

# Dragonflies and Damselflies of Peninsular India A Field Guide



K.A.Subramanian

Edition 1.0

2005



*Project Lifescape*

Series Editor: Madhav Gadgil



# Dragonflies and Damselflies of Peninsular India-A field guide

**K.A.Subramanian**

**Project Lifescape**

**Series Editor: Madhav Gadgil**

**Edition 1.0**



**A collaborative project of Centre  
for Ecological Sciences, Indian  
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**2005**

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## Project Lifescape

This book on dragonflies and damselflies of peninsular India represents the fourth fascicle to be published under Project Lifescape. This project is a part of the initiative of the Indian Academy of Sciences to enhance the quality of science education. It aims to publish illustrated accounts of 1,500 Indian species (and higher taxonomic categories such as orders and families) of micro-organisms, plants and animals. These accounts are meant to assist high school, college and postgraduate students and teachers of biology in reliably identifying these taxa. They would also include ancillary information on distribution, ecology and behaviour that would help design field exercises and projects focusing on first-hand observations of living organisms. The information thus generated could feed into a countrywide system of monitoring ongoing changes in India's lifescape to support efforts at conservation of biological diversity, as well as control of weeds, pests, vectors and diseases. Hopefully, the accounts would also stimulate popular interest in the broader spectrum of India's biological wealth, much as Salim Ali's books have done for birdlife over the last sixty years.

### About the author:

K.A.Subramanian studied stream insect communities of the Western Ghats for his doctoral thesis. He is interested in fresh water biodiversity conservation, odonate ecology and insect evolution. He is currently a Research Associate at the Centre for Ecological Sciences, Indian Institute of Science, Bangalore, India.



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# Foreword

Dragonflies and damselflies are amongst the most attractive of creatures on earth, the first to have conquered the aerial domain. Yet we know little of their diversity in India. Indeed most of the species are yet to be described, but they are all around us, their nymphs key predators in water, the adults, the scourge of gnats and midges. If we get to know them better, we are apt to become more concerned with their welfare. That, in turn would mean broader support for our efforts to conserve, and prudently use, India's rich heritage of biodiversity.

This is the aim of Project Lifescape, to help Indians know more of the wealth of life around us. This is similar to the function of illustrated field guides. In addition we hope to suggest scientific problems of interest that students or amateur naturalists could tackle and contribute to furthering our understanding of Indian ecology.

With this in view, we have published three books: on butterflies, fishes and amphibians of peninsular India. They have had a good reception, but books with colour photographs are still not easily affordable and their reach has remained limited. So we have decided to move on to a new medium, the web. Fortunately, the web is becoming more and more accessible, even in rural India, and web based publishing would increase the reach of the material by many orders of magnitude.

This e-book on dragonflies and damselflies is the first in this series. It is the product of the enthusiasm, interest and energy of a young naturalist, Dr.K.A.Subramanian. We sincerely hope that it would reach out to nature lovers, young and old, all over India, and would be most grateful for any and all manners of feedback.

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## PREFACE

The wings of dragonflies and damselflies (odonates) flag the triumph of metazoa over land and air. The ancestors of extant odonates date back to carboniferous era, about 250 million years ago. Odonates are primarily aquatic insects and their life history is closely linked to specific aquatic habitats. This habitat specificity makes them a good indicator of wetland health. India with its unique geography and diverse bioclimatic regions, support a rich odonate fauna. Thanks to the work of Fraser, the Indian odonate fauna is well documented in his monumental work-The Fauna of British India-Odonata (1933-1936). He describes 536 species within Indian region. Though the Indian odonate fauna is well known taxonomically, natural history and ecology is documented only of a few species . Even basic facts such as geographic and seasonal distribution of most of the species are barely known.

This poor documentation of natural history and ecology of odonates is largely due to non-availability of simple identification guides. The currently available books are highly technical and inaccessible to students and amateur naturalists. The consequence of this vacuum is very well reflected in popular natural history articles and documentaries, where many beautiful odonates are just labeled as "dragonflies" or "damselflies".

This field guide is an attempt to fill the vacuum by providing description and photographs of 60 Indian odonates belonging to 12 families. Some species are rare and few of them are endemic to the Western Ghats. The family Torrent Hawks (Cordulidae) is not included in this version. Novelty of this guide is the introduction of common English names to families and species of odonates. In addition to new names, I have also used some names like Club Tails, Darners and Skimmers which are already in use. In fact, it was field guides with common English names and colour plates that popularized study the of the birds and butterflies among amateurs. The names I

have introduced are along the lines of common English names for birds and butterflies. I hope that this will generate wider interest in odonates among students and naturalists.

World over, web based resources have emerged as a powerful tool for identification of organisms and dissemination of information concerned with biodiversity conservation. Recognizing the importance of web based tools for biodiversity conservation, the first edition of this field guide will be freely available in electronic form. I hope interest generated through this initiative will help in better understanding of Indian odonates and also improve the subsequent editions of this field guide.

**K.A.Subramanian**  
Bangalore  
November, 2005

## **Acknowledgements**

This field guide is an outcome of extensive field work done on stream insects as part of the Western Ghats biodiversity network initiated by Prof. Madhav Gadgil at the Centre for Ecological Sciences, IISc, Bangalore. I am grateful to him for giving me an opportunity to work in the network and for his encouragement while working on this fascicle. This book would not have attained this shape without the critical reviews of Prof. C.A.Virakatamath, Prof. T.C. Narendran, Prof. K.G. Sivaramakrishnan, Dr. Ranjith Daniels, E. Kunhikrishnan, Dr. Vincent Kalkman, Dr. Keith Wilson, Nancy Vander Poorten, Michael Vander Porten, Merry Zacharia and Krushnamegh Kunte. I thank them for their valuable comments and suggestions. I thank Natasha Mahatre, Kunhikrishnan, John Moore, Krushnamegh, Praveen, Shahil Lateef, Sivan, Srinidhi, Kishen Das and Tarique Sani for generous contribution of photographs. Last but not least, I thank my wife Shobana for her meticulous editorial corrections and designing the layout for this book.

**K.A.Subramanian**  
Bangalore  
November, 2005



## BIOGEOGRAPHIC REGIONS OF ASIA, AFRICA AND AUSTRALIA. INDIA AND OTHER SOUTH EAST ASIAN COUNTRIES ARE IN ORIENTAL REGION.



# Geographic scope of the field guide

Satellite image of India showing geographic features and regions of the peninsular India.

