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## FIELD ECOLOGY, ZOOGEOGRAPHY AND TAXONOMY OF THE ODONATA OF WESTERN HIMALAYA, INDIA

By
ARUN KUMAR
AND
MAHABIR PRASAD

Issued by the Director
Zoological Survey of India, Calcutta

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*Northern Regional Station, Zoological Survey of India, Dehra Dun*

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# FIELD ECOLOGY, ZOOGEOGRAPHY AND TAXONOMY OF THE ODONATA OF WESTERN HIMALAYA, INDIA

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(With 13 Text figures, 1 Plate and 3 Tables)

## INTRODUCTION

Within the Indian sub-region, the Odonata Fauna of Himalaya has so far been studied most extensively. In about the last two decades a number of odonatologists have studied the dragonflies of the Himalaya (*cf.* Kiauta, 1975), consequent to which about 225 species, out of approximately 600 Indian species of Odonata, have been recorded from the Himalayan region alone (*i.e.*, Western, Central and Eastern Himalaya). These include a considerable number of new species and a large number of new records made from this region since the publication of *Fauna of British India, Odonata* (1-3) (1933-1936).

Following the *Fauna of British India*, Odonata (1-3) (Fraser, 1933-1936); Bhasin (1953), Kumar (1970, 1971a, 1971b, 1971c, 1972a, 1972b, 1972c, 1973a, 1973b. 1973c, 1973d, 1977, in press, a series of papers), Kumar & Juneja (1976), Kumar & Prasad (1976, 1977a, 1977b, 1977c, 1977d, 1977e, 1977f, 1978, in press, a series of papers), Mani *et al.* (1956), Prasad (1976, in press), Prasad & Kumar (1977, 1978a, 1978b, in press), Prasad & Singh, (1976), Sahni (1964a, 1964b, 1965a, 1965b, 1971, 1972), Sangal & Kumar (1970a, 1970b); Singh & Prasad (1974, 1975, 1976a, 1976b, 1977); Singh, (1953, 1963), Singh & Baijal (1954), Singh *et al.* (1955), besides others (*cf.* bibliography at the end of text), have made valuable contributions to the faunal studies, bionomics and larval taxonomy of the Odonata from Western Himalaya. In addition, the present authors themselves have been engaged on the studies of the Odonata fauna of Western Himalaya since about a decade and have been able to made and analyse

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collections, made by us and by various survey parties of Zoological Survey of India, from througout Himachal Pradesh (12 districts) and all the hill areas (8 districts) of U. P. Himalaya. Collections have been made extensively from a large number of localities and biotopes and upto the maximum altitude of 3, 500 m in Kinnaur and Lahaulspiti districts of Himachal Pradesh. Besides, one of us (A. K.) has chiefly been engaged on the studies on larvae of Odonata of Western Himalaya. Consequent to the above studies the Odonata fauna of Western Himalaya has been almost doubled and is now quite well known.

However, all the above references are widely scattered and hence the rich wealth of information on the Odonata of Western Himalaya is neither easily accessible nor uptodate. In the present paper, therefore, an endeavour has been made to bring together all the known, published or otherwise, information on the Odonata of Western Himalaya, in the form of an annotated check-list. It follows the recent widely accepted classification of Fraser (1957), and the recent nomenclature. Under each species, which is arranged in presently followed systematic order, is cited the original reference, followed by the references pertaining to the Western Himalaya (in chronological order after Fraser (1933-36) (Sub. Faunistics, Taxonomy (larva & adult), life history, ecology, ethology, etc ); along with this is also given the district-wise distribution of the species throughout the western Himalaya, viz. 8 hill districts of Uttar Pradesh (U. P.) ; 12 districts of Himachal Pradesh (H. P.) and Kashmir Valley (J. & K.) ; notes have also been appended, where possible, for the first time on the field ecology as recorded by the authors. These briefly include the adult's flight period, *i. e.*, months in which the adults are generally present at the larval biotope(s), oviposition period, emergence period, larval biotope(s), altitudinal range in Western Himalaya and adult behaviour. This has chiefly been included with a view to facilitating the adult and larval studies in proper season and place in Western Himalaya and for general comparison with the phenology of the species from outside the Western Himalayan range. An attempt has also been made to supplement the identification key by Fraser (1933-36) for Indian Odonata in *Fauna of British India*, Odonata (1-3), by incorporating a large number of species which have been described from Western Himalaya subsequent to the above publication, and to provide for the first time an exclusive and uptodate identification key for the

Odonata of Western Himalaya. The key has been based on the morphological characters of males ; and also photographs of male wings of a large number of species (90) from the region have been given for the first time. It is hoped that an uptodate key for the Odonata of Western Himalaya would be of great use to any student of Odonata in the region ; the photographs of male wings should further facilitate quick identification in the field, since the wings (colouration and structure) are a very useful taxonomic character in Odonata at all levels of classification.

Zoogeography of Odonata species of Western Himalaya has been discussed briefly. Zoogeographical distribution of all the 78 genera occuring in Western Himalaya has been given in tabular from, and Zoogeographical distribution is also given in the form of a table. The species occuring in Western Himalaya have been assigned to different zoogeographical groups and the possible distributional patterns of the species have been discussed. Hitherto no attempt has been made to study this important aspect of Indian Odonata Fauna.

The term *"Western Himalaya"* used in the present study is for the Himalaya lying in Jammu & Kashmir, Himachal Pradesh, and Kumaon and Garhwal ranges of Uttar Pradesh (Dey, 1974). Nearly 20 thousand identified specimens of approximately 100 species, collected by the authors from various localities in Western Himalaya, the data of which eventually formed the basis of this and other papers by them, are present in the Northern Regional Station, Dehra Dun (U. P.), and High Altitude Zoology Field Station, Solan (H. P.), of Zoological Survey of India.

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## GEOGRAPHICAL FEATURES, DIVISIONS AND CLIMATE OF WESTERN HIMALAYA

The Himalaya extends between latitude 27° and 36°N. and longitude 70° and 96°E. ; it is approximately 2200 km. long and its total width varies between 140-400 km. The ranges of Himalaya fall under two major groups, *viz.*, the *Cis-Himalayan* and the *Trans-Himalayan*. The former group of ranges lies South of the Great Himalaya (the main range) and comprises the Siwalik Ranges and the lesser Himalayan Ranges. The Trans-Himalayan ranges lie north of the main range and includes Zaskar, Ladak and Karakoram ranges. The Siwalik Range separate the Himalaya proper from the Indo-Gangetic plains and is in reality the Southern border-range of the Himalayan System (Mani, 1974).

The major portion of Western Himalayan Range lies in Jammu & Kashmir (31-36°N. lat. ; 72-80°E. long.), Himachal Pradesh (31°-30°N. lat., 77°E. long.), and Garhwal and Kumaon Hills in Uttar Pradesh (28°-30°N. lat., 73°-77°E. long.). Physically the Himalayan range is of intricate nature and diverse character and in places highly deformed or in the form of flat alluvial Valleys as in Kashmir. Generally it is rugged and deeply dissected by rivers, and eroded by glaciers exposing all kinds of rocks.

Kashmir, which lies on the Southern Flank of the main Himalaya and is walled by Pir Punjal Range with its open or happy Valley, is famous for its beauty since Moghual times. Himachal Pradesh comprises montaineous terrain and is interspersed with a large number of stream and rivers (R. Sutlej, Beas, Chenab, Ravi, Spiti and Chandra-Bhaga). A northern extension of U. P. includes a considerable sector of Western Himalaya, which includes the numerous peaks like Nanda Devi, Chaukhamba, Trisul, and Kamst, etc. Among these mountains rise most of the head streams of R. Jamuna and Ganga.

The Himalaya obstruct the moisture-laden winds from the south, causing them to shed their moisture as copious rainfall along the

submountane areas, north of Indo-Gangetic plains, and as snowfall on the mountains further north. This great mountain barries is also equally effective in protecting India from the direct invasion of extremely cold winds from the Central Asia *North temperate regions* (Ramdas, 1974, in Mani *et al.*, 1974). Independently of the enormous variety of relief the altitude of the mountains also is sufficient to cause great modification in climate.

The mean winter temperature at 2200 mts. is 44°F (7°c) and the summer mean about 65°F (approx. 18°c), but in the valley a temperature of 90° to 100°F (32° to 37°c) may be felt during the day in May and June. Rainfall is related to the monsoon rainfall of India (from June to September) and is on the average about 2,000 mm/annum in most of the Western Himalaya, 85% of which falls in the months June, July, August and September, during the period of S. W. Monsoon.

## BRIEF DESCRIPTION OF TYPICAL ODONATA BIOTOPES IN WESTERN HIMALAYA

Dragonflies are true amphibiotic insects ; eggs and larvae are aquatic while the adults are aerial in habits. Their aquatic stages are found in almost all types of waters—be they permanent or temporary. Spatial and seasonal distribution of adults is determined to a large extent on the type of the aquatic larval habitat, and generally the adults are restricted in their distribution around the aquatic habitats. An attempt is being made here to give brief descriptions of typical aquatic odonata biotopes in Western Himalaya along with a general list of dragonflies (genera) which might be found around them.

Aquatic habitats in the Western Himalaya may be classified into two groups :

1 Permanent (Perennial) aquatic habitats,

2. Temporary (Seasonal) aquatic habitats,

### 1 *Permanent (Perennial) aquatic habitats :*

There are a number of permanent habitats in Western Himalaya in the form of rivers, torrential hill streams in hilly terrain, slow running marshy streams in flatter areas of the valleys, fresh water lakes and perennial ponds at the lower altitudes of the Himalayas.

If we traval along any hill stream in the Himalaya from North to South-East or South-West, we find that these streams in their upper reaches are usually isolated by steep sided hills, and the gradient is high. The supply of water is permanent and its flow is very swift (about 2m/sec) ; the water has low and steady temperature and contains sufficient oxygen. The pH fluctuate little (remain at about 9.5). Though the gradient is very steep, the bed is stable because large stones and boulders are jammed and form the floor of the channel which the water has carved through the rocks. The streams also have a number of rocky pools which are formed due to accumulation of water in between the boulders. Submerged aquatic vegetation is scarce. Common dragonflies around these biotopes are of the genera *Drepanosticta Laid.*, *Calicnemia* Starand, *Coeliccia* Kirby, *Bayadera* Selys, *Anisopleura* Selys, *Anisogomphus* Selys, *Lamelligomphus* Fraser, *Gynacanthaeschna* Fraser and *Zygonyx* Selys-Hagen.

As we move to lower altitudes or in flatter valleys the nature of streams changes considerably. The gradient becomes less, the adjacent area is open, *i. e.*, without steep hills. The climate becomes warmer and the temperature of water varies appreciably during the day and throughout the year with surrounding atmospheric temperature. The velocity of current becomes less (30 cm to 100 cm/sec.) and it may vary greatly even in a short stretch of these streams. The bed is stable consisting of small boulders, stones, pebbles, gravel and sand. It can be described as has been by Percival and Whitehead (*vide* Macan, 1963), as a *"cemented"* bottom consisting of large stones embeded in smaller stones and gravel in such a way that even the severest spate causes little alteration. These streams are about 5-8m wide, with a depth of water about 30-50 cm, except in the monsoons when it floods heavily. Submerged and bank vegetation is more. Common dragonflies around these biotopes are of the genera *Caconeura* Kirby, *Disparoneura* Selys, *Megalestes* Selys, *Rhinocypha* Rambur, *Libellago* Selys, *Bayadera* Selys, *Neurobasis* Selys, *Onychogomphus* Selys, *Nepogomphus* Fraser, *Anormogomphus* Selys, *Burmagomphus* Williamson, *Anax* Leach, *Macromia* Rambur, *Orthetrum* Newman, *Crocothemis* Brauer, *Sympetrum* Newman and *Trithemis* Brauer.

In the region which is comparatively plains or level in the heart of the Valleys, there are a number of smaller slow running streams

also. These streams are generally distributaries of larger rivers or streams and pass through the grassy area. These streams forms a net work of distributaries which generally rejoin the main stream. Though these distributaries or springs are perennial, a number of them still dry up in the summer. The water flow in these streams is slow (20 cm to 50 cm/sec.) and these have plenty of aquatic vegetation. There the bottom is muddy and contains a lot of debris and decaying leaves. There pH is low (between 8.2 to 9.0) and the water temperature quickly changes with the atmospheric temperature. These streams hold a rich population of Odonata and collection could be made from them round the year. Common dragonflies around these biotopes belong to genera *Copera* Kirby, *Pseudagrion* Selys, *Ceriagrion* Selys, *Ischnura* Charp., *Enallagma* Charp, *Rhodischnura* Laid., *Agriocnemis* (Selys), *Ceylonclestes* Kennedy, *Neurobasis* Selys, *Cordulegaster* Leach, *Tetrathemis* Leach, *Potamarcha* Rambur, *Orthetrum* Newman, *Palpopleura* Rambur, *Brachydiplax* Brauer, *Crocothemis* Brauer and *Trithemis* Brauer.

Within the forest line of Western Himalaya there are present a number of fresh water lakes. Odonata Fauna of at least some of these lakes, *viz.*, those of dist. Nainital (U. P. Himalaya) and Renuka Lake (Distt. Sirmaur, H. P.) has been studied sufficiently. These lakes have a rich composition of dragonflies, and common genera present around them are *Copara* Kirby, *Pseudagrion* Selys, *Ceriagrion* Selys, *Ischnura* Charp., *Aeshna* (Fabr.) *Anax* Leach, *Orthetrum* Newman, *Acisoma* Ramb., *Crocothemis* Brauer, *Diplacodes* Kirby, *Neurothemis* Brauer, *Trithemis* Brauer, *Tramea* (Hagen), and *Pantala* (Hagen).

In the foot-hills and lower range of Western Himalaya are also present a large number of perennial ponds, these are smaller in size than above lakes and have lot of vegetation and stagnant turbid water. However, these ponds have a rich assemblage of Odonata species around them almost throughout the year. The common genera are *Copera* Kirby, *Pseudagrion* Selys, *Ceriagrion* Selys, *Ischnura* Charp., *Rhodischnura* Laid., *Enallagma* Charp., *Agriocnemis* Selys, *Ictinogomphus* Ramb., *Anax* Leach, *Potamarcha* Karsch, *Orthetrum* Newman, *Acisoma* Rambur, *Crocothemis* Brauer, *Brachythemis* Brauer, *Diplacodes* Kirby, *Neurothemis* Brauer, *Trithmis* Brauer, *Tholymis* Hagen *Pantala* Hagen and *Tramea* Hagen.

2. *Temporary (Seasonal) aquatic habitats*

During monsoons the whole range of foot hills of Western Himalaya get dotted with seasonal wousoon ponds, which are in existence only for 3-4 months, *i. e.*, from June-July to September-October. These ponds, which might be 2-20 ms in diameter and few cm. to about a metre or more in depth, are formed as result of the filling of monsoon rain's water in the hollow depressions. They are spatially very restricted, and the water is warm and stagnant and form peculiar Odonata biotopes.

Because of their seasonal existance for about 3 months these ponds could hold only one larval generation in a year. Nevertheless the above ponds hold a very rich population of Odonata, besides other aquatic insects. The annual emergence from these ponds occur towards the decline of monsoons in September-October. Common dragonflies around these biotopes belong to genera *Pseudagrion* Selys, *Ceriagrion* Selys, *Ischnura* Charp., *Agriocnemis* Selys, *Lestes* Leach, *Anax* Leach, *Potam rcha* Karsch, *Orthetrum* Newman, *Crocothemis* Brauer, *Trithemis* Brauer, *Tholymis* Hagen, *Pantala* Hagen, and *Tramea* Hagen.

In addition, a number of dragonflies are common over the paddy fields during the summer and monsoon seasons. Some common genera are *Agriocnemis* Selys, *Lestes* Leach, *Orthetrum* Newman, *Crocothemis* Brauer, *Zygonyx* Selys-Hagen, and *Pantala* Hagen ; while a few species belonging to genera *Pseudagrion* Selys, *Bradinopyga* Kirby and *Zyxmma* Rambur are common over the ornamental and cemented garden tanks in the foot hills.

## PHENOLOGY

Seasonal distribution and larval development of some western Himalaya dragonflies has been discussed in some details by Kumar (1971b, 1972d, 1977a and in press), which gives us broad outlines about the phenology of dragonflies in this area.

Observations seem to indicate that in species developing in streams the larval period is prolonged for 5-6 months, *i. e.*, September-October to May-June. While adults are on wings for less than 3-4 months, *i. e.*, June to September-October (Univoltine). Emergence occurs from April to June and the oviposition takes place towards the decline of monsoons in September-October. On the other hand the larval period of the species breeding in perennial ponds

is shortend to about 2-4 months with a number of larval broods (3) in a year (Multi-voltine). In these species there seems to be a over-lapping of broods and apparently they seems to reproduce almost round the year. Emergence is also scattered, though concentrates in March-April, June-July, and September-October in a given year. In species which breed in seasonal monsoon ponds the larval period is again shortened to about 2-4 months, *i. e.*, June-July to September-October, while their adults life span is prolonged to 8-9 months, *i. e.*, September-October to following June-July (Univoltine).

From the above studies it is indicated that —

i) The duration and seasonal occurrence of larval stage of a species, which in its turn influence the phenology of adults, depends on the aquatic larval habitat used,

ii) majority of species emerge into imagos either before the start of the monsoons or after its decline, depending upon whether they are developing in perennial habitats or in ephemeral seasonal monsoon ponds.

## Key to the Odonata of Western Himalaya

### *Key to the suborders of Odonata*

1. Wings never petiolate, in both fore and hind wings the discoidal cell is subdivided into a triangle plus supratriangle ... ... ... ... ... ... ... ... *Anisoptera* [Text-fig. 1B-D & Plate I fig. 2]

— Wings petiolate, subpetiolate or non-petiolate ; discoidal cell in both wings simple, entire or traversed by nervures, closely similar in fore and hind wings ... ... ... ... *Zygoptera* [Text-fig 1A & Plate I, fig. 1]

### *Key to the superfamilies of Zygoptera*

1. Only 2 (exceptionally 3) antenodals nervures present ; postnodals in strict alignment with the veins below ; anal vein fused at base with the posterior of wing ... ... ... ... ... ... ... 2

— Never less than 5 antenodals present, postnodals not in line with the veins below them ; anal vein separate from posterior border of wing from its base ... ... ... ... ... ... ... *Agrioidea*

2. The veins IRiii and Riv+v begining much nearer to the nodus than to arculus ; genital hamules of male quadrate ... ... *Coenagrioidea*

— The veins IRiii and Riv+v begining much nearer to the arculus than to the nodus ; genital hamules of male elongate ... ... *Lestinoidea*

Key to the families of *Coenagrioidea*

1. The anal vein absent or greatly reduced ; cup varying from a vein of normal length to only 1 cell or so long ... ... ... ... 2

— The anal vein and cup of normal length ... ... ... 3

2. A short cross-vein at the base of wings joining cup with the border of wing proximal to the narmal cross-vein Ac ; discoidal cell elongate, obtuse apically ; subdiscoidal cell contiguous with posterior border of wing or greatly shortened and more or less triangular in shape ; pterostigma subquadrate .. *Platystictidae*

— No accessory cross-vein in the cubito-anal space at base of wing ; discoida cell elongate, anterior and posterior sides nearly equal : subdiscoidal cell more or less contiguous with posterior border of wing ... *Protoneuridae*

3. Discoidal cell elongate, anterior and posterior sides subequal, apex rather obtuse ; anal vein separating from wing border proximal to ac ; which latter lies about midway between the two antenodals ; veins MA, and IRiii running straight for the greater part of their length, only zigzagged apically or not at all ... ... ... ... ... *Platycnemididae*

— Discoidal cell short, anterior side considerably shorter than the posterior ; anal vein separating from wing border at various levels ; either proximal to, at or distal to the vein Ac, veins MA and IRiii markedly zigzagged for the greater part of their length ... ... ... ... *Coenagriidae*

Key to the families of *Lestinoidea*

1. Cuii at its origin from discoidal cell strongly arched towards the costa ; moderately large species ... ... ... *Chlorolestidae*

— Cuii at its origin only slightly arched towards the costa ; rather small species ... ... ... ... ... ... ... *Lestidae*

Key to the families of *Agrioidea*

1. The primary antenodals easily identified from the secondaries ; base of discoidal cell connected to Radius by the arculus ... ... ... 2

— The primary antenodals indistinguishable from the secondaries, base of discoidal cell connected to Radius by the arculus ... ... ... 3

2. Clypeus produced in the form of a prominent uptilted snout ; tibiae of males often dilated or brightly coloured, no basal antenodals present *Chlorocyphidae*

3. The vein Rii+iii not fused with Ri shortly after its origin ; discoidal cell short, entire or traversed by very few veins, 1st lateral thoracic suture incomplete ... ... ... ... ... ... *Epallagidae*

— The vein Rii+iii fused with Ri near its origin, discoidal cell longer and traversed by many veins, 1st lateral thoracic suture complete .. *Calopterygidae*

Key to the superfamilies of the *Anisoptera*

1. Eyes meeting only at a point, discoidal cells of fore and hind wings equal in

size and shape, or if dissimilar, than the median space traversed by one or more veins ... *Cordulegasteroidea* Family *Cordulegasteridae*

