red as in male.

**Size** : Male : Abdomen 27 to 32 mm, Hind wing 33 to 37 mm. Female : Abdomen 27 to 32 mm, Hind wing 34 to 36 mm.

**Habits and Habitat** : This is a shy insect and, with rapid flight; usually found in colonies near ponds, tanks and marshes. In plains, these are sitting on the coir ropes used for drying clothes and flying over the brackish water.

**Breeding** : Breeds in forest pools, ponds and marshes situated usually in heavy bamboo jungles.

**Status** : Uncommon.

**Distribution** : Sparingly distributed over the plains of India, except in dry zones; South Andaman Islands, West Bengal and Western India; Kerala: Idukki, Kannur, Kottayam, Kozhikode, Thiruvananthapuram and Wayanad.

***Orthetrum* Newman**

A large genus of medium sized dragonflies; diverse in colour, size and shape, especially with regard to the abdomen. Head moderately large; eyes shortly or broadly contiguous; frons with sharply defined crest in both sexes; vesicle variable; prothorax with a very large posterior lobe, fringed with long hairs; thorax robust; wings long, the hind wing moderately broader than the forewing; membrane large; node lying nearer pterostigma than base of wing; antenodal nervures numerous, distal antenodal nervure complete in forewing; abdomen variable in shape.

**Key to the species of Genus *Orthetrum* Newman**

- 1 Males coloured some shade of red ..... 2
  - Males coloured brown or black with yellow markings; often pruinosed ..... 3
2. Males bright red, never pruinosed; frons bright scarlet red; abdomen bright blood red; lamina of male genitalia with a tuft of stiff black bristles ..... *chrysis* Selys
  - Male violaceous red, due to the pruinescence; frons bluish black; abdomen purplish red; lamina of male genitalia without bristles ..... *pruinsum neglectum* (Rambur)
3. Abdomen enormously swollen at base and then abruptly slimmed and compressed laterally to the end; black marked with greenish yellow, not pruinosed ..... *sabina sabina* (Drury)
  - Abdomen variable, but never slim or compressed; mostly with pruinosed abdomen and thorax ..... 4
4. Base of hindwing with a broad triangular blackish brown spot ..... *triangulare triangulare* (Selys)
  - Base of hindwing without a black triangular marking ..... 5
5. *Cuii* in hindwing arising from the distal side of discoidal cell well away from its posterior angle ..... *luzonicum* (Brauer)
  - *Cuii* in hindwing arising from the posterior angle of discoidal cell ..... 6
6. Moderately large species with face and frons black; membrane black; abdomen pruinosed blue from segment 1 to apical end of segment 8 ..... *glaucum* (Brauer)
  - Smallest species of the genus, with face and frons grayish green or bluish; membrane dark brown bordered with white; abdomen pruinosed blue throughout in adults ..... *taeniolum* (Schneider)

98. *Orthetrum chrysis* Selys [Plate–VIII, Fig. 1]

1891. *Libella testacea* race? *chrysis* Selys, *Ann. Mus. Civ. Genova*, **30** : 462.

1900. *Orthetrum chrysis* Ris, *Archivfur Natur. Bd.*, **1** : 186, pl.ix, fig.2; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 310–311.

**Material examined** : 3 males, 17-ii-2004, Thusharagiri (Kozhikode Dt.); 1 male, 22-ii-2001, Chathancode (Kozhikode Dt.); 1 male, 15-xi-1998, Chalamattom (Kottayam Dt.); 3 males, 17-ii-2004, Thusharagiri (Kozhikode Dt.); 1 male, 27-x-2004, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma; 2 males, 30-v-2002, Kinalur estate (Kozhikode Dt.); 1 male, 1 female, 6-xi-2001, Thalakkulathur (Kozhikode Dt.), Coll. K. C. Gopi; 1 male, 12-i-1992, Kudayuritty (Idukki Dt.), Coll. M. B. Raghunathan; 1 male, 1 female, 27-x-2001, Aralam WLS (Kannur Dt.); 1 male, 22-x-2001, Meenmuttithodu (Kannavam R.F., Kannur Dt.); 1 male, 4-vi-2003, Thusharagiri (Kozhikode Dt.), Coll. Md. Jafer Palot; 1 male, 1 female, 4-ix-1995, Kottiyur R.F.(Kannur Dt.), Coll. C. Radhakrishnan.

**Diagnosis** : **Male** : Bright red; eyes red during life; labium, labrum, face and frons yellowish or pale brown; frons bright scarlet-red; thorax dark reddish brown; wings hyaline, with a dark golden-brownish yellow coloured spot at base of hind wing extending to the first antenodal nervure; membrane blackish brown; abdomen bright blood-red; lamina of male genitalia with a tuft of stiff black bristles. **Female** : the red colour replaced by bright brownish yellow throughout; wings without yellow basal marking.

**Size** : Male : Abdomen 28 to 33 mm, Hind wing 31 to 38 mm. Female : Abdomen 25 to 30 mm, Hind wing 31 to 36 mm.

**Habits and Habitat** : Usually found near small fresh water streams, lakes, ponds and tanks filled with vegetations.

**Breeding** : Breeds in pools and marshes near submontane streams. In plains it breeds in ponds, lakes and small streams.

**Status** : Common.

**Distribution** : Himachal Pradesh, Orissa, south Andaman Islands and Western Ghats: Kerala: Idukki, Kannur, Kasaragod, Kottayam, Kozhikode, Silent Valley National Park, Thiruvananthapuram and Wayanad.

99. *Orthetrum glaucum* (Brauer) [Plate–VIII, Fig. 4]

1865. *Libellula glauca* Brauer, *Verh. zool.-bot. Ges. Wien*, **15** : 1012.

1890. *Orthetrum glaucum* Kirby, *Cat. Odon.*, : 39; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 307–309.

**Material examined** : 2 males, 23-xii-1994, Kurichiat R.F (Wayanad Dt.), Coll. C. Radhakrishnan; 1 male, 1 female, 30-v-2002, Kinalur estate (Kozhikode Dt.); 1 male, 27-

x-1993, Pullody (Kasaragod Dt.), Coll. K. C. Gopi; 1 male, 9-xi-1996, Mlappara (Periyar Tiger Reserve, Idukki Dt.); 2 males, 2 females, 9-xi-1994, Periya R.F. (Wayanad Dt.); 1 male, 11-xi-1994, Rampur R.F. (Wayanad Dt.), Coll. P. M. Sureshan; 2 males, 2 females, 23-ix-2004, Thusharagiri (Kozhikode Dt.); 2 males, 12-v-2005, Banasuramala foot hills (Wayanad Dt.), Coll. K. G. Emiliyamma.

**Diagnosis : Male : Adults :** labium, labrum, face and frons glossy black; vesicle and occiput black or reddish brown; eyes dark green, capped with reddish brown; prothorax bright yellow to dark brown marked with yellow; thorax pruinose dark blue or black with a very thin pruinescence; wings hyaline, extreme base with dark yellowish brown upto cubital nervure and well into anal triangle in hindwing; the whole wing palely and evenly smoky brown; membrane black; discoidal cell of hindwing entire; abdomen ventrodorsally dilated at segments 1 to 3, then very slim and of even width to the end, pruinose dirty blue from segment 1 to 8, segments 9 and 10 black. **Subadult Male and Female :** labium, labrum, and face pale olivaceous brown; thorax olivaceous on mid dorsum, bordered by reddish brown humeral stripe; laterally warm reddish brown with two yellowish white narrow stripes on mesepimeron and metepimeron; wings similar to the male; abdomen reddish brown with a broad greenish yellow stripe on mid dorsum extending from segments 1 to 7; segments 8, 9 and bases of 10 black on mid dorsum.

**Size :** Male : Abdomen 29 to 35 mm, Hind wing 33 to 40 mm. Female : Abdomen 28 to 32 mm, Hind wing 32 to 37 mm.

**Habits and Habitat :** Usually found near small fresh water streams, ponds etc. infested with small water plants. The species varies greatly in colour according to the age and in size according to the altitude, large specimens collected from high altitudes.

**Breeding :** Breeds in pools and marshes near small freshwater stream and submontane streams.

**Status :** Locally common.

**Distribution :** Throughout India: Kerala: Ernakulam, Idukki, Kannur, Kasaragod, Kozhikode, Periyar Tiger Reserve and Wayanad.

#### 100. *Orthetrum luzonicum* (Brauer) [Plate-VIII, Fig. 5]

1868. *Libella luzonica* Brauer, *Verh. zool.-bot. Ges. Wien*, 18 : 169, 732.

1890. *Orthetrum luzonicum* Kirby, *Cat. Odon.*, : 38; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 298 - 300.

**Material examined :** 1 male, 30-xii-1998, Chalamattom (Kottayam Dt.); 1 male, 25-iv-2000, Muthappanpuzha (Kozhikode Dt.); 2 males, 24-x-2002, Vadikkadavu (Malappuram Dt.); 1 male, 1 female, 17-ii-2004, Thusharagiri (Kozhikode Dt.); 1 male, 9-v-2005, Pookode lake (Wayanad Dt.), Coll. K. G. Emiliyamma; 1 male, 15-iii-2001, Kallar (Thiruvananthapuram Dt.); 1 male, 24-i-1994, Ranipuram (Kasaragod Dt.); 1

**male**, 7-xii-2004, Kinalur estate (Kozhikode Dt.), Coll. K. C. Gopi; 1 male, 1 female, 8-iii-2002, Kinalur estate (Kozhikode Dt.); 1 female, 5-ix-2002, Chevayur (Kozhikode Dt.), Coll. C. Radhakrishnan; 1 male, 7-xii-2002, Aralam WLS (Kannur Dt), Coll. Md. Jafer Palot; 1 male, 18-viii-1997, Vallamvetti, Anchal R.F.(Kollam Dt.); 1 female, 12-xi-1994, Kuppadi R.F.(Wayanad Dt.), Coll. P. M. Sureshan.

**Diagnosis : Male** : Eyes bluish green capped with violet; face and frons pale bluish or greenish yellow; labium and labrum pale yellow; vesicle and occiput black; prothorax greenish yellow; in sub adult male, thorax pale olivaceous green dorsally with dim brownish along mid dorsal carina, a broad reddish brown humeral stripe bordered in front with black; laterally three brown stripes on a pale olivaceous green background; legs blackish brown with anterior pair of femora bright yellow on outer surface; wings hyaline, *Cu<sub>1</sub>* in hind wing arising well away from the posterior angle of discoidal cell; abdomen dorsoventrally dilated at base, then narrow and tapered, pruinose blue, the sides of segments 1, 2 and base of 3 bright yellow. **Female and subadult male** : Eyes capped with brown above and bluish green laterally; vesicle dark olivaceous; occiput ochreous or dark brown; sides of thorax palest green with fine black sutures, lateral brown stripes absent; legs yellow, darker on outer surface; wings similar to the male; abdomen greenish yellow, with mid dorsal carina and all sutures finely black, a broad black stripe on each side of segments 4 to 8, segments 9 and 10 black or 10 with an oval yellow dorsal spot.

**Size** : Male : Abdomen 28 to 30 mm, Hind wing 30 to 32 mm. Female : Abdomen 28 to 32 mm, Hind wing 30 to 32 mm.

**Habits and Habitat** : Found in the montane, submontane and plain areas.

**Breeding** : Breeds in marshes and swampy areas.

**Status** : Common.

**Distribution** : Extends throughout India: Kerala: Kannur, Kollam, Kottayam, Kozhikode, Malappuram, Thiruvananthapuram and Wayanad.

### 101. *Orthetrum pruinosum neglectum* (Rambur) [Plate–VIII, Fig. 2]

1842. *Libellula neglecta* Rambur, *Ins. Nevrop.*, : 86.

1909. *Orthetrum pruinosum neglectum* Ris, *Cat.coll. Selys, fasc. 9* : 181, 239–240; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 311–313.

**Material examined** : 1 male, 29-x-1995, Sirkarpathy (Parambikulam WLS, Palakkad Dt.); 2 males, 31-x-1995, Anchupoola (Parambikulam WLS); 1 male, 6-xi-1995, Muthalakayam (Palakkad, Parambikulam WLS); 1 male, 6-xi-1996, Karadikkavala (Periyar tiger Reserve, Idukki Dt.); 1 male, 8-xi-1996, Mlappara (Periyar Tiger Reserve, 1 male, 12-xi-1996, Mullakudy (Periyar Tiger Reserve); 2 males, 10-xi-1996, Karikkavu (Periyar Tiger Reserve, Idukki Dt.); 1 male, 17-xi-1999, Karimpuzha

(Ernakulam Dt.); 1 male, 1 female, 11-xi-1994, Rampur R.F.(Wayanad Dt.); 1 male, 18-xii-1998, Cheroopa (Kozhikode Dt.), Coll. P. M. Sureshan; 1 male, 16-iii-2001, Kulasekaram; 1 male, 17-iii-2001, Neyyattinkara (Thiruvananthapuram Dt.); 1 male, 24-i-1994, Ranipuram (Kasaragod Dt.); 1 male, 27-x-1993, Pullody (Kasaragod Dt.), Coll. K. C. Gopi; 1 male, 24-x-2002, Vadikkadavu (Malappuram Dt.); 2 males, 17-ii-2004, Thusharagiri (Kozhikode Dt.); 1 male, 27-x-2004, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma.

**Diagnosis : Male :** Violaceous red due to a thin overlying pruinescence; eyes blue black above, bluish gray below; labium, labrum and face ochreous to pale reddish brown; vesicle and occiput dark reddish brown; frons dark brown or blue-black anteriorly and above; prothorax and thorax reddish-brown to dull purple according to pruinescence present; wings hyaline, pale brown towards tips in old adults and with a reddish-brown basal marking in hind wing; membrane black; abdomen bright red in sub adults; purplish red in adults due to pruinescence. **Female :** dull ochreous; frons pale olivaceous brown; eyes yellowish capped with brown; thorax reddish brown or dull ochreous with brown antehumeral stripe on each side; never pruinose; wings similar to male, but the basal marking paler and almost indistinct; abdomen dull ochreous with all stripes and sutures black, sides of segment 8 dilated and broadly black.

**Size :** Male : Abdomen 28 to 31 mm, Hind wing 32 to 36 mm. Female : Abdomen 30 mm; hind wing 37 mm.

**Habits and Habitat :** one of the common dragonflies found near the forest streams and also in the plains, ponds, ditches and tanks.

**Breeding :** Breeding takes place in slow running streams, perennial and seasonal monsoon ponds, paddy fields and cemented tanks.

**Status :** Common.

**Distribution :** Throughout India: Kerala: Cochin, Kannur, Kasaragod, Kozhikode, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve (Idukki), Silent Valley National Park, Thiruvananthapuram and Wayanad.

## 102. *Orthetrum sabina sabina* (Drury) [Plate-VIII, Fig. 3]

1770. *Libellula sabina* Drury, *III. Exot. Ins.*, 1 : 114-115.

1889. *Orthetrum sabina* Kirby, *Trans. Zool. soc. Lond.*, 12 : 302; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 300-302.

1954. *Orthetrum sabina sabina*, Lieftinck, *Treubia*, 22 (suppl.) : 137.

**Material examined :** 1 male, 17-i-1995, Peruvannamuzhi (Kozhikode Dt.); 2 males, 3 females, 17-iii-1999, Malampuzha (Palakkad Dt.); 2 females, 23-iii-1999, Chulliyar (Palakkad Dt.); 2 males, 22-iii-1999, Kanjirampuzha (Palakkad Dt.), 1 male, 25-x-2000, Kanjirampara (Kottayam Dt.); 2 males, 26-ii-2002, Padanakara (Malappuram Dt.); 1

male, 2-xi-1995, Thunakadavu (Parambikulam WLS, Palakkad Dt.); 1 male, 3-xi-1995, Orukomban (Parambikulam WLS); 1 male, 6-xi-1995, Muthalakayam (Parambikulam WLS), Coll. P. M. Sureshan; 1 male, 18-xii-1997, Karamana (Thiruvananthapuram Dt.), Coll. M. B. Raghunathan; 1 female, 17-iii-2001, Parassala (Thiruvananthapuram Dt.); 1 female, 15-iii-2001, Kallar (Thiruvananthapuram Dt.); 1 male, 22-ii-2000, Thannermukkom (Alappuzha Dt.), Coll. K. C. Gopi; 1 female, 30-vii-1984, Mavoor (Kozhikode Dt.); 3 males, 1 female, 21-ix-1982, Koduvally (Kozhikode Dt.), Coll. K. N. Nair; 1 male, 8-iii-2002, Kinalur estate (Kozhikode Dt.); 1 male, 23-ii-2000, Parumala/Mannar (Alappuzha Dt.); 1 male, 11-x-1995, Peechi R.F.(Thrissur Dt.); 1 male, 23-ii-1994, Kurichiat R.F.(Wayanad Dt), Coll. C. Radhakrishnan; 1 male, 15-xi-1998, Chalamattom (Kottayam Dt.); 1 male, 24-iv-2002, Eengappuzha (Kozhikode Dt.); 2 males, 24-x-2002, Vadikkadavu (Malappuram Dt.); 1 male, 17-ii-2004, Thusharagiri (Kozhikode Dt.); 2 males, 1 female, 27-x-2004, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma.

**Diagnosis : Male :** Eyes greenish in colour; labrum, face and frons greenish yellow; thorax greenish yellow, marked with black stripes; wings hyaline, the inner edge of hindwing, near membrane tinted with yellow; abdomen greenish yellow, marked with black; segments 1 to 3 unusually swollen dorso ventrally as well as laterally; segments 4 to 6 very narrow, cylindrical, segments 7 to 9 dilated but compressed laterally; segment 10 very small; anal appendage creamy white in colour. **Female :** exactly similar to the male both in colour and the remarkable shape of abdomen.