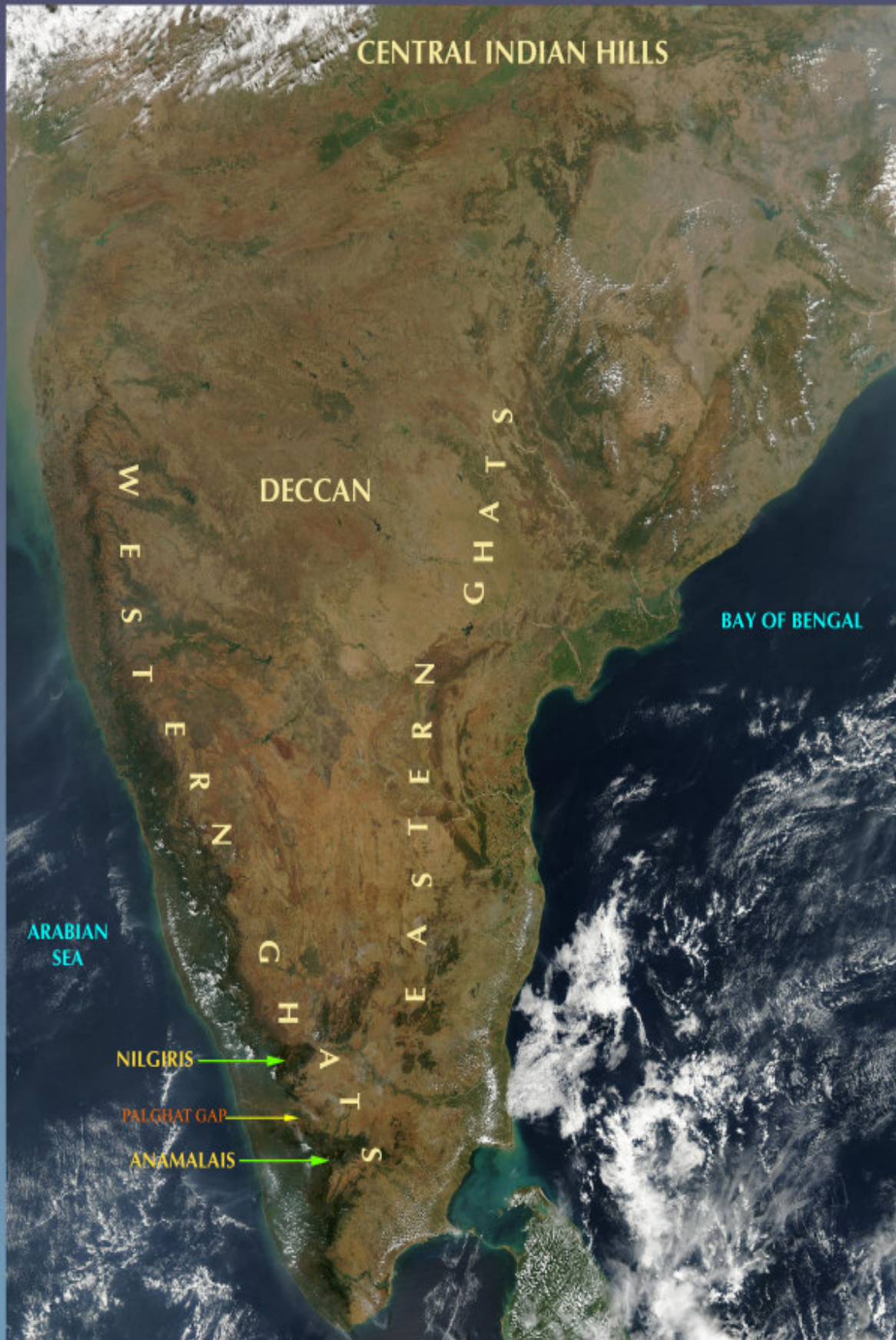
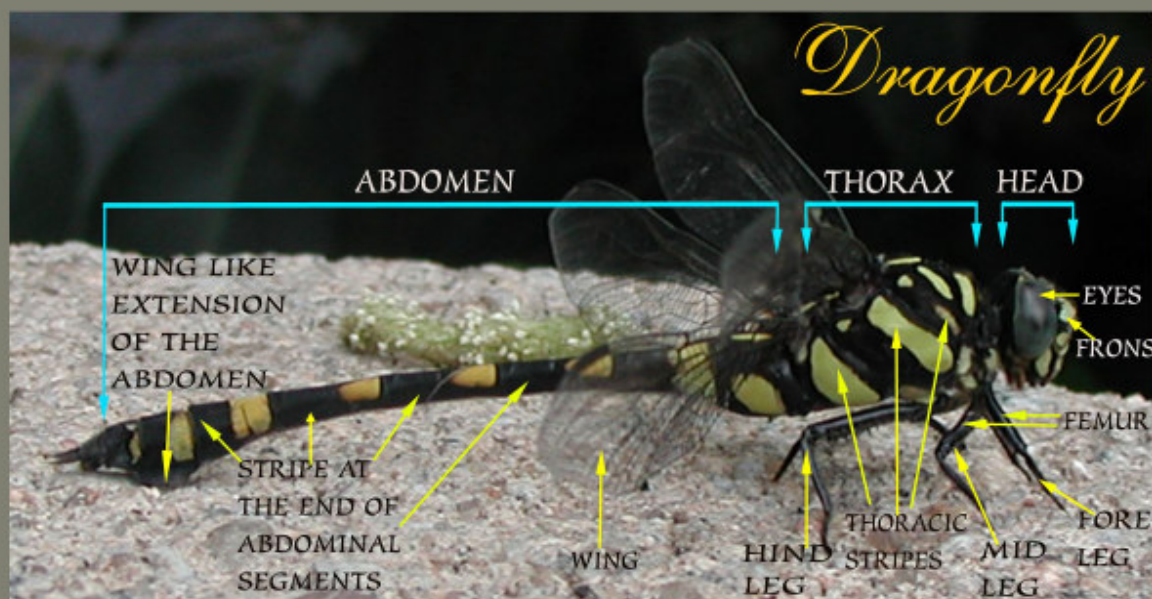
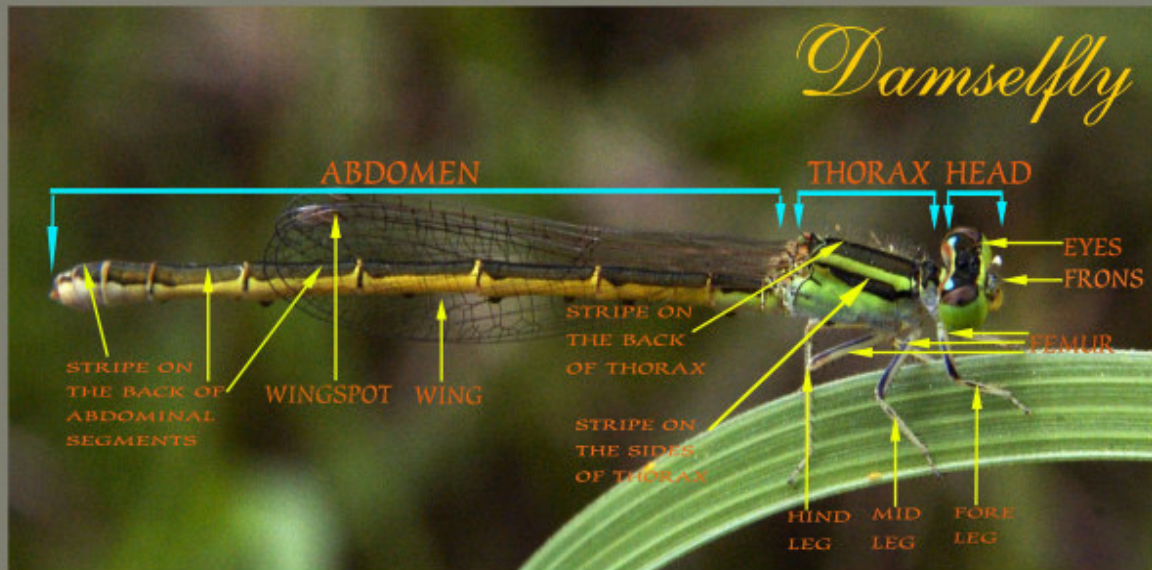


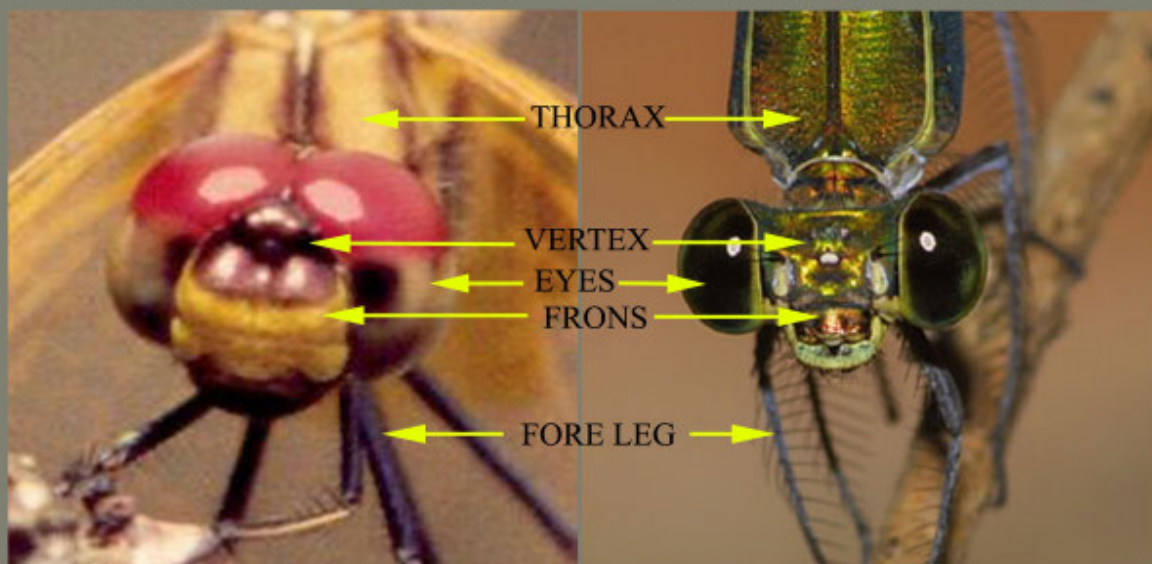
Image courtesy: <http://visibleearth.nasa.gov>

# Body Parts of Dragonflies and Damselflies



DRAGONFLY HEAD

DAMSELFLY HEAD



## NATURAL HISTORY OF DRAGONFLIES AND DAMSELFLIES (ODONATA)

### Introduction

Dragonflies and damselflies collectively called odonates, are one of the most common insects flying over forest, fields, meadows, ponds and rivers. About 6,000 extant species are distributed all over the world. India is highly diverse with more than 500 known species. Odonata are one of the ancient orders of insects. It first appeared during the Carboniferous era, about 250 million years ago along with mayflies (Ephemeroptera). Odonata of the Carboniferous era consists of giants; for example *Meganeuropsis americana* from that era had a wingspan of 71 cm, almost the span of pigeon. Dragonflies and mayflies are ancient groups of insects, which amongst others, were the first to develop wings and venture into air. Dragonflies mastered the art of flying and continue to be the masters aerobats.