— Eyes widely separated or more or less broadly confluent on vertex ... 2

2. Discoidal cells approximately of the same size and shape in fore-and hind-wings and situated equally distant from the arc ; costal and subcostal antenodal nervures not coinciding with the two robust primary antenodals present ; middle lobe of labium large and fissured ... ... *Aeshnoidea*

— Discoidal cells differing in size and shape in fore and hind wings, that of fore wing situated far distal of the arc ; middle lobe of labium very small, not fissured, broadly overlapped by the lateral lobes ; costal and subcostal antenodal nervure coinciding, the robust primary antenodals absent ... ... ... ... ... ... ... *Libelluloidea*

Key to the families of *Aeshnoidea*

1. Eyes broadly confluent above ... ... ... *Aeshnidae*

— Eyes separated ; ovipositor absent ... ... ... *Gomphidae*

Key to the families of *Libelluloidea*

1. Tibiae of males with an elongate lamina-shaped keel on the flexor surface : base of hind wing in the male more or less angulated or notched (save in genera *Hemicordulia* and *Procordulia*) ; oreillets present on the sides of abdominal segment 2 ; body usually coloured metallic ; primary antenodals present but some what atrophied and inconspicuous, antenodals in hind wing all of the same thickness, basal space always free or cross vein *Corduliidae*

— Tibae of males without keels, base of hindwing rounded in both sexes, oreillets absent ; body rarely matallic ... ... ... 2

2. Sectors of arculus diverging from their origin, distal antenodal of fore wings always complete, antenodals widely spaced, few in number, usually only 6 or 7 in fore wings 5 in the hind, temples of head swollen, primary antenodals present but atrophied and inconspicuous ... ... *Mocrodiplactidae*

— Sectors of arculus fused at their origion and arising from a common stalk ; distal antenodal of forewing complete or incomplete, antenodals variable in fore wing, complete or incomplete antenodals variable in number, primary antenodals absent ... ... ... ... *Libellulidae*

Key to the genus and species of *Platystictidae*

1. The nervure ab present ; pterostigma slightly longer than broad ; thorax with ill-defined blue stripes, blackish-brown beneath ... ... ... ... ... ... ... ... ... Genus : *Drepanosticta* Laid. ... ... ... Species : *D. carmichaeli* (Laid.) [sp. 1 ; Text fig. 2A]

Key to the genera of *Protoneuridae*

1. Wings hyaline in both sexes ; ab present, but incomplete and vestigial ; cuii

extending to middle of wing ... ... ... *Caconeura* Kirby

— Wings hyaline in both sexes; ab present and complete; cuii extending distally beyond the middle of wing ... ... *Disparoneura* Selys

Key to the species of *Caconeura* Kirby

1. Thorax without any markings; 13 postnodals in forewings; inferior anal appendages tipped with white ... ... ... .. ... ... ... ... *C. autumnalis autumnalis* Fraser [sp. 2 ; Text fig. 2B]

— Thorax pale yellow on metepisternum and lower 3/4 of metepimeron ; 14 postnodals in forewing ; inferior anal appendages light to dark brown in colour ... ... ... ... *C. autumnalis gaudawricus* Sahni [sp. 3]

Key to the species of *Disparoneura* Selys

1. Azure blue spots at the base of postclypeus absent ; 10-12 postnodal nervures in fore wing and 8-10 in hind wings ... ...*D. bhatnagri* Sahni [sp. 5]

— Azure blue spot at the base of postclypeus present ; 15-16 postnodal nervures in fore wing and 13-14 in hind wings ... *D. campioni* Fraser [sp. 4]

Key to the genera of *Platycnemididae*

1. Costal side of discoidal cell in forewing one fifth or shorter than the posterior 2

— Costal and posterior sides of discoidal cell equal or nearly so ... 3

2. Wings petiolated to the the level of ac, I.e., ab ends at the level of ac ... ... ... ... ... ... ... *Coeliccia* Kirby

— Wings petiolated short of ac, i. e., ab ends some distance proximal to ac ; only 3 cells between the discoidal cell and nervure descending from the subnode ... ... ... ... ... ... ... *Calicnemia* Selys

3. Second segment of antennae as long as the third ... *Copera* Kirby

— Third segment of antennae equal in length to the first two taken together ... ... ... ... ... ... *Platycnemis* Charpentier

Kes to the species of the *Platycnemis* Charpentier

1. Dark morkings of the femur and tibiae reduced, a black line behind the occiput absent ... ... ... *P. latipes dealbata* Selys [sp. 6]

Key to the species of *Copera* Kirby

1. The two hind pairs of tibiae white and widely dilated ; hind femora extending nearly to end of segment 2 ; 2nd abdominal segment wholly black on dorsum ; inferior anal appendages strongly arched, black at apices ... ... ... ... ... ... ... ... *C. annulata* (Selys) [sp. 7]

— The two hind Pairs of tibiae yellow, reddish or brownish, only moderately dilated or not at all ... ... ... ... ... 2

2. Superior anal appendages only 1/4 the length of inferiors ; female with posterior lobe of prothorax without spines ... ... *C. marginipes* (Ramb.) [sp. 8]

— Superior anal appendages at least half the length of inferiors ; posterior lobe of prothorax of female with a pair of divergent slender forwardly directed spines ... ... ... ... ... *C. vittata* (Selys) [sp. 9]

Key to the species of *Calicnemia* Selys

1. Beneath head entirely black, without markings *C. pulverulans* Selys [sp. 13]
— Head black, marked with yellow beneath ... ... ... 2

2. Abdomen bright vermilion-red, without markings, a small but conspicuous upper posthumeral spot on thorax ; face and head as far back as posterior ocellus red, without markings ... ... *C. eximia* Selys [sp. 10]

— Abdomen dark brown throughout, segment 2-6 with light pale latero-basal semicircular small stripe. One linear streak behind and below each eye, streaks narrowing towards the inner side ... ... *C. maheshi* Sahni [sp. 14]

— Abdomen black, more or less marked with red or ferruginous ; posthumeral yellow spot absent or very tiny ; front of head black or black traversed with red or citron-yellow bands ... ... ... ... ... 3

3. Abdomen black, with segments 1 and 2 and base of 3 brickred or bright ochreous, front of head and face black ... *C. mortoni* Laid. [sp. 12]

— Abdomen black from segment 6 to the end, basal segments red ; not more than 14 to 15 postnodal nervures in fore wing ... ... ... ... ... ... ... *C. miles* Laid [sp. 11 ; Text-fig. 2F]

Key to the species of *Coeliccia* Kirby

1. Dorsum of thorax not being pale blue or yellow ; legs black with femora pale yellow basally ... ... *C. kumaonensis* Singh & Baijal [sp. 16]

— Dorsum of thorax may be pale blue for the lower half or with two pair of pale blue spots ... ... ... ... ... .. 2

2. Superior anal appendages slightly longer than segment 10, conical and hollowed out within as seen from the dorsum ... *C. didyma* (Selys) [sp. 17]

— Superior anal appendages as long as segment 10, conical and rather obtuse at the apex as seen from dorsum ... ... *C. renifera* (Selys) [sp. 15]

Key to the genera of *Coenagriidae*

1. Arc situated at the level of the distal antenodal nervure ... ... 2

— Arc situated distal to the level of the distal antenodal nervure ; the junction of ab and 1 A (medio-anal link) markedly angulated ... *Agriocnemis* Selys

2. ab (anal bridge) arising from the hind border of wing at the point where ac meets it ... ... ... ... ... ... 3

— ab arising from the hind border of wing more or less proximal to the point where ac meets it ... ... ... ... ... 6

3. A prominent ridge on the frons ; no postocular coloured spots on head, head and thorax of a uniform colour, without any dark markings *Ceriagrion* Selys

— No ridge on frons, postocular coloured spots always present ; head and thorax not of uniform colour, and usually with black or dark markings ... 4

4. Pterostigma in fore-and hind-wings of the same size ; abdomen not unduly long and slender ; female without a ventral spine on apical border of segment 8 ... ... ... ... ... ... ... 5

— Pterostigma in fore wing longer than that in the hind ; abdomen usually very long and slender ; female with an apical ventral spine on segment 8 ... ... ... ... ... ... ... ... *Aciagrion* Selys

5. Pterostigma longer than broad, diamond shaped, distal and proximal sides very oblique ; 10 to 12 postnodal nervures in fore wing ... *Pseudagrion* Selys

— Pterostigma almost square, distal side convex ; 14 to 16 postnodal nervures in forewing ... ... ... ... ... *Archibasis* Kirby

6. Pterostigma diffeing in shape and size in fore and hind wings of male ; segment 10 of male with a pair of dorsal apical tubercles ; post-ocular coloured spots present or absent in the adult stage ... ... ... 7

— Pterostigma of the same colour and shape in fore and hind wings of male ; segment 10 of male usually without dorsal apical tubercles ; postocular coloured spot present or absent ... ... ... ... 8

7. Postocular coloured spot always present in adult stage ; tubercles on apical border of segment 10 closely opposed ... ... *Ischnura* Charp.

— Postocular coloured spots absent in the adult stage ; tubercles on apical border of segment 10 widely separated by a shallow notch ... *Rhodischnura* Laid.

8. Female with a robust ventral apical spine on segment 8 ; postocular coloured spots present ... ... ... ... *Enallagma* Charp.

— Female without a ventral apical spine on segment 8 ; postocular coloured spots present or absent ... ... ... ... ... 9

9. ab arising well distal to the level of the proximal antenodal nervure ; tarsal claw-hooks unequal in length ; postocular coloured spots present (except in some very old pruinosed specimens) ... ... ... 10

— ab arising well proximal to the level of the proximal antenodal nervure ; tarsal claw-hooks of equal length ; pastocular coloured spots absent ... ... ... ... ... ... ... *Onychargia* Selys [sp. 18]

10. Basal side of discoidal cell in fore-wing equal to the costal ; 15 to 16 post-nodal nervures in fore wing ; ab arising from hinder border of wing very slightly proximal to the level of ac ... ... *Himalagrion* Fraser

— Basal side of discoidal cell in fore-wing shorter than the costal side ; only 8 to 10 postnodal nervures in fore-wings ; ab arising from hinder border of wing well proximal to the level of ac ... ... ... *Coenagrion* Kirby

Key to the species of *Pseudagrion* Selys

1. Face, frons, and vertex bright reddish orange or dark ochreous ; thorax golden green on dorsum, azure blue on sides, sparingly marked with black ... ... ... ... ... ... ... *P. rubriceps* Selys [sp. 18]

— Face, frons, vertex and occiput blue or green, marked with black ... 2

2. Thorax azure blue on dorsum and sides marked with medial and humeral black stripes ... ... ... ... ... ... 3

— Thorax palest blue with three fine black lines on mid-dosal carinal ridge and a thicker black humeral stripe .. ... *P. decorum* (Ramb.) [sp. 19]

3. Superior anal appendages not expanded on the inner side, but with a long robust spine near base ... ... ... *P. spencei* Fraser [sp. 21]

— Superior anal appendages without expansion on the inner side and without any spines on inner side or near base ... ... *P. laidlawi* Fraser [sp. 20]

Key to the species of *Ceriagrion* Selys

1. Abdomen bright red at base and ends, black on dorsum ... ... ... ... ... ... ... *C. cerinorubellum* (Brauer) [sp. 23]

— Abdomen bright citron yellow, without markings ... ... ... ... ... ... ... ... *C. coromandelianum* (Fabr.) [sp. 22]

— Abdomen cirton-yellow with black marking on the end segment ; superior anal appendages more than half the length of segment 10 ... *C. fallax* Ris [sp. 24]

Key to the species of *Coenagrion* Kirby

1. Abdaminal segments 8 and 9 entirely blue, with an apical row of fine black spines, segment 10 blue, with narrow mid-dorsal streak of black, rather small species ... ... ... ... *B. dyeri* (Fraser) [sp. 25]

— Terminal segments of abdomen sky blue to black in colour ; moderately large species ... ... ... *C. kashmirus* Chowdhry & Das [sp. 26]

Key to the species of *Himalagrion* Fraser

1. Thorax green on dorsum ; legs light to brilliant yellow ; 12-14 postnodal nervures in fore-wing and 11-12 in hind wing *H. pithoragarhicus* Sahni [sp. 27]

Key to the species of *Archibesis* Kirby

1. Labrum greenish yellow ; segment 8, 9 & 10 brown except the lateral region which is some what apple green ; inferior anal appendages rounded, very short and vestigial ... ... ... *A. sushmae* Baijal [sp. 66]

Key to the species of *Ischnura* Charpentier

1. Species with the ground colour of both sexes bright orange red ... 2
— Species with ground colour of males and isochrome females blue or pale grass green ... ... ... ... ... ... 3

2. Abdominal segment 8 to 10 only black ... *I. rufostigma* Selys [sp. 31]

— Abdominal segment 7 black dorsally, 8 to 9 turquiose blue laterally and reddish-brown ventrally ... ... ... *I. bhimtalensis* Sahni [sp. 29]

3. Abdominal segment 3 to 6 citron-yellow ... ... ... 4

— Abdominal segment 3 to 6 black on dorsum ... ... ... 5

4. Inferior anal appendages longer than superior, and about as long as the segment 10 ; segment 6 with soma apical dorsal black markings ... ... ... ... ... ... ... ... *I. inarmata* Calv. [sp. 33]

— Inferior anal appendages shorter than superiors and segment 10 ; segment 6 without any black dorsal markings ... *I. delicata* (Hagen) [sp. 30]

5. Segment 10 with blue spot on dorsum ; pterostigma of fore wing with costal side shortest ... ... *I. forcipata* Morton [sp. 28 ; Text-fig. 3 G]

— Segment 10 unmarked with blue ; costal side of pterostigma not markedly shorter than the other sides ; 2nd abdominal segment steely metallic blue on dorsum ... ... *I. senegalensis* (Ramb.) [sp. 32 ; Text-fig. 4B]

Key to the species of *Aciagrion* Selys

1. Ground-colour pale brown, without black marking on head and thorax ... ... ... ... ... ... ... *A. pallidum* Selys [sp. 34]

Key to the species of *Rhodischnura* Laidlaw

1. Abdomen marked with bright crimson citron-yellow and black ... ... ... ... ... ... ... ... *R. nursei* (Morton) [sp. 35]

Key to the species of *Enallagma* Charp.

1. Very small species, with abdomen not more than 17 mm in length ; post nodal nervures in fore wings 6 to 7 in number *E. parvum* Selys [sp. 36 ; Text-fig. 4E]

— Longer species, with abdomen more than 20 mm in length ; post nodal nervures in forewing more than 7 in number ; dorsum or segment 2 with a small subapical cordate black spot isolated or narrowly confluent with an appical annule ... ... ... *E. cyathigerum* Charp. [sp. 37]

Key to the species of *Agriocnemis* Selys

1. Labrum non metallic ... ... ... ... ... 2

— Labrum metallic blue ; superior anal appendages longer than inferior ... ... ... ... ... ... ... *A. pygmaea* (Ramb.) [sp. 38]

2. Abdominal segment 8 entirely black ... *A. clauseni* Fraser (sp. 39)

— Abdominal segment 8 to 10 azure blue in colour ... ... ... ... ... ... ... ... *A. nainitalensis* Sahni [sp. 40]

— Abdominal segment 8 and 9 totally black ; 10th with a small rounded basal, black spot on dorsum ; prothorax light reddish brown, pale yellow anal appendages ... ... *Agriocnemis corbeti* Kumar & Prasad [sp. 41]

Key to the species of *Onychargia* Selys

1. Labium yellowish-white ; 9 postnodal nervures in fore-wing, 7-8 in hind wing ; light brown pterostigma with white around the borders ... ... ... ... ... ... ... ... *O. indica* Sahni [sp. 42]

Key to the genus and species of *Chlorolestidae*

1 Body metallic green, wings stalked to slightly proximal to the level of ac ; wings never coloured ; thorax pale yellow beneath or pruinosed white ; Inferior anal appendages with only a single spine ... ... ... Genus : *Megalestes* Selys Species : *M. major* Selys [sp. 44 ; Text-fig. 4 H]

Key to the genera of *Lestidae*

1. Discoidal cell of hind-wing longer and much narrower than that of fore-wing 2

— Discoidal cell of hind-wing shaped similarly to that of fore-wing *Lestes* Leach

2. Posterior lobe of prothorax trilobed, the middle lobe projecting for beyond the laterals ; ac almost at the level of the basal antenodal nervures ... ... ... ... ... ... ... ... *Sympycna* Charp

— Posterior lobe of prothorax a single simple lobe uniformly arched ; ac almost at the level of the distal antenodal nervure ; wings not enfumed or tinted ... ... ... ... ... ... ... *Ceylonolestes* Kennedy

Key to the subspecies of *Sympycna* Charp

1. Prothorax pale brown, its middle lobe with a large dorsal spot on each side, it posterior lobe metallic emerald green and border finely yellowish ; borders of the pterostigma yellow ; oblique at both ends ... ... ... ... ... ... ... *S. paedisca annulata* Selys [sp. 45]
... ... ... ... *S. yaedisca kashmirensis* Ander [sp. 46]*

Key to the species & subspecies of *Lestes* Leach

1 Thorax without metallic markings, vertex of head mat black ... ... ... ... ... ... ... ... *L. thoracica* Laid. [sp. 49]

— Thorax without metallic markings, vertex of head mat black ; superior anal appendages with a robust inner spine ... *L. manaliensis* Singh [sp. 51]

— Thorax with green metallic antehumeral stripes ... ... 2

*Details not available.

2. Thorax pale brown on dorsum with very prominent brilliant metallic green antehumeral stripes ; 12 postnodal nervure in fore wing ... ... ... ... ... ... ... ... *L. viridula* Ramb. [sp. 47 ; Text-fig. 5A]

— Thorax with antehumeral stripes deeply scalloped or crenulate on the outer sides ; mesothorax without metallic or other markings ... ... ... ... ... ... ... ... *L. praemorsa praemorsa* Selys [sp. 48]

— Thorax with the whole of the dorsum and fore part on sides brillient metallic green ; pterostigma bicolours ... ... *L. barbara* (Fabr.) [sp. 50]

Key to the species of *Ceylonolestes* Kennedy

1. Abdominal segments 2 to 7 with paired dorsal apical spots or stripes, the mid dorsum blue between them ... ... *C. cyanea* (Selys) [sp. 52]

— Abdominal segments 2 to 7 broadly black on dorsum ... ... ... ... ... ... ... ... ... *C. davenporti* Fraser [sp. 53]

Key to the genera of *Chlorocyphidae*

1. Sector of arc, separated at origin ; pterostigma present in all fore-wings of both sexes ; wings (at least hind-wings, except in *R. immaculata*) coloured in male ... ... ... ... ... *Rhinocypha* Ramb.

— Sectors of arc arising from a common point ; fore-wing of male without a pterostigma ... ... ... ... *Libellago* Sel.