**Size :** Male : Abdomen 30 to 36 mm, Hind wing 30 to 36 mm. Female : Abdomen 32 to 35 mm, Hind wing 31 to 35 mm.

**Habits and Habitat :** One of the common dragonfly found in all places and most predaceous dragonfly found in India; usually found near ponds, streams and tanks both in the plains and forests; occasionally far away from water and enters houses at night attracted by the light.

**Breeding :** Breeding occurs in still water, marshy side pools of slow running streams, perennial and seasonal monsoon ponds.

**Status :** Very common.

**Distribution :** Throughout India: Kerala: Alappuzha, Cochin, Eravikulam National Park, Idukki, Kannur, Kasaragod, Kovalam, Kottayam, Kozhikode, Malampuzha, New Amarambalam Reserve Forest, Palakkad, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Trichur, Thiruvananthapuram and Wayanad.

### 103. *Orthetrum taeniolatum* (Schneider)

1845. *Libellula taeniolata* Schneider, *Stett. Ent. Zeit.*, 6 : 111; Selys, 1850, *Rev. Odon.*, : 290.

1890. *Orthetrum taeniolatum* Kirby, *Cat. Odon.*, : 37; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 296-298.

**Material examined :** 1 male, 22-x-2001, Kannavam R.F. (Kannur Dt.), Coll. Md. Jafer Palot.

**Diagnosis : Male :** Labium, labrum, face, frons and vesicle pale brown, changing to grayish green or bluish above; prothorax and thorax uniform blue in full adults; legs black, inner surface yellow; wings hyaline, without pale brown colour, even in old specimens; membrane very narrow, dark brown bordered with white; nodal index is very low; abdomen laterally and dorsoventrally broad at base and tapered gradually to the end, pulverulent blue throughout in full adults. **Female and subadult male :** face pale olivaceous, nearly white; thorax pale brown on mid dorsum, bordered outwardly with pale olivaceous stripe; laterally olivaceous brown; wings hyaline, sometimes with pale brown throughout; abdomen olivaceous yellow, with a narrow black stripe extending along mid dorsum from segments 2 to 9; all sutures and ventro lateral borders finely black.

**Size :** Male : Abdomen 22 to 25 mm, Hind wing 25 to 27 mm. Female : Abdomen 24 mm, Hind wing 28 mm.

**Habits and Habitat :** Smallest species of the genus, found in montane and submontane areas.

**Breeding :** Breeds in marshes and swampy areas.

**Status :** Uncommon.

**Distribution :** Throughout India: Kerala: Kannur, Malabar and Travancore.

#### 104. *Orthetrum triangulare triangulare* (Selys) [Plate-VIII, Fig. 6]

1878. *Libella triangularis* Selys, *Mitth. Mus. Dresden*, : 314; id., 1891, *Ann. Mus. Civ. Genova*, 30 : 461.

1909. *Orthetrum triangulare triangulare* Ris, *Cat. Coll. Selys, fasc.*, 9 : 181, 243-244; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 305-307.

**Material examined :** 1 male, 12.iv.2005. Kurichyar mala (Wayanad Dt.). Coll. Md Jafer Palot; 1 female, 12-xi-1996, Mullakudy (Periyar Tiger Reserve, Idukki Dt.); 2 males, 8-xi-1996, Mlappara (Periyar Tiger Reserve), Coll. P. M. Sureshan.

**Diagnosis : Male :** Eyes dark blue; labrum, face, frons, vesicle and occiput glossy black; behind head black with a yellow spot; prothorax and thorax velvety black with the whole of metepimeron and a broad stripe on mesepimeron bright apple green colour; wings hyaline with a broad triangular blackish brown spot at base of hind wing and a small spot of the same in fore wing; membrane black; abdomen pruinose deep blue; broad at base, then narrowed gradually to the end, with a keel from segments 3 to 9; segment 1, sides of segment 2 and whole of segments 8 to 10 black. **Female :** face dark brown; thorax olivaceous green above, lateral stripes bright yellow; wings more

often spread with brown, this gradually deepening towards tips, and the basal black spot entirely absent, this area tinted with golden yellow; abdomen black, not pruinose, segments 1 to 7 with olivaceous green or yellow mid dorsal stripe; all segments from 2 to 7 with two large greenish yellow spots beneath as in male; segments 8 to 10 black.

**Size :** Male : Abdomen 29 to 33 mm, Hind wing 37 to 41 mm. Female : Abdomen 29 to 32 mm, Hind wing 37 mm.

**Habits and Habitat :** Usually found near the hill streams.

**Breeding :** Breeds in small fresh water streams flowing through marshes in the hills.

**Status :** Rare.

**Distribution :** Throughout India : Kerala : Idukki, Wayanad, Malabar and Travancore.

### *Potamarcha* Karsch

Dragonflies of moderate size, coloured blackish brown marked with yellow, the markings partly or entirely obscured by pruinescence; never metallic, eyes broadly contiguous; posterior lobe of prothorax small; thorax robust; wings long and narrow; node nearer pterostigma than base of wing; antenodal nervures numerous, the distal one incomplete; abdomen parallel sided, rather slim and cylindrical.

#### 105. *Potamarcha congener* (Rambur) [Plate–VIII, Fig. 7]

1842. *Libellula obscura* Rambur, *Ins. Nevrop.*, : 64.

1890. *Potamarcha obscura* Karsch, *Berlin Ent. Zeit.*, **33** : 371; Fraser, 1936, *Fauna Brit. India Odon.*, **3** : 289–291.

1891. *Potamarcha congener* Selys, *An. Soc. Espan.*, **20** : 221.

**Material examined :** 5 males, 18-iii-2001, Vithura Chathankodu (Thiruvananthapuram Dt.), Coll. K. C. Gopi; 1 female, 24-iii-1997, Peruvuripallam (Parambikulam WLS, Palakkad Dt.), Coll. C. Radhakrishnan; 1 female, 16-xi-1998, Maryland (Kottayam Dt.), Coll. K. G. Emiliyamma; 1 female, 23-iii-1999, Chulliyar (Palakkad Dt.); 1 male, 1-iii-1994, Thirunelli R.F. (Wayanad Dt.), Coll. P. M. Sureshan.

**Diagnosis :** **Male : Adults :** Eyes reddish brown above, bluish gray below; labrum yellow narrowly bordered with black; face and frons olivaceous yellow, frons in adults steely black or brown; prothorax dark brown, anterior lobe, a transverse stripe on middle lobe and posterior border of posterior lobe yellow; thorax black without yellow marking, or pruinose more or less densely and appearing dark violaceous or blackish blue; wings hyaline, tips are brown; membrane ash gray in colour; abdomen variable in colour according to age of individuals, completely pruinose in old adults. **Female and subadult male :** Head and prothorax similar to male; thorax and abdomen black with yellow marking in subadults or thorax warm reddish-brown on dorsum, dull ochreous

on the sides; laterally dark brown markings with two upright 'Y'shaped stripes; wings hyaline as in male, but the dark brown tips are more distinct and the costal area of both wings tinted with deep yellow; abdomen black, marked with bright ochreous as follows: segments 1 and 2 with broad lateral and mid dorsal stripes; segments 3 to 8 with fine stripes on mid dorsal carina, ventral borders broad; remaining segments black; pale beneath.

*Size* : Male : Abdomen 29 to 32 mm, Hind wing 33 to 35 mm. Female : Abdomen 29 to 31 mm, Hind wing 33 to 37 mm.

*Habits and Habitat* : Large colonies are found in patches of jungle or scrub jungle forests near small slow running streams and commonly around seasonal monsoon ponds; larva is sluggish and bottom dwelling.

*Breeding* : Breeds in small weedy ponds and marshy areas.

*Status* : Common.

*Distribution* : Throughout India: Kerala : Cochin, Kannur, Kovalam, Kozhikode, Palakkad, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve and Thiruvananthapuram.

### Subfamily SYMPETRINAE

#### *Acisoma* Rambur

Libelluline dragonflies of small size coloured blue marked with black and characterized by the unusual shape of the abdomen. Head small, eyes only just meeting; prothorax with large posterior lobe, fringed with long hairs; thorax narrow, small; wings short, moderately broad; 7 to 9 antenodal nervures in forewings; the characteristic shape of the abdomen and colour pattern will easily help to distinguish this species from other Libellulines.

#### 106. *Acisoma panorpoides panorpoides* Rambur [Plate-V, Fig. 7]

1842. *Acisoma panorpoides* Rambur, *Ins. Nevrop.*, : 28 ; Lieftinck, 1954, *Treubia*, 22 (suppl.) : 146.

1911. *Acisoma panorpoides panorpoides* Ris, *Cat. Coll. Selys Lib.* 12 : 456 ; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 330-331.

*Material examined* : 1 male, 1 female, 30-xii-1998, Chalamattom (Kottayam Dt.); 2 males, 3 females, 27-x-2004, Kadalundi (Kozhikode Dt.), 1 male, 9-v-2005, Pookode lake (Wayanad Dt.), Coll. K. G. Emiliyamma; 1 male, 18-xii-1998, Kanniparamba (Kozhikode Dt.), Coll. P. M. Sureshan; 1 male, 2-x-2001, Kuniyan (Kasaragod Dt.), Coll. Md. Jafer Palot.

*Diagnosis* : **Male** : Eyes blue, glossy black spotted with yellow behind; labrum pale yellow; face and frons pale azure blue; thorax azure blue marbled with black, forming a

hieroglyphic pattern on dorsum and sides; wings hyaline; membrane brownish; abdomen azure blue, marked with black; segments 1 to 5 dilated laterally and dorsoventrally, then abruptly slim and cylindrical from segments 6 to 10; hieroglyphic markings on sides of segments 1 to 5. **Female** : exactly similar to the male in colour, markings and shape of abdomen; in juvenile female, the colour olivaceous yellow with brown markings.

**Size** : Male : Abdomen 15 to 18 mm, Hind wing 16 to 21 mm. Female : Abdomen 15 to 18 mm, Hind wing 17 to 22 mm.

**Habits and Habitat** : An insect of plains and lower elevations with weak and short flights; usually found near the vegetation around heavily weeded ponds, tanks and other water bodies.

**Breeding** : Breeds in heavily weeded tanks and ponds.

**Status** : Locally common.

**Distribution** : Widely distributed throughout India : Kerala : Ernakulam, Kannur, Kasaragod, Kottayam, Kozhikode, Periyar Tiger Reserve and Thiruvananthapuram.

### *Brachythemis* Brauer

Medium sized and stout dragonflies coloured yellow marked with brown; wings partly coloured golden yellow or blackish brown. Eyes broadly contiguous; prothorax with small posterior lobe; thorax robust; wings short, rounded at tips; discoidal cell in fore wing traversed, that of hindwing entire; 6 ½ or 7 ½ antenodal nervures in forewings; pterostigma and membrane moderately large; abdomen short and broad, flattened and tapering to the end.

#### 107. *Brachythemis contaminata* (Fabricius) [Plate–VIII, Fig. 10]

1793. *Libellula contaminata* Fabricius, *Ent. Syst.*, 2 : 382.

1868. *Brachythemis contaminata* Brauer, *Verh. zool.–bot. Ges. Wien*, 17 : 736 ; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 365–366.

**Material examined** : 1 male, 18-xii-1998, Cheroopa (Kozhikode Dt.); 2 males, 4 females, 19-iii-1999, Pothundi (Palakkad Dt.); 4 males, 5 females, 17-iii-1999, Malampuzha (Palakkad Dt.); 1 male, 27-x-2000, Kanjirappally (Kottayam Dt.); 1 male, 2 females, 30-x-2000, Kidangoor (Kottayam Dt.), Coll. P. M. Sureshan; 3 males, 23-ii-2000, Parumala/Mannar (Alappuzha Dt.), Coll. K. C. Gopi; 1 male, 1 female, 12-ix-2001, Malampuzha (Palakkad Dt.), Coll. Dinesan Cheruvat; 1 male, 3 females, 25-ii-1996, Chimony WLS (Thrissur Dt.), Coll. C. Radhakrishnan; 2 males, 3 females, 24-x-2002, Vadikkadavu (Malappuram Dt.), Coll. K. G. Emiliyamma.

**Diagnosis** : **Male** : Eyes olivaceous brown above, bluish grey laterally and beneath; labrum reddish ochreous; face, frons and vesicle olivaceous or pale greenish yellow;

thorax olivaceous brown to reddish brown on upper side with two indistinct reddish brown humeral stripe; wings hyaline, reticulation reddish with a bright orange broad band extending from wing base to pterostigma in forewing and hindwing, this band variable in extent and depth of colour according to age of specimen; pterostigma rust red; membrane pale reddish brown; abdomen reddish ochreous, marked with indistinct dorsal and subdorsal brown stripes. **Female and subadult male** : Eyes pale brown above, bluish grey laterally and beneath; thorax pale greenish-yellow with a narrow brown stripe and band dorsally; wings hyaline, hind wings very palely tinted with yellow at base, bright orange band seen in the male absent; pterostigma bright ochreous between dark nervures; abdomen pale olivaceous brown, with a narrow black stripe on middorsal carina extending from segment 2 to 10; on segments 2 to 6 with subdorsal dark brown stripe, the space between this and middorsal carina bright yellow.

**Size** : Male : Abdomen 18 to 21 mm, Hind wing 20 to 23 mm. Female : Abdomen 18 to 20 mm, Hind wing 22 to 25 mm.

**Habits and Habitat** : A common dragonfly, found everywhere both along the borders of slow running streams, polluted waters and also near weedy ponds, tanks and lakes; they are crepuscular in habits, flying in the evening till the dark and sometimes enter into the house attracted by light.

**Breeding** : Breeds in marshes, ponds and streams.

**Status** : Very common.

**Distribution** : Throughout India : Kerala : Alappuzha, Cochin, Ernakulam, Kannur, Kottayam, Kozhikode, Palakkad, Periyar Tiger Reserve, Trichur, and Wayanad.

### ***Bradinopyga* Kirby**

Libelluline dragonflies of moderate size with cryptic coloration, in black, grays and white with hyaline wings. Head large; eyes broadly contiguous; prothorax with small, rounded posterior lobe; thorax robust; wings hyaline, long and moderately narrow; discoidal cell in forewing traversed, that of hindwing entire; pterostigma two coloured; abdomen slightly dilated at base, then narrow and triquetral, dorsum strongly ridged; thorax and abdomen of granite colour.

#### 108. ***Bradinopyga geminata* (Rambur) [Plate—VIII, Fig. 8]**

1842. *Libellula geminata* Rambur, *Ins. Nevrop.* : 90.

1911. *Bradinopyga geminata* Ris, *Cat. Coll. Selys, fasc.*, 13 : 545 & 548; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 349–350.

**Material examined** : 2 males, 18-i-1999, Eranhipalam (Kozhikode Dt.), Coll. Ashok kumar; 1 male, 2 females, 20-xii-1999, Chevayur (Kozhikode Dt.); 1 female, 23-ii-1996, Athirappally (Thrissur Dt.), Coll. C. Radhakrishnan; 2 males, 1 female, 12-ix-2001, Malampuzha (Palakkad Dt.), Coll. Dinesan Cheruvat; 2 males, 4-vi-2003, Thusharagiri (Kozhikode Dt.); 1 female, 21-vii-2004, Madayipara (Kannur Dt.) Coll. Md. Jafer Palot; 3 males, 4 females, 27-x-2004, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma.

**Diagnosis** : **Male** : Eyes brown above, pale grayish beneath; prothorax and thorax ash gray in colour or dirty pale yellow, marbled and sprinkled with black in a very irregular manner, or granite in colour; wings hyaline, pterostigma bicoloured, black at the center and white at both the ends; abdomen coloured very similarly to thorax, black marbled with yellow, but with more clear pattern; segments 3 to 8 with two elongate parallel spots; a triangular apical spot and a mid dorsal spot. **Female** : exactly similar to the male.

**Size** : Male : Abdomen 26 to 29 mm, Hind wing 33 to 36 mm. Female : Abdomen 26 to 29 mm, Hind wing 32 to 36 mm.

**Habits and Habitat** : This species is an example of protective, cryptic colouration; usually seen settled with wings flattened on granite rocks and cemented walls by which their marbled gray coloured body merge such an extent that they are almost invisible; during dark they enter into the house attracted by light.

**Breeding** : Breeds in wells, cemented tanks and large steel drums containing water and in rock pools.

**Status** : Common.

**Distribution** : Bihar, Central India, Haryana, Orissa, Rajasthan, Uttar Pradesh, West Bengal and Peninsular India : Kerala : Kozhikode, Malampuzha, Trichur and Thiruvananthapuram.

### *Crocothemis* Brauer

Dragonflies of moderate size, coloured uniform red. Eyes shortly contiguous; prothorax with small posterior lobe; thorax robust; wings long and narrow with pointed tips; transparent or partly coloured at extreme base; reticulation close; discoidal cell in forewing traversed, that of hindwing entire; 7 ½ to 14 ½ antenodal nervures in forewings; pterostigma and membrane large; abdomen flattened, moderately broad at base and tapered gradually to the end in the male, cylindrical in the female.

#### 109. *Crocothemis servilia servilia* (Drury) [Plate-VIII, Fig. 9]

1770. *Libellula servilia* Drury, *III. Ins.*, 1 : 112–113; Rambur, 1842, *Ins. Nevrop.* : 80.

1868. *Crocothemis servilia* Brauer, *Verh.zool.-bot.Ges.Wien.*, 18 : 737.