Based on morphology, the order Odonata are divided into three groups, viz. damselflies (Zygoptera), Anisozygoptera and dragonflies (Anisoptera). The suborder Anisozygoptera is a living fossil with two species of which *Epiophlebia laidlawi* is known from Darjeeling. Dragonflies and damselflies can easily be distinguished in the field (Table 1, Fig.1-6). Although they differ Considerably in morphology, their general life histories are comparable.





Fig 1: A male Damselfly (Golden Dartlet)



Fig 2: A male Dragonfly (Pied Paddy Skimmer)

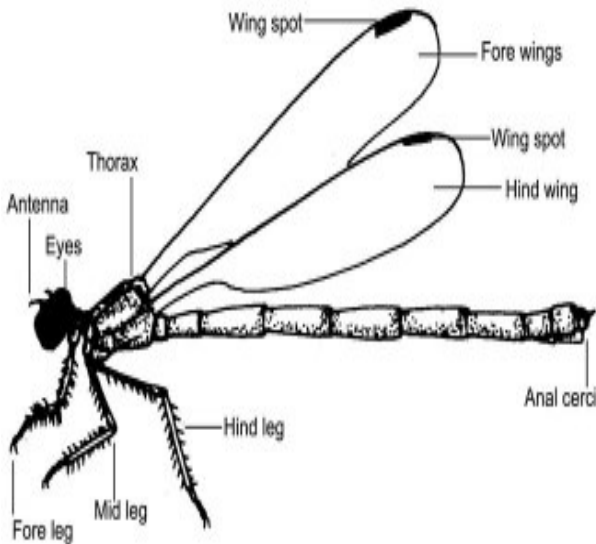


Fig. 3 Body parts of a Damselfly

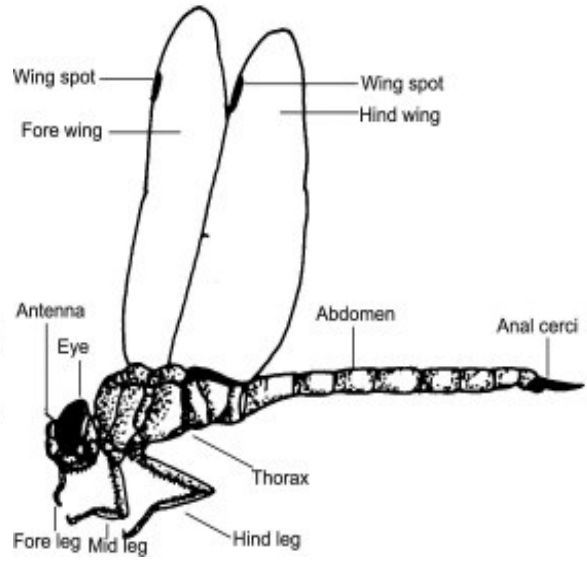


Fig.4 Body parts of a Dragonfly

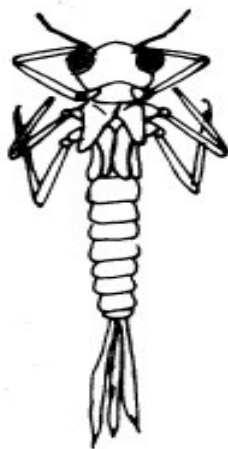


Fig. 5 Damselfly larva

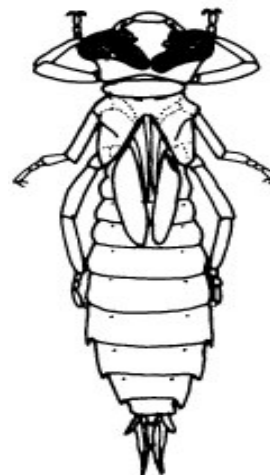


Fig. 6 Dragonfly larva

<b>Dragonflies (Anisoptera)</b>	<b>Damselflies (Zygoptera)</b>
<ol style="list-style-type: none"> <li>1. Fore wings and hind wings unequal in size; hind wings broader at the base than fore wings.</li> <li>2. Hing wing broad at base.</li> <li>3. Wings spread out at rest.</li> <li>4. Strong agile fliers.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fore wings and hind wings approximately of the same size and shape.</li> <li>2. Wings narrow at the base.</li> <li>3. Wings usually held together dorsally over thorax and abdomen.</li> <li>4. Comparatively weak fliers.</li> </ol>
<b>Larvae</b>	<b>Larvae</b>
<ol style="list-style-type: none"> <li>1. Stout, robust body.</li> <li>2. Gills not visible externally.</li> </ol>	<ol style="list-style-type: none"> <li>1. Slender, fragile body</li> <li>2. Three gills at the end of abdomen, visible externally.</li> </ol>

Table.1 Broad differences between dragonflies and damselflies

### Habitat

The life history of odonates is closely linked with water bodies. They use a wide range of flowing and stagnant water bodies . Even though most species of odonates are highly specific to a habitat, some have adapted to urban areas and make use of man-made water bodies. Habitat specificity has an important bearing on the distribution and ecology of odonates. Some species use specialized habitats such as those shown below (Fig 7-11).



Fig.7 Pond



Fig.8 Riffle in streams

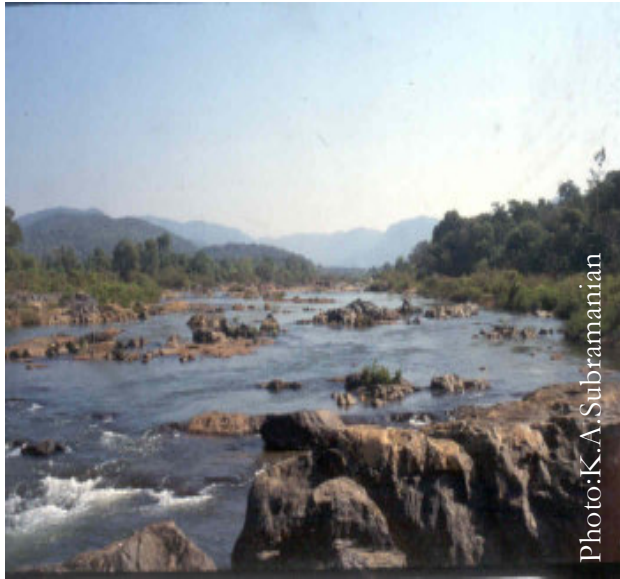


Fig. 9 Runs in rivers



Fig. 10 Waterfalls



Fig. 11 Cascade in streams

The species of hill streams tend to be narrowly distributed when compared to pool breeders, which are widespread.

#### **Life cycle**

##### **Eggs**

Odonates lay their eggs (Fig .12) in a wide range of aquatic habitats, from damp soil to waterfalls. Females select the egg-laying site mainly by physical characters such as the length of the shoreline. Species, breeding in rivers select either slow flowing or fast flowing sites depending on the ability of their larvae to cope with moving water. It has been observed that long straight shores of lakes are sometimes colonised by riverine species. Visual cues also play an important part in egg laying. Many pool breeders are deceived by

smooth shining surfaces, such as bonnets of cars and wet roads and they often try to lay eggs in these deceptive sites.



Fig. 12 Damselfly (Blue Bush Dart) laying eggs. Note how the male holds the female while she lays egg.

Many dragonflies lay their broad and elliptical eggs either in flight or by perching on an overhanging vegetation or rock. Eggs are laid in successive batches: a damselfly lays about 100-400 eggs and dragonflies, usually about several hundreds to thousands per batch. Eggs hatch in 5-40 days in the tropics. Eggs of temperate species may over-winter and hatch in about 80-230 days. In many stream dwelling dragonflies the eggs are invested with gelatinous substance which expands and becomes adhesive on contact with water. This helps the egg from being carried away far from its habitat by water current.

Damselflies insert their elongate and cylindrical eggs into a aquatic plant. Their elaborate ovipositor is serrated and adapted for making incisions in the tissues of plants and placing the eggs in them. Some are generalists and some are specific in their selection of the plant for egg laying. Host specific association sometime effectively determines the distribution of species such as *Coenagrion armatum* in Britain where it was closely associated with *Hydrocharis morsusrane* before it became extinct.