Key to the species and subspecies of *Rhinocypha* Rambur

1. Wings uncoloured in both sexes ... *R. immaculata* Selys [sp. 59]

— wings coloured, at least partly in male ... ... ... 2

2. Dorsal mesothoracic triangle extending as far as root of wings ... 3

— Dorsal mesothoracic triangle either absent, uncoloured, or extending not more than half-way upto root of wings ... ... ... 5

3. Hind-wings of male with apical, medial and nodal opaque bands separated ... ... ... ... *R. trifasciata trifasciata* Selys [sp. 56 Text-fig 5G]

— Hind-wings of male opaque with vitreous spots ... ... 4

4. Apical vitreous spot large, lying almost antirely proximal to line of pterostigma ; mid-row of vitreous spots more or less confluent ; large species ; hind-wing 27-28 mm ... ... ... *R. spuria* Selys [sp. 58]

— Apical vitreous spot moderately large, lying partly proximal to line of pterostigma ; mid-row of vitreous spots always well separated ; costal spot extending much nearer to node than middle spot small species, hind-wing 20 mm ... ... ... *R. quadrimaculata quadrimaculata* Selys [sp. 54 ; Text-fig. 5E]

5. Hind-wing with a large subquadrate violet green vitreous spot at its centre, very large species ... *R. unimaculata* Selys [sp. 55 ; Text fig. 5F]

— Only apical third of hind-wing opaque ; a single row of vitreous spots ; small species ... ... *R. biforàta beesoni* Fraser [sp. 57 ; Text fig. 5H]

Key to the subspecies of *Libellago* Selys

1. Abdomen marked with bright citron-yellow or greenish, male with six antenodal nervures to all wings ... *L. lineata lineata* (Burm.) [sp. 60 ; Text fig. 6A]

Key to the genera and species of *Epallagidae*

1. Costa of hind-wing of male running straight from base to node ... 2

— Costa of hind-wing of male with an obtuse projecting angle between base and node ... ... ... ... ... *Anisopleura* Selys

2. Abdomen of male longer than wings ; node situated slightly proximal to centre of wing ; wings petiolated to the level of first antenodal nervure ... ... ... ... ... ... ... *Bayadera* Selys

— Abdomen of male shorter than wings ; node situated at centre of wings ; petiolation almost absent ; ending well proximal to the first antenodal nervures ... ... ... *Epallage* Charp. Species *E. fatima* (Charp.) [sp. 65]

Key to the species of *Bayadera* Selys

1 Large size species ; apices of all wings in male tipped with black ... ... ... ... ... ... ... *B. indica* (Selys) [sp. 61 ; Text fig. 6B]

Key to the species of *Anisopleura* Selys

1. Several cubital nervures present ; superior anal appendages without spine ... ... ... ... ... *A. comes* Selys [sp. 63 ; Text fig. 6D]

— Usually only one cubital nervure in all wings ... ... ... 2

2. Superior anal appendages with short spine at middle ... ... ... ... ... ... ... ... *A. lestoides* Selys [sp. 62]

— Superior anal appendages with stout spine present near the base ... ... ... ... ... ... *A. kusumi* Sahni [ sp. 64 ]

Key to the genus & spacies of *Calopterygidae*

1. Fore-wings of the both sexes hyaline, hind wings opaque, or hyaline ; pterostigma absent in male ; false or absent in female ... Genus : *Neurobasis* Selys
Species : *N. chinensis chinensis* (Linn.) [sp. 66; Text fig. 6E]

Key to the genera of *Gomphidae*

1. Discoidal cell of hind wing traversed by a nervure running from costal to distal side ; 1A and cuii in hind-wing widely divergent at the border of wing ... ... ... ... ... ... ... *Davidius* Selys

— Discoidal cell in hind-wing never traversed ; 1A and cuii rarely, or but slightly ; divergent at margin of hind-wing ... ... ... 2

— Discoidal cell of hind-wing not traversed ; only one cubital nervure present in all wings ... ... ... ... *Acrogomphus* Laidlaw

2. Hind-wing not excavated at base with tornus rounded in the male ... ... ... ... ... ... *Anormogomphus* Selys

— Hind-wing more or less excavated at base ; with tornus more or less angulated ... ... ... ... ... ... ... 3

3. Anal loop absant ; first postnodal cell not extending proximal to base of sub-trigone in hind-wing; anal triangle nearly always 3 celled ... ... 4

— Anal loop present, although often rudimentary; first postnodal cell extending more or less proximal to base of trigone in hindwing; triangle nearly always 4 celled ... ... ... ... ... ... 7

4· Superior anal appendages and branches of inferior appendages of equal length and equal divaricate ... ... ... ... ... 5

— Superior anal appendages variable, usually much longer than branches of appendage; or, if not, then furnished with a ventral process or spine beneath 6

5. Discoidal field with two rows of cells to beyond level of node; only two rows of cells between 1A and border of fore-wing ... *Burmogomphus* Will.

— Discoidal field with three rows of cells at level at node, three or more rows of cells between 1A and margin of fore-wing, anal triangle poorly formed, segment 8 and 9 greatly dilated laterally ... ... *Platygomphus* Selys, Species : *P. attenuatas* Fraser [sp. 81]

6. Superior anal appendages as long as branches of inferior appendages and furnished beneath with a black robust spine or process ... *Anisogomphus* Selys

— Superior anal appendages longer than branches of inferior appendages ; simple and without spines or processes beneath ; segments 8 and 9 with lateral foliated dilations ... .. *Mesogomphus* Forster

7. Ground-colour a fine-grass green, with very reduced black markings ; anal loop well developed ; formed of three cells ; anal appendages short, simple of about equal length ... ... ... *Ophiogomphus* Selys

— Ground colour black or bright yellow, with extensive markings ; anal loop present, but poorly developed, formed of two cells ; anal appendages variable ... ... ... ... ... .. ... .. 8

8. Anal triangle 3-celled only two rows of cells between 1A and margin of fore-wing ; lobe of penis swollen and markedly vesiculate ... ... ... ... ... ... ... *Nepogomphus* Fraser

— Anal triangle 4-celled : three or more rows of cells between 1A and margin of fore-wing ; lobe of penis not vesiculate ... ... 9

9. Ground-colour preponderatingly black ; superior anal appendages enormous

curled hooks, which enclose a broad cordate or oval space by meeting the similarly curled branches of inferior appendages slightly shorter than superior, between which they may project ... ... *Onychogomphus* Selys

Key to the species of *Davidius* Selys

1. Superior anal appendages simple unbranched ... ... ... 3

— Superior anal appendages branched ... ... ... ... 3

2. Labrum and face entirely yellow ; a narrow antehumeral yellow stripe lying close to and parallel with the mid-dorsal stripe ... ... ... ... ... ... ... ... *D. aberrans aberrans* (Selys) [sp. 83]

3. Abdominal segments 3 to 8 with very broad complete basal annules ... ... ... ... ... ... ... *D. kumaonensis* Fraser [sp. 84]

Key to the species of *Anormogomphus* Selys

1. Head and thorax with pale brown markings ... *A. heteropterus* Selys [sp. 79]
— Head and thorax without markings ... *A. kiritschenkoi* Bart [sp. 78]

Key to the species of *Anisogomphus* Selys

1. A sinuous humeral stripe present, not confluent above with the antehumeral stripe ; postclypeus at its lower part and the occiput yellow ... ... ... ... ... ... ... ... *A. bivittatus* (Selys) [sp. 68]

— Only an upper humeral spot present, ante-humeral stripes confluent with the middle of each half of the mesothoracic coller, so as to form inverted T — shaped figure ... ... *A. occipitalis* (Selys) [sp. 67 ; Text-fig. 6F]

Key to the species of *Burmogomphus* Willamson

1. Only upper and lower halves antehumeral and humeral thoracic stripes respectively present, the two halves joined obliquely to form a sinuous stripe on each side of dorsum of thorax ; middle lobe of labium black - segment 5 without a yellow mid-dorsal stripe ... ... *B. hasimaricus* Fraser [sp. 86]

— Antehumeral and humeral stripes separated ; humeral stripe complete ; three lateral black stripes on thorax ... ... *B. sivalikensis* Laid [sp. 85]

Key to the species of *Mesogomphus* Forster

1. Anal appendages yellow ... ... *M. lineatus* (Selys) [sp. 77]

Key to the species of *Lamelligomphus* Fraser

1. Humeral stripe present and complete ; abdominal segments 3 to 6 with yellow oval mid-dorsal spots ... ... ... *L. biforceps* (Selys) [sp. 74]

— Humeral stripe absent or represented only by a tiny upper spot ; superior and inferior anal appendages markedly curlad, so as to enclose together a broad cordate space ; superior humeral spot present *L. risi* (Fraser) [sp. 75]

Key to the species of *Nepogomphus* Fraser

1. Branches of inferior anal appendages with a robust superior subapical spine ... ... ... ... ... *N. modestus* (Selys) [sp. 76]

Key to the species of *Ophiogomphus* Selys

1. Head and thorax grass-green in colour ... *O. reductus* Calvert [sp. 82]

Key to the species of *Acrogomphus* Laidlaw

1. Small in size, clypeus black, golden yellow colour near the base of the wings absent; pterothorax light green with black marking ... ... ... ... ... ... .. ... *A. mohani* Sahni [sp. 80]

Key to the species of *Onychogomphus* Selys

1. Yellow humeral stripe present, but vestigial or interrupted ... ... 2

— The humeral stripe present and complete ... ... ... 3

2. Inferior anal appendages with a distinct but obtuse upper basal spine ... ... ... ... ... ... ... *O. duaricus* Fraser [sp. 72]

— Inferior (anal appendages) cleft near to base, with a stout tooth basally and an acute tooth subapically .. *O. garhwalicus* Singh & Baijal [sp. 73]

3. Antehumeral stripes confluent with mesothoracic collar ... ... 4

— Antehumeral stripes long and very narrow, abdominal segments 3 to 6 with mid-dorsal oval yellow spots ... ... *O. cerastes* (Selys) [sp. 70]

4. Many of the transverse nervures proximal to node and on anterior part of wings bright yellow ... ... ... *O. bistrigatus* (Selys) [sp. 71]

— Transverse nervures black throughout; superior anal appendages entirely yellow — ... ... *O. M-flavum* Selys [sp. 69; Text-fig. 6G]

Key to the species of *Ictinogomphus* Rambur

1. Face largely black; posterior border of thorax margined with black; femora largely black; segment 8 with a broad yellow ring ... ... ... ... ... ... ... ... ... *I. rapax* (Ramb) [sp. 87]

Key to the genera & species of *Aeshnidae*

1. Base of hind-wing without a notch; tornus (postero - basal angle) 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; 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 1A in the hind-wing ... *Anax* Leach

— Segment 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 1A in the hind-wing ... ... ... ... *Hemianax* Selys Species : *H. ephippiger* (Burm.) [sp. 101 ; Text fig. 8D]

3. The nervure Riii making an abrupt curve towards and beneath outer end of pterostigma ; MA fusing with Riv+v well before posterior border of wing ; Rspl forked shortly after its origin ; the posterior branch running parallel with Riv+v to posterior border of wing ; superior anal appendages with apex prolonged and curled downwards abruptly ... ... *Anaciaeschna* Selys Species : *A. kashmirense* Singh & Baijal [sp. 100]

— The nervure Riii without an abrupt curve towards and beneath the outer end of pterostigma ; MA not fusing with Riv+v, but interrupted or forked at the same level ; superior anal appendages not prolonged at apex ... 4

4. Median (basal) space traversed by one or more nervures ; an incomplete basal antenodal nervure nearly always present ... ... ... 5

— Median space entire ; incomplete basal antenodal nervure absent ... 6

5. Segment 10 of female rounded, dentigerous plate absent ; discoidal cell short and broad ; frons raised markedly ... *Cephalaeschna* Selys

— Dentigerous plate ending in 2 robust apposed spines ; discoidal cell short and broad ; frons raised markedly ... *Gynacanthaeschna* Fraser Species : *G. sikkima* (Karsch.) [sp. 88 ; Text fig. 7F]

6. Membrane large, extending on to base of wing ... .. 7

— Membrane nearly obsolete, not extending to base of wing ... 8

7. Dentigerous plate of female simple, rounded, not prolonged posteriorly, coated with numerous short spines ; arc very near ; proximal antenodal nervure ... ... ... ... ... *Aesthrna* Fabricius

— Dentigerous plate of female specialized, produced posteriorly and ending in a number of robust spines ; arc distal to proximal antenodal nervure for a distance equal to one-third the length between the two primary antenodal nervures ... ... ... *Polycanthagyna* Fraser Species : *P. erythromelas* (MacLach.) [sp. 94]

8. Pterostigma long and narrow, without any opaque cells beneath it ; dentigerous plate of female ending in 2 long curved divaricate spines ... ... ... ... ... ... ... *Gynacantha* Rambur Species : *G. Khasiaca* MacLach. [sp. 90 ; Text fig 7G]

Key to the species of *Cephalaeschna* Selys

1. Anal triangle with 3 cells only ; face rounded, as broad as deep and nearly as broad as eyes at level of post clypeus ... *C. orbifrons* Selys [sp. 89]

Key to the species of *Aeshna* Fabricius

1. Anal triangle very narrow, of about equal breadth throughout and only 2 celled ... ... ... ... *A. juncea* (Linn.) [sp. 93]

Key to the genera and species of *Libellulidae*

1. Base of discoidal cell in hind-wing widely distal to level of arc (except in *Nannophya* and *Phyllothemis*) ; costal side of discoidal cell in fore-wing markedly angulated, so that the cell is four sided (the angulation very distal and slight in *Phyllothemis*) ; anal loop absent or very small, consisting of not more than 6 cells ; discoidal field begining with only 1 row of cells ... 2

— Base of discoidal cell in hind-wing at level of arc or but a shade distal (except in *Nesoxemia* and *Agrionoptera*) ; costal side of discoidal cell in fore-wing not angulated ; anal loop elongate, made up of more than 6 cells ; discoidal field beginning with 2 or more rows of cells ... ... ... 4

2. Anal loop present ... ... ... ... ... 3

— Anal loop absent ; arc situated between the first and second antenodal nervures ; only 5 or 6 antenodal nervures ... *Nannophya* Rambur ... ... ... ... Species : *N. katrainsis* Baijal [sp. 134]

3. No supplementary nervures to bridge, discoidal cell in hind-wing entire ; not more than 9 antenodal nervures in fore-wing ... *Tetrathemis* Brauer ... ... ... Species : *T platyptera* Selys [sp. 111 ; Text fig. 8G]

— Supplementary nervures to bridge ; discoidal cell in hind-wing traversed ; not less than 14 antenodals in fore-wing ... ... *Hylaeothemis* Ris ... ... ... ... Species : *H. gardeneri* Fraser [sp. 112]

4. 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 of latter ; thorax but rarely metallic ... ... ... ... ... 5

5. Borders of anal loop running on to meet posterior of wing, apex of loop open ... ... ... ... ... ... ... 6

— Borders of anal loop converging and meeting before posterior border of wing, apex of loop closed ... ... ... ... ... 7

6. Abdomen broad at base, then tappering gradually to the end ; male with an opalescent white spot in centre of hind wing ... *Tholymis* Hagen

— Abdomen very tumid at base, then abruptly narrowed and very slim and cylindrical to the end ; wings broadly tipped with dark brown and without an opalescent white spot in centre of hind wing ... *Zyxomma* Rambur ... ... Species : *Z. petiolatum* Rambur [sp. 157 ; Text fig. 13A]

7. Distal antenodal nervure in fore-wing complete ... ... ... 8

— Distal antenodal nervure in fore-wing incomplete ... ... 11

8. Lobe of prothorax large and fringed with long hairs ... ... 9

— Lobe of prothorax small, inconspicuous and usually naked, only one cubital

nervure in all wing, anal loop very long and overlapping distal end of discoidal cell ... ... ... ... .. *Cratilla* Kirby ... ... Species : *C. lineata calverti* Forster [sp 113 ; Text fig. 8H]

9. Frons metallic above ... ... ... *Brachydiplax* Brauer ... ... ... ... Species : *B. sobrina* (Rambur) [sp. 133]

— Frons non-metallic above ... ... ... ... 10

10. Only 6 antenodal nervure in fore-wing ; abdominal segments 1 to 6 dilated, 7 to 10 slim and cylindrical ... ... *Acisoma* Rambur ... Species : *A. panorpoides panorpoides* Rambur [sp. 135 ; Text fig. 10F]

— Never less than 12 antenodal nervures in fore-wing, shape of abdomen variable ... ... ... ... ... *Orthetrum* Newman

11 Lobe of prothorax large and fringed with long hairs ... ... 12

— Lobe of prothorax small, usually naked ... ... ... 14

12. Borders of discoidal field (nervures MA and cuii) converging strongly at wing border ... ... ... ... *Sympetrum* Newman

— Borders of discoidal field in fore-wing diverging widely at wing border ... 13

13. Eyes contiguous for a short space, discoidal cell in hind-wing entire ; costal border of fore-wing straight ; frons non-metallic above, discoidal field in fore wing begining with at least 3 rows of cells ... *Diplacodes* Kirby

— Eyes more broadly contiguous, discoidal cell in hind-wing traversed ; costal border of fore-wing sinuous near base ; frons metallic above ; discoidal field begining with at least 3 rows of cells ... *Palpopleura* Rambur ... Species : *P. sexmaculata sexmaculata* (Fabr.) [sp. 132 ; Text fig. 10C & D]

14. Sectors of arc in fore-wing separated and diverging at origin ... 15

— Sectors of arc in fore-wing arising from a common and rather long stalk ... 16

15. Body very dark metallic, frons metallic, above ; discoidal field in fore-wing with borders parallel or strongly converging at wing-border ; wings generally broadly covered black or black and golden amber ... *Rhyothemis* Hagen

— Body pale-brown, non-metallic ; frons non-metallic ; discoidal field in fore-wing with borders widely diverging at wing margin ; wings often spotted with dark markings, but never broadly black or black and yellow ... ... ... ... ... ... .. *Libellula* Linn. ... ... ... Species : *L. quadrimaculata* Linn. [sp. 115]

16. Discoidal field with borders Converging strongly at wing margin ... 17

— Discoidal field with borders parallel or widely divergent at wing margin 18

17. Discoidal cell in fore-wing very narrow, its costal side only about one-fourth to one-third the length of basal ; a conspicuous supplementary narvure (IR iii)

present between Rii & Riii ... ... ... *Pantala* Hagen
... ... Species : *P. flavescens* (Fabr.) [sp. 160 ; Text-fig. 13C]

— Discoidal cell in fore-wing broader, its costal side about one half the length of basal, no supplementary nervures (IRii) present between Rii & Riii ...
... ... ... ... ... ... *Trithemis* Brauer

18. Genital hamules small and inconspicuous in profile, hind-wing not markedly tapered ... ... ... ... ... ... 19

— Genital hamules very long, projecting, and conspicuous in profiles ; hind-wing very broad at base and rather tapered at apex ; pterostigma smaller in hind-wing than in fore ; apical angle of anal loop much acute than the distal ...
... ... ... ... ... ... *Tramea* Hagen

19. Pterostigma bicolorous, black with white ends ; 2 rows of cells between IRiii & Rspl ... ... ... ... *Bradinopyga* Kirby
... ... Speices : *B. geminata* (Rambur) [sp. 144 ; Text-fig. 11G]

— Pterostigma unicolorous ; 1 or rarely 2 rows of cells between IRiii & Rspl 20

20. 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 but a small basal yellow marking in hind-wing (a broader mediual fascia in *Brachythemis*) ; no secondary reticulation in the wings ; only 1 cubital nervure in all wings ... ... ... 21

21. Red or ochreous species with basal or medial yellow markings to wings ... 22

— Variably coloured and darker species; never or only partly red or ochreous; arc situated between the first and second antenodal nervures; 2 rows of cells between IRiii & Rspl ... ... ... *Potamarcha* Karsch
... ... Species : *P. obscura* (Rambur) [Sp. 114 ; Text-fig. 9A]

22. Wings with small basal yellow marking ; eyes but shortly contiguous ; face and frons red ; 9 1/2 to 10 1/2 antenodal nervures in fore-wing ... ...
... ... ... ... ... ... *Crocothemis* Brauer

— Wing with broad reddish yellow medial fascia ; face and abdomen never red ; eyes broadly contiguous ; only 6 1/2 to 7 1/2 antenodal nervures in fore-wing
... ... ... *Brachythemis* Brauer
... .. Species : *B. contaminata* (Fabr.) [sp. 138 ; Text fig. 10H]

Key to the species of *Orthetrum* Newmen

1. Males coloured some what shade of red ... ... ... 2

— Males coloured brown or black with yellow markings, often pruinosed ... 3

2. Males violaceous-red, due to a thin over-lying pruinescence ; frons blue black anteriorly .. ... *O. pruinosum neglectum* (Ramb.) [sp. 129]

— Males bright red ; frons bright red or yellow in front, lamina of male genitalia with a tuft of stiff black bristles ... *O. chrysis* (Selys) [sp. 124]

3. Abdomen enormously swollen at base and then abruptly slimmed and compressed laterally to the end ; black marked with greenish-yellow ; not pruinosed ... ... ... *O. sabina sabina* (Drury) [sp. 126]

— Abdomen dark brown, segment one with a triangular yellow area in the middle line, curled spine in hamule ; pterothorax brown, pterostigma yellow ; ... ... ... ... ... *O. gangi* Sahni [sp. 130]

— Abdomen variable but never very slim nor compressed laterally ; mostly with pruinosed abdomen and thorax ... ... ... ... 4

4. Base of hind-wing with a large black triangular marking ... ... ... ... *O. triangulare triangulare* (Selys) [sp. 131 ; Text fig. 10B]

— Base of hind-wing without a black triangular marking ... ... 5

5. Cuii in hind-wing arising from the distal side of discoidal cell well away from its posterior angle ... ... ... ... ... .. ... *O. chrysostigma luzonicum* (Brauer) [sp. 119 ; Text fig. 9D]

— Cuii in hind-wing arising from the posterior angle of discoidal cell ... 6

6. Only a single row of cells between IRiii and Rspl ... ... ... ... ... ... ... ... *O. anceps* (Schneider) [sp. 118]

— One or two rows of cells between IRiii and Rspl. ; are situated opposite to 2nd antenodal nervure, membrane grey coloured ... ... ... ... ... .. ... ... *O. fraseri* Sahni [sp. 127]

— Two or more rows of cells between IRiii and Rspl ... ... 7

7. Costal border of wings and antenodal narvures bright yellow ... 8

— Costal border of wings and antenodal nervures black ... ... 9

8. Pterostigma largely yellow ; labrum, face and frons yellow ... ... ... ... *O. garhwalicum* Singh & Baijal [sp. 122 ; Text fig. 9F]

— Pterostigma pale ; pterothorax olivaceous green and covered by stiff setae ... ... ... ... ... *O. guptai* Baijal [sp. 121]

— Pterostigma pale grey ... *O. mathewi* Singh & Baijal [sp. 128]

— Pterostigma dark reddish-brown or black ... ... ... ... ... ... *O. cancellatum cancellatum* (Linn.) [sp. 123]

9. Abdomen short and broad, almost white with pruinescence ; thorax with 2 broad greenish or bluish stripes more or less obscured by pruinescence ... ... ... ... *O. japonicum internum* MacLach. [sp. 120]