1936. *Crocothemis servilia servilia* Fraser, *Fauna Brit. India Odon.*, 3 : 345–347.

**Material examined :** 1 male, 1 female, 2-iv-1998, Anchuthengu (Thiruvananthapuram Dt.), Coll. P. T. Cherian; 1 male, 21-ix-1999, Kadalundi (Kozhikode Dt.); 1 male, 24-iv-2002, Eengappuzha (Kozhikode Dt.), Coll. K. G. Emiliyamma; 1 female, 16-iii-2001, Kulasekaram (Thiruvananthapuram Dt.); 2 males, 3 females, 6-xi-2002, Payangadi (Kannur Dt.); 1 male, 24-xi-1994, Madayikavu (Kannur Dt.) Coll. K. C. Gopi; 1 male, 21-ix-1999, Kadalundi (Kozhikode Dt.); 3 females, 18-xii-1998, Mavoor/ Pallikadavu (Kozhikode Dt.); 1 female, 20-iii-1999, Mangalam dam (Palakkad Dt.); 1 male, 1 female, 5-ix-2001, Kolavipalam (Kozhikode Dt.), Coll. P. M. Sureshan; 1 male, 9-ix-2001, Chemballikundu (Kannur Dt.); 2 females, 23-vii-2004, Madayipara (Kannur Dt.) Coll. Md. Jafer Palot.

**Diagnosis :** **Male :** Eyes blood red above, purple laterally and pale below; labrum, face, frons and vesicle bright blood-red; thorax bright reddish brown, often blood-red on dorsum during life; wings hyaline, bases of all wings marked with rich yellowish-brown extend upto cubital nervure in forewing and from first antenodal nervure to tornal angle in hindwing; wing tips brown in old specimens; membrane dark reddish brown; abdomen blood-red; a broad black mid dorsal stripe present along the whole length of abdomen. **Female :** Eyes brown above, olivaceous below; labrum, face, frons and vesicle deep yellowish green; thorax olivaceous brown; wings similar to male, but basal marking paler and the neuration in this part bright yellow, instead of yellowish-brown; abdomen brownish yellow, with black middorsal stripe. **Teneral males and females :** pale straw yellow coloured; thorax with pale yellowish-white humeral stripe on each side; abdomen with broad black dorsal stripe and light brown subdorsal stripe, running along the whole length of abdomen; the basal marking of wing is paler, the reticulation bright yellowish; pterostigma very pale yellow between black nervures.

**Size :** Male : Abdomen 24 to 35 mm, Hind wing 27 to 38 mm. Female : Abdomen 25 to 32 mm, Hind wing 31 to 37 mm.

**Habits and Habitat :** A very common species and found everywhere, at all altitudes, especially around slow running streams, perennial as well as seasonal monsoon ponds, small weedy tanks and ditches near human habitations.

**Breeding :** Breeds in still waters, like ponds, tanks, ditches etc., but during the dry season, they breed in streams when the water level decreases.

**Status :** Common.

**Distribution :** Throughout India: Kerala: Cochin, Eravikulam National Park, Kannur, Karamana, Kovalam, Kozhikode, Malampuzha, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Silent Valley National Park, Thiruvananthapuram and Wayanad.

### ***Diplacodes* Kirby**

Libelluline dragonflies of small size, coloured greenish yellow, marked with black in the subadult stage, blue or black with or without pruinescence in the adult stage; eyes

contiguous for a short distance; prothorax with large posterior lobe, fringed with long hairs; thorax rather narrow; wings short and broad; hyaline with or without black tips; discoidal cell in forewing traversed, that of hindwing entire;  $6\frac{1}{2}$  to  $9\frac{1}{2}$  antenodal nervures in forewings; *Cuii* in hindwing widely separated from posterior angle of discoidal cell; borders of discoidal field in forewing diverging widely at wing border; abdomen slightly dilated at base, then slim and triquetral to the end; cylindrical in female.

### Key to the species of Genus *Diplacodes* Kirby

1. Tips of all wings blackish brown; adults entirely black; anal appendages black or yellow ..... *nebulosa* (Fabricius)
- Tips of all wings hyaline; adults black marked with yellow or pruinose dark blue throughout; wings uncoloured at base; anal appendages creamy white ..... *trivialis* (Rambur)

### 110. *Diplacodes nebulosa* (Fabricius) [Plate–V, Fig. 2]

1793. *Libellula nebulosa* Fabricius, *Ent. Syst.*, 2: 379.

1889. *Diplacodes nebulosa* Kirby, *Trans. Zool. Soc. Lond.*, 12: 308 : Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 335–336.

**Material examined** : 2 males, 1 female, 14-viii-2000, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot; 2 males, 27-x-2002, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma.

**Diagnosis** : **Male** : Labrum and face brown, occasionally marked with a yellow spot on each side of postclypeus and on base of mandibles; upper surface of eyes dark violet; frons and vertex dark metallic violet; prothorax, thorax, legs and abdomen black, thinly pruinose in old adults; subadults and teneral with yellow markings on sides of thorax and abdomen black with yellow markings, sides of segments 1 to 3 and paired subdorsal spots on segments 4 to 8 yellow; all wing tips blackish brown; pterostigma reddish brown between thick black nervures; anal appendages black or yellow, with base black in subadults. **Female** : eyes reddish brown; labium, labrum, face, frons and vertex creamy yellow without dark markings; prothorax and thorax bright citron yellow, with black markings as follows: a broad stripe on middorsum divided into three, the outer arm merged with a 'y'-shaped stripe on humeral region; legs black, bases of femora and extensor surface of tibiae yellow; wings hyaline, hindwing with a trace of yellowish-brown near membrane; abdomen as in subadult and teneral males.

**Size** : Male: Abdomen 15 to 17 mm, Hind wing 17 to 19 mm. Female : Abdomen 14 to 15 mm, Hind wing 18 mm.

**Habits and Habitat** : A rare dragonfly, usually found near waterbodies, with heavily weeded ponds, tanks and marshes.

**Breeding** : Breeds in heavily weeded ponds, tanks and marshes.

**Status** : Uncommon.

**Distribution** : Throughout India : Kerala : Kannur and Kozhikode.

111. *Diplacodes trivialis* (Rambur) [Plate-V, Fig. 1]

1842. *Libellula trivialis* Rambur, *Ins. Nevrop.*, : 115.

1891. *Diplacodes trivialis* Karsch, *Ent. Nachr.*, 17 : 246; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 336-338.

**Material examined** : 1 male, 30-x-1995, Kamathalachi (Parambikulam WLS, Palakkad Dt.); 1 male, 1 female, 14-iii-1996, Cheechali (Parambikulam WLS), 3 females, 23-ii-2000, Parumala (Alappuzha Dt.); 1 male, 1 female, 26-vi-2002, Thavanakkadavu (Ernakulam Dt.), Coll. C. Radhakrishnan; 1 female, 24-iii-1998, Neyyar Dam site (Thiruvananthapuram Dt.); 1 male, 25-iii-1998, Kovalam (Thiruvananthapuram Dt.); 1 male, 1 female, 28-iii-1998, Golden Valley (Thiruvananthapuram Dt.); 1 male, 1 female, 29-iii-1998, way to Chankiri (Thiruvananthapuram Dt.); 1 female, 30-iii-1998, Mottanood river (Thiruvananthapuram Dt.); 1 female, 3-iv-1998, Paighat (Thiruvananthapuram Dt.), Coll. P. T. Cherian; 2 males, 18-iii-2001, Chathankode (Thiruvananthapuram Dt.); 2 males, 1 female, 16-iii-2001, Kulasekaram (Thiruvananthapuram Dt.); 1 male, 17-iii-2001, Parassala, (Thiruvananthapuram Dt.); 1 female, 10-v-1995, Peechi R.F.(Trichur Dt.); 1 female, 13-x-1993, Parappa R.F.(Kasaragod Dt.); 6 females, 6-xi-2002, Payangadi (Kannur Dt.); 2 males, 4 females, 7-xi-2002, Theckumbad island (Kannur Dt.); 1 female, 30-iii-1997, Pulickal (Parambikulam WLS, Palakkad Dt), Coll. K. C. Gopi; 1 female, 25-iv-2000, Thiruvambadi (Kozhikode Dt.); 1 male, 15-xi-1998, Chalamattom (Kottayam Dt.); 1 male, 2 females, 3-ii-2000, Calicut university campus; 1 male, 1 female, 24-i-2002, Kadalundi (Kozhikode Dt.); 2 males, 6 females, 30-i-2003, Ponnani port area (Malappuram Dt.); 3 males, 25-vi-2004, Thusharagiri (Kozhikode Dt.); 1 male, 11-v-2005, Chembra (Wayanad Dt.), Coll. K. G. Emiliyamma; 1 female, 19-vii-1982, Chathamangalam (Kozhikode Dt.), Coll. K. N. Nair; 3 males, 23-iii-1999, Chulliyar (Palakkad Dt.); 1 female, 20-iii-1999, Mangalam dam site (Palakkad Dt.); 1 female, 4-xi-1995, Pezhakunnu (Parambikulam WLS, Palakkad Dt.); 1 female, 19-ix-2001, Kolavipalam (Kozhikode Dt.); 1 female, 19-ii-1997, Pamba (Pathanamthitta Dt.); 1 male, 2-iii-1994, Vattapoil (Wayanad Dt.), Coll. P. M. Sureshan; 1 male, 1 female, 14-ii-2003, Chinnar WLS (Idukki Dt), 4 males, 6 females, 14-x-2001, Madayipara (Kannur Dt.); 1 male, 2 females, 8-ix-2001, Malampuzha (Palakkad Dt.); 1 male, 2 females, 27-iii-2003, Manjeswaram (Kasaragod Dt.), Coll. Md. Jafer Palot; 1 male, 17-i-1992, Kuyilimala (Idukki Dt.), Coll. M. B. Raghunathan.

**Diagnosis** : **Male** : **Adults** : Eyes reddish brown above, pale bluish or yellowish below; labium, labrum and mandibles creamy yellow; face, frons and vesicle pale azure blue with a fine black line at base of frons; the whole thorax pruinose blue; legs, black marked with yellow; wings hyaline, a minute yellow point in cubital space of hindwing;

abdomen pruinose blue, except the segments 7 to 10, which are black; an oval shaped yellow spot present on the 8<sup>th</sup> segment; anal appendage, creamy white. **Female and sub adult male** : Head similar to the adult male; thorax greenish-yellow or olivaceous with sutures finely black, the area between middorsal carina and humeral sutures brown speckled with small black dots; legs greenish-yellow marked with black, the inner surface of anterior femora and extensor surface of tibiae yellow; abdomen greenish yellow with fine black sutures and broad mid dorsal and subdorsal stripes on segments 1 to 10; anal appendage creamy yellow.

**Size** : Male : Abdomen 19 to 22 mm, Hind wing 22 to 23 mm. Female : Abdomen 18 to 20 mm, Hind wing 22 to 24 mm.

**Habits and Habitat** : One of the commonest dragonflies found in India and occurs in the plains and high altitude areas, in both dry and wet areas; usually it wanders far from water and found settled on footpaths in open spaces, gardens, fields etc.

**Breeding** : Breeds in swampy lakes and ponds.

**Status** : Very common.

**Distribution** : Throughout India: Kerala: Cochin, Eravikulam National Park, Idukki, Kannur, Kasaragod, Kottayam, Kozhikode, Malampuzha, Palakkad, Parambikulam Wildlife Sanctuary, Pathanamthitta, Periyar Tiger Reserve, Thiruvananthapuram and Wayanad.

### *Indothemis* Ris

Dragonflies of moderate or rather small size, coloured black in the adult, or black marked with yellow in subadults. Head moderately large; eyes rather broadly contiguous; prothorax with small posterior lobe; thorax robust; wings hyaline; discoidal field beginning with 2 rows of cells, its borders diverging at wing border; 1 row of cells between *IRiii* and *Rspl*; abdomen slim and cylindrical, but slightly broader at base and tapered very gradually to the end.

#### 112. *Indothemis carnatica* (Fabricius)

1842. *Libellula caesia* Rambur, *Ins. Nevrop.*, : 95.

1911. *Indothemis caesia* Ris, *Cat. Coll. Selys, fasc.*, 13 : 529 –531; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 340-341.

1991. *Indothemis carnatica* Tsuda, *A distributional list of World Odonata*, 1991, : 157.

**Diagnosis** : **Male** : Eyes violaceous above, paler below; labrum and face blackish brown with a yellow spot on each side of postclypeus; frons and vertex metallic violet black with a small triangular yellow spot on each side of frons; thorax blackish brown with pruinescence, uniformly dark violaceous in full adults; in subadults, greenish yellow with black markings showing indistinctly through pruinescence; legs black, distal end of

femora and extensor surface of tibiae greenish yellow; wings hyaline, with a small marking of amber yellow at the base of hindwing; Cuii in hindwing always widely separated from the posterior angle of discoidal cell; abdomen dark blackish brown with yellow markings. **Teneral male and Female** : Differs widely from male in colour and markings. Eyes brown above, golden yellow below; labium, labrum, face, frons, vesicle and occiput bright yellow; thorax golden yellow on dorsum, pale greenish yellow laterally, with diffuse brown antehumeral stripe; legs entirely yellow; wings similar to male; abdomen golden yellow on dorsum, fading to greenish yellow laterally, marked with black and reddish brown as follows: a narrow subdorsal stripe extending from segment 2 to the end of abdomen and fusing with the ventral black mark on segments 5 to 9; segment 10 yellow. Old adults with markings are more extensive and with yellow lateral elongate spots.

**Size** : Male : Abdomen 25 to 26 mm, Hind wing 28 to 31 mm. Female : Abdomen 24 mm, Hind wing 29 mm.

**Habits and Habitat** : The adults are found near the waterbody, viz. ponds, lakes etc. in which they are ovipositing, and have a habit of lying up among scrub or long grass developed in the depression of the ground.

**Breeding** : Breeds in small, heavily weeded ponds and lakes.

**Status** : Rare.

**Distribution** : Peninsular India : Kerala : Silent valley national park.

### *Neurothemis* Brauer

Dragonflies of moderate size characterized by the wings partly or wholly coloured in one or both sexes; body usually coloured some shade of yellow or reddish brown. Wings rather broad; reticulation very close, a secondary closer reticulation often present in the coloured basal parts of wings; discoidal cell in fore and hindwings often traversed many times; more than 1 cubital nervures in all wings; pterostigma and membrane moderately large; abdomen short, in male it is slightly dilated dorso ventrally at base, then slim and tapered gradually to the end; rather compressed and subcylindrical in the female.

### Key to the species of Genus *Neurothemis* Brauer

1. Bases of wings in male broadly black, the black area is bordering with an opalescent white band; in female the tips of wings black with sickle shaped stripe on basal half of wings ..... *tullia tullia* (Drury)
- Wings dark reddish brown from base to about middle of pterostigma, tips of wings also narrowly reddish brown to partly enclosing a clear and uncoloured area ..... *fulvia* (Drury)
- Wings tinted with pale or golden yellow at base ..... 2

2. Base of all wings tinted with pale yellow, and with a broad basal amber yellow marking; costal and subcostal spaces also tinted with yellow and extend up to pterostigma; a pale brown humeral stripe present on thorax ..... *intermedia intermedia* (Rambur)
- Yellow colour at the base of wings very well defined and deep amber yellow, often enfumed with brown; costal border of wings not tinted with yellow; humeral stripe absent on thorax ..... *intermedia atlanta* Ris

### 113. *Neurothemis fulvia* (Drury) [Plate–IV, Fig. 12]

1773. *Libellula fulvia* Drury, *Ill. Exot. Ins.*, 2 : 84–85.

1889. *Neurothemis fulvia* Kirby, *Trans. Zool. Soc. Lond.*, 12 : 271; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 353–354; Lieftinck, 1954, *Treubia*, 22 (suppl.) : 150.

**Material examined** : 1 male, 25-iv-2000, Thiruvambadi (Kozhikode Dt.), Coll. K. G. Emiliyamma; 1 male, 21-iii-1994, Kasadukka (Kasaragod Dt.); 1 female, 14-x-1993, Chempilankai (Kasaragod Dt.); 1 female, 30-v-2002, Kinalur estate (Kozhikode Dt.); 2 females, 13-x-1993, Parappa R.F.(Kasaragod Dt.); 1 male, 19-iii-1994, Kavadikanam (Kasaragod Dt.); 1 male, 24-ix-1993, Santhimala (Kasaragod Dt.), Coll. K. C. Gopi; 1 female, 4-xi-2002, Edakkad (Kozhikode Dt.), Coll. Ashok Kumar; 2 males, 9-viii-1982, Kudathai (Kozhikode Dt.), Coll. K. N. Nair; 1 female, 18-i-1992, Painavu (Idukki Dt.), Coll. M. B. Raghunathan; 1 male, 6-iv-1995, Aralam WLS(Kannur Dt.), Coll. Md. Jafer Palot; 1 female, 2-iii-1994, Chandanathodu (Wayanad Dt.), Coll. P. M. Sureshan.

**Diagnosis** : **Male** : Eyes dark reddish brown above, golden brown below; prothorax, thorax and abdomen uniform reddish brown; wings dark reddish-brown from base to about middle of pterostigma, with an irregular triangular transparent area at the tips of wings, extreme tips reddish brown; neuration very close; the whole of the dark area very finely and closely reticulated by bright yellow nervures, except in the clear spaces. **Female** : many forms of females are found, varying from complete isochrome (having tips of fore wings completely clear and that of hind wings bordered with amber yellow but not opaque brown) to several different types of heterochromes: having the ground colour of head, thorax and body generally much paler or ochreous, with some dark brown shade at apical parts of segments 3 to 7; wings clear amber yellow with a dark ray in the subcostal and costal areas near the node and form a nodal spot. Many other forms are also present in between these two forms.