### **Larval stages**

The larva is a sophisticated predator (Fig.13). Their cryptic colouration and keen eyesight make them an effective predator. Larvae are generally ambush predators, that is they wait for their prey to come close before striking. But some systematically stalk their prey much like birds of prey or as tigers do. When they are in the striking range they shoot-out their formidable jaws which virtually stab the prey (Fig.14).





Fig.13 Damselfly larva (Nilgiri Torrent Dart).



Fig. 14 Damselfly larva (Nilgiri Torrent Dart) showing jaw



Fig.15 Emerging dragonfly (Blue Tailed Green Darner)

They are gluttonous and feed on any moving and seizable prey including their own kind. Last instar larvae of bigger species are known to catch even small fishes, tadpoles and freshly emerged adults of their own species.

In dragonflies, the inner surface of the rectum has become foliate and richly supplied by trachea. These foliations or “rectal gills” are the respiratory organs. Pumping movements of the abdomen continually renew water in the rectum. In

damselflies, there are foliaceous lamellae at the end of the abdomen. They are the supplementary respiratory devices in addition to rectum, in the body surface and wing sheaths through which also gaseous exchange occurs.

Some larvae can complete development in two months. The number of larval instars is variable within and between species and is usually 9-15. When they are ready to moult, stop feeding and crawl up to emergent vegetation or rock (Fig.15-17). This usually happens after sunset and the larvae moult into adults just before sunrise. The newly emerged adults are wet and delicate, and as the day warm up, they become dry and fit for their maiden flight. Some of the tropics and warm temperate regions often complete one or more generations per year.



Fig. 16 Emerging damselfly (Nilgiri Torrent Dart)



Fig. 17 Larval cases of an aeshnid (top) and libellulid (bottom)

### Adult stage

Newly emerged male and female odonates leave their emergence site and inhabit nearby landscape. Generally males travel farther than females. Damselflies complete their maturation period in about a week or less whereas dragonflies takes approximately two weeks. During the maturation period, sequential changes occur in the colour of the body and wings. In a few species maturation period serves as a resting stage and lasts about 8-9 months.

### Flight

Odonates surpass all other groups of insects in their flying skills. Odonates have uncoupled wings, that is unlike moths, butterflies, wasps and bees, fore and hind wings are unattached to each other and they beat independently. The powerful thoracic muscles help them in long sustained flight and good maneuverability (Fig.18-19). Odonates can hover and turn 180° while in flight and can fly backwards. Dragonflies are stronger fliers than damselflies and they can reach a speed up

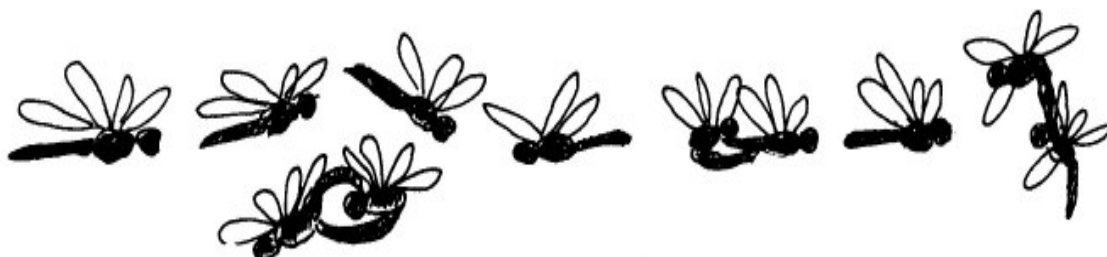




Fig. 18 Dragonfly in flight (*Wandering Glider*)

example, *Agriocnemis pygmaea* has a weak flight and is dispersed by wind throughout Asia and Australia.

Like many other organisms, dragonflies also migrate. Generally it is observed that dragonflies which breed in temporary pools migrate. One of our most common species, *Pantala flavescens* migrates

immediately after the monsoons. Large swarms of these dragonflies move through prominent clearings in the landscapes such as highways and railway tracks. It is not yet clear how and where they migrate.

### Feeding

Adult dragonflies are aerial predators and catch insects like mosquitoes, midges, butterflies, moths bees and odonates on flight (Fig.20). Most of the dragonflies are day flying but a few actively hunt during twilight hours. Darter dragonflies capture their prey by perching at a vantage-point and making short sallying flights and hawker dragonflies hunt by flying continuously. In this, they resemble insectivorous birds like flycatchers and swifts respectively. Large numbers of adults sometime congregate especially during dawn and dusk near tree canopies to feed on swarming insects. They feed in flight, using the legs to capture the prey and transfer

to 25-30 km per hour. The difference in flying abilities influences their dispersal and geographic distribution. It is generally observed that big and powerful fliers have wider geographic range than small and weak fliers do. Some weak fliers are dispersed by wind. For



Fig.19 Damselfly in flight (*River Helidor*)

it to the jaws. The legs are highly specialised for this purpose, particularly with regard to its position, relative length, articulation and complement of spines. Their vision is well developed as in butterflies and as far as modern Anisoptera are concerned, most of the head is made up of eyes.

## Reproduction

Sexually matured dragonflies return to breeding habitat from their foraging or roosting sites. Usually males mature earlier than females and reach the breeding habitat first. Mature males hold territory, but species may or may not show pronounced site fidelity. Resident males show aggressive behaviour towards conspecific males, which enter their

territory. Aggressive behaviour may be simple “wing warning” by perched males (Fig.21) and a display of the abdomen. More elaborate aggressive encounters occur in flight, progressing from mutual threat display to physical fighting.

Most odonates are sexually dimorphic when they mature. Newly emerged males and females are similarly coloured. Males acquire bright colouration as they become sexually mature.



Fig. 20 Damselfly (*Senegal Golden Dartlet*) feeding on newly emerged *Bush Dart*.

Colours and patterns on the wings and body may play an important role in territoriality and courtship. Courtship is more evident in damselflies than in dragonflies. It ranges from simple submissive posture by males towards approaching females to elaborate displays where the male flies towards an egg laying site and allows itself to be carried by the water current for a short distance. Competition over sexually receptive females is very intense among male odonates.

A receptive female adopts a characteristic posture towards a potential male and pairing follows immediately. The last abdominal segments of the male have claspers, which are used to hold the female by her thorax. The structure of



Fig. 21 Territorial display of male damselflies (*Stream Glory*)



Fig. 22 Mating of Dragonflies (*Green Marsh Hawk*)



Fig. 23 Mating of Damselflies (*Senegal Golden Dartlet*)

the female thorax is such that the male clasper fits exactly into it. This lock and key mechanism prevents mating across closely related species. During copulation or just before that, the male transfers his sperms into an accessory genital organ at the second abdominal segment (Fig. 22-23). This accessory genitalia is a complicated harpoon-shaped structure, which can be used to remove sperms from previous couplings before insemination. Multiple mating in both males and females is common among odonates.

### Egg laying

Egg laying commences immediately after copulation. In many cases, the male continues to hold the female and flies with her to an egg-laying site or just accompanies her. It is usually observed that territory holding males accompany females and non-territory holding males maintain physical contact

with the female while laying egg. Usually during this period the female is very vulnerable to the attack by other males. Non-mated males attack the mated pair and try to hijack the female. Some damselflies lay eggs in submerged plants. In such cases the hovering male anchors the egg-laying female (Fig.12).

### Longevity

Most of the records of longevity in nature refer only to the reproductive period. During this, most damselflies live up to 8 weeks and dragonflies up to 6 weeks. If maturation period is included, it may extend up to 7-9 and 8-10 weeks, respectively. It is known that aestivating spread wings (Lestidae) can live much longer as adults.

Dragonflies encounter a large number of predators

throughout their life. Fishes are important predators during the larval stage. Birds such as Hobby (*Falco subbuteo*), Bee-eaters (*Merops sp.*), Kingfishers, Herons



Fig. 25 Damselfly female (Golden Dartlet) infested with mites

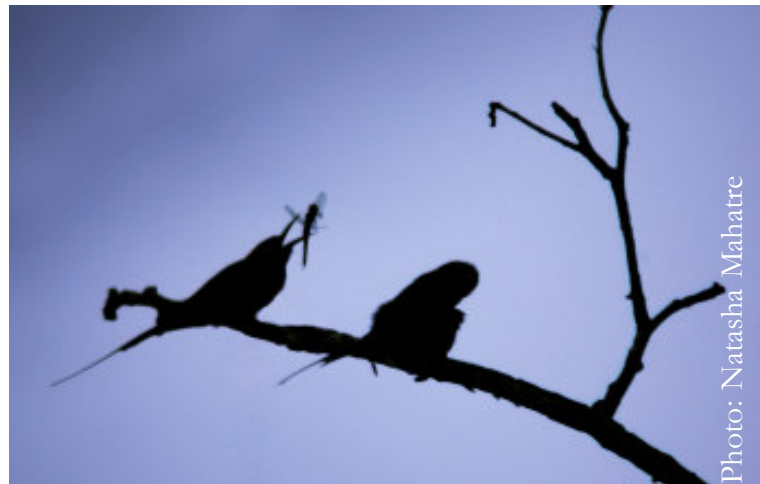


Fig. 24 Small Green Bee eater (*Merops orientalis*) feeding on a dragonfly

and Terns have been observed to feed on odonates (Fig. 24). Large dragonflies, robberflies (Asilidae) and spiders are important invertebrate predators. Small Hymenoptera belonging to the families *Mymaridae*, *Eulophidae* and *Trichogrammatidae* parasitise eggs of damselflies. Parasitizing females climb or swim beneath the water to search for the eggs in the

submerged plants. Many migrating species are intermediate hosts of avian trematode parasites like *Prosthogonimus*. During mass emergence of these

species, aquatic birds such as sandpipers, terns, gulls and herons feed on them. This predation forms an important link in the transfer metacercariae and cysts of the parasite.