— Abdomen long and rather narraw ; often blue with pruinescence thorax with very narrow whitish or creamy stripes ... ... ... 10

10. Moderately large species with face black or frons blackish anteriorly, membrane black ... ... *O. glaucum* (Brauer) [sp. 125 ; Text fig. 9G]

— Moderately large species with face dark brown ; membrane pure white ... ... ... *O. brunneum brunneum* (Fons.) [sp. 116 ; Text fig. 9B]

— Smallest species of the genus, with face and frons greyish green or bluish ; membrane dark brown bordered with black ... ... ... ... ... ... *O. taenoilatum* (Schneider) [sp. 117 ; Text fig. 9C]

Key to the species of *Diplacodes* Kirby

1. Apices of wings tipped with black ... ... ... ... ... ... ... *D. nebulosa* (Fabr.) [sp. 139 ; Text fig. 11A]

— Apices of wings hyaline, wings uncoloured except at base ; anal appendages yellow ... ... *D. trivialis* (Rambur) [sp. 140 ; Text fig. 11B]

Key to the species of *Crocothemis* Brauer

1. Abdominal segments 8 and 9 with middorsal carina blackish ; anal appendages blood red ... ... ... *C. servilia servilia* (Drury) [sp. 136]

— Abdominal segments 8 entirely dark red and 9 marked black ; anal appendages reddish brown with black base ... ... *C. indica* Sahni [sp. 137]

Key to the species of *Neurothemis* Brauer

1. Base of wings of male broadly black ; black basal area of wings edged outwardly with an opalescent white band ... ... ... ... ... ... *N. tullia tullia* (Drury) [sp. 143 ; Text fig. 11E & F]

— Wings dark reddish-brown from base to about middle of pterostigma ; apex of wings also narrowly opeque brown to partly enclose a clear window in each wing at apex ... ... *N. fulvia* (Drury) [sp. 141 ; Text fig. 11C]

— Wings golden yellow at base not very sharply defined and rather pale in colour ; costal border of wings pale yellow to as far as pterostigma ; a pale brown humeral stripe on thorax .. ... ... ... ... *N. intermedia intermedia* (Rambur) [sp. 142 ; Text fig. 11D]

Key to the species of *Sympetrum* Newman

1. Upper or flexor surface of femora and tibiae yellow ... ... 2

— Legs entirely black or only anterior femora yellow on inner side ... 3

2. Base of hind-wing with poorly defined yellow marking ; legs entirely yellow or broadly so on flexor surface ; poorly defined black basal line to frons above ; abdomen and thorax reddish, the latter with a diffuse greenish antehumeral stripe ... ... ... *S. meridionala* (Selys) [sp. 148]

— Base of hind-wing with well-defined yellow markings ; legs black with a fine yellow line on flexor surface ; a well-defined black basal line to frons above ... ... ... ... *S. fonscolombei* (Selys) [sp. 147]

3. Only 6 1/2 to 7 1/2 antenodal nervures to fore-wing ... ... ... ... ... ... *S. commixtum* (Selys) [sp. 145 ; Text fig. 11H]

— At least 8 1/2 to 10 1/2 antenodal nervures to fore-wing ... 4

4. Basal reticulation of wings red ; thorax blood, red without lateral yellow markings ... ... ... *S. haematoneura* Fraser [sp. 146]

— Basal reticulation black ; thorax reddish with sides broadly marked with yellow extending to wings, anterior femora yellow on inner side ... ... ... ... ... *S. hypomelas* (Selys) [sp. 149 ; Text fig. 12A)

Key to the species of *Trithemis* Brauer

1. Legs very long and spidery ; petrostigma bicolorous ; body yellow marked with black ... ... *T pallidinervis* (Kirby) [sp. 152 ; Text fig. 12D]

— Legs ordinary length ; pterostigma unicolorous ; body colour variable ... 2

2. Thorax and abdomen bright vermilion-red base of hind-wing bright orange ; neuration yellow ... *T kirbyi kirbyi* Selys [sp. 153 ; Text fig. 12E]

— Thorax and abdomen violaceous-black ; base of hind-wing with a small dark brown spot ; neuration black ... *T festive* (Ramb.) [sp. 151 ; Text fig. 12C]

— Thorax and abdomen violaceous crimson ; base of hind-wing with small reddish-brown spot ; neuration crimson ... ... ... ... ... ... ... *T aurora* (Burmeister) [sp. 150 ; Text fig. 12B]

Key to the species of *Zygonyx* Selys

1. Base of hind-wing uncoloured ; abdominal segments 2 to 8 with large yellow spot each side ; those on segments 6 to 7 confluent with mid dorsal spots ... ... ... ... ... *Z. torrida isis* Fraser [sp. 154]

Key to the spacies of *Rhyothemis* Hagen

1 Wings marked with black and amber-yellow ; two rows of cells between IRiii and Rspl base of wings deep black, with steely blue reflex, up to discoidal cell in fore-wing, and nearly to nods in the hind *R. triangularis* Kirby [sp. 156]

— Wings marked with black only, or with black and brown with metallic reflex ; wings widely different in the sexes ; male with whole of wings tinted yellow ; fore-wings with spots at node, discoidal cell, apex and at middle of Riii ; hind-wing with similar dark spots and two broad longitudinal basal bands ; female with broader, shorter wing ; fore-wing hyaline from node to apex, basal half with broad black markings, hind-wings with broad irregular markings to as for distal as pterostigma, apex hyaline ... *R. variegata variegata* ... ... ... ... (Linn.) [sp. 155 ; Text fig. 12 G & H]

Key to the species of *Tramea* Hagen

1. Hamule but slightly over lapping lobe ; two large black spots at the hind-wing surrounded by a golden yellow areola, one in cubital space, the other lying

obliquely in anal area of wing, the two narrowly confluent near base of discoidal cell in the male ... *T basilaris burmeisteri* Kirby [sp. 161 ; Text fig. 13D]

— Hamule much longer and greatly overlapping lobe ; only a single black spot of variable size at base of hind-wing, spot in hind-wing dark raddish-brown, very large, extending distally to distal end of discoidal cell and involving nearly whole of anal loop ... ... *T virginia* (Rambur.) [sp. 162 Text fig.13E]

Key to the species of *Tholymis* Hagen

1. Golden brown fascia present only in hind-wing ; eyes are brown and capped with red ... ... ... *T. tillarga* (Fabr.) [sp, 158 ; Text fig. 13B]

— Golden brown fascia present in both pairs of wings ; eyes black and capped with brown .. ... *Tholymis paratillarga* Singh & Prasad [sp. 159]

## CHECK LIST OF ODONATA OF WESTERN HIMALAYA WITH NOTES ON FIELD ECOLOGY.

(For distribution see Table 3.)

### 1 Subordar *Zygoptera*

### 1 Family *Platystictidae*

**1 Drepanosticta carmichaeli** (Laidlaw, 1915) ]Text fig. 2A]

*Protosticta carmichaeli* Laidlaw, 1915, *Rec. Indian Mus.*, **11** : 341-342.

*Drepanosticta carmichaeli*, Bnasin, 1953, *Ind. For. Leafl.*, **121** (3) ; 66 ; Singh & Prasad, 1974, *J. Bombay nat. Hist. Soc.*, **70** (2) : 403 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** ; 121 ; Prasad, *Indian J. Ent.* (in press).

*Field Ecology* : Flight period—June-August; oviposition—June-July; emergence-June; larval habitat—hill streams in the flatter areas; range—500-1500 m. Adults common around streams.

### 2. Family *Protoneuridae*

**2. Caconeura autumnalis autumnalis** Fraser, 1922 [Text fig. 2B]

*Caconeura autumnalis* Fraser, 1922, *Mem. dep. Agric. India* (Ent.), **7** : 43 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 121 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 419, Prasad, *Indian J. Ent.*, (in press).

*Field Ecology* : Flignt period—June-September; oviposition—not known; emergence—June-July; larval habitat—slow running marshy streams; range—300-700 m. Adults occur in vegetation around marshy streams.

### 3. **Caconeura autumanalis gaudawaricus** Sahni, 1964

*Caconeura autumanalis gaudawaricus* Sahni, 1964, *Agra Univ. J. Res.*, **13** (3) : 84-86.

*Field Ecology* : Not known

### 4. **Disparoneura campioni** Fraser, 1922

*Disparoneura campioni* Fraser 1922, *Mem. dept. Agric. India* (Ent.), **7** : 43-44 ; Kumar, 1973, *Oriental Ins.*, **7** (1) : 86 (Larva).

*Field Ecology :* Flight period—June-September; oviposition-June-July; emergence—June; larval habitat-hill streams with scares vegetation; range—300-600 m. Adults found around hill streams.

### 5. **Disparoneura bhatnagri** Sahni, 1965

*Disparoneura bhatnagri* Sahni, 1965, *Indian J. Ent.*, **27** (2) : 209.

*Field Ecology :* Not known

## 3. Family *Platycnemididae*

### 6. **Platycnemis latipes dealbata** Selys, 1863

*Platycnemis latipes* race *dealbata* Selys. 1863, *Bull. Acad. Belg.* (2)**16** : 167;

*Platycnemis latipes dealbata* Fraser, 1933, *Fauna Brit. India*, **1** : 188-191 ; Mani *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 472.

*Field Ecology :* Not known

### 7. **Copera annulata** (Selys, 1963) [Text-fig. 2C]

*Psilocnemis annulata* Selys, 1863, *Bull. Acad. Belg.* (2) **16** : 172.

*Copera annulata*, Kumar & Juneja, 1976, *Newal. zool. Surv. India*, **2** (3) : 95 ; Kumar, *Odonatologica* (in press)

*Field Ecology :* Flight period—April-September; oviposition—not known; emergence—September; larval habitat—marshy area of fresh water lakes ; range—600m. Adults very common in reeds in shallower region of the lakes and surrounding vegetation.

### 8. **Copera marginipes** (Rambur, 1842) [Text-fig. 2D]

*Platybcemis marginipes* Rambur, 1842, *Ins. Neverop.* : 240

*Copera marginipes*, Sahni, 1972, *Bull. Ent.*, **12** (2) : 69-84 ; Kumar, 1973, *Oriental Ins.*, **7** (1) : 86-87 (Larva) ; Singh & Prasad, 1974, *J. Bombay nat. Hist. Soc.*, **70** (2) : 403 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 95-96 ; Prasad & Singh,, 1976, *Rec. zool. Surv. India*, **70** : 122 ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Singh &

Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 419 ; Prasad, *Indian J. Ent.*, (in press), Kumar, *Odonatologica* (in press)

*Field Ecology* : Flight period June-November ; oviposition—August-September; emergence--June-September; larval habitat—slow running marshy streams and marshy parts of fresh water lakes ; range—300-600m. Adults are common on vegetation around the larval habitats.

### 9. Copera vittata (Selys, 1863) [Text fig. 2E]

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

*Copera vittata*, Prasad, 1976 *Rec. zool. Surv. India*, **71** : 96 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 122 ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95-96 ; Kumar, *Odonatologica* (in press)

*Field Ecology* : Flight period—June-September ; oviposition-September ; emergence—June-July ; larval habitat—marshy area of fresh water lake and ponds ; range—300-600 m. Adults are common around larval habitats and frequently perching on the vegetation quite away from the place of breeding.

### 10. Calicnemia eximia Selys, 1863

*Calicnemia eximia* Selys, 1863, *Bull. Acad Belg.* (2) **16** : 160 Fraser, 1933, *Fauna Brit. India*, **1** : 174-175; Bhasin, 1953, *Ind. For. Leafl.* **121** (3) : 66 ; Sahni, 1972, *Bull. Ent.*, **12** (2) : 69- 84; Kumar, *Odonatologica* (in press).

*Field Ecology* : Flight period—April-September ; range—500-1500 m.

### 11 Calicnemia miles Laidlaw, 1917 [Text fig. 2F]

*Calicnemia miles* Laidlaw, 1917, *Rec. Indian Mus.*, **13** : 330(nom. nov ); Fraser, 1933, *Fauna Brit. India*: **1** : 178-181 ; Bhasin, 1953, *Indian For. Leafl.* **121** (3) : 66 ; Singh & Prasad, 1974, *J. Bombay nat. Hist. Soc.*, **70** (2) : 403 Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 122 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 96 Prasad, *Indian J. Ent.*, (in press) Kumar, *Odonatologica* (in press) Kumar & Prasad, 1977, *Entomon*, **2** (2) : 225.229 (Larva)

*Field Ecology* : Flight period—May-September ; oviposition-June-July ; emergence—May-July ; larval habitat—semiterrestrial, larvae are found among mosses and ferns adjacent to water falls, the sprinkling water of these falls seeps through the vegetation inhabited by the larvae. Larvae show close morphological resemblance with

the terrestrial larvae of Family Megapodagrionidae; range--500-1500m. Adults very conspicous, perching on vegetation adjacent to water falls.

### 12. **Calicnemia mortoni** Laidlaw, 1917

*Calicnemia mortoni* Laidlaw, 1917, *Rec. Indian Mus.*, **13** 525 ; Sahni, 1972, *Bull. Ent.*, **12** (2) : 69-84.

*Field Ecology* : Not known.

### 13. **Calicnemia pulverulans** Selys, 1886 [Text fig. 2G]

*Calicnemia pulverulans* Selys, 1886, *Mem. Cour.*, **38** : 133 ; Bhasin, 1953, *IndianFor. Leafl.*, **121** (3) : 66 Singh & Prasad, 1974, *J. Bombay nat. Hist. Soc.*, **70** (2) : 403 ; Prasad, *Indian J. Ent.*, (in press).

*Field Ecology* : Flight period—June-September ; range—1000-1500 m.

### 14. **Calicnemia maheshi** Sahni, 1964

*Calicnemia maheshi* Sahni, 1964, *Agra Univ. J. Res.*, **13** (3) : 82-84.

*Field Ecology* : Not known

### 15. **Coeliccia renifera** (Selys, 1836)

*Trichocnemis renifera* Selys, 1836, *Mem. Cour.*, **38** : 119 ; *Coeliccia renifera*, Fraser, 1933, *Fauna Brit. India*, **1** : 156-159 Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 66 Kumar, *Odonatologica* (in press).

*Field Ecology* : Fligth period—May-September ; range—1500-2000 m.

### 16. **Coeliccia kumaonenis** Singh & Baijal, 1954

*Coeliccia kumaonensis* Singh & Baijal, 1954, *Agra Univ. J. Res.*, **3** (2) : 398-399.

*Field Ecology* : Not known.

### 17. **Coeliccia didyma** (Selys, 1863)

*Trichocnemis didyma* Selys, 1863, *Bull. Acad. Belg.*, (2) **16** : 155
*Coeliccia didyma* Fraser, 1933, *Fauna Brit. India*, **1** : 159-160 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Not known.

## 4. Family *Coenagriidae*

### 18. **Pseudagrion rubriceps** Selys, 1876 [Text fig. 2H]

*Pseudagrion rubriceps* Selys, 1876, *Bull. Acad. Belg.*(2)**42** : 510 Bhasin, 1953,

*Indian For. Leafl.*, **121** (3) : 69 ; Sahni, 1965, *Indian J. Ent.*, **27** (2) : 205 ; Kumar & Juneia, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 124 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 419 ; Prasad, *India J. Ent.*, (in press) Kumar, *Odonatologica* (in press) ; Kumar, *Rec. zool. Surve. India*, (in press) (Life history).

*Field Ecology* : Flight Period—Almost throughout the year ; oviposition—March-April, June-July and September-October ; emergence—almost during the above period ; larval habitat—perennial ponds, temporaty monsoon ponds, cemented garden ponds, and slow running marshy streams ; range—300-1800 m. Adults common around various aquatic habitats and amidst the nearby vegetation.

**19. Pseudagrion decorum** (Rambur, 1842) [Text fig. 3A]

*Agrion decorum* Rambur, 1842, *Ins. Névrop.* : 258 ; *Pseduagrion decorum*, Bhasin. 1953, *Indian For. Leafl.* **121** (3) : 68 ; Sahni, 1965, *Ind. J. Ent.*, **27** (2) : 205 ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 123 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—March-October ; oviposition—not known, emergence—March-June; larval habitat—slow running marshy streams; range—500-1800 m. Adults fly low over the water surface specially at spots where side pools are present.

**20. Pseudagrion laidlawi** Fraser, 1929 (Text fig. 3B)

*Pseudagrion laidlawi* Fraser, 1922, *Mem. Dep. Agric. India* (Ent.), **7** (7) : 48-50 Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 68 ; Kumar, 1973 *Oriental Ins.*, **7** (1) : 88-89 (Larva) ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 123-124.

*Field Ecology* Flight period—October-December; oviposition—not known, emergence—October-November, larval habitat—slow running streams and near the bank of river; range—400-600 m. Adults not common and occur in the jungles around streams.

**21 Pseudagrion spencei** Fraser, 1922 [Text fig. 3C]

*Pseudagrion spencei* Fraser, 1922 ; *Mem. dept. Agric. India* (Ent.), **7** (7) : 47-48 Sahni, 1972, *Bull. Ent.*, **12** (2) : 69-84.

*Field Ecology* : Not known.

**22. Ceriagrion coromandelianum** (Fabricius, 1798) [Text fig.3D]

*Agrion coromandelianum* Fabricius, 1798, *Ent. Syst. Suppl.* : 287 *Ceriagrion coromandelianum*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3): 68 ; Sahni,

1972, *Bull. Ent.*, **12** (2) : 69-84 ; Kumar, 1973, *Oriental Ins.*, **7** (1) : 89-90 (Larva) ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 124 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 97 ; Prasad, *Ind. J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press) Kumar, *Rec. zool. Surv. India*, (in press) (Life history).

*Field Ecology* Flight period—almost throughout the year; oviposition—April-October; emergence—almost in the same period as oviposition, larval habitat—slow running marshy streams perennial and seasonal monsoon ponds in submountaneous tracts. It is commonly being replaced by *Ceriagrion fallax* Ris at higher elevations; range—300-2000 m. Adults hover lazily amidst the vegetation around the aquatic habitats.

### 23. Ceriagrion cerinorubellum (Brauer, 1865) [Text fig. 3E]

*Pyrrhosoma cerinorubellum* Brauer, 1865, *Verh. zool. bot. Ges. Wien.*, **15** : 511
*Ceriagrion cerinorubellum*, Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 124-125 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 97 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* Flight period—September-November; oviposition—not known; emergence—not known; larval habitat—marshy area of large perennial water bodies; range arouod 600 m. Adults very rare amidst the vegetation near larval habitats.

### 24. Ceriagrion fallax Ris, 1914 [Text fig. 3F]

*Cariagrion fallax* Ris, 1914 *Ent. Mitteil*, **3** (2) : 47-48 ; Fraser, 1933, *Fauna Brit. India*, **1** : 321-323 ; Singh & Baijal, 1954, *Agra Univ. J. Res.*, **4** (Suppl.) : 747 ; Singh, 1963, *Agra Univ. J. Res.*, **12** (1) : 364 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—June-October ; oviposition—not known ; emergence—not known ; larval habitat—small, slow running stream in the flatter, grassy areas at higher elevations ; range—1000-2000 m. Adult common in vegetation around larval habitats.

### 25. Coenagrion dyeri (Fraser, 1919)

*Agriocnemis dyeri*, Fraser, 1919, *Rec. Indian Mus* **16** : 451-453

*Coenagrion dyeri*, Kumar, 1972, *Odonatologica*, **1** (4) : 203 ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Kumar, *Odonatologica* (in press).

*Field Ecology* : Not known.

### 26. Coenagrion kashmirus Chaudhary & Das, 1975

*Coenagrion kashmirus* Chaudhary & Das, 1975, *3rd All India Cong. Zool.* : 60-61.

*Field Ecology* : Not known.

### 27. Himalagrion pithoragarhicus Sahni, 1964

*Himalagrion pithoragarhicus* Sahni, 1964, *Agra Univ. J. Res.*, **13** (3) : 79-80.

*Field Ecology* : Not known.

### 28. Ischnura forcipata Morton, 1907 [Text fig. 3G]

*Ischnura forcipata* Motron, 1907, *Trans. Ent. Soc.*, Lond., : 306 ; Fraser, 1933, *Fauna. Brit. India*, **1** : 354-357 ; Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 68 ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (13) : 95 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 97-98 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 125-126 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 419 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—almost throughout the year save the extreme winters, oviposition—April-September ; emergence—approximately same period as of oviposition ; larval habitat—slow running marshy streams and ponds ; range—600-1500 m. Adults common near the small marshy streams and perennial ponds.

### 29, Ischnura bhimtalensis Sahni, 1965

*Ischnura bhimtalensis* Sahni, 1965, *Indian J. Ent.*, **27** (2) : 207-209.

*Field Ecology* Not known.

### 30. Ischnura delicata (Hagen, 1958) [Text fig. 3H)

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

*Iscenura delicata*, Bashin, 1953, *Indian. For. Leafl.*, **121** (3) : 68 ; Kumar, 1973, *Oriental Ins.*, **7** (1) : 90-91 (Larva) ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad, 1976, *Res. zool. Surv. India*, **71** : 98-99 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 126 Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 419 Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica* (in press).