**Size** : **Male** : Abdomen 21 to 26 mm, Hind wing 27 to 32 mm. **Female** : Abdomen 20 to 24 mm, Hind wing 26 to 32 mm.

**Habits and Habitat** : Weak flight; occurs in large colonies at the forest edges and in low-lying marshy areas; usually found near waterbodies, resting on dry branches of plants; abundant during August-September months.

**Breeding** : Breeds in weedy ponds or marshes.

**Status** : Common.

**Distribution** : Throughout India : Kerala : Cochin, Idukki, Kannur, Kasaragod, Kottayam, Kozhikode, Malappuram, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Silent Valley National Park and Trichur.

#### 114. *Neurothemis intermedia intermedia* (Rambur)

1842. *Libellula intermedia* Rambur, *Ins. Nevrop.* p.91.

1889. *Neurothemis intermedia* Selys, *Ann. Mus. Civ. Genova*, 27 : 454.

1911. *Neurothemis intermedia intermedia* Ris, *Cat. Coll. Selys*, fasc., 13 : 563-564; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 357-358.

**Material examined** : 2 males, 17-iii-1999, Malampuzha (Palakkad Dt.); 3 males, 1 female, 21-iii-1999, Pothundi (Palakkad Dt.); 3 males, 22-iii-1999, Kanjirampuzha (Palakkad Dt.); 1 male, 16-viii-1997, Amakulam (Kollam Dt.); 1 female, 27-x-1995, Venkoli (Parambikulam WLS, Palakkad Dt.), Coll. P. M. Sureshan; 1 female, 26-i-1994, Manjucholamala (Kasaragod Dt.); 1 male, 23-iii-1994, Bendadukka (Kasaragod Dt.), Coll. K. C. Gopi. 1 female, 1-ix-2001, Madayipara (Kannur Dt.); 1 male, 27-xii-2001, Aralam WLS (Kannur Dt.), Coll. Md. Jafer Palot.

**Diagnosis** : **Male** : Eyes reddish brown above, golden yellow below; labium, labrum, face and frons pale yellow; thorax pale greenish yellow, dorsum tinged with reddish brown and with a reddish brown humeral stripe; wings hyaline, very palely tinted with yellow, a broad amber yellow marking at base of all wings; costal and subcostal spaces also tinted with yellow to as far as pterostigma; abdomen bright reddish ochreous with dark brown sutures on segments 2 and 3; a well defined ventro lateral brown stripe on segments 3 to 8. **Female** : Resembles the male in colour and markings of body; wings uniformly tinted with pale yellow, this spread through out along costal area; basal marking found in male entirely absent; abdomen with ventro lateral stripe very sharply present.

**Size** : Male : Abdomen 22 to 24 mm, Hind wing 24 to 27 mm. Female : Abdomen 21 to 24 mm, Hind wing 25 to 28 mm.

**Habits and Habitat** : Found near the banks of streams; very weak in flight.

**Breeding** : Breeds in monsoon pools and ponds, oviposition during August and September.

**Status** : Uncommon.

**Distribution** : Throughout Peninsular India: Kerala: Kannur, Kozhikode, Malampuzha, Palakkad, Parambikulam Wildlife Sanctuary and Silent Valley National Park.

115. *Neurothemis intermedia atlanta* Ris [Plate-V, Fig. 5]

1916. *Neurothemis intermedia atlanta* Ris, *Cat. Coll. Selys*, fasc., 16 : 1168; Fraser, 1924, *Rec. Ind. Mus.*, 26 : 438-439; Fraser, 1936. *Fauna Brit. India Odon.*, 3 : 358-359.

**Material examined** : 1 female, 14-x-1993, Chempilankai (Kasaragod Dt.), Coll. K. C. Gopi; 1 male, 1 female, 2-x-2001, Kuniyan (Kasaragod Dt.), Coll. Md. Jafer Palot.

**Diagnosis** : **Male** : Closely resembles *N. intermedia intermedia*, differs as: labrum, frons and often whole face brightly tinted with crimson; dorsum of thorax uniform olivaceous to dark reddish brown and without humeral stripe; wings with basal marking well distinct and deep amber yellow, often becomes dark brown in old adults; costal border of wings not tinted with yellow. **Female** : Resembles the female of *N. intermedia intermedia*, but the yellow colour on costal area usually absent or very pale; dorsum of thorax dark olivaceous; humeral stripe absent; markings of abdomen as in the male, but more extensive and dark coloured.

**Size** : Female : Abdomen 19 to 21 mm, Hind wing 22 to 27 mm.

**Habits and Habitat** : This species is much smaller than *N. intermedia intermedia* found near the banks of streams; weak in flight.

**Breeding** : Breeds in monsoon pools and ponds, oviposition during August and September.

**Status** : Uncommon.

**Distribution** : Tripura, Assam, Meghalaya, Sikkim and South India: Kerala: Kasaragod, Manjeri, Palakkad and Wayanad.

116. *Neurothemis tullia tullia* (Drury) [Plate-V, Fig. 3]

1773. *Libellula tullia* Drury, *III. Exot. Ins.*, 2 : 85.

1890. *Neurothemis tullia* Kirby, *Cat. Odon.*, : 8.

1911. *Neurothemis tullia tullia* Ris, *Cat. Coll. Selys. fasc.*, 13 : 551; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 360-362.

**Material examined** : 1 male, 3 females, 3-iv-1998, Paighat (Thiruvananthapuram Dt.), Coll. P.T.Cherien; 2 males, 14-iv-1997, Vely (Thiruvananthapuram Dt.), Coll. M.B.Raghunathan; 2 males, 14-iii-2001, Attingal (Thiruvananthapuram Dt.); 3 males, 17-iii-2001, Parassala (Thiruvananthapuram Dt.); 2 males, 1 female, 17-iii-2001, Neyyattinkara; 1 male, 1 female, 18-iii-2001, Vithura Chathankodu (Thiruvananthapuram Dt.); 1 male, 1 female, 30-v-2002, Kinalur estate (Kozhikode Dt.), Coll. K. C. Gopi; 2 males, 20-xii-1998, Maryland (Kottayam Dt.); 1 female, 24-x-2002, Vadikkadavu (Malappuram Dt.); 2 females, 9-v-2005, Pookode lake (Wayanad Dt.); 1 male, 25-iv-2000, Thiruvambadi (Kozhikode Dt.); 2 males, 6 females, 22-ii-2001, Kuttiadi

(Kozhikode Dt.) Coll. K. G. Emiliyamma; 2 males, 1 female, 8-iii-2002, Kinaloor estate (Kozhikode Dt.), Coll. C. Radhakrishnan; 3 males, 4 females, 18-xii-1998, Mavoor/Thennilakadavu (Kozhikode Dt.); 2 males, 17-i-1995, Peruvannamuzhi (Kozhikode Dt.); 4 males, 21-iii-1999, Pothundi (Palakkad Dt.), 2 males, 24-x-2000, Kumarakom (Kottayam Dt.); 1 male, 30-x-2000, Kidangoor (Kottayam Dt.); 1 male, 31-x-2000, Velloor (Kottayam Dt.); 1 male, 1 female, 25-x-2000, Kanjirampara (Kottayam Dt.); 2 males, 1 female, 12-xi-1996, Mullakudy (Periyar Tiger Reserve, Idukki Dt.); 1 male, 14-xi-1996, Vellayikkamalai (Idukki WLS); 1 male, 1 female, 14-iii-1996, Cheechali (Parambikulam WLS, Palakkad Dt.), Coll. P. M. Sureshan; 4 males, 2 females, 21-ix-1982, Koduvally (Kozhikode Dt.); 2 males, 1 female, 6-xii-1985, Kurichiarmala (Wayanad Dt.), Coll. K. N. Nair.

**Diagnosis :** **Male :** Eyes blackish brown above, violaceous below; labrum, face, frons, vesicle and occiput black; prothorax and thorax black, mid dorsal carina of thorax fine yellow, bases of all wings bluish black, which is bordered outwardly with a milky white band; and transparent at the tips; abdomen black, with a creamy white stripe on segments 1 to 8; anal appendages creamy white. **Female :** Differs significantly from the male both in colouration and markings; eyes pale brown above, pale olivaceous laterally and beneath; prothorax and thorax greenish yellow, with a bright yellow stripe running along the whole length; this stripe is bordered with blackish brown throughout; bases of all wings bright amber-yellow; subcostal space blackish brown, broadening at node into a very large blackish-brown spot, which is variably shaped, i.e. round, oval or triangular shape in fore-wing, irregular or curved like a sickle in the hind; tips of all wings broadly opaque blackish-brown; the area between these two opaque parts and costa with pale yellow neuration; abdomen bright yellow with a broad black lateral stripe extending from segment 1 to 10. **Teneral males :** body coloured as in the female and with wing markings warm brown and two darker rays in subcostal space and space between sectors of arc; many varieties are found according to the age of individuals.

**Size :** Male : Abdomen 16 to 20 mm, Hind wing 19 to 23 mm. Female: Abdomen 16 to 19 mm, Hind wing 20 to 23mm.

**Habits and Habitat :** Both male and female, always found near water, resting on plants; occurs in large colonies in heavily weeded tanks, ponds, drainage channels of paddy fields and slow running streams. This species has a weak and slow flight; size of the specimens varies according to the habitat.

**Breeding :** Breeds in marshes and drainage channels of paddy fields.

**Status :** Very common.

**Distribution :** Throughout India: Kerala: Cochin, Idukki, Kannur, Kasaragod, Kottayam, Kozhikode, Malappuram, Malampuzha, Palakkad, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Silent Valley National Park, Thiruvananthapuram and Wayanad.

*Rhodothemis* Ris

A monotypic genus of Libellulidae, characterized by the large size and uniform scarlet red colour, which closely resembles that of *Crocothemis servilia* and the red species of *Orthetrum*. Eyes meeting only at a point; vesicle high, tips with two sharp points; prothorax with large posterior lobe, emarginated, fringed with long hairs; thorax robust; wings long and broad; discoidal cell in forewing traversed, that of hindwing entire; Cuii widely separated from the posterior angle of discoidal cell in hindwing; abdomen slightly dilated at base, then tapered very gradually to the end.

117. *Rhodothemis rufa* (Rambur) [Plate–VI, Fig. 1]

1842. *Libellula rufa* Rambur, *Ins. Nevrop.* p.71.

1911. *Rhodothemis rufa* Ris, *Cat. Coll. Selys, fasc.*, 13 : 592–593; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 368–369.

**Material examined** : 3 males, 1 female, 24-x-2002, Vadikkalkdavu (Malappuram Dt.); 1 male, 1 female, 27-x-2004, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma. 1 female, 30-x-2000, Kidangoor (Kottayam Dt.); 1 female, 20-ii-2002, Kottooli (Kozhikode Dt.), Coll. P. M. Sureshan; 1 female, 23-ix-2001, Madayipara (Kannur Dt.); 1 female, 15-ix-2001, Kasaragod, Coll. Md. Jafer Palot.

**Diagnosis** : **Male** : Eyes bright scarlet, capped above with brown; labrum and anteclypeus reddish ochreous; postclypeus, frons and vesicle blood red; occiput reddish brown; prothorax and thorax reddish-brown without markings; wings hyaline, with a dark amber yellow spot at base of fore and hindwings; costa and basal neuration reddish; abdomen and anal appendages brilliant scarlet red. **Female** : Eyes reddish-brown above, olivaceous below; labrum, anteclypeus and lower part of postclypeus ochreous; upper part of postclypeus blackish brown and above frons bright citron yellow; prothorax dark brown with a middorsal citron yellow stripe; thorax golden-brown laterally, blackish brown dorsally, with a bright citron-yellow stripe extending from front of dorsum between the roots of wings, this stripe split into two elongate narrow triangular ante-humeral stripes; wings similar to male, but basal marking less extensive; abdomen dark golden-brown, with a bright citron-yellow stripe on mid-dorsum of segments 1 to 4, and on segments 5 to 8 or 9 by a pair of small dorsal basal spots; anal appendages brownish-yellow.

**Size** : Male : Abdomen 25 to 29 mm, Hind wing 32 to 37 mm. Female : Abdomen 25 to 29 mm, Hind wing 32 to 37 mm.

**Habits and Habitat** : Usually found near weedy tanks and ponds, settled on herbage near the waterbodies; male specimens are not very commonly seen.

**Breeding** : Breeds in weedy tanks and ponds.

**Status** : Uncommon.

**Distribution :** Throughout India : Kerala : Kasaragod, Kottayam, Malappuram, Kozhikode and Thiruvananthapuram.

### *Sympetrum* Newman

Libelluline dragonflies of rather small or moderate size, usually coloured yellow or reddish with more or less restricted black markings. Eyes moderately contiguous; prothorax with very large posterior lobe, fringed with long hairs; wings short and broad, reticulation rather open; discoidal field in forewing strongly converging at wing border; abdomen slim or narrowly fusiform towards the end.

#### 118. *Sympetrum fonscolombei* (Selys)

1837. *Libellula flaveola* (nom.preoc.) Fonscolombe, *Ann. Soc. Ent. France*, 6 : 144.

1874. *Sympetrum fonscolombei* Meyer-Dur, *Mitt. Schweiz. Ent. Ges.*, 4 : 327; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 377-379.

**Diagnosis : Male :** Eyes brown above, red at sides and pale olivaceous yellow below; labrum, face and frons cherry red, sides of face pale yellow; prothorax black, a small spot on each side of middle lobe and whole of posterior lobe reddish; thorax golden or reddish brown, covered with yellowish hairs, very long and dense on upper surface; two narrow bluish white stripe on posterior half of mesepimeron and metepimeron; legs black, upper surface of femora and tibiae yellow; wings transparent, costal border and reticulation near to node red; extreme bases of wings with a small spot of amber yellow; pterostigma bright ochreous between thick black nervures; membrane reddish brown, attached border white; abdomen blood red marked with black as: a broad spot on segment 1, base of segment 2, upper surface of segments 8 and 9 and whole ventral border finely black; segment 8 with a red spot at base; beneath abdomen black with triangular spots on segments 6 to 9; anal appendage bright red. **Female :** Similar to the male, differs as: red colour replaced by ochreous; upper surface of thorax with pale brown antehumeral stripe incomplete above; wings similar to male, but basal marking very big, especially in hindwing; pterostigma bright yellow between thick black nervures; abdomen dark ochreous above, bright yellow at sides along the ventral border; a subdorsal black stripe extending from segment 3 to base of 10; segments 7 to 9 with elongate spots; all sutures and stripes black as in male.

**Size :** Male : Abdomen 22 to 28 mm, Hind wing 24 to 29 mm. Female : Abdomen 23 to 28 mm, Hind wing 27 to 30 mm.

**Habits and Habitat :** Females can be seen only during the months of November to March, the males are apparently hibernating.

**Breeding :** Breeds in ponds, marshes and lakes.

**Status :** Rare.

**Distribution** : Jammu & Kashmir, Western Ghats: Kerala: Eravikulam National Park and Travancore hills.

### Subfamily TRITHEMISTINAE

#### *Trithemis* Brauer

Libelluline dragonflies of medium size, variable in colour and shape. Head small; eyes moderately contiguous; frons with or without a distinct crest, always rounded in the female; beneath thorax marked with a black square with an angular black line crossing it; legs variable, moderately long and robust, or very long and slim; wings long and relatively broad; discoidal field in forewing with its borders strongly convergent at wing border; pterostigma short; membrane rather long; abdomen variable in the species.

#### Key to the species of Genus *Trithemis* Brauer

1. Pterostigma bicoloured, black with creamy white ends; body yellow marked with black ..... *pallidinervis* (Kirby)
- Pterostigma unicolorous; body colour variable ..... 2
2. Thorax and abdomen violaceous crimson coloured; base of wings with a broad amber yellow fascia, with dark yellowish brown rays in subcostal and cubital spaces; neurulation crimson ..... *aurora* (Burmeister)
- Thorax and abdomen violaceous black; base of hindwing with a dark brown spot with dark rays in subcostal and cubital spaces; neurulation black ..... *festiva* (Rambur)
- Thorax olivaceous to golden brown tinted with rose red dorsally and laterally; abdomen bright vermilion red with black spots on segments 8 and 9; base of wings, costal and subcostal spaces with broad bright reddish yellow markings; neurulation bright red ..... *kirbyi kirbyi* Selys

#### 119. *Trithemis aurora* (Burmeister) [Plate–VI, Fig. 3]

1839. *Libellula aurora* Burmeister, *Handb. Ent.*, 2 : 859.

1868. *Trithemis aurora* Brauer, *Verh. zool.-bot. Ges. Wien.*, 18 : 177, 735; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 383–385.