Larval stages of water mite (Hydrachnidia) parasitise odonates. For example, *Arrenurus cupidator* is a common ectoparasite of coenagrionid damselflies. The mite larvae infest the final instar host larvae. The larvae briefly feed on the host larvae and when the adult damselfly emerges, the mite larvae get attached to the adult host (Fig.25).



Fig. 26 The Granite Ghost is very efficient in urban mosquito control

Mite larvae pierces the host body and starts feeding. The larvae detach only when the host comes back to water for egg laying. The detached mite larvae complete two more larval stages as predator before moulting into an adult.

### Human significance

Odonates, being predators both at larval and adult stages, play a significant role in the wetland ecosystem. Adult odonates feed on mosquitoes, blackflies and other blood-sucking flies and act as an important biocontrol agent of these harmful insects. In the urban areas of Thailand, larvae of the container breeding dragonfly, Granite ghost (*Bradinopyga geminata*) was successfully used to control *Aedes* mosquito, an important vector of the dengue fever (Fig. 26). Many species of odonates inhabiting in agro ecosystems play a crucial role controlling pest populations.

### Bio indicators

In addition to the direct role of predators in ecosystem, their value as indicators of quality of the biotope is now being increasingly recognised. For example, in South Africa it has been shown how species assemblages of dragonflies change with levels of human disturbance. Dragonflies found at undisturbed habitats with good riparian vegetation were specialists with narrow

distribution. On the other hand, species recorded at industrial land or urban areas with disturbed riparian vegetation were generalists with wide habitat preference and distribution. These studies also show that dragonflies are sensitive not only to the quality of the wetland but also to the major landscape changes, especially changes in the riparian zone. Recent studies on dragonfly ecology from Western Ghats indicate families like Bamboo tails, Reed tails, Glories, Torrent darts, Torrent Hawks and Club tails are good indicators of health of riverine ecosystem.



Fig.27 Presence of damselflies such as Nilgiri Torrent Dart indicates unpolluted hill streams.



Fig. 28 Damselflies such as Myristica Bamboo Tail is found only in highly threatened myristica swamps.

### Conservation

Though the Indian odonate fauna is well described in terms of adult taxonomy, their ecology is poorly known. Larval stages of only 76 Indian species are known and the full life history is documented for only 15 species. A good understanding of larval ecology is crucial for odonate conservation. The paucity of ecological information is a serious lacuna when designing any conservation measure. The impact of landscape changes going on since last fifty years or so in the peninsular India on dragonfly distribution and status is not known. This can be tackled only by fresh field surveys to know the threat status and distribution of many species. Future studies on dragonflies may be directed to have a comprehensive understanding of their ecology and their value as a biomonitoring tool. There is no comprehensive account of Indian odonates after Fraser's fauna volumes published during 1930's. Recent



assessment by IUCN Red Data Books (International Union for Conservation of Nature, 2004) lists *Burmagomphus sivalikensis*, *Cephalaeschna acutifrons* and *Epiophlebia laidlawi* as threatened Indian odonates. All the three species are restricted to North East India. However a large number of endemic odonates are threatened due to large scale habitat destruction. For example, Myristica Bambootail (Fig. 28) the monotypic damselfly of the Western Ghats is restricted to Myristica swamps of evergreen forests (Fig. 29). The swamps are very restricted geographically within the ghats. The swamps are being drained in an unprecedented scale for agriculture expansion, especially for the arecanut plantations. Draining of the swamps have caused irreversable damage to the breeding habitat of this species.



Photo:K.A.Subramanian

Fig. 29 A myristica swamp, the habitat of Myristica Bambootail

The case of Myristica Bambootail is only one example. About 67 species of peninsular Indian odonates are endemic. Most of these species are restricted to the riverine ecosystem. Large scale habitat alterations such as damming, channel diversion, sand mining and pollution is seriously threating the survival of these species. Long term conservation of odonates and other freshwater biota can only be assured through appropriate national level policy interventions and definite freshwater biodiversity conservation programmes.



Long legged Marsh Glider (*Trithemis pallidinervis*)

Photo:K.A.Subramanian

# STUDYING DRAGONFLIES AND DAMSELFLIES

## **Why study dragonflies and damselflies**

Dragonflies and damselflies are amongst the prominent and colourful insects in tropical landscapes. In addition to providing aesthetic pleasure, studying them could give us valuable insights about ecosystem health, especially of wetland. Being very specific about breeding habitat, odonates are sensitive indicators of the health of wetland and its landscape. Odonates are also very good subjects in study of behaviour, ecology and biogeography.

## **Where to watch**

Odonates are found in diverse habitat. However, their diversity and abundance vary with the habitat. Best place to see various odonate species and their behaviour is near freshwater bodies such as ponds, tanks, streams and rivers where there is good sunlight.

## **When to watch**

Best time to watch odonates is during midday. They are most active during this time. Some species are crepuscular or nocturnal. It is very difficult to locate and observe them in low light conditions. Many of our odonate species are seasonal and their emergence and breeding coincide with the monsoon. So most of our odonate species can be observed between May-November.

## **How to watch**

Most of the odonates can be observed at very close range. Flying odonates or odonates perched in inaccessible areas can be observed through binoculars. Due to their sensitive eye, odonates get easily disturbed with bright coloured objects. So it is better to wear dull coloured clothing and cap, especially when photographing.

## **Identifying odonates**

A large number of odonate species can be identified without collecting them. However, females and young adults are difficult to identify in the field. Most of the

damselflies can be collected by hand. For collecting dragonflies, a butterfly net with dark coloured clothing is the best. Odonates are very delicate insects and they get easily killed while handling, especially when they are held by abdomen or the thorax. So, while handling odonates avoid holding by abdomen or the thorax. The wings are relatively tough and odonates can be held by wings between fingers for a short time. A detailed sketch of the live insect with colour and patterns is very important for accurate identification. An example from field notes on *Euphaea dispar* is given in figure 31.