*Field Ecology :* Flight period—almost throughout the year; oviposition—March-October; emergence—approximately same period as for oviposition; larval habitat—slow running marshy streams, weedy

banks of rivers, perennial and seasonal monsoon ponds; range—500--1500 m. Adults very common near water amidst vegetation and grass.

### 31. Ischnura rufostigma Salys, 1976 [Text fig. 4A]

*Ischnura rufostigma* Selys, 1876, *Bull. Acad. Belg.*, (2) **41** : 283 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 99 ; Prasad & Kumar, 1977, *Newsl. zool. Surv. India*, **4** (4) : 171.

*Field Ecology :* Flight period—April-October; larval habitat—at weedy banks of lakes; adults fly around vegetation at banks.

### 32. Ischnura senegalensis (Rambur, 1842) [Text fig, 4B]

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

*Ischnura senegalensis* Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 68 ; Kumar, 1973, *Oriental Ins.*, **7** (1) : 91-92 (Larva) ; Kumar & Juneja, 1976, *Newsl. zool! Surv. India*, **2** (3) : 95 ; Kumar, *Odonatologica*, (in press).

*Field Ecology :* Flight period—April-October; oviposition—July-September; emergence—April-June; larval habitat—slow running streams with lot of vegetation; range—500-800 m. Adults fly amidst the vegetation around small streams.

### 33. Ischnura inarmata Calvert, 1898

*Ischnura inarmata* Calvert, 1898, *Proc. Acad. nat. Sci. Phil.* : 147-148 ; Fraser, 1933, *Fauna Brit. India*, **1** 357-360 ; Mani *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 472.

*Field Ecology* Not known.

### 34. Aciagrion pallidum Selys, 1891 [Text fig. 4C]

*Aciagrion pallidum* Selys, 1891 *Ann Mus. Civ. Genova*, (2) **10** (30) : 512-513 Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 419.

*Field Ecology* Not known.

### 35. Rhodischnura nursei (Morton, 1907) [Text fig. 4D]

*Ischnura nursei* Morton, 1907, *Trans Ent Soc.* London 306-307 ;

*Rhodischnura nursei* Bhasin, 1953, *Indian For. Leafl.*, **121** (3) 69 ; Sahni, 1972, *Bull. Ent.*, **12** (2) : 69-84 Kumar, 1973, *Oriental Ins.*, **7** (1) : 92-93 (Larva) ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.* **73** : 419 Prasad, *Ind. J. Ent.*, (in press).

*Field Ecology :* Flight period—June-October; oviposition—June-

July; emergence—September-October; larval habitat—seasonal monsoon ponds; range—500-1500 m. Adults occur around monsoon ponds from June-October.

### 36. Enallagma parvum Selys, 1876 [Text-fig. 4E]

*Enallagma parvum* Selys, 1876, *Bull. Acad. Belg.*, **41** : 537 ; Sahni, 1972, *Bull. Ent.*, **12** (2) : 69-84 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 126.

*Field Ecology :* Flight period—March-September ; oviposition—March June ; emergence—March-October ; larval habitat—perennial and seasonal monsoon ponds ; range—600-1500 m. Adults very common near the water line of perennial ponds in summers.

### 37. Enallagma cyathigerum Charpentier, 1840

*Enallagma cyathigerum* Charpentier, 1840, Lib, Europe : 163 ; Fraser, 1933, *Fauna Brjt. India*, **1** : 373-375 ; Baijal, 1955, *Agra Univ. J. Res.*, **4** (Suppl.) : 745 ; Mani *et at.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 472 ; Kumar, *Odonatologica* (in press).

*Field Ecology* Not known

### 38. Agriocnemis pygmaea (Rambur, 1842) [Text-fig. 4F]

*Agrion pygmaea* Rambur, 1842, *Ins. Neurop.* ; 278 ; *Agriocnemis pygmaea* Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 67; Kumar, 1973, *Orient. Insects.*, **7** (1) : 93-94 (Larva) ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 99 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 127 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 419 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology :* Flight period—March-October; oviposition—period same as above; emergence—same as above; larval habitat—slow running marshy streams, perennial and seasonal monsoon ponds ; range—500-1400 m. Adults common amidst vegetation around larval habitats.

### 39. Agriocnemis clauseni Fraser, 1922 [Text-fig. 4G]

*Agriocnemis clauseni* Fraser, 1922, *Mem. Dep. Agric. India* (Ent.), **7** (7) : 55-55 ; Prasad and Singh, 1976, *Rec. zool. Surv. India*, **70** : 126-127 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 419.

*Field Ecology :* Flight period—June-September ; oviposition—not known ; emergence—not known ; larval habitats—weedy banks

of large perennial streams in the flatter regions ; range—300-500 m. Adults not common, found on vegetation around the above streams.

### 40. Agriocnemis nainitalensis Sahni, 1964

*Agriocnemis nainitalensis* Sahni, 1964, *Agra Univ. J. Res.*, **13** (3) : 81 (♀) ; Sahni, 1965, *Indian J. Ent.*, **27** : 206-207.

*Field Ecology :* Not known

### 41 Agriocnemis corbeti Kumar & Prasad, 1978

*Agriocnemis corbeti* Kumar & Prasad, 1970 *J. Bombay nat. Hist. Soc.*, **75** : 174-179.

*Field Ecology :* Flight period—March-April ; oviposition—not known ; emergence—March ; larval habitat—perennial marshy ponds ; range—600 m. Adults are rare but have been observed flying amidst grass at the marshy bank of ponds at type locality.

### 42. Onychargia indica Sahni, 1964

*Onychargia indica* Sahni, 1964, *Agra Univ. J. Res.*, **13** (3) : 81-82.

*Field Ecology :* Not known

### 43. Archibasis Sushmae Baijal, 1955

*Archibasis sushmae* Baijal, 1955. *Agra Univ. J. Res.*, **4** (suppl.) : 747-748 ; Kumar, *Odonatologica*, (in press).

*Field Ecology :* Not known

### 44. Megalestes major Selys, 1862 [Text-fig. 4H]

*Megalestes major* Selys, 1862, *Bull. Acad. Belg.*, (2) **13** : 293 ; Fraser, 1933, *Fauna Brit. India*, **1** : 21-23 ; Bhasin, 1953, *Indian For. Leafl* **12** (3) : 65 ; Sahni, 1965, *Indian J. Ent.*, **27** (2) : 211-212 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology :* Not known

## 6. Family : *Lestidae*

### 45. Sympycna paedisca annulata Selys, 1887

*Sympycna paedisca annulata* Selys, 1887, *Ann. Soc. Ent. Belg.*, **31** : 43 ; Fraser, 1933, *Fauna Brit. India*, **1** : 85-88 ; Mani *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 472.

*Field Ecology :* Not known

### 46. Sympycna paedisca kashmirensis Ander, 1944

*Sympcna paedisca kashmirensis* Ander, 1944, *Forh. K. Fysiogr. Sallsk. Lond.* 168.

*Field Ecology* : Not known

### 47. Lestes viridula Rambur, 1842 [Text-fig. 5A]

*Lestes viridula* Rambur, 1842, *Ins. Neurop.*. 252-253 ; Singh & Prasad, 1974, *J. Bombay nat. Hist. Soc.*, **70** (2) : 403 ; Prasad, 1976, *Rec. zool Surv. India*, **71** : 100 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 127-128 ; Singh & Prasad, 1977, *J. Bombay nat. Hist Soc.*, **73** : 419 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Range—300-1000m Aestivating adults commonly found in thick forest from October-April amidst dry vegetation.

### 48. Lestes praemorsa praemors Selys, 1862 [Text-fig. 5B]

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

*Lestes praemorsa praemorsa*, Sahni, 1965, *Indian J. Ent.*, **27** (2) : 212 ; Kumar, 1972, *Treubia* **28** (1) : 3-20 (Life history) ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 127.

*Field Ecology* : Flight period-mature adults common around seasonal monsoon ponds from June-September ; oviposition June-July ; emergence—September ; larval habitat—seasonal monsoon pond; srange—500-2000 m. Aestivating adults are found in deep forest in the valley away from the larval habitat from November to May.

### 49. Lestes thoracica Laidlaw, 1920 [Text-fig. 5C]

*Lestes thoracica* Laidlaw, 1920, *Rec. Indian Mus.*, **19** : 152-153 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 128.

*Field Ecology* : Flight period—July-September ; range—600 m Adults some times occur at the seasonal monsoon ponds.

### 50. Lestes barbara (Fabricius, 1798)

*Agrion barbara* Fabricius, 1798, *Suppl. Ent. Syst.* : 286 ; *Lestes barbara*, Fraser, 1933, *Fauna Brit. India* **1** : 49-51 ; Mani, *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 474.

*Field Ecology* : Not known

### 51. Lestes manaliensis Singh, 1955

*Lestes manaliensis* Singh, *Agra Univ. J. Res.* **4** (1) : 172 ; Mani *et al.*, 1955,

*Agra Univ. J. Res.*, **4** (2) : 472 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Not known

### 52. Ceylonolestes cyanea (Selys, 1862)

*Lestes cyanea* Selys, 1862. *Bull. Acad. Belg.*, (2) **13** : 335 ;

*Ceylonolestes cyanea*, Fraser, 1933, *Fauna Brit. India*, **1** : 74-77 ; Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 65 ; Kumar, *Odonatologica*, (in press) ; Prasad & Kumar, 1977 *Newsl. zool. Surv. India*, **3** (4) : 171.

*Field Ecology* : Flight period—April-September ; range—1000-1500 m.

### 53. Ceylonolestes devenporti Fraser, 1916 [Text-fig. 5D]

*Lestes gracilis birmanus* Ris, nec. Selys, 1916, *Suppl. Ent.* no. **5** : 13-14 ;

*Ceylonolestes davenporti*, Fraser, 1930, *J. Bombay nat. Hist. Soc.*, **34** : 90-97 ; Prasad & Kumar, 1977 *Newsl. zool. Surv. India*, **3** (4) : 171.

*Field Ecology* : Flight period—October ; range—1500 m.

## 7 Family : *Chlorocyphidae*

### 54. Rhinocypha quadrimaculata quadrimaculata Selys, 1853 [Text fig. 5E]

*Rhinocypha quadrimaculata* Selys, 1853, *Syn. Cal.*, : 60 ; Fraser, 1934, *Fauna Brit. India*, **2** : 14-17 ; Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 69 ; Sahni, 1972, *Bull. Ent.*, **12** (2) : 83 ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 128-129 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 100-101 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Kumar & Prasad, 1977, *Oriental Ins.*, **11** (4) : 555-558 (Larva) ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—April-November ; oviposition—not known ; emergence—April-June ; larval habitat-hill streams with ripidly flowing water, stony bottom and little or no vegetation ; range—300-1500 m. Adults, specially males, could commonly be seen perching on partially submerged stones or over hanging bushes at these streams almost from April to November.

### 55. Rhinocypha unimaculata Selys, 1853 [Text-fig. 5F]

*Rhinocypha unimaculata* Selys, 1853 *Syn. Cal* : 51 ; Bhasin, 1953, *Indian For. Leafl.*, **121** (3): 69; Sahni, 1972, *Bull. Ent.*, **12**(2): 81; Kumar, 1973. *Oriental Ins*, **7** (1) : 94-95 (Larva) Singh & Prasad, 1974, *J. Bombay*

*nat. Hist. Soc.*, **70** (2) : 404 ; Prasad & Singh, 1976, *Rec. zool Surv. India*, **70** : 129 Prasad, *Indian. J. Ent.*, (in press).

*Field Ecology*: Almost same as that of *Rhinocypha quadrimaculata.*

**56. Rhinocypha trifasciata trifasciata** Selys, 1853 [Text-fig. 5G]

*Rhinocypha trifasciata* Selys, 1853, *Syn. cat.*, : 61 ; Fraser, 1934, *Fauna Brit. India*, **2** : 31-33 ; Bhasin, 1953, *Indian For. Leafl* **121** (3) : 69 ; Mani *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 471 ; Sahni, 1972, *Bull. Ent.*, **12** (2) : 82-83 ; Singh & Prasad, 1976, *Oriental Ins.* **10** (4) ; 553-556 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 129 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press) ; Kumar & Prasad, 1977, *Oriental Ins.* **11** (4) : 549-551 (*Larva*).

*Field Ecology* : Almost same as that of *R. quadrimaculata.*

**57. Rhinocypha biforata beesoni** Fraser, 1922 [Text-fig. 5H]

*Rhinocypha biforata beesoni* Fraser 1922, *Mem. Dept. Agri. India*, (Ent), **7** : 61-62 ; Fraser, 1934, *Fauna Brit India*, **2** : 48-49 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 129 ; Kumar & Prasad, 1977, *Oriental Ins.*, **11** (4) ; 547 549 (Larva).

*Field Ecolcgy* : Flight period—May-June ; oviposition—not known ; emergence—May-June ; larval habitat—shaded forest hill streams with steady gradient in the Dehra Dun Valley ; range—300-500 m. Adults are found only around small shaded streams in thick forest where they generally perch on over hanging bushes.

**58. Rhinocypha (Aristocypha) spuria** Selys, 1879

*Rhinocypha spuria* Selys, 1979, *Bull. Acad. Belg.*, (2) **42** : 388 ; *Rhinocypha (Aristocypha) spuria*, Sahni, 1972, *Bull. Ent.*, **12** (2) : 81.

*Field Ecology* : Not known

**59. Rhincoypha immaculata** Selys, 1879

*Rhinocypha immaculata* Selys, 1879, *Bull. Acad. Belg.*, (2) **42** : 385 ; Sahni, 1972, *Bull. Ent.*, **12** (2) : 81.

*Field Ecology* : Not onown

**60. Libellago lineata lineata** (Burmeister, 1839) [Text-fig. 6A]

*Calopteryx lineata* Burmeister, 1939, *Handb. Ent.*, **2** : 826 ; *Labellago lineata lineata*. Fraser, 1934, *Fauna Brit. India*, **2** : 60-63 ; Bhasin, 1953, *Indian*

*For. Leafl.*, **121** (3) : 69. Sahni, 1972, *Bull. Ent* **12** (2) : 80-81 ; Kumar & Juneja. 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 130 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Prasad, *Indian J. Ent* (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—June-October ; larval habitat—side pools of large hill streams and along deep shore line of large perennial water bodies ; range—600-1000 m. Adults rare, local insects, fly low over the water surface near shore.

## 8. Family *Epallagidae*

### 61 Bayadera indica (Selys, 1853) [Text-fig. 6B]

*Epallage indica* Selys, 1853, *Syn. Cal* : 49 ; *Bayadera indica*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 70 ; Sahni; 1972, *Bull. Ent.*, **12** (2) : 78-80 ; Kumar; 1973, *Oriental Ins.*, **7** (1) : 95-97 (Larva) ; Singh & Prasad 1974, *J. Bombay nat. Hist. Soc.*, **70** (2) : 404-405 ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*: **2** (3) : 95 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 101 ; Prasad & Singh, 1976, *Rec zool. Surv. India*, **70** : 130 ; Prasad, *Indian J. Ent.*, (in press), Kumar, *Odonatologica* (in press).

*Field Ecology* : Flight period—April-October ; oviposition—September-October, emergence—April-June ; larval habitat fast flowing hill streams with stony bed ; range—500-2000 m. Adults common around streams in summer when emergence occurs and again towards decline of the monsoon (October), when oviposition takes place. During the intermediate period they commonly shelter in forest vegetation away from larval habitats.

### 62. Anisopleura lestoides Selys, 1853 [Text-fig. 6C]

*Anisopleura lestoides* Selys. 1853, *Syn. Cal.*, : 48 ; Bhasin, 1953, *Indian For. Leafl* **121** (3) : 70 ; Sahni, 1972, *Bull. Ent* **12** (2) : 77-78 ; Singh & Prasad, 1974, *J. Bombay nat. Hist. Soc.*, **70** (2) : 404 ; Prasad & Singh, 1976 ; *Rec. zool. Surv. India*, **70** : 130 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar & Prasad, 1977, *Entomon*, **2** (2) : 229-230 (Larva).

*Field Ecology* : Flight period—May-October ; emergence—May-June ; larval habitat—small semi-permanent hill streams with rapid current, clear water and stony bed, identical to those of *Bayadera indica* ; range—600 2000 m. Adults are common around small hill streams in summer.

### 63. Anisopleura comes Selys, 1880 [Text fig. 6D]

*Anisopleura comes* Selys, 1880; *C. R. Soc. Ent. Belg.*, **13** : 64 ; Fraser, 1934,

*Fauna Brit. India*, **2** : 87-89 ; Bhasin, 1953, *Indian For. Leafl.*, **121** (3) ; 70 ; Prasad & Singh, 1976 ; *Rec. zool. Surv. India*, **70** : 130-131 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Almost similar to *Anisopleura lestoides*, however, a rare species.

### 64. Anisopleura kusumi Sahni, 1965

*Anisopleura kusumi* Sahni, 1965, *Indian J. Ent.*, **27** (2) : 212-215.

*Field Ecology* : Not known

### 65. Epallage fatima (Charpentier, 1840)

*Agrion fatima* Charpentier, 1840, *Lib. Europ.* 132 ; *Epallage fatima*, Fraser, 1934, *Fauna Brit. India*, **2** ; 76-78 ; Mani, *et al.*, 1955, *Agra. Univ. J. Res.*, **4** (2) : 471.

*Field Ecology* : Not known

## 9. Family : *Calopterygidae*

### 66. Neurobasis chinensis chinensis (Linn., 1758) [Text-fig. 6E]

*Libellula chinensis* Linnaeus, 1758, *Syst. nat.*, **1** : 545 ; *Neurobasis chinensis chinensis*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 70 ; Sahni, 1965, *Indian J. Ent.*, **27** : 215-216 ; Kumar, 1973, *Oriental Ins.*, **7** (1) : 96-97 (Larva) ; Kumar & Juneja, 1976, *Newsl. zool Surv. India*, **2** (3) : 95 ; Prasad , 1976, *Rec. zool. Surv. India*, **71** : 101-103 ; Prasad & Singh, 1976, *Rec. zool. Surv. India*, **70** : 131 ; Singn & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Kumar & Prasad, 1977, *Odonatologica*, **6** (3) : 163-171 (Ethology) ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica* (in press).

*Field Ecology* : Flight period—common in February to October, rare in November, oviposition—April-June, October ; emergence—February-June, September-October ; larval habitat—slow running marshy streams or artificial water channels (1-1.5 m. wide and approx. 50 cm. deep) present in comperatively plain or level region ; range-500-2000 m, but usually found at 600-1200 mtrs. Adults are sun loving and flutter lazily over hanging vegetation in the late forenoon, confined to the larval habitats and demonstrate complex territorial behaviour.

## II. Suborder *Anisoptera*

### I. Family *Gomphidae*

### 67. Anisogomphus occipitalis (Selys, 1854) [Text-fig. 6F]

*Gomphus occipitalis* Selys, 1854, *Bull. Acad. Belg.*, **21** (2) : 45 ; *Anisogomphus occipitalis*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 71 ; Kumar, 1973, *Oriental Ins.*, **7** (2) : 293 (Larva) ; Prasad, *Indian J. Ent.*, (in press).

*Field Ecology* : Flight period—May-October ; emergence—May-June ; larval habitat—side pools of typical hill streams ; range—600-1000 m. Adulta do not occur near the larval habitats.

### 68. Anisogomphus bivittatus (Selys, 1854)

*Gomphus bivittatus* Selys, 1854, *Bull. Acad. Belg.*, **21** (2) : 46 ; *Anisogomphus bivittatus*, Fraser, 1934, *Fauna Brit. India*, **2** : 192-194 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica* (in press).

*Field Ecology* : Not known

### 69. Onychogomphus M-flavum Selys, 1894 [ Text-fig. 6G ]

*Onychogomphus M-flavum* Selys, 1894, *Ann. Soc. Ent. Belg.*, **38** : 169 ; Sahni, 1970, *Bull. Ent.*, **11** (2) : 127-128 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 102-103 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 24 ; Prasad, *Indian J. Ent.*, (in press).

*Field Ecology* : Adults sometimes found patrolling over the small channel like streams.

### 70. Onychogomphus cerastes (Selys, 1854) [Text-fig. 6H]

*Nphiogomphus cerastes* Selys, 1854, *Bull. Acad. Belg.*, **21** (2) : 41 ; *Onychogomphus cerastes*, Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 24.

*Field Ecology* ; Not known

### 71 Onychogomphus bistrigatus (Selys, 1854)

*Gomphus bistrigatus* Selys, 1854, *Bull. Acad. Belg.*, **21** (2) : 46 ; *Onychogomphus bistrigatus*, Fraser, 1934, *Fauna Brit. India*, **2** : 247-248 ; Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 71.

*Field Ecology* : Not known

### 72. Onychogomphus duaricus Fraser, 1924

*Onychogomphus duaricus* Fraser, 1924, *J. Bombay nat. Hist. Soc.*, **29** : 1001-1003 ; Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 71.

*Fieid Ecology* : Not known.

**73. Onychogomphus garhwalicus** Singh & Baijal, 1954

*Onychogomphus garhwalicus* Singh & Baijal, 1954, *Agra Univ. J. Res.*, **3** (2) 385-387.