**Material examined** : 1 male, 1 female, 28-iii-1998, Golden Valley (Idukki); 1 male, 30-iii-1998, Mottanood river (Thiruvananthapuram Dt.), Coll. P. T. Cherian; 3 males, 30-xii-1998, Chalamattom (Kottayam Dt.); 1 male, 25-iv-2000, Muthappanpuzha (Kozhikode Dt.); 3 males, 24-iv-2002, Eengappuzha (Kozhikode Dt.); 1 female, 28-viii-2003, Thusharagiri (Kozhikode Dt.); 1 male, 9-v-2005, Kalpetta (Wayanad Dt.), Coll. K. G. Emiliyamma; 1 male, 15-iii-2001, Kallar (Thiruvananthapuram Dt.); 3 females, 30-v-2002, Kinalur estate (Kozhikode Dt.), Coll. K. C. Gopi; 1 male, 2-xi-1995, Thunakadavu

(Parambikulam WLS, Palakkad Dt.); 2 males, 1 female, 3-xi-1995, Orukomban (Parambikulam WLS); 1 male, 1 female, 6-xi-1995, Muthalakayam (Parambikulam WLS); 2 males, 27-x-2000, Kanjirappally (Kottayam Dt.); 1 male, 8-xi-1996, Mlappara (Periyar Tiger Reserve, Idukki Dt.); 1 male, 6-xi-1996, Karadikkavala (Periyar tiger Reserve, Idukki Dt.); 1 male, 18-xi-1996, Chambakkad (Chinnar WLS, Idukki Dt.), Coll. P. M. Sureshan; 1 male, 22-x-2001, Meenmuttithodu (Kannavam R.F., Kannur Dt.), Coll. Md. Jafer Palot; 2 males, 16-xii-1985, Muthanga WLS (Wayanad Dt.), Coll. K. N. Nair; 2 males, 1 female, 23-xii-1994, Kurichiat R.F.(Wayanad Dt.), Coll. C. Radhakrishnan.

**Diagnosis : Male :** Eyes crimson above, brown on sides, and lilaceous underneath; vesicle and upper surface of frons metallic violet; labrum dark brown; face and front of frons ochreous; thorax red, but looks dull purple due to thin pruinescence; beneath olivaceous; wings hyaline, with crimson reticulation and a broad amber yellow spot at base of wings, with darker brown rays in subcostal and cubital spaces, neuration crimson; membrane blackish brown; abdomen crimson violet with black mark on the base of 10. **Female :** eyes purplish brown above, lilaceous or gray below; face and frons olivaceous or bright ochreous; thorax pale olivaceous on sides, darker on dorsum with distinct black stripes; wings hyaline, tipped with brown; reticulation bright yellow to brown, basal marking similar as in male, but pale and without dark rays in subcostal and cubital spaces; abdomen brownish yellow with dorsal, median and lateral black markings. **Teneral :** abdomen very narrow, bright ochreous in colour and black spots on end segments absent; wings with yellow neuration and the basal marking small; thorax yellow or olivaceous without any pruinescence and with well defined black markings.

**Size :** Male : Abdomen 21 to 29 mm, Hind wing 24 to 34 mm. Female : Abdomen 19 to 27 mm, Hind wing 24 to 31 mm.

**Habits and Habitat :** A common dragonfly of the plains and submontane regions; adult males can be seen resting on vegetation near water bodies, making short flights up and down, but always returning to the initial resting place; females and teneral males always found taking rest away from water.

**Breeding :** Breeds in slow-running streams, ponds, tanks and irrigation channels. Status: Common.

**Distribution :** Throughout India: Kerala: Cochin, Chinnar Wildlife Sanctuary, Eravikulam National Park, Idukki, Kannur, Kasaragod, Kollam, Kottayam, Kozhikode, Malappuram, Malampuzha, Palakkad, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Silent Valley National Park, Thiruvananthapuram and Wayanad.

#### 120. *Trithemis festiva* (Rambur) [Plate-VI, Fig. 4]

1842. *Libellula festiva* Rambur, *Ins. Nevrop.*, : 92.

1868. *Trithemis festiva* Brauer, *Verh. zool.-bot. Ges. Wien*, 18 : 736; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 387-389.

**Material examined :** 1 male, 28-iii-1998, Golden Valley (Thiruvananthapuram Dt.), Coll. P. T. Cherian; 1 male, 8-iii-2002, Kinalur estate (Kozhikode Dt.); 3 males, 23-xii-1994, Kurichiat R.F.(Wayanad Dt), Coll. C.Radhakrishnan; 2 males, 28-xii-1998, Chalamattom (Kottayam Dt.); 1 male, 24-iv-2002, Eengappuzh (Kozhikode Dt.); 2 males, 17-ii-2004, Thusharagiri (Kozhikode Dt.); 1 male, 11-v-2005, Kanthanpara (Wayanad Dt.), Coll. K. G. Emiliyamma; 1 male, 30-v-2002, Kinalur estate (Kozhikode Dt.), Coll. K. C. Gopi; 2 males, 2 females, 19-iii-1999, Pothundi (Palakkad Dt.); 1 male, 8-xi-1996, Mlappara (Periyar Tiger Reserve, Idukki Dt.); 1 male, 6-xi-1996, Karadikkavala (Periyar tiger Reserve, Idukki Dt.); 1 male, 18-xi-1999, Thundathil (Ernakulam Dt.); 2 males, 8-viii-1997, Parakkadavu (Kollam Dt.); 1 male, 22-vi-1995, Thusharagiri (Kozhikode Dt.), 3 males, 30-iii-1997, Orukomban (Parambikulam WLS, Plakkad Dt.); Coll. P. M. Sureshan; 1 male, 22-x-2001, Kannavam R.F., (Kannur Dt.), Coll. Md. Jafer Palot; 3 males, 16-xii-1985, Muthanga WLS (Wayanad Dt.), Coll. K.N.Nair.

**Diagnosis : Male :** Eyes dark brown above with purple shining, bluish gray laterally and beneath; upper surface of frons and vesicle metallic violet; labrum dark olivaceous brown or black; prothorax dark blue; thorax and abdomen violaceous or bluish black; base of hind wing with a dark brown spot, subcostal and cubital spaces with dark rays, neuration black; membrane dark with pale attached border; abdomen black, moderately broad at base and tapered gradually to the end; segments 1 to 3 with bluish pruinescence. **Female and teneral male :** eyes dark brown above, lilaceous below; frons and vesicle non-metallic; labrum, face and frons dull yellow, changing to dark brown on upper surface of frons; thorax greenish-yellow or olivaceous with broad blackish brown humeral stripe, an inverted Y-shaped stripe on mesepimeron and a narrow stripe on posterolateral suture; other sutures and stripes black; beneath olivaceous; wings similar to the male, but in adults broadly dark reddish-brown at tips; abdomen cylindrical, bright yellow, marked broadly with black, a broad subdorsal stripe extending the whole length of abdomen confluent with mid dorsal and ventral black stripes and enclosed wedge shaped yellow spots.

**Size :** Male : Abdomen 22 to 28 mm, Hind wing 26 to 32 mm. Female : Abdomen 21 to 24 mm, Hind wing 24 to 29 mm.

**Habits and Habitat :** Always found near water, usually settling on rocks in mid-stream or on twigs overhanging water.

**Breeding :** Breeds in both still and slow running water.

**Status :** Locally common.

**Distribution :** Throughout India: Kerala: Cochin, Kannur, Kasaragod, Kottayam, Kozhikode, Malappuram, Palakkad, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Travancore, Thiruvananthapuram and Wayanad.

121. *Trithemis kirbyi kirbyi* Selys

1868. *Trithemis aurora* Kirby (pars), *Proc. Zool. Soc. Lond.*, : 327.

1891. *Trithemis kirbyi* Selys, *Ann. Mus. Civ. Genova*, 30 : 465.

1912. *Trithemis kirbyi kirbyi* Ris, *Cat. Coll. Selys. Fasc.*, 14 : 760, 778; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 385-387.

**Material examined** : 1 female, 10-iii-2001, Valiyakarikkandam (Kannur Dt.), Coll. Md. Jafer Palot; 1 female, 11-iv-2000, Adivaram (Kozhikode Dt.), Coll. K. G. Emiliyamma; 1 female, 8-iii-2002, Kinaloor estate (Kozhikode Dt.), Coll. C. Radhakrishnan; 1 female, 6-xi-1996, Karadikkavala (Periyar tiger Reserve, Idukki Dt.); 1 female, 18-xi-1996, Chambakkad (Chinnar WLS, Idukki); 1 female, 23-i-1997, Venkoli (Parambikulam WLS, Palakkad Dt.), Coll. P. M. Sureshan; 1 female, 12-ix-2001, Malampuzha (Palakkad Dt.), Coll. Dinesan Cheruvat; 1 female, 11-x-1995, Peechi R.F. (Thrissur Dt.), Coll. K. C. Gopi.

**Diagnosis** : **Male** : Eyes bright red above, lilaceous below; labium, labrum and anteclypeus yellowish white; frons pale yellow, usually with a bright rosy red blush; vesicle yellow tipped with red; occiput brown; thorax olivaceous to golden brown, tinted with rose red on dorsal, humeral and metepimeral areas, the mesepimeron bluish or greenish white; wings hyaline, neuration including costa bright red; bases of all wings with a broad bright reddish yellow mark with dark rays to subcostal and cubital spaces, discoidal cells and central portion of anal area of fore and hindwing; pterostigma black, with a narrow red stripe at its middle or this stripe palest yellow beneath; abdomen brilliant vermilion red with small black spots on segment 8 and 9. **Female** : Pale and with well defined black markings; face pale creamy yellow; citron yellow on front of frons and top of vesicle; thorax pale greenish white, with or without suffusion of rose red; an olivaceous brown antehumeral stripe parallel to the humeral suture and black markings well defined; wings variable, in one form exactly similar to the male, in another form the basal marking of wings restricted to the extreme base of forewing and present only as two rays in the subcostal and cubital spaces; abdomen reddish brown on dorsum, pale olivaceous laterally, often spread over with pink, and marked with variable subdorsal stripe from segments 5 to 10, or extending whole length of abdomen, or as basal spots; dorsal spots on 8 and 9 as in male.

**Size** : **Male** : Abdomen 21 to 24 mm, Hind wing 24 to 27 mm. **Female** : Abdomen 23 mm, Hind wing 26 to 30 mm.

**Habits and Habitat** : Females are very rarely and occasionally seen, sometimes they settled on bushes far from water or could see during their visit to oviposit; the males have a habit of settling flat on slab rock, where they are most conspicuous, they are very swift in taking off and on the wing; this species is seasonal, appearing suddenly during summer and disappearing with the advent of S.W.monsoon.

**Breeding** : Breeds in both still and slow running water.

**Status** : Uncommon.

**Distribution** : Himachal Pradesh, Maharashtra, Uttar Pradesh and South India: Kerala: Kannur, Kozhikode, Malampuzha, Parambikulam Wildlife Sanctuary and Periyar Tiger Reserve.

122. *Trithemis pallidinervis* Kirby [Plate-VI, Fig. 5]

1889. *Sympetrum pallidinervis* Kirby, *Trans. Zool. Soc. Lond.*, 12 : 327.

1907. *Trithemis pallidinervis* Morton, *Trans. Ent. Soc. Lond.*, : 304; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 389-391.

**Material examined** : 1 male, 27-iii-1998, Kallar river site (Thiruvananthapuram Dt.), Coll. P. T. Cherian; 1 female, 1 male, 1-ii-2002, Kadalundi (Kozhikode Dt.); 1 male, 29-i-2003, Puthuponnani (Malappuram Dt.); 1 male, 12-v-2005, Banasura foothills (Wayanad Dt.), Coll. K. G. Emiliyamma.

**Diagnosis** : **Male** : Eyes reddish brown above, brown laterally and bluish gray below; labrum black, with two large basal citron yellow spots; frons and vesicle metallic purple; thorax olivaceous brown on upper surface and upper part of sides, bright olivaceous on lower part of sides, upper surface is thickly covered with gray hairs; legs very long and spidery; wings hyaline, with reddish reticulation; bright amber-yellow spot at extreme base in fore-wing which extends upto first ante nodal nervure and slightly over cubital nervure in hind-wing; pterostigma black with creamy white ends; abdomen long, slender and coloured black, marked with bright yellow; the sides of segments 1 to 3 with broad markings; long wedge shaped spots on segments 4 to 7; a small basal subdorsal spot on segment 8 and remaining segments black. **Female** : frons with upper surface ochreous, broadly marked at basal half with metallic or bronzed golden-green; vesicle bright yellow; wings similar to male, but often tinted with yellow or reddish-brown, especially towards the tips; extensor surfaces of all femora yellow; segment 10 of abdomen yellow, with base broadly black.

**Size** : Male : Abdomen 28 to 32 mm, Hind wing 30 to 36 mm. Female : Abdomen 26 to 28 mm, Hind wing 30 to 32 mm.

**Habits and Habitat** : This dragonfly is generally found resting on the top of tall aquatic weeds or shrubs, uplifting itself by its long spidery legs, bunched together like a support.

**Breeding** : Breeds in stagnant water like ponds, tanks and in marshy areas.

**Status** : Locally common.

**Distribution** : Throughout India: Kerala: Kannur, Kozhikode, Malampuzha, Periyar Tiger Reserve, Thiruvananthapuram and Wayanad.

## Subfamily ONYCHOTHEMISTINAE

*Onychothemis* Brauer

Libelluline dragonflies of rather large size and very robust build, characterized by their dark metallic colour with bright yellow markings and claws without hooks. Eyes contiguous for a short distance; prothorax with large posterior lobe, emarginated and fringed with long hairs; thorax very robust; wings long and broad, with close reticulation; abdomen robust, broad dorsoventrally at base and somewhat widened, then tapering gradually to the end and with a high mid dorsal keel or carina.

123. *Onychothemis testacea ceylanica* Ris

1912. *Onychothemis tonkinensis ceylanica* Ris, *Cat. Coll. Selys, fasc.*, 16 : 832, 835

1924. *Onychothemis testacea ceylanica* Laidlaw, *Spolia Zeylanica*, 12 : 349; Fraser, 1936, *Fauna Brit. India Odon.* 3 : 404–406.

**Diagnosis : Male :** Eyes metallic green; labrum black with yellow spot on each side of base; anteclypeus and postclypeus bright yellow, with a broad curved black stripe on anteclypeus resembling a bushy moustache across the face; frons and vesicle dark metallic blue; prothorax black, marked with bright yellow; thorax dark metallic blue, marked with citron yellow as follows: a fine middorsal carina; humeral spot or a stripe; a stripe on mesepimeron and posterior half of metepimeron citron yellow; wings hyaline, tipped with brown or sometimes clear; membrane black; abdomen black, marked with citron yellow and reddish ochreous as follows: segment 1 with a triangular spot on mid dorsum; segment 2 with a small diamond shaped spot on mid dorsum; the base of segment 3 yellow with a star shaped spot on mid dorsum and a ventro lateral spot; segments 4 to 9 similar to 3, but the lateral spots on 4 to 6 much smaller and confluent with the mid dorsal spot, which on segments 5 to 9 much larger, enlarging from segment to segment and segment 9 is almost entirely yellow; segments 3 to 8 with paired yellow spots beneath; segment 10 yellow. **Female :** Resembles the male in all respects, except the abdominal markings and sexual characters; vesicle capped with a large yellow spot; wings in very old specimens often rather deeply and evenly enfumed with brown; abdomen much stouter at base, with yellow markings much restricted on most segments.

**Size :** Male : Abdomen 34 to 36 mm, Hind wing 40 to 42 mm. Female : Abdomen 36 mm, Hind wing 42 to 44 mm.

**Habits and Habitat :** Found in the foothills of montane streams and nearby forest; their flight is usually short, but are strong fliers, flying up and down, taking frequent rest and attacking other large dragonflies which may pass within their locality.

**Breeding :** Breeds in shallow flowing waters under the shade of dense forest.

**Status :** Rare.

**Distribution :** Meghalaya, West Bengal and South India : Kerala : Malabar.

## Subfamily PALPOPLEURINAE

*Palpopleura* Rambur

Libelluline dragonflies of small size but robust build, coloured yellow with black markings, abdomen pruinose blue in adults and with wings more or less coloured and marked with black, brown and yellow, the costal border of forewing sinuously curved near base; frons markedly angulated at crest; prothorax with large posterior lobe, quadrate and fringed with long hairs; thorax robust; legs slim, moderately long; wings short, broadly and strikingly marked and coloured in both sexes; abdomen short, depressed and fusiform.

124. *Palpopleura sexmaculata sexmaculata* (Fabricius) [Plate-V, Fig. 8]

1787. *Libellula sexmaculata* Fabricius, *Mant. Ins.*, 1 : 338.

1868. *Palpopleura sexmaculata* Brauer, *Verh. zool.-bot. Ges. Wien*, 18 : 716.

1936. *Palpopleura sexmaculata sexmaculata* Farser, *Fauna Brit. India Odon.*, 3 : 318–320.

**Material examined** : 1 female, 13-xii-1985, Thariyodu (Wayanad Dt.); 1 female, 18-iv-1984, Meppadi (Wayanad Dt.); 1 male, 4 females, 27-ix-1983, Kottappadi (Wayanad Dt.), Coll. K. N. Nair; 1 male, 8-iii-2006, Kasaragod, Coll. K. G. Emiliyamma; 1 female, 12-xi-1996, Mullakudy (Periyar Tiger Reserve, Idukki Dt.); 1 female, 9-xi-1996, Mlappara (Periyar Tiger Reserve, Idukki Dt.); 1 male, 6-xi-1996, Karadikkavala (Periyar tiger Reserve, Idukki Dt.); 1 female, 12-xi-1994, Kuppadi R.F.(Wayanad Dt.), Coll. P. M. Sureshan; 1 male, 2 females, 11-v-2002, Vallamkulam (Pathanamthitta Dt.), Coll. Ashok Kumar; 1 female, 28-ii-1994, Mananthavady,(Wayanad Dt.); 1 male, 24-xii-1994, Kurichiat R.F.(Wayanad Dt.), Coll. C. Radhakrishnan; 1 male, 1 female, 22-iii-1997, Thunakkadavu, (Parambikulam WLS, Palakkad Dt.); 1 male, 24-i-1994, Ranipuram (Kasaragod Dt.), Coll. K. C. Gopi.