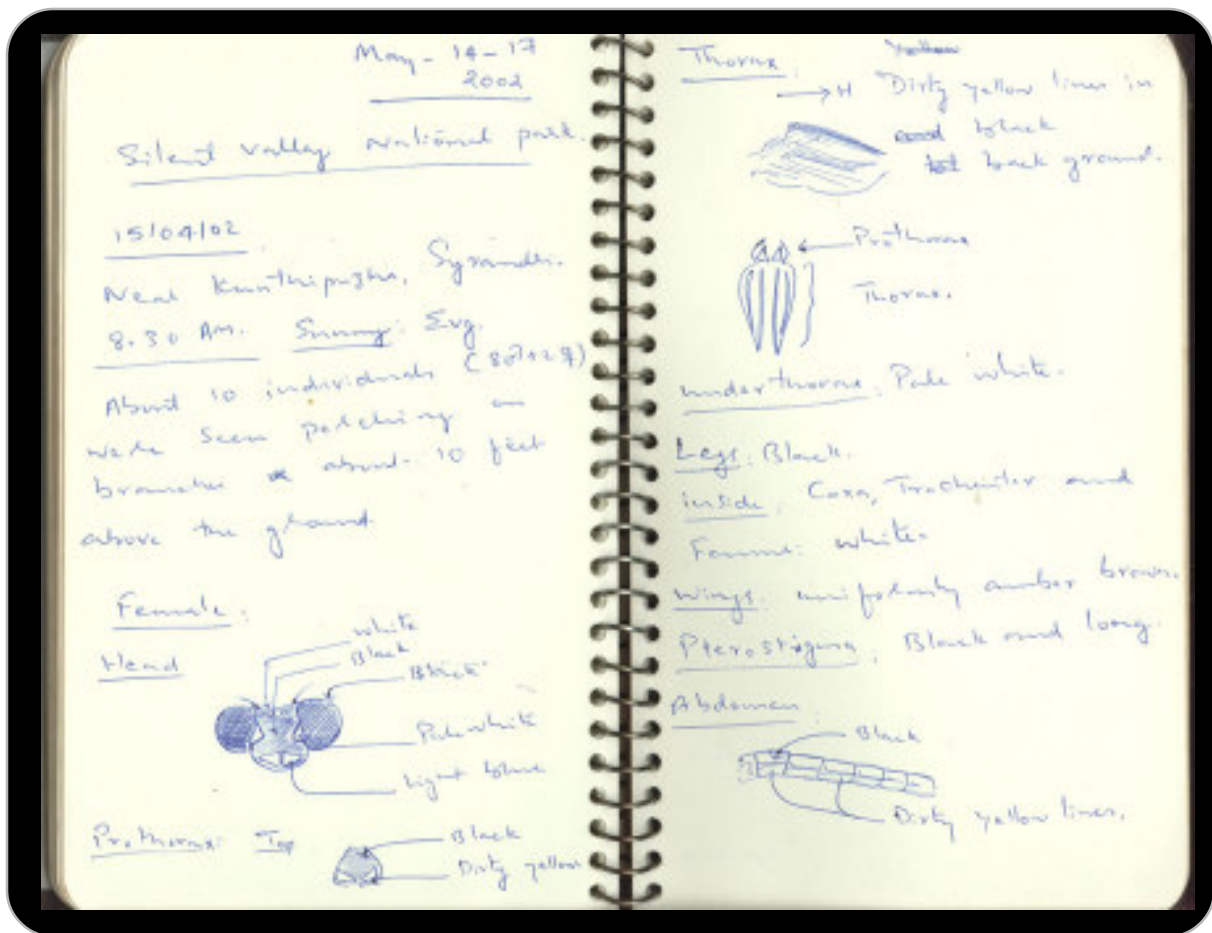
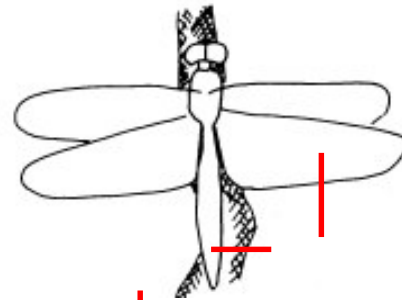


Fig.31. Sample of a field note book for recording information on odonate species

# FIELD KEY TO ADULT DRAGONFLIES AND DAMSELFLIES

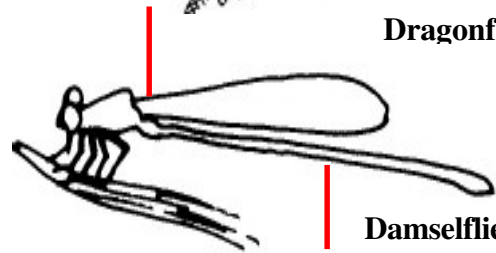
## KEY TO GROUPS (SUB ORDERS)

1. Hind wings broader than the forewings; abdomen stout; the wings are held perpendicular to the body.....**Dragonflies (Anisoptera)**.....I(**Page-36**).



**Dragonflies**

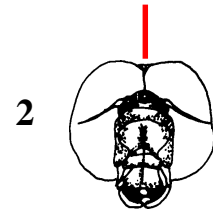
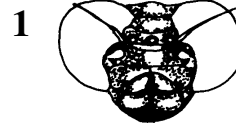
2. Fore and hind wings narrowed at base; similar in size and shape; abdomen slender; usually the wings are kept closed over the body.....**Damselflies (Zygoptera)**.....II(**Page-75**).



**Damselflies**

## I. KEY TO DRAGONFLY FAMILIES (ANISOPTERA)

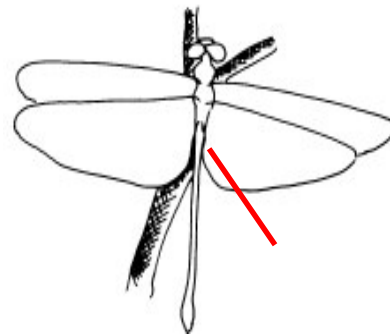
Eyes separated or meeting only at a point..... **1.**



Eyes broadly touch each other on face... ..**2.**

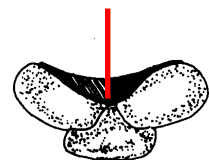
(1)

**1a.** Large sized dragonflies; black or dark brown marked with yellow; large eyes slightly separated or meeting at a point; cylindrical abdomen swollen at base.....



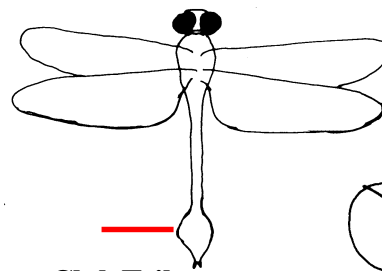
**Mountain Hawks**

**Mountain Hawks (Cordulegasteridae)** (**Page-46**).



**Head front view**

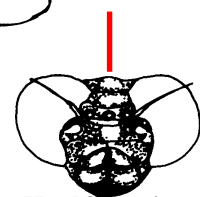
**1b.** Yellow or black dragonflies, marked with yellow or green; never iridescent; eyes well separated; wings moderately broad and never coloured; abdomen often bulbous at the end.....**Club Tails (Gomphidae)** (**Page-37**).



**Club Tails**

(2)

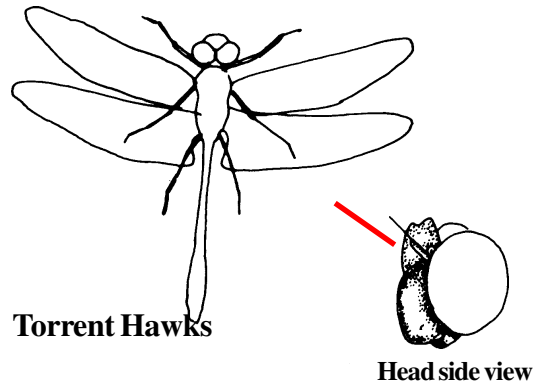
Bulbous eyes with a wavy projection at the middle of posterior border..... **2a.**



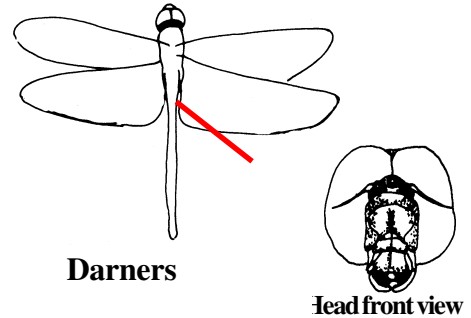
**Head front view**

Eyes without a wavy projection at the middle of posterior border..... **2b.**

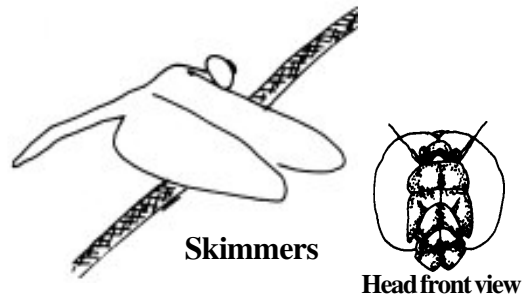
**2a.** Thorax coloured iridescent green or blue marked with bright yellow; abdomen cylindrical or compressed in females; frequents forested streams.....  
**Torrent Hawks (Cordulidae).**



**2b.1.** Large sized dragonflies with non-iridescent colour; wings long and moderately broad; abdomen as long as or longer than the wings, tumid at base, often constricted at 3<sup>rd</sup> segment; found in diverse habitats; often crepuscular .....  
**Darners (Aeshnidae) (Page-40).**



**2b.2.** Brightly coloured dragonflies, rarely iridescent; sexes are highly dimorphic; abdomen variable in shape; found in diverse habitats.....  
**Skimmers (Libellulidae) (Page-48).**



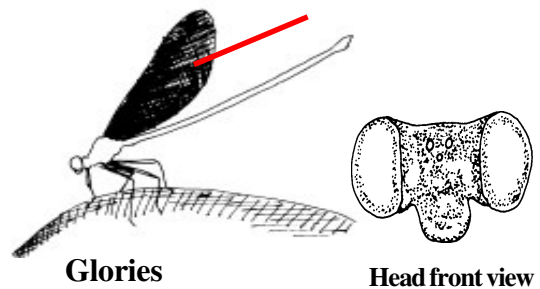
**II. KEY TO DAMSELFLY FAMILIES (ZYGOPTERA)**