*Field Ecology* : Not known

**74. Lamelligomphus biforceps** (Selys, 1878) [ Text-fig. 7A ]

*Onychogomphus biforceps* Selys, 1878, *Bull. Acad. Belg.*, (2) **46** : 420 ; *Lamelligomphus biforceps* Prasad, *Indian J. Ent.*, (in press).

*Field Ecology* : Flight period—May-October ; emergence – May-early June ; larval habitat—typical fast flowing hill streams ; range—around 1000 m. Adults found hovering over vegetation away from larval habitats.

**75. Lamelligomphus risi** (Fraser 1922) [ Text-fig. 7B ]

*Gomphus risi* Fraser, 1922, *Mem. Dept. Agri. India*, **7** : 73 ; *Lamelligomphus risi*, Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 24 ; Prasad & Kumar, 1977, *Newsl. zool. Surv. India*, **3** (4) : 172.

*Field Ecology* : Flight period—May-October ; emergence—May-June ; larval habitats—marshy small hill streams ; range—approv. 1300 m. Adults found hovering over the vegetation near the small marshy hill streams.

**76. Nepogomphus modestus** (Selys, 1878) [ Text-fig 7C ]

*Onychogomphus modestus* Selys, 1878, *Bull. Acad. Belg.* **46** (2): 423 ; *Nepogomphus modestus*, Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 103 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 24 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica* (in press).

*Field Ecology* : Flight period—May-October ; emergence—May-June ; larval habitat hill streams with steep gradient ; range—600-1000 m. Adults found near the hill streams during the emergence season and sometimes mature adults could be observed patrolling over streams in the thick forest.

**77. Mesogomphus lineatus** (Selys, 1850) [ Text-fig. 7D ]

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

Fraser, 1934, *Fauna Brit. India*, **2** : 230-234 ; Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 71 ; Kumar, 1973, *Oriental Ins.*, **7** (2) : 294-295 (Larva) : Prasad, 1976, *Rec. zool. Surv. India*, **71** : 102 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 23 ; Singh and Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420.

*Field Ecology* : Flight period—February-October ; oviposition—not known ; emergence—February-June ; larval habitat—hill streams with sand the pebbles at the bed, larvae burrow in coarse sand in shallow water ; range—300-800 m. Adults rare, only sometimes found near the hill streams.

### 78. Anormogomphus kiritschenkoi Bartenef, 1913

*Anormogomphus kiritschenkoi* Bartenef, 1913, *Revue Russe d' Ent.*, **13** ; 179 ; Singh & Prasad, 1974, *J. Bombay nat. Hist. Soc.*, **70** (2) : 403-405 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 22.

*Field Ecology* : Not known

### 79. Anormogomphus heteropterus Selys, 1854

*Anormogomphus heteropterus* Selys, 1854, *Bull. Acad. Belg.*, **31** (2) : 61 ; Prasad, 1976, *Rec zool. Surv. India*, **71** : 102 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 22.

*Field Ecology* : Not known

### 80. Acrogomphus mohani Sahni, 1964

*Acrogomphus mohani*, Sahni, 1964, *Agra Univ. J. Res.*, **13** (2) : 93-94.

*Field Ecology* : Not known

### *81 Platygomphus attenuatus Fraser

*Field Ecology* : Not known

### 82. Ophiogomphus reductus Calvert, 1898

*Ophiogomphus reductus* Calvert, 1898, *Proc. Acad. Sci. Phil* ; 150-152 ; Fraser, 1934, *Fauna Brit. India*, **2** : 306-309 ; Mani *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 472.

*Field Ecology* : Not known

### 83. Davidius aberrans aberrans (Selys, 1873)

*Hagenius ? aberrans* Selys, 1873, *Bull. Acad. Belg.* **36** (2) : 506 ; *Davidius aberrans aberrans*, Fraser, 1934 ; *Fauna Brit. India*, **2** : 165-167.

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*Details not available

*Field Ecology* : Not known

### 84. Davidius kumaonensis Fraser, 1926

*Davidius kumaonensis* Fraser, 1926, *J. Bombay nat. Hist. Soc.*, **31** : 170: Fraser, 1934, *Fauna Brit. India*, **2** ; 171-172.

*Field Ecology* : Not known

### 85. Burmogomphus sivalikensis Laidlaw, 1922

*Burmogomphus sivalikensis* Laidlaw, 1922, *Rec. Indian. Mus.*, **14** : 401-402 ; Fraser, 1934, *Fauna Brit. India.*, **2** : 217-219 ; Kumar, 1973, *Oriental Ins.* **7** (2) : 294 (Larva) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—May-October ; emergence—May-July ; larval habitat—small hill streams with steep gradient and rocky substratum ; range—approx. 600 m. Adults rarely seen alighting on partially submerged boulders in hill streams.

### 86. Burmogomphus hasimaricus Fraser, 1926

*Burmogomphus hasimaricus* Fraser, 1926, *J. Bombay. nat. Hist Soc.*, **31** : 411.

*Field Ecology* : Not known

### 87. Ictiongomphus rapax (Rambur, 1842) [ Text-fig. 7E ]

*Diastatoma rapax* Rambur, 1842, *Ins. Neurop.* 169 ; *Ictinogomphus rapax* ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (2) : 95 ; Prasad. 1976, *Rec. zool. Surv. India*, **71** : 103 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 25 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—June-October ; oviposition— not known ; emergence—May-June ; larval habitat—perennial ponds ; rgnge—900-1000 m. Adults could commonly be observed perching on vegetation at the banks of such ponds in post-monsoon period.

## 2. Family *Aeshnidae*

### 88. Gynacanthaeschna sikkima (Karsch, 1891) [Text-fig 7F ]

*Cephalaeschna sikkima* Karsch, 1891, *Ent. Machr.* **17** : 6-7 ; *Gynacanthaeschna sikkima*, Bhasin, 1963. *Indian For. Leafl.*, **121** (3) : 72 ; Prasad & Kumar, 1977, *Newsl. zool. Surv. India*, **3** (4) : 172.

*Field Ecology* : Adults occur under the thick thorny bushes around the hill streams in post monsoon period, *i.e* , September-November.

### 89. **Cephalaeschna orbifrons** Selys, 1883

*Cephalaeschna orbifrons* Selys, 1883, *Bull. Acad. Belg.*, **5** (3) : 739 ; Fraser, 1936, *Fauna Brit. India*, **3** : 67-69 ; Kumar, *Ononatologica*, (in press).

*Field Ecology* : Not known

### 90. **Gynacantha khasiaca** MacLachlan, 1896 [ Text-fig. 7G ]

*Gynacantha khasiaca* MacLachlan, 1896, *Ann. Mag. nat. Hist.*, **17** (6) 411 ; Prasad & Kumar, 1977, *Newsl. zool. Surv. India*, **3** (6) : 340.

*Field Ecology* : Not known

### 91. **Aeshna ornithocephala** MacLachlan 1896 [ Text-fig. 7H ]

*Aeshna ornithocephala* MacLachlan, 1896, *Ann. Mag. nat. Hist.*, **17** (6) : 368 ; Fraser, 1936, *Fauna Brit. India*, **3** : 125-127 ; Kumar, *Odonatologic*, (in press) ; Prasad & Kumar, 1977, *Newsl. zool. Surv. India*, **3** (4) : 173.

*Field Ecology* : Not known

### 92. **Aeshna mixta** Latreille, 1805

*Aeshna mixta* Latreille, 1805, *Hist. Nat. Crust. Ins.*, **13** : 7 ; Fraser, 1936, *Fauna Brit. India*, **3** : 130-132.

*Field Ecology* : Not known

### 93. **Aeshna juncea** (Linnaeus, 1758)

*Libellula juncea* Linnaeus, 1758, *Syst. Nat.*, **10** : 544 ; *Aeshna juncea*, Fraser, 1936, *Fauna Brit. India*, **3** : 132-135 ; Mani, *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 471

*Field Ecology* : Not known

### 94. **Polycanthagyna erythromelas** (MacLachlan, 1896)

*Aeschna erythromelas* MacLachlan, 1896, *Ann. Mag. nat. Hist.*, **17** (6) ; 368 ; *Polycanthagyna erythromelas*, Fraser, 1936, *Fauna Brit. India*, **3** : 120-122 ; Kumar, *Odonatologica* (in press).

*Field Ecology* : Not known

### 95. **Anax imperator** Leach, 1815,

*Anax imperator* Leach, 1815, *Endin. Encycl.*, **9** : 137 ; Fraser, 1936, *Fauna Brit. India*, **3** : 136-138 ; Sangal & Kumar, 1970, *J. nat. Hist.*, **4** : 305-316 (Larva).

*Field Ecology* : Not known

### 96. Anax immaculifrons Rambur, 1842 [Text-fig 8A ]

*Anax immaculifrons* Rambur, 1842, *Ins. Neurop.*, 189 ; Fraser, 1936, **3** : 145-146 Sangal & Kumar, 1970, **4** : 310-313 (Larva) ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 25 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—April-June (common), rarely found upto October ; oviposition—May-June ; emergence—April-June ; larval habitat—rocky pools of hill streams with steep gradient ; range—600-2000 m. Adults are difficult to found since they normaly occur at ravines traversed by streams in forest.

### 97. Anax guttatus (Burmeister, 1839) [ Text-fig. 8B)

*Aeshna guttatus* Burmeister, 1839, *Handb. Ent.*, **2** : 840 ; *Anax guttatus*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 73 ; Sangal & Kumar, 1970, *J. nat. Hist.*, **4** : 305 : 310 (Larva) ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 25 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—June-october ; oviposition—June-July ; emergence—September-October ; larval habitat—seasonal monsoon ponds ; range—500-2000 m. Adults seen patrolling high over the seasonal water bodies during monsoons.

### 98. Anax nigrofasciatus nigrolineatus Fraser, 1935 [Text-fig 8C]

*Anax nigrolineatus* Fraser, 1935, *J. Darjeeling nat. Hist. Soc.*, **10** : 23-25 ; Bhasin, 1953, *Indian, For, Leafl.*, **128** (3) : 73 ; *Anax nigrofasciatus nigrolineatus*, Asahina, 1962, *Jap. J. zool.* **13** (2) ; 249-255 ; Sahni, 1970, *Bull. Ent.* **11** (2) ; 129-130 ; Kumar, 1973, *Odonatologica*, **2** ; 84-85 (Larva) ; Prasad, *Indian J. Ent.*, (in press).

*Field Ecology* : Flight period—April-October ; emergence—June-September ; larval habitat—large fresh water perennial bodies ; lakes ; range—1500-2000 m. Adults could be observed during the summer and monsoon seasons over the mountain lakes at high elevation.

### 99. Anax parthenope parthenope (Selys, 1839)

*Aeshna (Anax) parthenope* Selys, 1839, *Bull. Acad. Belg.*, **6** (2) 389 ; *Anax. parthenopoe parthenope*, Fraser, 1936, *Fauna Brit. India*, **3** : 142-145 ; Sahni, 1966, *Indian J. Ent.*, **27** : 288-289; Kumar, 1973, *Odonatologica*, **2** (3) : 86-89 (Larva) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Not known

### 100. Anaciaeschna kashmirense Singh & Baijal, 1954

*Anaciaeschna kashmirense* Singh & Baijal, 1954, *Agra Univ. J. Res.*, **3** (2) : 388-391 ; Mani *et al.* 1955, *Agra Univ. J. Res.*, **4** (2) : 471.

*Field Ecology* : Not known

### 101. Hemianax ephippiger (Burmeister, 1839) [Text-fig. 8D]

*Aeshna ephippiger*, Burmeister, 1839, *Handb. Ent. Band.*, **2** : 840 ; *Hemianax ephippiger*, Prasad, 1976, *Rec. zool. Surv. India*, **71** : 103-104 ; Prasad & Kumar, 1977, *Newsl. zool. surv. India*, **3**(4) : 173.

*Field Ecology* : Not known

### 102. Anotogaster basalis basalis Selys, 1854 [ Text-fig. 8E ]

*Anotogaster basalis* Selys, 1854, *Bull. Acad. Belg.*, **21** (2) : 102 ; *Anotogaster basalis basalis*, Fraser, 1936, *Fauna Brit. India*, **3** : 46-49 ; Bhasin, 1953 *Indian For. Leafl.*, **121** (3) : 72 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Not known

### 103. Allogaster parvistigma (Selys, 1873)

*Thecagaster parvistigma* Selys, 1873, *Bull. Acad. Belg* **36** (2) : 508 ; *Allogaster parvistigma*, Fraser, 1936, *Fauna Brit. India*, **3** : 41-43 ; Mani, *et al.*, 1955, *Agra Univ. J. Res*, **4** (2) : 472 ; Kumar, *Ododatologica*, (in prees).

*Field Ecology* : Not known

### 104. Cordulegaster brevistigma brevistigma (Selys, 1854)

*Thecagaster brevistigma* Selys, 1854, *Bull. Acad. Belg.*, **21** (2) : 103 ; *Cordulegaster bevistigma* Fraser, 1936, *Fauna Brit. India*, **3** : 32-35 ; Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 72 ; Mani, *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 472 ; Singh, 1955, *Agra Univ. J. Res.*, **4** (2) : 743-744 ; Kumar, 1973, *Oriental Ins.* **7** (2) : 295-296 (Larva) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Not known

### 105. Cordulegaster brevistigma folia Fraser, 1929

*Cordulegaster brevistigma folia*, Fraser, 1929, *Mem. Indian Mus.*, **9** (3) : 73, 98, 120-121 ; Fraser, 1936, *Fauna Brit. India*, **3** : 35-37.

*Field Ecology* : Not known

### 106. Chlorogomphus atkinsoni (Selys, 1878)

*Orogomphus atkinsoni* Selys, 1878, *Bull. Acad. Belg.*, **46** (2) : 682 ; *Chlorogomphus atkinsoni*, Fraser, 1936, *Fauna Brit India*, **3** : 26-28 ; Bhasin, 1953, *Indran For. Leafl.*, **121** (3) : 72.

*Field Ecology* : Non known

### 107. Chlorogomphus olympicus Fraser, 1933

*Chlorogomphus olympicus* Fraser. 1933, *Mem. Indian Mus.*, **9** (6) : 257-258 ; Fraser, 1936, *Fauna Brit. India*, **3** : 24-26 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Not known

### 108. Macromia moorei Selys, 1874 [Text-fig. 8F]

*Macromia moorei* Selys, 1874, *Bull.Acad.Belg.*, **37**(2). 28; Fraser, 1936. *Fauna Brit. India*, **3** : 164-166 ; Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 74 ; Sahni, 1964, *Agra Univ. J. Res.*, **13** (2) : 92-93 ; Kumar, 1973, *Oriental Ins.*, **7** (2) : 296-297 (Larva) ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 104 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** ; 25-26 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—April-November, oviposition—October-November ; emergence—April-July ; larval habitar-side pools of hill streams with steep gradent ; range—600-2000 m. Adults fly high above the larval habitats in post monsoon period.

### 109. Epophthalmia vittata vittata Burmeister, 1839

*Epophthalmia vittata* Burmeister, 1839, *Handb. Ent., Band.*, **2** : 845 ; *Epophthalmia vittata vittata*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 73.

*Field Ecology* : Not known

## 5. Family : *Macrodiplactidae*

### 110. Selysiothemis nigra (Vander Linden, 1825)

*Libellula nigra* Vander Linden, 1825, *Monogr., :* 16 ; *Selysiothemis nigra*, Fraser, 1936, *Fauna Brit. India*, **3** : 451-452 ; Mani *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 473.

*Field Ecology* : Not known

## 6. Family : *Libellulidae*

### 111. Tetrathemis platyptera Selys, 1878 [Text-fig. 8G]

*Tetrathemis platyptera* Selys, 1878; *Mitt. Mus. Dresden* : 316 ; Singh &

Prasad, 1977, *J. Bombay nat, Hist. Soc.*, **73** (2) : 420 ; Prasad & Kumar, 1977, *Newsl. zool. Surv. India*, **3** (4) : 173.

*Field Ecology* : Flight period—June-July, October ; emergence—June ; larval habitat—stagnant pools of small marshy streams in thick forests ; range—300-503 m. Adults are rare and localized.

### 112. Hyelaeothemis gardeneri Fraser, 1927

*Hyelaeothemis gardeneri* Fraser, 1927, *Rec. Indian Mus.*, **29** : 66-67 ; Fraser, 1936, *Fauna Brit. Indian* **3** : 262-263.

*Field Ecology* : Not known

### 113. Cratilla lineata calverti Forster, 1903 [Text-fig. 8H]

*Orthemis lineata* Brauer, 1878, *Sitzungsber Akad, Wien*, **77** : 9 ; *Cratilla calverti* Forster, 1903, *Ann. Mus. nat. Hung.*, **1** : 537-sex ; *Cratilla lineata calverti*, Lieftinck, 1949, *Verh. Naturai Ges*, Basel., **64** (1) : 201-202 ; *Caratilla lineata*, Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 26 ; Singh & Prasad, 1974, *J. Bombay nat. Hist. Soc.*, **70** (2) : 404 ; Prasad, *Indian J. Ent.*, (in press).

*Field Ecology* : Flight period—June October ; larval habitat—seasonal monsoon ponds in forests ; range—300-600 m. Adults are rare, occur around larval habitats at monsoon-ponds.

### 114. Potamarcha obscura (Rambur, 1842) [Text-fig. 9A]

*Libellula obscura* Rambur, 1842, *Ins. Neurop.* : 64 ; *Potamarcha obscura*, Kumar, 1973, *Oriental Ins.*, **7** (2) : 298-299 (Larva) Prasad, 1976, *Rec. zool. Surv. India*, **71** : 104-105 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 26.

*Field Ecology* : Flight period—April-October ; oviposition—June-July ; emergence—September-October ; larval habitat—seasonal monsoon ponds ; range—around 500 m. Adults some times occur perching on vegetation around small slow running streams and commonly at seasonal monsoon ponds.

### 115. Libellula quadrimaculata Linnaeus, 1758

*Libellula quadrimaculata* Linnaeus, 1758, *Syst. Nat.*, **10** ; 543 ; Fraser, 1936, *Fauna Brit. India*, **3** : 315-316 ; Mani *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 472.

*Field Ecology* : Not known.

### 116. Orthetrum brunneum brunneum (Fonscolombe, 1837) [Text-fig. 9B]

*Libellula brunnea* Fonscolombe, 1837, *Ann. Soc. Ent.* France, **6** : 141 *Orthetrum brunneum brunneum*, Fraser, 1936, *Fauna Brit. India*, **3** : 294-295 ; Bhasin, 1953, *Indian For. Leafl.* **121** (3) : 76 ; *Mani, et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 472 ; Kumar, 1971, *J. nat. Hist.*, **5** : 121-132 (Larval stages) : Kumar & Juneja, 1976, *Newsl zool. Surv. India*, **2** (3) : 95 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*. **70** : 26 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—June-November ; oviposition—July-October ; emergence—May-June ; larval habitat-side pools of hill streams ; range—600-2000 m. Adults alite on rocky bed of hill streams.

### 117. Orthetrum taeniolatum (Schneider, 1845) [Text-fig. 9C]

*Libellula taeniolata* Schneider, 1845, *Stett., Ent. Zeit.*, **6** : 111 ; *Orthetrum taeniolatum*, Bhasin, 1953. *Indian, For. Leafl*, **121** (3) : 77 ; Kumar, 1971, *J. nat. Hist.*, **5** ; 131-132 (Larva) ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 105 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 27 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in prees).

*Field Ecology* : Flight period—almost around the year ; oviposition—July-September ; emergence—May-June ; larval habitat—slow running marshy streams with mud and algal growth ; range—300-1800 m. Adults common at open rocky and sanday beds of the streams.

### 118. Orthetrum anceps (Schneider, 1845)

*Libellula anceps* Schneider, 1845, *Stett. Ent. Zeit*:, **6** : 111 ; *Orthetrum anceps* ; Kumar, *Odonatologica*, (in press) ; Prasad & Kumar, 1977, *Newsl. zool. Surv. India*, **3** (4) : 173- 174.

*Field Ecology* : Not known

### 119. Orthetrum chrysostigma luzonicum (Brauer, 1868) [Text-fig. 9D]

*Libellula luzonica* Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, **38** : 169, 732 ; *Orthetrum chrysostigma luzonicum*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 76 ; Baijal, 1955' *Agra Univ. J. Res.*, **4** (Suppll.) : 745-746 ; Singh. 1963, *Agra Univ. J. Res.*, **12** (1) : 364 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 105-106 ; Singh & Prasad, 1976, *Rec. zool.*

*Surv. India*, **70** : 27 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Prasad, *Indian J. Ent.*, (in press).

***Field Ecology*** : Flight period—May-November ; larval habitat—slow running marshy streams ; range—300-2000 m. Adults common at bushes and marshy bed around streams.

### 120.Orthetrum japonicum internum MacLachlan, 1894 [Text-fig. 9E]

*Orthetrum japonicum internum* MacLachlan, 1894, *Ann. Mag. nat. Hist.* **13**, (6) : 431 ; Fraser, 1936, *Fauna Brit. India*, **3** : 304-305 ; Bhasin, 1953, *Indian For. Lenfl.* **121** (3) : 76 ; Baijal, 1955, *Agra Univ. J. Res.* **4** (Suppll.) : 745 ; Mani, *et al.*, 1955, **4** (2) : 473 Prasad, 1976, *Rec zool. Surv. India*. **71** ; 106-107 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica* (in press).