**Diagnosis** : **Male** : Eyes olivaceous, capped with brown above; labrum and face creamy yellow; frons and vesicle brilliant metallic blue; thorax pale greenish yellow, marked with black; wings hyaline marked with black; a black spot at node near the pterostigma in forewing; a black stripe in costal and sub costal space extending from base to node; another stripe between sectors of arc, and a third stripe in cubital space extending from base to discoidal cell; hind wings usually tinted with yellow from base to proximal end of pterostigma; stripes present only in the sub costal space; stripes on costal space and the intersector area are absent; these stripes very variable according to locality; pterostigma black in adults with center marked with white, yellow with borders black in teneral; abdomen pruinose blue, sides of segments 1, 2 and base of 3 yellow; beneath yellow with a median stripe of black. **Teneral, subadult male and Female** : Frons non-metallic; labrum, face and frons bright yellow; thorax yellow with restricted

markings; wings more broadly marked with blackish brown and black and more deeply tinted with amber yellow; neurulation in dark areas golden yellow; pterostigma black for inner half and creamy yellow for outer part; abdomen bright ochreous with ventral borders and sutures finely black and with a mid dorsal stripe of black, extending from segments 3 to 10.

**Size :** Male : Abdomen 14 to 16 mm, Hind wing 15 to 21 mm. Female : Abdomen 13 to 14 mm, Hind wing 18 to 21 mm.

**Habits and Habitat :** Two adult specimens are found near a small water channel passing through vegetations; many subadult specimens are seen near a temple pond covered with aquatic plants; they resemble to wasp in appearance and flight;

**Breeding :** Breeds in marshes and bamboo jungle.

**Status :** Uncommon.

**Distribution :** Throughout India : Kerala : Cochin, Kasaragod, Kozhikode, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve and Wayanad.

#### Subfamily TRMAEINAE

#### *Rhyothemis* Hagen

Libelluline dragonflies with metallic coloured and wings partly or wholly coloured black and golden yellow or metallic blue black; wings variable, broad at base, pointed at tips, or long and moderately broad at base; reticulation close; sectors of arc separated at origin in forewing, shortly fused at origin in the hindwing; discoidal field beginning with 3 to 5 rows of cells, but very irregular, its borders parallel or converging strongly at wing border; membrane large; abdomen short, markedly compressed in both sexes. Their flight is weak and when flying low, the wing action is fluttering like that of the large Lepidoptera.

#### Key to the species of Genus *Rhyothemis* Hagen

1. Bases of all wings marked with black and amber yellow; male with whole of wings tinted yellow; female with wing tips hyaline ..... *variegata variegata* (Linnaeus)
- Bases of all wings black with dark metallic blue reflex up to discoidal cell in forewing and nearly to node in the hindwing ..... *triangularis* Kirby

#### 125. *Rhyothemis triangularis* Kirby

1889. *Rhyothemis triangularis* Kirby, *Trans. Zool. Soc. Lond.* 12 : 319; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 427–428.

**Material examined :** 1 male, 13-xii-2002, Periya R.F (Wayanad), Coll. Md. Jafer Palot.

**Diagnosis : Male :** Eyes blackish brown above, pale brown or lilaceous below; labium, labrum and face black; frons and vesicle dark green or metallic greenish blue; occiput black; thorax dark metallic green; legs, abdomen and anal appendages entirely black; wings hyaline, spread with pale brown uniformly or deepening towards tips; bases of all wings black with dark metallic blue; in forewing from base to 2<sup>nd</sup> or 3<sup>rd</sup> antenodal nervure, cubital, median, discoidal cell and upto subtrigone metallic blue; in hind wing as far distal as 4<sup>th</sup> or 5<sup>th</sup> antenodal nervure, and then to the posterior border of wing near the tips of anal loop; pterostigma dark reddish brown, very short; membrane black. **Female:** Exactly similar to the male, except in sexual characters; hindwing often rather broader and pterostigma always shorter.

**Size :** Male : Abdomen 16 to 20 mm, Hind wing 24 to 29 mm. Female : Abdomen 16 to 17 mm, Hind wing 24 to 28 mm.

**Habits and Habitat :** Found in colonies near marshy areas and weedy tanks; mimic bees in their flight and get considerable protection from birds.

**Breeding :** Breeds in marshes and weedy tanks.

**Status :** Uncommon.

**Distribution :** Assam, Himachal Pradesh and South India: Kerala: Kannur, Wayanad, Manjeri and Palakkad.

#### 126. *Rhyothemis variegata variegata* (Linnaeus) [Plate-VII, Fig. 1]

1763. *Libellula variegata* Linnaeus, *Amoenitates Acad.*, 6 : 412.

1867. *Rhyothemis variegata* Hagen, *Stett. Ent. Zeit.*, 28 : 232.

1913. *Rhyothemis variegata variegata* Ris, *Cat. Coll. Selys, fasc.*, 15 : 931; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 423-424.

**Material examined :** 1 male, 1 female, 20-xii-1998, Maryland (Kottayam Dt.); 1 male, 22-ii-2001, Kuttiadi (Kozhikode Dt.); 1 female, 25-vi-2004, Thusharagiri (Kozhikode Dt.) Coll. K. G. Emiliyamma; 1 female, 22-x-1998, Chevarambalam (Kozhikode Dt.); 1 male, 3 females, 23-ii-2000, Parumala/Mannar (Alappuzha Dt.), Coll. C. Radhakrishnan; 1 female, 30-v-2002, Kinalur estate (Kozhikode Dt.); 2 males, 7-xi-2002, Theckumbadu island (Kannur Dt.), Coll. K. C. Gopi; 1 female, 30-vii-1984, Mavoor/Myladikunnu (Kozhikode Dt.); 1 female, 7-vii-1982, Quilandy (Kozhikode Dt.); 2 females, 15-xii-1985, Kalpetta (Wayanad Dt.), Coll. K. N. Nair; 2 females, 16-iii-1999, Chittoor (Palakkad Dt.), 1 male, 27-x-2000, Kanjirappally (Kottayam Dt.), 1 male, 25-x-2000, Kanjirampara (Kottayam Dt.); 1 male, 2 females, 24-x-2000, Kumarakom (Kottayam Dt.); 1 female, 31-x-2000, Velloor (Kottayam Dt.); 2 males, 1 female, 29-x-2000, Kidangoor (Kottayam Dt.); 1 male, 12-xi-1999, Kodanad/Mallana R.F.(Ernakulam Dt.); 1 male, 16-viii-1997, Amakulam (Kollam Dt.), Coll. P. M. Sureshan.

**Diagnosis : Male :** Eyes dark reddish brown above; clypeus and lower border of frons creamy yellow; all other characters and colour of head, thorax and abdomen similar to *R. triangularis*; wings widely different in both sexes; both wings tinted with pale yellow, forewings with black spots at node, discoidal cell, distal ends of cubital and hypertrigone, occasionally small spots at subcostal space and at origin of sectors of arc, tips and at middle of Riii; hindwings with similar dark spots and two broad longitudinal basal bands extending slightly beyond discoidal cell and well beyond anal loop; the posterior band with a small rounded notch and which meets with the border of wing; all these markings subject to variation. **Female :** with broader, shorter wings; fore wings hyaline from node to tips, basal half tinted with golden yellow, and marked with blackish brown; a stripe in subcostal space, costal space and ends at node, where it confluent with a broad band on the posterior border of wing; a triangular spot at base of discoidal cell confluent with band present on arc; hind wings hyaline from inner end of pterostigma to tips; two broad bands as in male, these two bands connected by a transverse stripe from the node; a quadrate band between node and pterostigma, connected to the base by a transverse stripe at the middle of wing, a small, round, yellow spot present at the middle of this stripe. **Andromorphic female** are also found, which are exactly similar to the male in colouration.

**Size :** Male : Abdomen 23 to 25 mm, Hind wing 33 to 36 mm. Female : Abdomen 20 to 22 mm, Hind wing 28 to 37 mm.

**Habits and Habitat :** A local insect of the plains, found near weedy ponds, tanks, paddy fields and marshes; weak in flight and mistaken as a butterfly.

**Breeding :** Breeds in weedy ponds, tanks and marshes.

**Status :** Common.

**Distribution :** Throughout India. : Kerala : Cochin, Kannur, Karamana, Kasaragod, Kottayam, Kozhikode, Malampuzha, Parambikulam Wildlife Sanctuary, Thiruvananthapuram and Wayanad.

### ***Hydrobasileus* Kirby**

Dragonflies of large size and robust build with wings partly coloured; body ochreous or ferruginous; vesicle high, deeply notched or with two points at apex; prothorax with small posterior lobe; wings long and broad, especially at base, pointed at tips; cells at base of hindwing becoming arranged into straight rows of closely packed narrow cells; pterostigma in fore and hindwings of almost equal size; *Riii* markedly undulated; anal loop truncate, squared at distal end, apical and distal angles equal; abdomen comparatively short, broad at base and tapered gradually to the end; genital hamules of male very long and projecting markedly.

127. *Hydrobasileus croceus* (Brauer)

1867. *Tramea croceus* Brauer, *Verh. zool.-bot. Ges. Wien*, 17 : 813.

1890. *Hydrobasileus croceus* Karsch, *Berlin Ent. Zeit.*, 33 : 351; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 429–430.

**Material examined** : 1 female, 21-x-2001, Pandalam (Pathanamthitta Dt.), Coll. Ashok Kumar.

**Diagnosis : Male** : Eyes reddish brown above, olivaceous to yellowish laterally and below; labium pale yellow; labrum bright golden ochreous; prothorax olivaceous with a golden tinge; thorax rich olivaceous spread over with golden reddish brown; legs ochreous; wings palely tinted throughout with burnt brown or golden amber, tips with burnt brown colour; base of hindwing along posterior border marked with a moderately broad dark reddish brown band, anterior border of this marking sinuous and neuration within it pale yellow; pterostigma reddish brown above, bright ochreous beneath; membrane reddish brown; abdomen olivaceous, changing to reddish or ochreous towards anal end, marked with black; all sutures, mid dorsal carina and ventrolateral borders very fine black; apical ends of segments 3 to 9 bright yellow; segments 4 to 9 with apical and basal black wedge shaped spots; segment 10 black with dorsal carina and two spots yellow; anal appendages reddish brown, long and narrow. **Female** : Exactly similar to the male; abdomen stouter towards base.

**Size** : Male : Abdomen 29 to 33 mm, Hind wing 40 to 42 mm. Female : Abdomen 28 to 34 mm, Hind wing 42 to 48 mm.

**Habits and Habitat** : They are found near weedy tanks and lakes.

**Breeding** : Breeds in weedy tanks and lakes, on first emergence, they move away from the water and resting in the nearby jungle, on attaining full adult age they return to the tanks and are found flying and hovering over the water for hours at a time.

**Distribution** : Assam, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Meghalaya and Rajasthan. Kerala: Alappuzha, Periyar Tiger Reserve and Walayar.

*Pantala* Hagen

Libelluline dragonflies of rather large size and robust build, coloured ochreous or reddish and uncoloured wings. Head large; eyes broadly contiguous; frons broad, developed two oval flat surfaces anteriorly, separated by a deep sulcus; wings long and broad, especially at base, narrow and pointed at tips; discoidal cell in forewing very narrow; discoidal field with borders converging strongly at wing margin; pterostigma differing in size in fore and hindwings, that of hindwing distinctly smaller than that of forewing; abdomen robust, dilated at basal segments and then gradually tapered to the end.

128. *Pantala flavescens* (Fabricius) [Plate–VII, Fig. 3]

1798. *Libellula flavescens* Fabricius, *Ent. Syst. Suppl.*, : 285.

1861. *Pantala flavescens* Hagen, *Syn. Neur. N.Amer.*, : 142 ; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 414–416.

**Material examined** : 5 females, 17-xii-1997, Tropical Botanical Garden, Palode (Thiruvananthapuram Dt.), Coll. M. B. Raghunathan; 1 male, 15-x-2001, Kadalundi (Kozhikode Dt.); 1 male, 30-xii-1998, Chalamattom (Kottayam Dt.); 2 males, 3 females, 24-x-2002, Vadikkadavu (Malappuram Dt.), Coll. K. G. Emiliyamma; 1 male, 4 females, 30-x-2002, Chevayur (Kozhikode Dt.); 1 male, 26-vi-2002, Thavanakkadavu (Kozhikode Dt.); 1 female, 9-x-1995, Vellanimala-Adakappara (Thrissur Dt.), Coll. C. Radhakrishnan; 3 males, 4 females, 20-x-1983, Koumpara (Kozhikode Dt.), Coll. K. N. Nair; 1 male, 17-iii-1999, Malampuzha (Palakkad Dt.); 4 males, 30-x-2000, Kidangoor (Kottayam Dt.); 1 female, 27-x-2000, Kanjirappally (Kottayam Dt.); 2 males, 26-x-2000, Mundakayam (Kottayam Dt.); 2 females, 12-xi-1996, Mullakudy (Periyar Tiger Reserve, Idukki Dt.); 1 male, 19-xi-1996, Chinnar WLS, (Idukki Dt.); 2 males, 24-xi-1999, Idamalayar (Idukki Dt.), Coll. P. M. Sureshan; 1 male, 24-xi-1994, Madayikavu (Kannur Dt.), Coll. K. C. Gopi; 2 males, 1 female, 13-iii-2000, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot.

**Diagnosis** : **Male** : Eyes reddish brown above, lilaceous or bluish laterally; labrum bright ochreous broadly bordered with black; postclypeus and frons bright golden yellow or orange, often spread over with reddish in front; prothorax rich ochreous; thorax olivaceous or ferruginous, covered with yellowish soft, hairs, pale bluish green or greenish white laterally, without markings; wings hyaline, the base of hind-wing pale golden yellow up to anal loop and with a narrow apical brown spot to the posterior border of wing; pterostigma bright ochreous or reddish brown, short and unequal in fore and hindwings; membrane white; *IRiii* and *Riii* extremely sinuous or wavy in their length; abdomen bright ochreous, dorsum tinted with bright brick red, sides of segments 1 to 4 pale yellow; segments 3 or 4 to 10 with sharply defined black mid dorsal pyriform spots. **Female** : Similar to the male, but differs in the following characters: eyes olivaceous brown above; face without any reddish tinting; wings often evenly and more or less deeply smoky brown and always without the apical brown spot; abdomen without red colour on dorsum.

**Size** : Male : Abdomen 29 to 35 mm, Hind wing 38 to 40 mm. Female : Abdomen 30 to 33 mm, Hind wing 39 to 41 mm.

**Habits and Habitat** : Most common dragonfly of the plains and submontane regions. They can be found in permanent and temporary ponds, pools and other water bodies, including brackish ones. Huge swarms can be observed just before and after the monsoon. They migrate in large numbers along with monsoon winds, through the seacoast, over railway tracks, open highways etc. during October and November. It is observed that sometimes these species are followed the running vehicle.

**Breeding** : Breeding takes place in weedy, marshy and shallow water.

**Status** : Very common.

**Distribution** : Widely and commonly distributed throughout India: Kerala: Alappuzha, Cochin, Kannur, Kasaragod, Kottayam, Kovalam, Kozhikode, Malampuzha, Malappuram, Palakkad, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Trichur, Thiruvananthapuram and Wayanad.

***Tramea* Hagen**

Libelluline dragonflies of large size and robust build, variably coloured; wings coloured and marked at the base. Head large; eyes moderately contiguous; frons broad, projecting, often with distinct crest, but variable in the species; wings long and broad at base, rather pointed at tips; cells at base of hindwing becoming arranged into straight rows of closely packed narrow cells; pterostigma small, unequal in fore and hindwings, smaller in the hindwing; *Riii* evenly curved; anal loop dilated at apex and quadrate; 2 rows of cells between *IRiii* and *Rspl*; abdomen rather long and slim, base dilated, then markedly constricted, and finally, narrowly fusiform to the end; anal appendages very long and slim in both sexes; genital hamules of male very long and projecting markedly.

**Key to the species of Genus *Tramea* Hagen**

- 1. Two large black spots at base of hind wing surrounded by a golden yellow areola, one in cubital space and other in the anal area, these two spots confluent near the base of discoidal cell in the male; neuration in this dark area bright yellow ..... *basilaris burmeisteri* Kirby
- Only a single black spot at base of hind wing, confined to the base, very narrow, not invading the anal area, this black spot is not surrounded by an areola of golden amber; neuration in this spot is reddish ..... *limbata similata* (Rambur)

**129. *Tramea basilaris burmeisteri* Kirby [Plate-VII, Fig. 8]**

1839. *Libellula chinensis* Burmeister, *Handb. Ent.*, 2 : 852.  
1889. *Tramea burmeisteri* Kirby, *Trans. Zool. Soc. Lond.*, 12 : 316.  
1936. *Tramea basilaris burmeisteri* Fraser, *Fauna Brit. India Odon.*, 3 : 432-434.

**Material examined** : 1 male, 7-iii-2006, Kannur, Coll. K. G. Emiliyamma.

**Diagnosis** : **Male** : Eyes dark reddish brown above, lilaceous laterally and beneath; labrum reddish brown, broadly bordered with black; postclypeus and frons bright vermilion red with a fine basal black line on frons; vesicle olivaceous or tipped with red; prothorax yellowish; thorax olivaceous, with a reddish tinge on dorsum and a bluish tinge laterally; wings hyaline, hindwing with two large black or reddish brown spots at base,

surrounded by a golden yellow areola, one in cubital space, the other lying obliquely in anal area of wing, the two spots narrowly confluent near base of discoidal cell; venation in this dark area bright yellow, in some specimens this marking extending into the basal and subcostal spaces and as far as second antenodal nervure; membrane pure white; pterostigma bright ochreous, that of hindwing shorter; abdomen bright brick red, marked with black; apical annules or rings on segments 4 to 7; segment 8 black with triangular yellow basal spot on each side; 9 and 10 black with medial lateral spot; and apical joints of segments 7 to 9 bright yellow; below thorax black ringed with yellow; hamules slightly overlapping lobe. **Female** : Resembles the male very closely; frons bright chrome yellow, not tinted with red, labrum finely bordered with black; thorax bluish green laterally, black markings more distinct; wings often tinted with yellow; basal spots are similar to male, surrounded by golden areola, but the two spots are well separated; abdomen olivaceous green or yellowish with similar black markings as in the male.