Damselflies with wings and body iridescent or non-iridescent colouration in males; restricted to forested streams..... **1.**

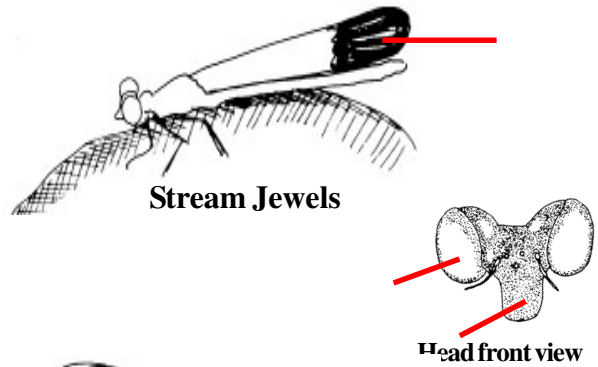
Damselflies with wings and body non-iridescent colouration in males; found in diverse aquatic habitats.....**2.**

**(1) A. Body or wings with iridescent colouration or markings**

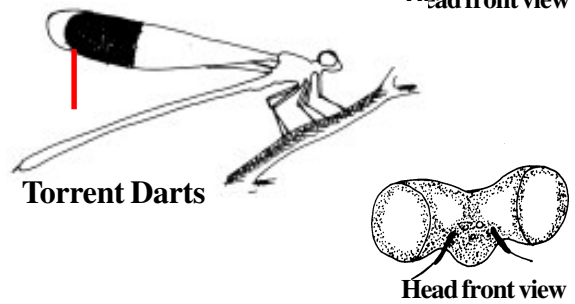
**(1) a.** Large iridescent green damselflies with broad wings; wings are iridescent green or with blue sheen; often tipped with black .....**Glories (Calopterygidae) (Page-99).**



(1) b. Small damselflies with large bulbous eyes; mouth parts project like a snout in front of face; abdomen shorter than wings; opaque hind wings of males with iridescent streaks.....**Stream Jewels (Chlorocyphidae) (Page-103).**

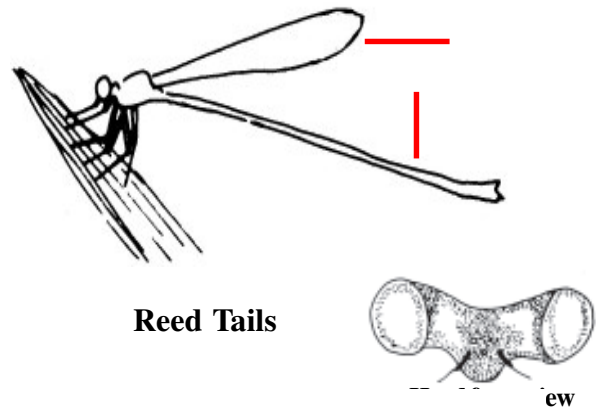


(1) c. Large damselflies; fore wings are broad and taper towards the tip; hind wing short and rounded in some; wings uniformly amber coloured; where hind wings are shorter than the fore wings, they tipped with deep blue on underside and iridescent red on the upper side.....**Torrent Darts (Euphaeidae) (Page-106).**

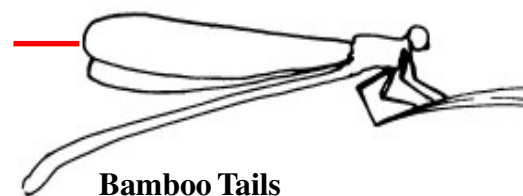


**B. Body or wings without iridescent coloration or markings**

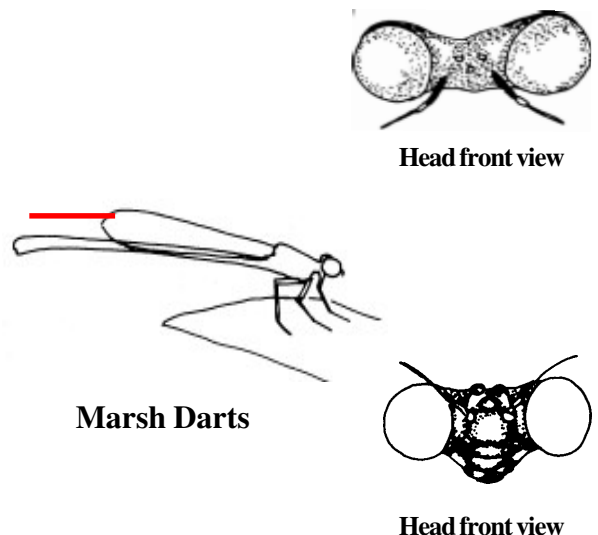
(1) d. Black or brown damselflies with white or rarely reddish or blue markings; narrow wings abruptly bend at the apex; abdomen about twice the size of hind wing .....**Reedtails (Platystictidae) (Page-89).**



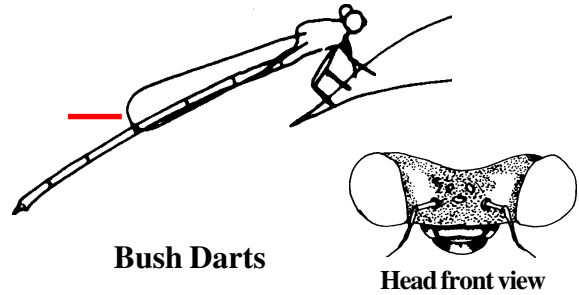
(1) e. Damselflies usually coloured with black with blue markings, rarely with red, yellow or iridescent; wings pointed or rounded at apex, rarely tipped or barred with black; abdomen never twice the length of the wing .....**Bambootails (Protoneuridae) (Page-91).**



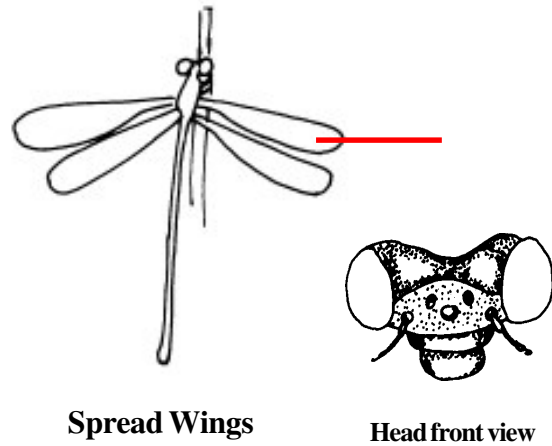
(2) a. Damselflies with non-iridescent or rarely iridescent body; wings narrow and rounded at apex; transparent wings are rarely coloured; found in diverse aquatic habitats.....**Marsh Darts (Coenagrionidae) (Page-76).**



(2) **b.** Black damselflies marked with blue, red, yellow or rarely iridescent; narrow transparent wings are rounded at the apex; abdomen moderately long and never twice the length of the hind wing; found in bushes near aquatic habitats.....**Bush Darts (Platycenemididae) (Page-86).**



(2) **c.** Damselflies with iridescent or non iridescent markings on head, body and abdomen; transparent wings nearly kept wide open while resting; found in diverse habitats .....**Spreadwings (Lestidae) (Page-96).**



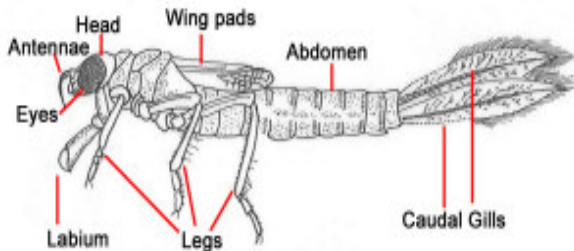
Size Categories of Dragonflies and Damselflies	
Category	Length of Abdomen (mm)
1. Small	10-25mm
2. Medium	26-40mm
3. Large	>40mm

Size range of Dragonfly and Damselfly Families	
Family	Category
<b>Dragonflies</b>	
1. Clubtails	Small to Large
2. Mountain Hawks	Large
3. Darners	Large
4. Torrent Hawks	Medium to Large
5. Skimmers	Small to Large
<b>Damselflies</b>	
1. Glories	Large
2. Stream Jewels	Small
3. Torrent Darts	Large
4. Reedtails	Medium to Large
5. Bambootails	Small to Large
6. Marsh Darts	Small to Medium
7. Bush Darts	Medium
8. Spreadwings	Small to Medium

# KEY TO THE LARVAE OF DRAGONFLIES AND DAMSELFLIES

**1.**Abdomen short and stout, caudal gills absent and terminating in five short spine-like processes.....**Dragonflies (Anisoptera)-I**