***Field Ecology*** : Flight period—June-January ; range—300-3000 m. Adults common near hill streams, perching on bushes.

### 121 Orthetrum guptai Baijal, 1955

*Orthetrum guptai* Baijal, 1955, *Agra Univ. J. Res.*, **4** (Suppll.) : 746 ; Singh, 1963, *Agra Univ. J. Res.*, **12** (8) : 364 ; Kumar, *Odonatologica*, (in press).

***Field Ecology*** : Not known

### 122. Orthetrum garhwalicum Singh & Baijal, 1954p [Text-fig. 9F]

*Orthetrum garhwalicum* Singh & Baijal, 1954, *Agra Univ. J. Res.*, **3** (2) : 393-395 ; Kumar & Prasad 1976, *Newsl. zool. Surv India*, **2** (3) : 94.

***Field Ecology*** : Range—1600-3000 m. Adults occur in open ravines near torrential streams during summer.

### 123. Orthetrum cancellatum cancellatum (Linnaeus, 1758)

*Libellula cancellata* Linnaeus, 1758, *Syst. Nat.*, **10** (1) : 544 ; *Orthetrum cancellatum cancellatum*, Fraser, 1936, *Fauna Brit. Ind.*, **3** : 302-304 ; Baijal, 1955, *Agra Univ. J. Res.*, **4** (Suppll.) ; 745 ; Mani, *et al.*, 1955, *Agra. Univ. J. Res.*, **4** (2) : 473 ; Kumar, *Odonatologica* (in press).

***Field Ecology*** : Not known

### 124. Orthetrum chrysis (Selys, 1891)

*Libella testacea* race, *chrysis* Selys, 1891, *Ann. Mus. Civ. Genoya*, **30** ; 462 ; *Orthetrum chrysis*, Kumar, *Odonatologica*, (in press).

*Field Ecology* : Not known

### 125. Orthetrum glaucum (Brauer, 1865) [Text-fig. 9G]

*Libellula glauca Brauer*, 1865, *Verh. zool. bot. Ges.* Wien., **15** : 1012 ; *Orthetrum glaucum*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 76 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 107 ; Singh & Prasad, 1976, *Rec. zool Surv. India*, **70** : 29 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—June-November ; emergence—June-July ; larval habitat—stagnent side pools of small hill streams ; range—300-800 m. Adults are common in the side pools of the hill streams perching on bushes.

### 126. Orthetrum sabina sabina (Drury, 1770) [Text-fig. 9H]

*Libellula sabina* Drury, 1770, *Ill. Exotic Ins.*, **1** : 114 ; *Orthetrum sabina*, Sahni, 1964, *Agra Univ. J. Res.*, **13** (2) : 89 ; Kumar, 1973, *Oriental. Ins.*, **7** (2) : 297-298 (Larva) ; Kumar & Juneja ; 1976, *Newsl. zool. Surv. India*, **2** (3) ; 95 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 106 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 27-28 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Prasad, *Indian J. Ent.*, (in press) ; *Orthetrum sabina sabina*, Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—almost round the year except December to February ; oviposition-almost continuously during the flight period ; emergence—March-October ; lerval habitat—marshy side pools of slow running streams, perennial and seasonal monsoon ponds ; range—500-1200 m. Adults are common around larval habitats or perching on bushes in submontaneous forests.

### 127. Orthetrum fraseri Sahni, 1965

*Orthetrum freseri* Sahni, 1965 *Indian J. Ent* **27** ; 280-281.

*Field Ecology* : Not known

### 128 Orthetrum mathewi Singh & Baijal, 1954

*Orthetrum mathewi* Sigh & Baijal, 1954 *Agra Univ. J. Res.*, **3** (2) : 391-393 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Not known

### 129. Orthetrum pruinosum neglectum (Rambur, 1842) [Text-fig. 10A]

*Libellula neglecta* Rambur, 1842, *Ins. Nevrop.*, 86 ; *Orthetrum pruinosum neglectum*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 76 ; Baijal, 1955, *Agra Univ. J. Res.*, **4** (Suppll.) : 744-745 ; Singh, 1963, *Agra Univ. J. Res.*, **12** (1) : 364 ; Sahni, 1965, *Indian. J. Ent.*, **27** : 277 ; Kumar 1970, *Bull. Ent.*, **11** (1) : 85-93 (Bionomics) ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad, 1976 *Rec. zool. Surv. India*, **71** : 107-108; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 29 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Prasad, *Indian J. Ent.* (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—throughout the year ; oviposition almost round the year ; emergence—almost round the year ; larval habitat—marshy side pools of slow running streams, perennial and seasonal monsoon ponds, paddy fields, and Cemented tanks ; range—300-1800 mtrs. Adults slow fliers, seen perching on vegetation around larval habitats.

### 130. Orthetrum gangi Sahni, 1964

*Orthetrum gangi* Sahni, 1964, *Agra Univ. J. Res.*, **13** (2) : 89-90

*Field Ecology* : Not known

### 131. Orthetrum triangulare triangulare (Selys, 1978) [Text-fig. 10B]

*Libella triangularis* Selys, 1878, *Mitth. Mus. Dresden* : 314 ; *Orthetrum triangulare triangulare*, Fraser, 1936, *Fauna Brit. India*, **3** : 305-307 ; Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 77 ; Singh & Baijal, 1954, *Agra Univ. J. Res.*, **3** (2) : 396-397 ; Mani, *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2): 473 Sahni, 1965, *Indian J. Ent* **27**: 277-280; Kumar & Juneja, 1976, *Newsl. zool. Surv India*, **2** (3) : 95-96 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 197 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 28-29 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Prasad, *Indian J. Ent.*, (in press), Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—June-October ; emergence—June-July ; larval habitat—marshy pools of slow running hill streams ; range—300-2300 m. Adults are common around hill streams.

### 132. Palpopleura sexmoculata sexmaculata (Fabr., 1787) [Text-fig. 10 C & D]

*Libellula sexmaculata Fabricius*, 1787, *Mant. Ins.* **1** : 338 ; *Polpopleura*

*sexmaculata sexmaculata*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) 77 ; Sahni, 1965, *Indian J. Ent.*, **27** : 281-282 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 108-109 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 30 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc*, **73** : 420 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—May-October ; emergence—June ; larval habitat—rocky marshy pools at the beds of hill streams range—300-2300 m. Adults commonly occur on hills away from, streams or sheltering in vegetation immediately following emergence.

### 133. Nannophya katrainais Baijal, 1955

*Nannophya katrainsis* Baijal, 1955, *Agra Univ. J. Res.*, **4** (Suppll) : 744 ; Singh, 1963, *Agra Univ. J. Res.*, **12** (1) : 364 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Not known

### 134. Brachydiplax sobrina (Rambur, 1842) [Text fig.-10E]

*Libellula sobrina* Rambur, 1842, *Ins. Nevrop.* : 114 ; *Brachydinlax sobrina*, Singe & Prasad, 1974, *J. Bombay nat. Hist Soc.*, **70** (2) : 404 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 109 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 30.

*Field Ecology* : Range—around 600 m. Adults occur at small streams during summer.

### 135. Acisoma panorpoides panorpoides Rambur, 1842 [Text-fig. 10F]

*Acisoma panorpoides* Rembur, 1842, *Ins. Nevrop.* : 28 ; *Acisoma panorpoides panorpoides*, Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 109-110 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 30-31 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—March-september ; oviposition—April ; emergence—June-July ; larval habitat—perennial ponds ; range 300-800 m. Adults common at the vegetation around perennial ponds.

### 136. Crocothemis servilia servilia (Drury, 1778) [Text-fig. 10G]

*Libellula servilia* Drury, 1778, *Ill. Ex. Ins.*, **1** : 112-133 ; *Crocothemis servilia*

*servilia*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) 74 ; Sahni, 1965, *Indian J. Ent.*, **27** : 284 ; Sangal and Kumar, 1970, *J. nat. Hist.*, **4** : 34-36 (Larva) ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 110-111 ; Singh & Prasad, 1976, *Rec. zool, Surv. India*, **70** : 32 ; Singh & Prasad, 1977, *J. Bombay nat Hist Soc.*, **73** : 420 ; Prasad, *Indian J. Ent*, (in press) ; Kumar, *Odonatologica* (in press)

***Field Ecolgoy*** : Flight period, oviposition and emergence almost throughout the year ; larval habitat—side pools of slow running streams, perennial, seasonal monsoon ponds and paddy fields ; range—300-1800 m. Adults very common at vegetation around and away from larval habitats.

### 137. Crocothemis indica Sahni, 1965

*Crocothemis indica* Sahni, 1965, *Indian J. Ent.*, **27** (3) : 284-287.

***Field Ecology :*** Not known

### 138. Brachythemis contaminata (Fabricius, 1793) [Text-fig. 10H]

*Libellula contaminata* Fabricius, 1793 *Ent. Syst.*, **2** : 382 ; *Brachythemis contaminata* ; Kumar, 1973, *Oriental Ins.* **7** (2) : 299-300 (Larva) ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 112-113 ; Singh & Prasad, 1976, *Rec. zool Surv. India*, **70** : 34 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.* **73** : 420 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar *Odonatologica* (in press).

***Field Ecology*** : Flight period—April-October ; oviposition—June-July ; emergence—September-October ; larval habitat—perennial and seasonal monsoon ponds, submontaneous lakes ; range—300-800 m. Adults conspicous and found in large number flying over the water surface and muddy ground near the larval habitats.

### 139. Diplacodes nebulosa (Fabricius, 1793) [Text-fig. 11A]

*Libellula nebulosa* Fabricius, 1793, *Ent. Syst.* **2** : 379 ; *Diplacodes nebulosa*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 75 ; Singh & Prasad, 1974, *J. Bombay nat. Hist. Soc.*, **70** (2) : 404 ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 95 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 110 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 31-32 ; Singh & Prasad 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 Kumar, *Odonatologica*, (in press).

***Field Ecology*** : Flight period—April-September larval habitat-

perennial ponds ; range—300-600 m. Adults not common, found around the ponds.

### 140. Diplacodes trivialis (Rambur, 1842) [Text-fig. 11B)

*Libellula trivialis* Rambur, 1842, *Ins. Nevrop.* : 115 ; *Diplacodes trivialis*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 75 ; Sahni, 1965, *Indian J. Ent.*, **27** : 282-283 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 110 ; Singh & Prasad, 1976, *Rec. zool Surv. India*, **70** : 32 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420.

*Field Ecology* : Flight period—March-September ; oviposition—April ; emergece—June-July ; larval habitat-perennial ponds ; range—300-600 m. Adults occur around larval habitats.

### 141. Neurothemis fulvia (Drury 1773) [Text-fig. 11C]

*Libellula fulvia* Drury, 1773, *Ill. Exot. Ins.*, **2** : 84-85 ; *Newsl. zool Surv. India*, **2** (3) : 95-96 ; Singh & Prasad, 1976, *Rec. zool Surv. India*, **70** : 33-34 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.* **73** : 420 ; Kumar, *Odonatologica* (in press).

*Field Ecology* : Flight period—April September ; oviposition—July-August ; larval habitat—perennial and seasonol ponds ; range—300-600 m. Adults, very conspicuous because of their rusty wings, common around larval habitats.

### 142. Neurothemis intermedia intermedia (Rambur, 1842) [Text-fig. 11D]

*Libellula intermedia* Rambur, 1842, *Ins. Nevrop.* : 91 *Neurothemis intermedia intermedia*, Prasad, 1976, *Rec. zool Surv India*, **71** : 111-112 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 34.

*Field Ecology* : Flight period—April-November ; range—600-1000 m.

### 143. Neurothemis tullia tullia (Drury, 1773) [Text-fig. 11F]

*Libellula tullia* Drury, 1973, *Ill. Exot Ins.*, **2** : 85 ; *Neurothemis tullia tullia*, Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) ; 96 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 112 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 34 Kumar, *Odonatologica* (in press).

*Field Ecology* : Flight period—March-September ; emergence—

March-April ; larval habitat-marshy area of large of perennial water bodies ; range—600-100 m. Adults aggregate in large numbers in vegetation in marshy areas of lakes and perenniel ponds.

### 144. Bradinopyga geminata (Rambur, 1842) [Text-fig. 11G]

*Libellula geminata* Rambur, 1842, *Ins. Nevrop.* 90 ; *Bradinopyga geminata* Sahni, 1964, *Agra Univ. J. Res.* **13** (2) : 92 ; Sangal & Kumar, 1970, *J. nat. Hist* **4** : 33-38 (Larva) Kumar, 1973, *G. K. V. J. Sci Rec.*, **5** : 50-57 (Life history) ; Singh & Prasad, 1976, *Rec. zool Surv. India*, **70** : 32-33.

*Field Ecology* : Flight period—March-October, at larval habitats ; oviposition—March-April, emergence—July-September ; larval habitat—clear water cemented garden tank and some times large steel drums, *etc.* ; range—round 100 m. Adults aestivate in sheltered sites from October-March, common at larval habitats from March-October.

### 145. Sympetrum commixtum (Selys, 1884) [Text-fig. 11H]

*Diplax commixta* Selys, 1884. *Ann. Soc. Ent. Belg* : 38 ; *Sympetrum commixtum*, Fraser, 1936, *Fauna Brit. India*, **3** : 372-373 ; Singh & Baijal, 1955, *Agra Univ. J. Res.*, **3** (2) : 397 ; Baijal, 1955, *Agra Univ. J. Res.*, **4** (Suppll.) : 746 ; Mani *et al.* 1955, *Agra. Univ. J. Res.*, **4** (2) : 473 ; Sahni, 1964, *Agra Univ. J. Res.*, **13** (2) : 90-91, Kumar 1973, *Oriental Ins*, **7** (2) : 300-301 (Larva) ; Singh & Prasad 1976, *Rec. zool. Surv India*, **70** : 35 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 420 ; Prasad, *Indian J. Ent.*, (in press) Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—April-December ; oviposition—October-November ; emergence—April-May ; larval habitat—side pools of hill streams ; range-300-2300 m. Adults occur around hill streams in October to December. A rare or local species.

### 146. Sympetrum haematoneura Fraser, 1934

*Sympetrum haematoneura* Fraser, 1934, *Mem. Dept. Agric. India* (Ent), **8** : 70-71 ; Fraser, 1936, *Fauna Brit. India*, **3** : 379-380 ; Sahni, 1964, *Agra Univ. J. Ses.*, **13** (2) : 91-92.

*Field Ecology* : Not known

### 147. Sympetrum fonscolombei (Selys, 1840)

*Libellula fonscolombei* Selys, 1840, *Mon. Libr. Eur* : 21, 49, 208 ; *Sympe-*

*trum fonscolombei*, Fraser, 1936, *Fauna Brit. India*, **3**: 377-379; Mani, *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2): 473.

*Field Ecology*: Not known

### 148. Sympetrum meridionale (Selys, 1841)

*Libellula meridionale* Selys, 1841, *Rev. zool.*,: 245; *Sympetrum meridionale*, Fraser, 1936, *Fauna Brit. India*, **3**; 376-377; Mani *et al.* 1955, *Agra Uni. J. Res.*, **4** (2); 473.

*Field Ecology*: Not known

### 149. Sympetrum hypomelas (Selys, 1884) [Text-fig. 12A]

*Diplax hypomelas* Selys, 1884, *Ann. Soc. Ent. Belg.*, 28: 37; *Sympetrum hypomelas*, Kumar, *Odonatologica*, (in press); Prasad & Kumar, 1977, *Newsl. zool. Surv. India*, **3** (4): 174.

*Field Ecology*: Not known

### 150. Trithemis aurora (Burmeister, 1839) [Text-fig. 12B]

*Libellula aurora Burmeister*, 1839, *Handb. Ent.*, **2**: 859; *Trithemis aurora*, Bhasin, 1953, *Indian For. Leafl* **121** (3): 78; Sahni, 1965, *Indian J. Ent.*, **27**: 288; Kumar, 1973, *Oriental. ins*, **7** (3): 301-302 (Larva); Kumar and & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3): 96; Prasad, 1976, *Rec zool. Surv. India*, **71**: 113-114; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70**: 35; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73**: 420; Prasad, *Indian J. Ent.*, (in press); Kumar, *Odonatologica* (in press).

*Field Ecology*: Flight period—May-November; emergence—September-October; larval habitat—side waters of marshy streams and seasonal monsoon ponds; range—300-1000 m. Adults fly in large number around larval habitats, perching with spread wing either on vegetation or on sun exposed rocks.

### 151. Trithemis festiva (Rambur, 1842) [Text-fig. 12C]

*Libellula festiva* Rambur, 1842, *Ins. Nevrop.*: 92; *Trithemis festiva* Bhasin, 1953, *Indian For. Leaflt*, **121** (3): 76; Sahni, 1965, *Indian J. Ent.*, **27** (3): 287-288; Kumar, 1972, *Odonatologica*, **1** (2): 103-112 (Life history); Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3): 96, Prasad, 1976, *Rec. zool. Surv. Indian*, **71**: 114-115; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70**: 36-37; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73**: 420; Prasad, *Indian J. Ent.*, (in press); Kumar, *Odonatologica*, (in press).

*Field Ecology* : Flight period—March-December ; oviposition—October-November , emergence—March-June ; larval habitat—slow running marshy streams ; range – 300-1500 m. It is one of the first dragonfly which emerge with the approach of the spring. Adults common around larval habitat from March-November.

### 152. **Trithemis pallidinervis** (Kirby, 1889) [Text-fig. 12D]

*Sympetrum pallidinervis* Kirby; 1889, *Trans. zool. Soc. Lond.*, **12** : 327 ; *Trithemis pallidinervis*, Bhasin, 1953, *Indian For. Leafl.*, **121** (3) : 78 ; Kumar & Juneja, 1976, *Newsl. zool. Surv. India*, **2** (3) : 96 ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 115 ; Singh & Prasad, 1976, *J. Bombay nat. Hist. Soc.*, **73** : 420-421 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar, *Odonatologica* (in press).

*Field Ecology* : Flight period—April-July range—300-800 m. Adults are common at marshy vegetation around streams and perennial ponds.

### 153. **Trithemis kirbyi kirbyi** Selys, 1891 [Text-fig. 12E]

*Trithemis kirbyi* Selys, 1891, *Ann. Mus. Civ. Genova* **30** : 465 ; *Trithemis kirbyi kirbyi*, Prasad, 1976, *Rec. zooi. Surv. India*, **71** : 114 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 35-36.

*Field Ecology* : Not known

### 154. **Zygonyx torrida isis** Fraser, 1924 [Text-fig. 12F]

*Zygonyx isis* Fraser, 1924, *Rec. Indian. Mns.*, **26** : 426, 440-451 ; *Zygonyx torrida isis*, Singh & Prasad, 1977, *Rec. zool. Surv. India*, **70** : 37 ; Prasad, & Kumar 1977, *Newsl. zool. Surv. India*. **3** (4) : 174.

*Field Ecology* : Adults hover over the hillstreams and paddy fields from May-September ; range—round 600 m.

### 155. **Rhyothemis variegata variegata** (Linn. 1763) [Text-fig. 12G & H]

*Libellula variegata* Linnaeus, 1763, *Amoonitalas Acad.*, **6** : 412 ; *Rhyothemis variegata variegata*, Prasad, 1976, *Rec. zool. Surv. India*, **71** : 115-116.

*Field Ecology* : Not known

### 156. **Rhyothemis nr triangularis** Kirby, 1889

*Rhothemis triangularis* Kirby, 1889, *Trans. zool. Soc. Lond.* **12** : 319 ; Kumar, *Odonatologica*, (in press).

*Field Ecology* : Not known

### 157. Zyxomma petiolatum Rambur, 1842 [Text-fig. 13A]

*Zyzomma petiolatum* Rambur. 1842, *Ins. Nevrop.* : 30 ; Kumar 1973, *Oriental Ins*, **7** (2) : 302-303 (Larva) ; Prasad, 1976, *Rec. zool. Surv. India*, **71** : 116 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 37.

*Field Ecology* : Flight period—May-September, oviposition—July-September ; emergence—May-June ; larval habitat—cemented garden tank with stagnent water ; range—600-1000 m. Adults crepucular and frequent the larval habitat from afternoon to late evening till it gets completely dark.

### 158. Tholymis tillarga (Fabricius, 1798) [Text-fig. 13B]

*Liibellula tillarga* Fabricius, 1789, *Ent. Syst. Suppl.* : 285 ; *Tholymis tillarga*, Kumar, 1973, *Oriental Ins*, **7** (2) : 303-304 (Larva) : Prasad, 1976, *Rec. zool. Surv. India*. **71** : 116.

*Field Ecology* : Flight period –June-October ; oviposition—June-July ; emergence—Septeber-October ; larval habitat—seasonal monsoon ponds ; range—600-1000 m. Adults migratory in nature, and could rarely be seen at seasonal ponds during monsoon.