**Size** : Male : Abdomen 30 to 35 mm, Hind wing 40 to 44 mm. Female : Abdomen 32 to 36 mm, Hind wing 38 to 45 mm.

**Habits and Habitat** : Found in the plains; usually found along with *Pantala flavescens* and their habitats are small weedy tanks and marshes.

**Breeding** : Breeds in marshes and ponds.

**Status** : Uncommon.

**Distribution** : Bihar, Himachal Pradesh, Kerala, Maharashtra, Meghalaya, Orissa, Rajasthan, Tamil Nadu and Uttar Pradesh. In Kerala: Malabar and Periyar Tiger Reserve.

### 130. *Tramea limbata similata* (Rambur) [Plate-VII, Fig. 7]

1832. *Libellula limbata* Desjardins, *Rapport Soc. Maurice*, : 1

1889. *Tramea limbata* Kirby, *Trans. Zool. Soc. Lond.*, 12 : 318 ; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 436-438.

1920. *Tramea limbata* race *similata* Fraser, *J. Bombay nat.Hist. Soc.* 27 : 53, 54.

1991. *Tramea limbata similata* Tsuda, *A distributional list of world Odonata* 1991, p.184.

**Material examined** : 1 male, 1-vi-2000, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma; 1 fe male, 30-iii-1998, Mottanood river (Thiruvananthapuram Dt.), Coll. P. T. Cherian; 1 male, 16-iii-1999, Chittoor (Palakkad Dt.), 1 male, 25-x-2000, Kanjirampara (Kottayam Dt.); 1 male, 5-ix-2001, Kolavipalam (Kozhikode Dt.), Coll. P. M. Sureshan; 1 male, 29-iv-2003, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot; 1 male, 8-ix-2001, Malampuzha (Palakkad Dt.), Coll. Dinesan Cheruvat.

**Diagnosis** : **Male** : Eyes dark brown above, olivaceous laterally and below; labrum black or bright reddish ochreous with middle portion black; upper surface and upper part

of anterior surface of frons dark metallic violet; postclypeus, lower border and sides of frons olivaceous or bright ochreous; thorax olivaceous with a reddish tinge on dorsum; wings hyaline, sometimes evenly and palely enfumed; base of hindwing with a single black spot of variable size, narrow, not invading base of anal loop; nervures in this area are reddish; the spot is not surrounded by golden areola as in *T.basilaris burmeisteri*; pterostigma dark ochreous; abdomen blood red, marked with black on last three segments; genital hamules much longer and greatly overlapping lobe. **Female** : Exactly similar to male; black markings of abdomen often more broad; narrow black apical annules and ventral borders of segments 4 to 7 finely black.

**Size** : Male : Abdomen 33 to 35.5 mm, Hind wing 44 to 46 mm. Female : Abdomen 32 mm, Hind wing 43 to 46 mm.

**Habits and Habitat** : Very active species, widely distributed on the plains and submontane regions; usually found along with *Pantala flavescens* hovering above the waterbody in submontane areas.

**Breeding** : Breeds in weedy tanks, temporary pools and ponds.

**Status** : Common.

**Distribution** : South India and Sri Lanka. In Kerala : Cochin, Kannur, Kottayam, Kovalam, Kozhikode, Malampuzha, Periyar Tiger Reserve, Thiruvananthapuram and Wayanad.

### *Tholymis* Hagen

Dragonflies of large size and robust build, coloured ochreous and reddish, with wings partly coloured or milky white. Eyes broadly contiguous; prothorax with a very small posterior lobe; thorax broad and robust; wings moderately long and broad; anal loop long, narrow, and its borders running straight on to border of wing, so that the tip is open, distal side of anal loop obtusely angulated; pterostigma rather short, that of hindwing shorter than forewing; membrane narrow; abdomen broad at base and tapered gradually to the end.

#### 131. *Tholymis tillarga* (Fabricius) [Plate–VII, Fig. 4]

1798. *Libellula tillarga* Fabricius, *Ent. Syst. Suppl.*, : 285.

1867. *Tholymis tillarga* Hagen, *Stett. Ent. Zeit.*, 28 : 220; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 411–413.

**Material examined** : 1 male, 1 female, 20-vii-1999, Chevayur (Kozhikode Dt.); 2 males, 4-iii-1999, Chevarambalam (Kozhikode Dt.); 1 male, 27-xii-1994, Chethalayam (Wayanad Dt.), Coll. C. Radhakrishnan; 2 females, 25-iv-2000, Pullurampara (Kozhikode Dt.); 1 male, 1 female, 24-x-2002, Vadikkadavu (Malappuram Dt.); 1 female, Mathappuzha (Malappuram Dt.) Coll. K. G. Emiliyamma; 1 female, 29-x-1995,

Sirkarpathy (Parambikulam WLS, Palakkad Dt.); 1 male, 30-x-2000, Kidangoor (Kottayam Dt.); 1 male, 19-xi-1996, Chinnar WLS, (Idukki Dt.) Coll. P. M. Sureshan; 1 male, 16-x-2001, Edakkad (Kozhikode Dt.), Coll. Ashok kumar; 1 female, 30-x-2002, Chevayur (Kozhikode Dt.); 1 male, 30-vi-2001, Madayipara (Kannur Dt.), Coll. Md. Jafer Palot; 1 female, 6-xi-2001, Thalakkulathur (Kozhikode Dt.), Coll. K. C. Gopi.

**Diagnosis : Male :** Eyes brown capped with reddish, olivaceous below; labium, labrum and face olivaceous or pale yellowish brown; frons and vesicle ochreous, often with crimson red coloured; prothorax and thorax golden yellow or olivaceous with a bright reddish tint on upper surface; legs ochreous; wings hyaline, with a broad fan-shaped, smoky, golden-brown fascia or band extending from node to base of hind wing, bordered by a broad oval milky white spot; pterostigma reddish brown between dark nervures; membrane blackish brown, paler along attachment; abdomen bright rusty red. **Female :** closely similar to male; the differences are: thorax olivaceous and without reddish tinge; wings without milky white spot and the golden brown band very pale and obscure; abdomen olivaceous brown.

**Size :** Male : Abdomen 28 to 33 mm, Hind wing 33 to 37 mm. Female : Abdomen 27 to 31 mm, Hind wing 31 to 37 mm.

**Habits and Habitat :** Crepuscular in habit, appearing soon before sunset, frequently come to the house attracted by light; found in the plains and lower montane regions.

**Breeding :** Breeds in marshes and weedy ponds.

**Status :** Common.

**Distribution :** Throughout India : Kerala : Cochin, Kannur, Kottayam, Kozhikode, Malappuram, Parambikulam Wildlife Sanctuary, Periyar Tiger Reserve, Thiruvananthapuram and Wayanad.

### *Zygomma* Rambur

Dragonflies of moderate size and slender build, characterized by the shape of the abdomen, open apex of anal loop in hindwing and by their crepuscular habits. Head large, globular; eyes very broadly contiguous; vesicle hood shaped, blocked in middle ocellus; prothorax with small posterior lobe; thorax short and small, thickly covered with long, fine hairs; legs long and slim; wings long, rounded at tips, broad at base; sectors of arc fused for a short distance in forewing, rather longer in the hindwing; anal loop with its apex open as in genus *Tholymis*; abdomen swollen at segments 1 to base of 3, as in *Orthetrum sabina*, then suddenly become thin and very slim and cylindrical to the end.

#### 132. *Zygomma petiolatum* Rambur [Plate-VII, Fig. 5]

1842. *Zygomma petiolatum* Rambur, *Ins. Nevrop.*, : 30; Hagen, 1858, *Verh. zool.-bot. Ges. Wien.*, 8 : 479; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 409-410.

**Material examined** : 1 male, 18-viii-2000, Edakkad (Kozhikode Dt.); 1 female, 2-ii-2000, Kunduparamba (Kozhikode Dt.), Coll. Ashok kumar; 1 female, 21-ii-2001, Puthiyangadi (Kannur Dt.); 1 female, 26-x-2001, Aralam WLS (Kannur Dt.), Coll. Md. Jafer Palot; 1 male, 1 female, 12-xi-2002, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma.

**Diagnosis** : **Male** : Eyes brilliant emerald green during life; labium pale yellow; labrum pale ochreous; face and frons pale olivaceous, and usually dark reddish brown margined with bright golden yellow in front; vesicle dark reddish brown; prothorax and thorax chocolate brown, paling at sides, unmarked; legs pale reddish brown; wings hyaline with brown tips; but in full adult age, the whole wings spread with smoky brown and tips dark brown; membrane blackish brown, paler at attached border; abdomen reddish brown of variable shades, with black rings at the end of each segments; swollen at segment 1 to base of 3, then abruptly thin and very slim to the end. **Female** : Exactly similar to the male, but wings usually more broadly dark reddish brown at tips.

**Size** : Male : Abdomen 37 to 42 mm, Hind wing 32 to 35 mm. Female : Abdomen 37 to 42 mm, Hind wing 32 to 38 mm.

**Habits and Habitat** : Crepuscular in habit, flying after sunset and flying till dark; often comes to light at night; during daytime flies round and round close over the water.

**Breeding** : Breeds in small stagnant ponds, tanks and wells.

**Status** : Locally common.

**Distribution** : Throughout India : Kerala : Kannur, Kozhikode, Malappuram, Periyar Tiger Reserve, Thiruvananthapuram and Wayanad.

### Subfamily UROTHEMISTINAE

#### *Aethriamanta* Kirby

Libelluline dragonflies of small size, variably coloured, with wings coloured and marked at the base. Head, prothorax and thorax normal; wings short, reticulation open; discoidal cell in forewing broad, entire and that of hindwing also entire; sectors of arc separated or a short fusion in forewing, fused at origin for a very short distance in the hindwing; 6 antenodal nervure, distal one complete in forewings; discoidal field beginning with 2 rows of cells and continued as such nearly to wing border; subtrigone in forewing with a single cell; only 1 row of cell between *IRiii* and *Rspl*; anal loop short and stout; pterostigma small, membrane rather large; abdomen short and flattened, broadly fusiform in the male, nearly cylindrical in the female.

#### 133. *Aethriamanta brevipennis* (Rambur) [Plate-VI, Fig. 2]

1842. *Libellula brevipennis* Rambur, *Ins. Nevrop.* p. 114.

1889. *Aethriamanta brevipennis* Kirby, *Trans. Zool. Soc. Lond.*, 12 : 283; Tsuda, 1991, *A distributional list of World Odonata*, 1991, : 144.
1936. *Aethriamanta brevipennis brevipennis* Fraser, *Fauna Brit. India Odon.*, 3 : 445–447.

**Material examined** : 1 male, 1 female, 20-x-2003; 1 male, 27-x-2004, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma; 4 males, 1 female, 23-ii-2000, Parumala/Mannar (Alappuzha Dt.), Coll. K. C. Gopi; 1 male, 15-ix-2001, Kasaragod, Coll. Md. Jafer Palot.

**Diagnosis** : **Male** : Eyes dark reddish brown above, pale laterally and below; labium bright yellow, middle and lateral lobes black; labrum black; anteclypeus pale olivaceous brown; postclypeus and frons blackish brown, upper surface of frons steely black; face, frons, vesicle and labrum covered with short stiff black hairs; occiput reddish brown; thorax dark chocolate brown on upper surface, golden olivaceous brown laterally; legs black, with a bright red spot on hind femora; wings hyaline, tinted with deep golden amber at base; in forewing this amber colour extending slightly beyond the first antenodal nervure and cubital nervure; in hindwing, as a broad band extending from costa to posterior border of wing with a large black spot, the nervures inside this spot is bright yellow; black opaque rays in costal, subcostal and cubital spaces; pterostigma blackish brown; membrane dark reddish brown; abdomen brilliant bright-red throughout, dilated and flattened. **Female** : Labium with middle lobe yellow; labrum black with an elongated yellow spot at the base; whole face and frons bright citron yellow; vesicle yellow, dark brown on dorsum; thorax golden-olivaceous on upper surface; wings similar to male, but the opaque black basal spot usually small; pterostigma grayish white; legs black with citron yellow spot on hind femora; abdomen golden olivaceous, segments 3 and 4 with small, black dorsal mark; dorsum of segments 5 to 10 broadly black.

**Size** : Male : Abdomen 17 to 20 mm, Hind wing 23 to 26 mm. Female : Abdomen 16 mm, Hind wing 23 mm.

**Habits and Habitat** : Not very common species, found near weed covered ponds and tanks.

**Breeding** : Breeds in small weed covered ponds and tanks surrounded by vegetation.

**Status** : Uncommon.

**Distribution** : Bihar, Kerala, West Bengal, and Western Ghats. In Kerala: Alappuzha, Kasaragod, Kozhikode and Thiruvananthapuram.

### *Macrodiplax* Brauer

Libelluline dragonflies of moderate size, coloured ochreous or reddish brown; abdomen red coloured and transparent wings. Eyes broadly contiguous; vesicle very large with two blunt points at the top; wings moderately long and broad, with very open

reticulation; discoidal cell in forewing broad, entire and that of hindwing also entire; sectors of arc separated in forewing, shortly fused in the hindwing; 6 or 7 antenodal nervures in forewings, distal one complete; discoidal field beginning with 2 rows of cells, its borders widely divergent at wing border; only 1 row of cells between IRiii and Rspl; pterostigma short, that of hindwing slightly shorter than forewing; abdomen rather broad, flattened, strongly carinated, relatively short and tapering from base to apical end.

#### 134. *Macrodiplax cora* (Brauer)

1867. *Diplax cora* Brauer, *Verh. zool.-bot. Ges. Wien*, 17 : 20.

1868. *Macrodiplax cora* Brauer, *Verh. zool.-bot. Ges. Wien*, 18 : 737 ; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 448–450.

**Material examined** : 1 female, 5-ix-2001, Kolavipalam (Kozhikode Dt.), Coll. P. M. Sureshan.

**Diagnosis** : **Male** : Eyes reddish brown above, lilaceous or pale yellow below; labium creamy white, middle lobe black; labrum black, yellow at base; anteclypeus olivaceous; postclypeus and frons bright ochreous with reddish tinge; upper part of frons red; sides of frons and face yellow; vesicle red; occiput reddish brown; thorax golden olivaceous brown on upper surface, olivaceous or bluish green laterally, with black spots on humeral and postero-lateral suture and a short stripe over spiracle; legs black, coxae, trochanters and base of femora yellow; wings hyaline, with or without a narrow amber yellow band at basal border of hindwing; pterostigma reddish brown; membrane pale brown or white; abdomen bright ochreous tinted with blood red on upper surface and dorsal black marking extending the whole length, segment 1 with a triangular dorsal spot; segments 2, 3, 8 and 9 with broad black stripe; segments 4 to 7 with hourglass shaped stripe, segment 10 with a small mid dorsal point only. **Female** : Closely similar to male, but paler in colour; face, frons and vesicle creamy white, base of frons glossy black above; prothorax black; thorax pale golden olivaceous on upper surface and pale greenish yellow laterally, with well developed black markings; wings similar to that of male; abdomen ochreous, not tinted with red on dorsum, black markings similar to male.

**Size** : Male : Abdomen 15 to 17 mm, Hind wing 30 to 32 mm. Female : Abdomen 24 to 25 mm, Hind wing 32 mm.

**Habits and Habitat** : This is an annual migrant along with *Pantala flavescens*, when in flight it rests overnight on the top of small trees and bushes, perched on twigs until the sun rises, and making short, quick and sudden flights in chase of prey; if disturbed it will rise, but quickly returns to the same twig.

**Breeding** : Breeding in marshes or brackish water in the vicinity of estuaries.

**Status** : Uncommon.

**Distribution** : South India and West Bengal. In Kerala : Kozhikode.

### Urothemis Brauer

Libelluline dragonflies of moderately large size and robust build, coloured ochreous, reddish or black and with wings partly coloured at the base. Head large, frons rounded at crest and cut into two conical projections by a very deep groove; wings long and moderately broad, reticulation open; discoidal cell in forewing and hindwing entire; sectors of arc separated at origin; 7 antenodal nervure; discoidal field beginning with 2 rows of cells and continued as such nearly to wing border, its sides more or less parallel or slightly convergent at wing border; subtrigone in forewing 3 celled; only 1 row of cell between *IRiii* and *Rspl*; abdomen dilated dorsoventrally at base, then gradually tapered to the end, relatively short and strongly carinated.

#### 135. *Urothemis signata signata* (Rambur) [Plate-VI, Fig. 6]

1839. *Libellula sanguinea* Burmeister, *Handb. Ent.*, 2 : 858.

1913. *Urothemis signata signata* Ris, *Cat. Coll. Selys, fasc.*, 16 : 1023; Fraser, 1936, *Fauna Brit. India Odon.*, 3: 442-444.