**2.**Abdomen long and slender and terminating in three (rarely two) leaf or sac like caudal gills.....**Damselflies(Zygoptera)-II**



**Body Parts of Damselfly Larva**

**Dragonfly Larva**



**Damselfly Larva**



**Labium Flat**



**Labium Scoop Shaped**

## I. Dragonflies (Anisoptera)

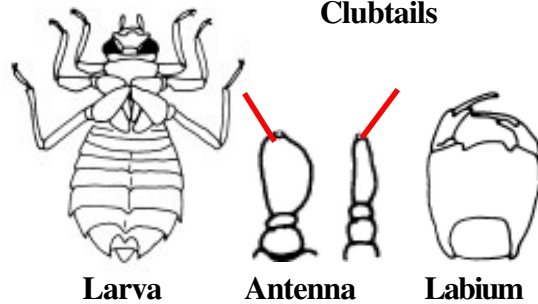
Prementum and palpal lobes of labium flat.....**1**

Prementum and palpal lobes of labium scoop or spoon shaped.....**2**

**1a.**Antennae four-segmented, 3rd segment enlarged and fourth vestigial.....**Clubtails (Gomphidae)**

**1b.**Antennae six or seven segmented and filamentous.....**Darners (Aeshnidae)**

**Clubtails**

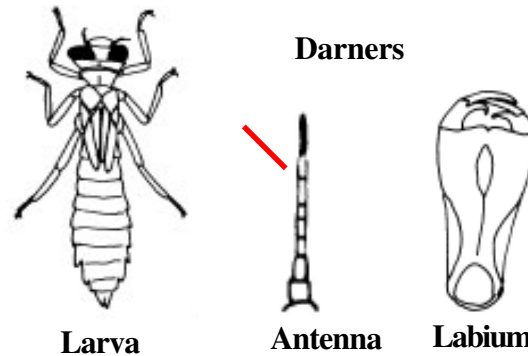


**Larva**

**Antenna**

**Labium**

**Darners**



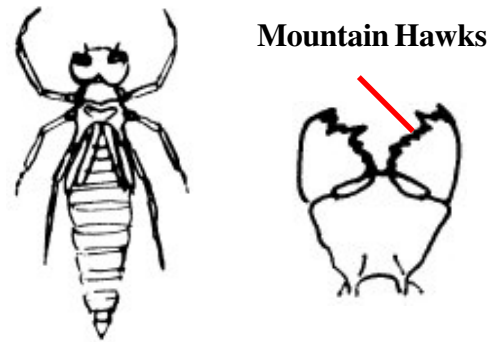
**Larva**

**Antenna**

**Labium**



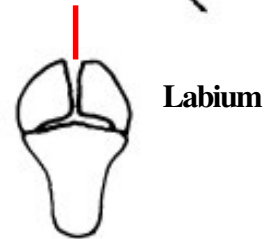
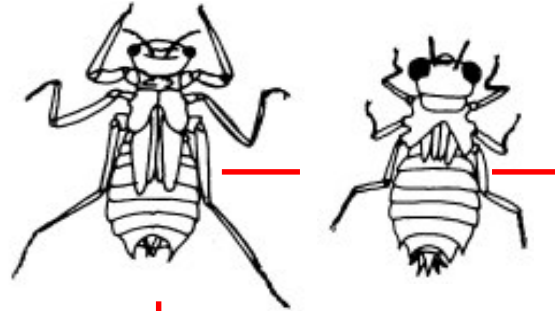
**2a.**Body elongate and covered with bristles or tufts of setae, labium with large irregular teeth.....**Mountain Hawks (Cordulegasterdiae)**



**Torrent Hawks**

**Skimmers**

**2b.**Hind femur does not extend beyond abdominal segment VIII, labium with small teeth.....**Torrent Hawks and Skimmers (Corduliidae and Libellulidae)**



**Labium**

**II. Damselflies (Zygoptera)**

Two forceps like caudal gills.....1

Three leaf, blade or sac like caudal gills.....2

**Caudal Gills of Damselfly Larva**



**Stream Jewels**

**Labium**

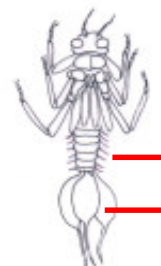
**1a.**Two forceps like caudal gills, which are triangular in cross section.....**Stream Jewels (Chlorocyphidae)**



**2a.**Filamentous gills on the underside of abdominal segments II-VIII, caudal gills are sac like.....**Torrent Darts (Euphaeidae)**

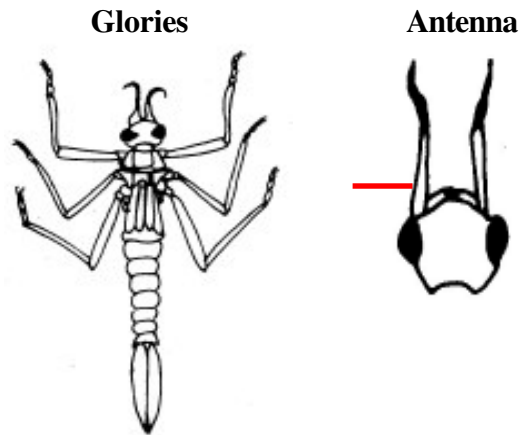
**Torrent Darts**

**Labium**



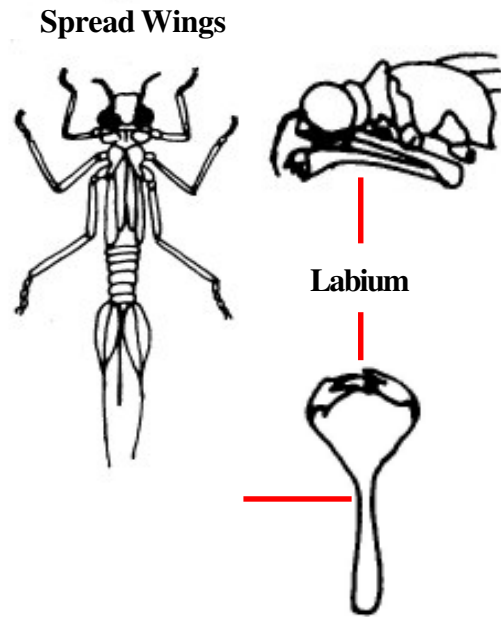
Without filamentous gills on abdominal segments II-VIII.....3

**3a.**First antennal segment longer than the combined length of other segments; body slender and long, caudal gills blade like with a distinct dorsal ridge.....**Glories(Calopterygidae)**



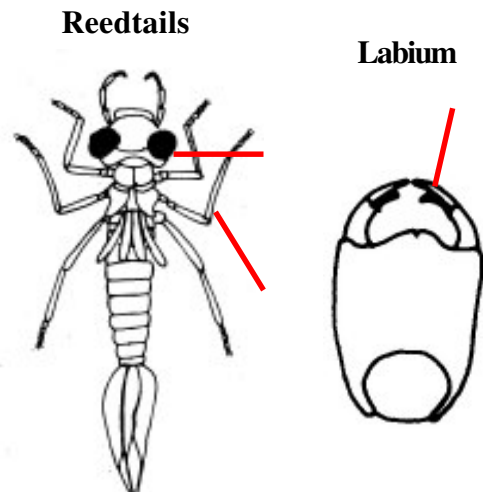
First antennal segment similar to other segments.....4

**4a.**Labium distinctly spoon shaped and strongly tapered posteriorly with large sharp teeth .....**Spread Wings ( Lestidae)**



Labium quadrate or more or less triangular in shape, but not spoon shaped; with movable hooks or spines at the tip.....5

**5a.**Pale and lanky larvae with large bulbous eyes, labium with single spine and one movable hook.....**Reedtails (Platystictidae)**



**5b.** Gills clearly divided into a thickened dark proximal part and a thin, paler distal part.....**Bambootails (Protoneuridae)**

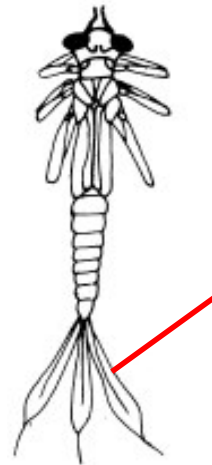
**Bambootails**



Gills not divided into proximal and distal parts.....**6**

**6a.** Caudal gills long, about same length as the abdomen, apices pointed or tapering, third segment of antenna longer than the second .....**Bush Darts (Platycnemididae)**

**Bush Darts**



**6b.** Caudal gills shorter than the abdomen, with rounded apices third segment of antenna shorter than second....**Marsh Darts (Coenagrionidae)**

**Marsh Darts**



**Head and Antenna**



**Labium**