**Material examined** : 1 female, 22-ii-2001, Chathancode (Kozhikode Dt.); 2 females, 29-i-2003, B. M. Kayal (Malappuram Dt.), 3 males, 2 females, 20-x-2003, Kadalundi (Kozhikode Dt.), Coll. K. G. Emiliyamma; 1 male, 16-x-2001, Edakkad (Kozhikode Dt.), Coll. Ashok kumar; 2 males, 29-x-2000, Kumarakom (Kottayam Dt.); 1 male, 30-x-2000, Kidangoor (Kottayam Dt.); 1 male, 26-x-2000, Mundakayam (Kottayam Dt.); 1 female, 25-x-2000, Kanjirampara (Kottayam Dt.); 2 males, 3 females 5-ix-2001, Kolavipalam (Kozhikode Dt.), Coll. P. M. Sureshan; 1 male, 26-vi-2002, Thavanakkadavu, (Ernakulam Dt.), Coll. C. Radhakrishnan.

**Diagnosis** : **Male** : Eyes blood red above, reddish brown laterally; labium, labrum and postclypeus ochreous; frons in front and above blood red; anteclypeus olivaceous; occiput reddish brown; prothorax dark reddish brown; thorax red on upper surface, olivaceous with a reddish tinge laterally; wings hyaline with crimson reticulation; extreme base of fore wing with golden-amber colour; a broad dark amber-coloured spot at base of hind-wing, in this spot, and framed by it, a blackish brown spot, the network of neuration over it bright ochreous or crimson with dark brown rays in the costal and subcostal spaces; pterostigma ochreous above, pale whitish yellow below; membrane blackish brown; abdomen blood red, with black markings on dorsum of segments 8 and 9. **Female** : Closely similar to the male; differs as: eyes brown above; labrum bright golden yellow; face and frons bright lemon yellow; occiput ochreous; thorax ochreous or golden brown on upper surface, olivaceous-green laterally; wings tipped with brown; usually the blackish brown spot on hindwing well separated from that in the cubital space, so that there are three distinct dark areas instead of two at base of hind wing in male; abdomen greenish-olivaceous on dorsum, black markings on segments 8 and 9 as in the male and segments 3 to 7 with small subdorsal apical spots.

**Size :** Male : Abdomen 27 to 28 mm, Hind wing 34 to 37 mm. Female : Abdomen 25 to 27 mm, Hind wing 34 to 36 mm.

**Habits and Habitat :** A common dragonfly found in the plains, also extending to lower montane regions; usually found near weed covered ponds, tanks and stagnant streams.

**Breeding :** Breeds in weedy tanks, ponds and slow running streams.

**Status :** Locally common.

**Distribution :** Throughout Peninsular India : Kerala : Cochin, Kottayam, Kozhikode, Malappuram and Periyar Tiger Reserve.

### Subfamily ZYGONYCHINAE

#### *Zygonyx* Hagen

Libelluline dragonflies of large size, and Corduline like appearance, coloured black marked with yellow and partly metallic. Head large; frons rounded or with crest; vesicle broad, rounded or broadly grooved; thorax robust, metallic; legs long and very robust, claw hooks very robust, broad and as long as the claws, thus appear bifid; wings long and narrow, reticulation rather open; membrane ash gray in colour, with white border; discoidal cell traversed in both wings; sectors of arc with a short fusion in forewing and with a long fusion in hindwing; discoidal field beginning with rows of 2,3 or 4 cells; *Riii* and *IRiii* markedly undulated; subtrigone in forewing 1 to 5 celled, usually 3 celled; abdomen long and narrow, shorter than the wings, slightly dilated dorsoventrally at base, then slim and parallel sided to the end in male; in female, it is cylindrical, more robust, swollen at base and not constricted at segments 3 and 4.

#### Key to the species of Genus *Zygonyx* Selys

1. Abdomen with mid dorsal spot on segment 7 scutellate, broadening apically; face and sides of thorax more broadly yellow; tips of superior anal appendage tapered.....  
..... *malabaricus* Fraser
- Abdomen with mid dorsal spot on segment 7 fusiform, tapering basally and apically; face and sides of thorax more broadly yellow; tips of superior anal appendage produced and with a ventral spine below ..... *metallicus* Fraser

#### 136. *Zygonyx malabaricus* (Fraser) [Plate–VII, Fig. 2]

1919. *Zygonyx iris* Fraser (pars), *J. Bombay nat. Hist. Soc.*, 26 : 741–742.

1926. *Zygonyx iris malabarica* Fraser, *J. Bombay nat. Hist. Soc.*, 31 : 763–766; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 395–396.

**Material examined :** 1 male, 17-ii-2004, Thusharagiri (Kozhikode Dt.); 1 male, 1 female, 10-v-2005, Vannathimala (Wayanad Dt.), Coll. K. G. Emiliyamma; 1 male, 13-vi-2003, Thusharagiri (Kozhikode Dt.); 1 male, 9-iii-2002, Kappil, (Aralam WLS, Kannur Dt.), Coll. Md. Jafer Palot; 1 male, 27-v-2003, Thusharagiri (Kozhikode Dt.), Coll. C. Radhakrishnan.

**Diagnosis : Male :** Eyes dark reddish brown above, pale laterally and below; face broadly yellow; labrum black; anteclypeus, sides of frons and postclypeus bright citron yellow; vesicle, frons above including crest dark metallic blue; occiput black; prothorax blackish brown, border of anterior lobe, dorsum of middle lobe and whole posterior lobe dull yellow; thorax dark metallic or greenish blue with a small round yellow spot on lower part of humeral region and also an antero lateral yellow stripe; sides broadly yellow; beneath yellow; legs black, anterior femora bright yellow on inner side; claw hooks equal; wings tipped with light brown and with a small dark brown spot at extreme base of hindwing; abdomen black, the sides of segments 1 to 3 broadly yellow; fine yellow annules on segments 2 and 3; narrow basal annules on segments 4 to 7; segment 7 with a broad scutellate shaped yellow spot; segment 8 with a small subdorsal basal yellow point. **Female :** closely similar to male in colour and markings, but differing in shape of abdomen; thorax with broad complete humeral stripe, medio lateral and postero lateral yellow stripes; tergum spotted with citron yellow; wings with tips more darkly enfumed and the basal brown spot in hindwing large and better defined; abdomen with mid dorsal carina from segment 1 to middle of segment 6, fine yellow; other yellow markings similar to male.

**Size :** Male : Abdomen 40 to 42 mm, Hind wing 46 to 48 mm. Female : Abdomen 40 to 43 mm, Hind wing 47 to 49 mm.

**Habits and Habitat :** The habits and habitats are similar like that of Cordulines, the adults fly up and down in the air, often fly at great heights and patrol for long distances; they pair over water and the sexes travel in copula for great distances upstream for suitable situation to deposit the eggs.

**Breeding :** Breeds in fast flowing montane streams; their larvae are having flat limpet like abdomen to cling on the rocks, the body is generally streamlined.

**Status :** Locally common.

**Distribution :** South India : Kerala : Kannur, Kozhikode, Parambikulam Wildlife Sanctuary, Travancore and Wayanad.

### 137. *Zygonyx metallicus* (Fraser)

1931. *Zygonyx iris metallica* Fraser, *Rec. Indian Mus.*, 33 : 450–451; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 398–399.

**Diagnosis : Male :** Very similar to *Z. malabaricus*, of which it may be a variety. The main differences are its greater melanism, higher nodal index, closer reticulation of wings and differently shaped anal loop. Thorax with humeral stripe reduced to small lower spot; mid lateral stripe broken up into two or three spots, the posterior stripe on mesepimeron covers less than half area; abdomen with yellow colour on side of segments 2 and 3 reduced, small baso lateral spots on segments 4 to 7; middorsal spot on segment 7 smaller and oval or fusiform in shape, tapering at both ends; wings with tips usually more or less narrowly enfumed with brown and often tinted with yellow throughout; anal loop acutely angulated at distal side; anal appendages and genitalia similar to *Z. malabaricus*, superior anal appendages more tapered. **Female :** Resembles the male in all respects; anal appendages as in *Z. malabaricus*, slender, curved outwardly, pointed at tips, black; vulvar scales very short, broad and consisting of two narrow triangular lobes.

**Size :** Male : Abdomen 40 mm, Hind wing 44 mm. Female : Abdomen 41 mm, Hind wing 50 mm.

**Habits and Habitat :** Similar to that of *Z. malabaricus*, this species is perhaps only a variety of *Z. malabaricus*, characterized by its smaller size, more restricted yellow markings, oval shape of spot on mid dorsum of segment 7 etc.

**Breeding :** Breeds in fast flowing forest streams.

**Status :** Uncommon.

**Distribution :** Western Ghats: Kerala: South Malabar and Vythiri ghat (Wayanad).

## DISCUSSION

Odonate fauna of Kerala exhibits notable diversity and richness. The state is, currently, known to have an odonate diversity of about 137 species (including subspecies), out of 499 odonate taxa recognized from India, and it constitutes a considerable share - nearly about 28% - of the diversity richness of Indian odonates. Of these 137 species of Odonata, 7 species, *Agriocnemis keralensis* Peters, *Protosticta antelopoides* Fraser, *Caconeura risi* (Fraser), *Merogomphus longistigma tamaracherriensis* Fraser, *Davidioides martini* Fraser, *Onychogomphus malabarensis* (Fraser) and *Idionyx rhinoceroideus* Fraser are endemic to Kerala.

This higher species diversity of odonates truly reflects the zoogeographic significance of the Western Ghats system of which Kerala forms an integral biogeographic territory. The physiographic features and the tropical climate, with very high annual rainfall, of this region invariably influence the state's biogeography and biodiversity potential, in general. The state's physiography - which is typically identical to that of the Western Ghats system itself - is characterized by the mountainous high ranges and isolated small

hills with lush vegetation, valleys and meadows interspersed with varied inland water bodies such as rivers, reservoirs, lakes, tanks etc., which offer diverse aquatic habitat environs for odonates. The species diversity of odonates, according to Fraser (1931), happens to have a direct ratio or relationship to the measures of rainfall or abundance of water supplies. Given the higher odonate diversity of Kerala, this notion seems to have credence. Some of the water bodies, especially the perennial ones, are often observed to be ideal haunts of the localized populations of a good number of odonate species, especially rare and endemic ones. Such odonate assemblages continually frequent these water bodies apparently evoking the behavioral phenomenon as being visitations to their natal home habitats. As Fraser (*op. cit.*) further remarked, such visitations to their specified natal habitats, probably influenced by a homing instinct, could be a part of their biology evolved over time, possibly enabling them to ensure the optimal habitat conditions, or microhabitat environs, for the build up, survival and perpetuity of the progenies generation after generation.

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## PLATE - I : Odonata (Insecta) of Kerala



Fig. 1. *Pseudagrion rubriceps rubriceps* (Selys)

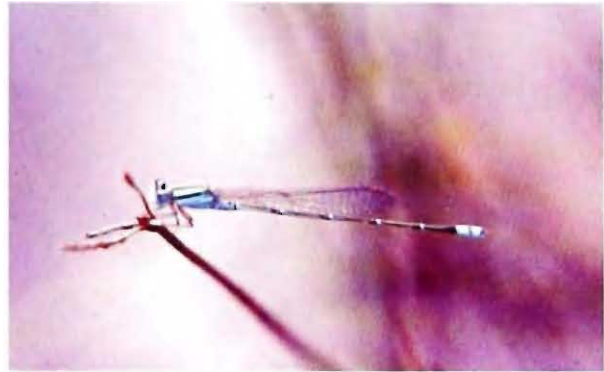


Fig. 2. *Pseudagrion microcephalum* (Rambur)



Fig. 3. *Copera marginipes* (Rambur)



Fig. 4. *Copera vittata* Laidlaw



Fig. 5. *Ceriagrion cerinorubellum* (Brauer)



Fig. 6. *Ceriagrion coromandelianum* (Fab.)



Fig. 7. *Ceriagrion rubiae* Laidlaw



Fig. 8. *Ceriagrion olivaceum* Laidlaw



Fig. 9. *Ischnura aurora aurora* (Brauer)



Fig. 10. *Aciagrion occidentale* Laidlaw

PLATE - II : Odonata (Insecta) of Kerala

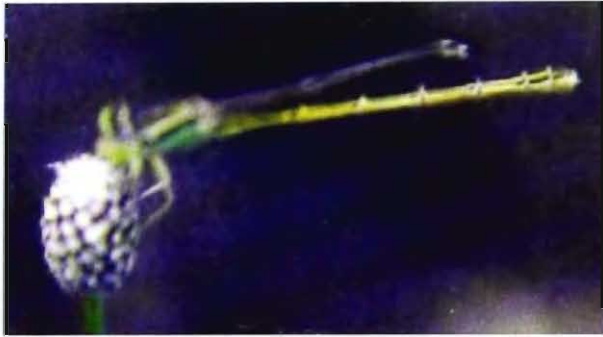


Fig. 1. *Agriocnemis pygmaea* (Rambur)



Fig. 2. *Agriocnemis pieris* Laidlaw



Fig. 3. *Agriocnemis keralensis* Peters



Fig. 4. *Mortonagrion varralli* Fraser



Fig. 5. *Rhinocypha bisignata* (Selys)



Fig. 6. *Calocypha laidlawi* (Fraser)



Fig. 7. *Libellago lineata indica* (Fraser)



Fig. 8. *Lestes elatus* Hagen

PLATE - III : Odonata (Insecta) of Kerala



Fig. 1. *Caconeura ramburi* (Fraser)



Fig. 2. *Caconeura risi* (Fraser)



Fig. 3. *Euphaea fraseri* (Laidlaw)



Fig. 4. *Euphaea dispar* (Rambur)



Fig. 5. *Vestalis gracilis gracilis* (Rambur)



Fig. 6. *Vestalis apicalis apicalis* Selys



Fig. 7. *Onychargia atrocyana* Selys



Fig. 8. *Neurobasis ch. chinensis* (Linn.)



Fig. 9. *Protosticta* sp.



Fig. 10. *Protosticta gravelyi* Laidlaw

## PLATE - IV : Odonata (Insecta) of Kerala



Fig. 1. *Macromia indica* Fraser



Fig. 2. *Gynacantha dravida* Lieftinck

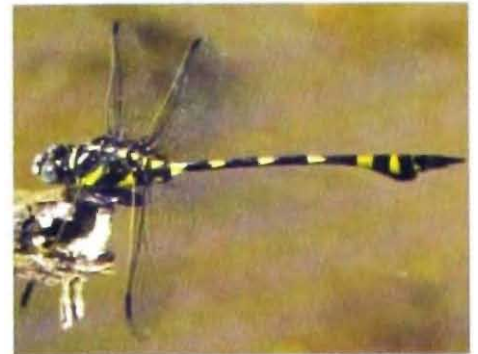


Fig. 3. *Ictinogomphus rapax* (Rambur)



Fig. 4. *Paragomphus lineatus* (Selys)



Fig. 5. *Idionyx saffronata* Fraser



Fig. 6. *Davidioides martini* Fraser



Fig. 7. *Anax guttaus* (Burmeister)



Fig. 8. *Anax immaculifrons* Rambur



Fig. 9. *Chlorogomphus campioni* (Fraser)



Fig. 10. *Anaciaeschna jaspidea* (Burm.)



Fig. 11. *Cratilla lineata* (Brauer)



Fig. 12. *Neurothemis fulvia* (Drury)

PLATE - V : Odonata (Insecta) of Kerala



Fig. 1. *Diplacodes trivialis* (Rambur)



Fig. 2. *Diplacodes nebulosa* (Fab.)



Fig. 3. *Neurothemis tullia tullia* (Drury)



Fig. 4. *Epithemis mariae* Laidlaw



Fig. 5. *Neurothemis intermedia atlanta* Ris



Fig. 6. *Tetrathemis platyptera* Selys



Fig. 7. *Acisoma p. panorpoides* Rambur



Fig. 8. *Palpopleura s. sexmaculata* (Fab.)

PLATE - VI : Odonata (Insecta) of Kerala



Fig. 1. *Rhodothemis rufa* (Rambur)



Fig. 2. *Aethriamanta brevipennis* (Rambur)



Fig. 3. *Trithemis aurora* (Burmeister)



Fig. 4. *Trithemis festiva* (Rambur)



Fig. 5. *Trithemis pallidinervis* (Kirby)



Fig. 6. *Urothemis signata signata* (Rambur)



Fig. 7. *Brachydiplax chalybea chalybea* Brauer



Fig. 8. *Brachydiplax sobrina* (Rambur)

PLATE - VII : Odonata (Insecta) of Kerala



Fig. 1. *Rhyothemis variegata variegata* (Linnaeus)



Fig. 2. *Zygonyx malabaricus* Fraser



Fig. 3. *Pantala flavescens* (Fab.)



Fig. 4. *Tholymis tillarga* (Fab.)



Fig. 5. *Zyxomma petiolatum* Rambur



Fig. 6. *Lathrecista asiatica* (Fabricius)



Fig. 7. *Tramea limbata similata* (Rambur)



Fig. 8. *Tramea basilaris burmeisteri* Kirby

PLATE - VIII : Odonata (Insecta) of Kerala



Fig. 1. *Orthetrum chrysis* Selys



Fig. 2. *Orthetrum pruinatum neglectum* (Rambur)



Fig. 3. *Orthetrum sabina sabina* (Drury)



Fig. 4. *Orthetrum glaucum* (Brauer)



Fig. 5. *Orthetrum luzonicum* (Brauer)



Fig. 6. *Orthetrum tr. triangulare* (Selys)



Fig. 7. *Potamarcha congener* (Rambur)



Fig. 8. *Bradinopyga geminata* (Rambur)



Fig. 9. *Crocothemis servilia servilia* (Drury)



Fig. 10. *Brachythemis contaminata* (Fab.)