### 159. Tholymis paratillarga Singh & Prasad

*Tholymis paratillarga* Singh & Prasad, *Zool. Beit.* (in press)

*Field Ecology* : Not known

### 160. Pantala flavescens (Fabricius, 1798) [Text-fig. 13C]

*Libellula flavescens* Fabricius, 1798, *Ent. Syst. Suppl.*, : 285 ; *Sympetrum tandicola*, Singh, 1955, *Agra Univ. J. Res.*, **4** (1) : 171-174 ; Mani *et al.*, 1955, *Agra Univ. J. Res.*, **4** (2) : 473 ; *Pantala fravescens*, Kumar, 1973, *Oriental. Ins*, **7** (2) : 304-305 (Larva) ; Mitra, 1973, *Ent. Res. J. Var.*, **85** (1) : 30-31 ; Prasad, 1976, *Res. zool. Surv. India*, **71** : 116-117 ; Singh & Prasad, 1976, *Rec. zool. Surv. India*, **70** : 38 ; Singh & Prasad, 1977, *J. Bombay nat. Hist Soc.* **73** : 421 ; Prasad, *Indian J. Ent.*, (in press) ; Kumar *Odonatologica*, (in press).

*Field Ecology* : Flight period—May-October ; oviposition—June-July ; emergence—August-October ; larval habitat—seasonal monsoon ponds ; range—300-3000 m. Adults are obligatory

migrants and could be seen in Himalayas during monsoon period either at the larval habitats or flying in large number high about the cultivated fields.

### 161. Tramea basilaris burmeisteri Kirby, 1889 [Text-fig. 13D]

*Tramea basilaris burmeisteri* Kirby, 1889, *Trans. zool. Soc. Lond.*, **12** : 316 ; Kumar, 1973, *Oriental Ins.* **7** (2) : 305-306 (Larva) ; prasad, 1976, *Rec. zool. Surv. India*, **71** : 117 ; Singh & Prasad, 1976, *Rec zool.Surv. India*, **70** : 38.

*Field Ecology* : Flight period—June-October ; oviposition—June-July ; emergence—September-October ; larval habitat—seasonal monsoon pond ; renge—600-2300 m. Adults common around larval habitats from June-October, rare, specimens could be seen in winter, away from the larval habitats

### 162. Tramea virginia (Rambur 1842 ) [Text-fig. 13E]

*Libellula virginia* Rambur, 1842, *Ins. Nevrop.* : 33 : *Tramea virginia*, Prasad, 1976, *Rec. zool. Surv. India* **71** : 117-118 ; Singh & Prasad, 1976 *Rec. zool. Surv. India*, **70** : 38 ; Singh & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **73** : 421 ; Kumar & Prasad, 1977, *J. Bombay nat. Hist. Soc.*, **74** (1) : 199-202 (Larva).

*Field Ecology* : Flight period—April-November, oviposition—April-May ; emergence—March-April ; larval habitat—perennial ponds ; range—300-800 m. Adults could be seen patrolling over the water surface of perenial ponds during summer.

## ZOOGEOGRAPHY OF ODONATA OF WESTERN HIMALAYA

No attempt has yet been made to discuss the Zoogeographical distribution pattern of Indian Odonata fauna, though we have such records for other groups of animals from the Indian Subregion (*cf.* Mani, 1974). However, with our present knowledge of the composition of *Odonata of Western Himalaya*, some Zoogeographical conclusions can tentatively be drawn.

The generic distribution and composition of Odonata fauna of Western Himalaya is not being discussed in detail here, although summary of Zoogeography of these is given in tabular form (*cf.* Table 2). Out of 78 genera present in Western Himalaya (28 Zygoptera ; 50 Anisoptera), only 1, *i. e.*, *Himalagrion* Fraser is Endemic to

Himalaya (Oriental), while 40 are Oriental, 10 Tropical (old world), 9 Palearctic, 7 Ethiopian, 6 Australian and 6 are cosmopolitan in their distribution. The present check-list contains 70 genera comprising 162 species and subspecies from the Western Himalaya. these consists of 66 Zygoptera (42%) and 96 Anisoptera (58%). From these 162 forms, 131 are Oriental (80 %), 28 Palearctic (17 %), 2 Ethiopian (2%), and 1 Cercumtropical (1%). Out of 66 Zygoptera, 57 are Oriental (86%), 8 Palearctic (12%) and 1 Ethiopian (1%), while out of 96 Anisoptera, 75 are Oriental (78%), 19 Palearctic (20%), 1 Ethiopian (1%) and 1 Circumtropical (1%), (*cf.* Table 1).

In table 4 the detailed Zoogeographical distribution of 162 species are given in the following Order-in Western Himalaya, other Indian limits (state wise), Palearctic range, Nepal, Burma, Ceylon and other localities, if any, in Oriental and Ethiopian region. The arabic number in brackets, following the distribution indicates the Zoogeographical element of the fauna to which species is considered to belong (as per discussion, below). The detailed faunal elements of the 162 species of Odanata present in Western Himalaya are as follows.

1 *Oriental Element* (131 species) : This element consists of species known from Indian Sub-continent (other than Palearctic, which have moved from North—West Palearctic region into Kashmir or restricted to Kashmir valley only) and whose range extends South-Eastwards across to Indo-Chinese-Malaysian and Indonesian region. In few cases (9%) they have been found to extend in Australian Region also.

The Oriental element forms the major bulk of the Odonata fauna of Western Himalaya and could be further subdivided into following subgroups, according to the distribution range of the species.

1 (I) *Indian Element* (65 species) : This element comprises species recorded from the Indian Sub-continent and neighbouring countries (India, Pakistan, Bangladesh, Nepal and Ceylon and whose range extends eastwards across Burma and Thailand and some times to Laos and Vietnam). The origin of majority of these species seems to have occurred in the Indian area though some of them may have originated in Indo-China.

It comprises 33 Zygoptera (50%) and 32 Anisoptera (32%), while on the whole it forms 40% of the total Odonata fauna of Western Himalaya. As it is evident the number of Zygoptera is more than Anisoptera perhaps due to their weak flying capabilities and restricted nature of larval habitats. Large number of these species are widely distributed in Himachal Pradesh and U. P. Himalayas. However, only a single species, viz., *Orthetrum triangulare triangulare* (Selys), has extended its distribution into Kashmir Valley.

1 (II) *Indo-Malayasian Element* (23 species) This element includes species whose distribution includes the Indian-Indo-Chinese and Malaysian-Indonesian areas upto Philippines and Taiwan in East. The area of origin of majority of these species is not clear.

It comprises 23 species, 8 Zygoptera (12%) and 15 Anisoptera-16% , and on the whole it forms 14% of the total Odonata Fauna of Western Himalaya. Understandably in this element ; the number of Anisoptera species is almost double of Zygoptera, since the former are strong fliers and can breed in more variable biotopes. These species are widely distributed in Himachal Pradesh and U. P. Himalayas. However, none of them have extended into Kashmir Valley. 16 species are common with Nepal and Ceylon.

1 (III). *Indo-Malaysian Element Extending into Australian Region* (15 species) : This element consists of the species which have further S. E. extending distribution beyond Oriental region into New Guinea, Sunda Islands, Micronesia and upto the continent of Australia. Though these species are present both in the Oriental & Australian Region, since they are chiefly distributed in Oriental (Indo-Malaysian) region, these have been included under Oriental Fauna only.

It comprises 15 species, 2 Zygoptera (3%) and 13 Anisoptera (14%), and 9% of the total Odonata Fauna of Western Himalaya. The Zygoptera are only two, viz., *Ischnura delicata* (Hagen) and *Agriocnemis pygmaea* (Rambur), while the Anisoptera are progressively many times more in ratio in this element. All these species are widely distributed in lower ranges of Himachal Pradesh and U. P. Himalaya, while none have extended into Kashmir Valley. 11 species are common with Nepal, while all 15 are common with Ceylon.

1 (IV). *Endemic Element* (28 species) : It includes the species which are known only from Western Himalaya (other than those which have Palearctic affinities). Basically it forms a sub-unit of the Oriental Fauna, since they have been recorded from Southern slopes of Himalaya. A number of these should be found in other parts of India, specially from Central and Eastern Himalaya and the hilly tracts of penninsula.

It comprises 28 species, 13 Zygoptera 20% and 15 Anisoptera (15%) and forms 17% of total Odonata Fauna of Western Himalaya. However, as such it constitutes only a small bulk. Majority of these species considered here are known only from their type localities in Western Himalaya.

2 *Palearctic Element* (28 species) : This element has species which are usually distributed in palearctic region, but generally not reaching across the southern slopes of Himalaya. We have also included under this element those species of Palearctic genera which are recorded in Western Himalaya from Kashmir Valley alone, but not from other Palearctic localities in Eurasia.

It comprises 11 genera, of which all are present in Kashmir Valley ; there are 28 species, 9 Zygoptera (12%), and 19 Anisoptera (20%) and on the whole it forms 17% of total Odonata species of Western Himalaya. Out of these 28 species, 23 are present in Kashmir Valley, while only 11 have extended their distribution east of Kashmir into Himalaya. Only 4 species are common with Nepal while only 2 with Ceylon, and 1 *viz.*, *O. japonicum internum* Macl. has extended up to eastern Himalaya.

A number of Palearctic species which are present in Kashmir are widely distributed through Europe, Iran, Asia Minor and N. Africa, some of the common examples of such species are *Enallagma cyathigerum* Charp, *Lestes barbara* (Fab.), *Aeshna mixta* Lat., *Libellula quadrimaculata* Linn. and *Sympetrum fonscolombei* (Selys), etc.

3. *Ethiopian Element* (2 species) : The element compries the species which are commonly distributed in tropical Africa. This element is almost absent in the Odonata of Western Himalaya and we have only 2 species (2%) of these element, *viz*, *Ischnura*

*senegalensis* (Rambur) (Zygoptera) and *Orthetrum taeniolatum* (Schneider) (Anisoptera), the latter is widely distributed in countries bordering Mediterranean.

4. *Circumtropical Element* (1 species) : This element comprises the species which are cosmopolitan in old world as well as New world tropics, thus they are widely distributed in Oriental region, tropical Africa (Ethiopian Region), Tropical America Neotropics) and Pacific Island. In fauna of Western Himalaya we have only one such species, *viz. Pantala flavescens* (Fab ), which is widely distributed in U. P. Himalayas and Himachal Pradesh from the altitude of 300-3000 m. Though it has so for not been recorded from Kashmir Valley, but it do occur in semi-arid shadow zone of Lahaul - spiti dist. of Himachal Pradesh.

Mani (1974), while discussing Bio-geography of Himalaya, has demonstrated the presence of distinct geographical distributional pattern in the fauna of Himalaya. He has shown that Fauna of Western Himalaya is composed partly of Oriental fauna, which has spread west-wards from Eastern Himalaya, largely of Palearctic forms and to some extent Mediteranean, Ethiopian element. He has further demonstrated that although the Indo-Chinese and Malayan genera and species are concentrated largely in Eastern Himalaya, a number of them have thus spread, with dicreasing abundance, upto Kumaon and sometimes even as for West as Kashmir. The Palearctic-Ethiopian genera and species are similarly dominant in North-West Himalaya, but have sparsely spread eastward to Nepal and rarely even around Assam and Burmese mountains.

Similar Zoo-geographical pattern of distribution is demonstrated in our aforesaid Faunistic studies on the Odonata of Western Himalaya. Though the major bulk (80%) of Odonata fauna of Western Himalaya is Oriental in nature while only 17% is Palearctic, we find that *Oriental* and *Palearctic Fauna* show almost a clear demarcation in their distributional ranges in Western Himalaya, *i. e.*, out of 9 Palearctic genera of Odonata from Western Himalaya. (*viz., Platycnemis Coenagrion, Sympycna, Epallage, Aeshna, Cordulegaster, Libellula, Selysiothemis* and *Sympetrum*) all are present in Kashmir Valley, while only 4 *viz., Coenagrion, Aeshna, Cordulegaster* and *Sympetrum* have moved further South-east

into the Himalaya. Similarly out of 28 Palearctic species of Odonata of Western Himalaya, 23 are present in Kashmir Valley, while only 11 extend further east of Kashmir into Himalaya. Thus the typical European-Palearctic species have extended into Himalaya only upto Kashmir Valley, the Palearctic zone of Western Himalaya. On the other hand the Oriental species have rarely traversed to Western end of Himalaya and only 2 Oriental species, *viz., Rhinocypha quadrimaculata quadrimaculata* (Selys) and *Orthetrum triangulare triangulare* (Selys) have Palearctic affinities.

Besides Kashmir, the Himachal Pradesh and Uttar Pradesh Himalaya which form the eastern flank of Western Himalaya) have predominantly Oriental Odonata Fauna, and only about 10 Palearctic species are present in this region. A large number of species are endemic to the Himalayan zone (64 species ; 40% of the total Odonata fauna of Western Himalaya). The Ethiopian and Circum-tropical element is almost neglesible.

The species of Western Himalaya show considerable affinity with the Odonata of Central (Nepal) and Eastern Himalaya. 67 species of Odonata are common between Western and Central Himalaya, while 94 species are common between Western and Eastern Himalaya.

Interesting case of discontinuous distribution of the fauna of the Himalaya in the form of its affinities with the fauna of the hills of South India and Ceylon, has also been emphasized by Mani (1974). The Odonata fauna of Western Himalaya follows this pattern and 21 of these species are found in hills of S. India, while 43 species are common with the Odonata of Sri Lanka.

## SUMMARY

A checklist is given of 162 species of Odonata (66 Zygoptera ; 96 Anisoptera) from Western Himalaya, India (U. P. Himalaya, Himachal Pradesh and Kashmir Valley). Brief description of Odonata Biotopes and phenology of Odonata in Western Himalaya is given. The recent classification of Odonata (Fraser, 1957) has been followed and under each species is cited the original reference followed by the uptodate references (in chronological order) partain-

ing to Western Himalaya (Subject Faunistic, taxonomy (adult and larva), life history, ecology, ethology, etc ), along with its district-wise distribution in Western Himalaya ; distribution in other parts of India, as well as its total geographical distribution range are given in tabular form. Notes have been appended, where possible, on field ecology ; these briefly include adult flight period, oviposition period, emergence period, larval habitat (s), altitudinal range in Western Himalaya and adult behavious. A key has been made for the adults (♂) of above 162 species of Western Himalaya ; it includes for the first time photographs of the wings (♂) of a large number of Indian species. The Zoogeography of Odonata of Western Himalaya has been discussed for the first time and the species are classified into 4 faunal elements, viz. Oriental (131 species) ; Paleartic (28 species) ; Ethiopian (2 species) and Circumtropical (1 species). the Oriental fauna (131 species) could further be subdivided into the following subgroups, namely : Indian element (65 species), Indo-Malaysian element (23 species), Indo-Malaysian element extending into Australian region (15 species), Endomic element (W. Himalaya) (28 species). A brief discussion has been made of the zoogeographical pattern of Odonata fauna of Western Himalaya. Composition of the fauna is also compared with that of Central Himalaya (Nepal), Eastern Himalaya and Sri Lanka.

Table 1 *Composition and comparison of Faunal Elements in Zygoptera and Anisoptera of Western Himalaya.*

| Faunal Elements | Zygoptera (Number of species) | % | | Anisoptera (Number of species) | % | |
|---|---|---|---|---|---|---|
| 1. *ORIENTAL* | | | | | | |
| (I) Indian | 33 | 50 | | 32 | 32 | |
| (II) Indo-Malaysian | 8 | 12 | | 15 | 16 | |
| (III) Indo-Malaysian extending into Australian Region | 2 | 03 | 85% | 13 | 14 | 77% |
| | | 57 | | | 74 | |
| (IV) Endemic (W. Himalaya) | 13 | 20 | | 15 | 15 | |

Table 1 Contd.

| | | | | |
|---|---|---|---|---|
| 2. *PALEARCTIC* | 9 | 13% | 19 | 21 |
| 3. *ETHIOPIAN* | 01 | 2% | 01 | 01 |
| 4. *CIRCUMTROPICAL* | — | — | 01 | 01 |
| TOTAL | 66 | 100 | 96 | 100 |
| % in total Odonata fauna | 42 | | 58 | |

Table 2. *Zoo-Geographical Classification of the Odonata Genera Present in Western Himalaya.*

| Sl. No. | Genera | Family | Oriental | Palearctic | Tropical | Ethiopian | Australian | Cosmopolitan |
|---|---|---|---|---|---|---|---|---|
| 1. | *Drepanosticta* Laid. | Platystictidae | + | — | — | — | — | — |
| 2. | *Caconeura* Kirby | Protoneuridae | + | — | — | — | — | — |
| 3. | *Disparoneura* Selys | ,, | — | — | — | — | — | — |
| 4. | *Platycnemis* Charpentier | Platycnemididae | — | + | — | — | — | — |
| 5. | *Copera* Kirby | ,, | + | — | — | — | — | — |
| 6. | *Calicnemia* Starand | ,, | + | — | — | — | — | — |
| 7. | *Coeliccia* Kirby | ,, | + | — | — | — | — | — |
| 8. | *Pseudagrion* Selys | Coenagriidae | — | — | + | — | — | — |
| 9. | *Ceriagrion* Selys | ,, | — | — | + | — | — | — |
| 10. | *Coenagrion* Kirby | ,, | — | + | — | — | — | — |
| 11 | *Himalgrion* Fraser | ,, | + | — | — | — | — | — |
| 12. | *Ischnura* Charp. | ,, | — | — | — | — | + | — |
| 13. | *Aciagrion* Selys | ,, | — | — | + | — | — | — |

Table 2 Contd.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 14. | *Rhodischnura* Laidlaw | .. | + | — | — | — | — | — |
| 15. | *Enallagma* Charp. | .. | — | — | — | — | — | + |
| 16. | *Agriocnemis* Selys | .. | — | — | + | — | — | — |
| 17. | *Onychargia* Selys | .. | + | — | — | — | — | — |
| 18. | *Archibasis* Kirby | .. | + | — | — | — | — | — |
| 19. | *Megalestes* Selys | Chlorolestidae | + | — | — | — | — | — |
| 20. | *Sympycna* Charp. | Lestidae | — | + | — | — | — | — |
| 21. | *Lestes* Leach | .. | — | — | — | — | — | + |
| 22. | *Ceylonolestes* Kenn. | .. | + | — | — | — | — | — |
| 23. | *Rhinocypha* Ramb. | Chlorocyphidae | — | — | — | — | + | — |
| 24. | *Libellago* Selys | .. | + | — | — | — | — | — |
| 25. | *Anisopleura* Selys | Epallagidae | + | — | — | — | — | — |
| 26. | *Bayadera* Selys | | + | — | — | — | — | — |
| 27. | *Epallage* Charp. | .. | — | + | — | — | — | — |
| 28. | *Neurobasis* Selys | Agriidae | + | — | — | — | — | — |
| 29. | *Anisogomphus* Selys | Gomphidae | + | — | — | — | — | — |
| 30. | *Onychogomphus* Selys | .. | + | — | — | — | — | — |
| 31. | *Lamelligomphus* Fraser | .. | + | — | — | — | — | — |
| 32. | *Nepogomphus* Farser | .. | + | — | — | — | — | — |
| 33. | *Mesogomphus* Forster | .. | + | — | — | — | — | — |
| 34. | *Anormogomphus* Selys | Gomphidae | + | — | — | — | — | — |
| 35. | *Acrogomphus* Laid. | .. | + | — | — | — | — | — |
| 36. | *Platygomphus* Laid. | .. | + | — | — | — | — | — |
| 37. | *Davidius* Selys | .. | + | — | — | — | — | — |
| 38. | *Burmogomphus* Will. | .. | + | — | — | — | — | — |
| 39. | *Ophiogomphus* Selys | .. | — | — | + | — | — | — |
| 40. | *Ictinogomphus* Cowley | .. | — | — | — | + | — | — |
| 41. | *Gynacanthaeschna* Fraser | Aeshnidae | + | — | — | — | — | — |
| 42. | *Gynacantha* Rambur | .. | — | — | — | — | — | + |
| 43. | *Aeshna* Fabr. | .. | — | + | — | — | — | — |
| 44. | *Anax* Leach | .. | — | — | + | — | — | — |

Table 2 Contd.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 45. | *Hemianax* Selys | ,, | — | — | + | — | — | — |
| 46. | *Polycanthagyna* Fraser | ,, | + | — | — | — | — | — |
| 47. | *Cephalaeschna* Selys | ,, | + | — | — | — | — | — |
| 48. | *Anaciaeshna* Selys | ,, | — | — | + | — | — | — |
| 49. | *Anotogaster* Selys | Cordulegasteridae | + | — | — | — | — | — |
| 50. | *Allogaster* Selys | ,, | + | — | — | — | — | — |
| 51. | *Cordulegaster* Leach | ,, | — | + | — | — | — | — |
| 52. | *Chlorogomphus* Selys | ,, | + | — | — | — | — | — |
| 53. | *Macromia* Ramb. | Corduliidae | + | — | — | — | — | — |
| 54. | *Selysiothemis* Ris | Macrodiplactidae | — | + | — | — | — | — |
| 55. | *Epophthalmia* Burm. | Corduliidae | + | — | — | — | — | — |
| 56. | *Tetrathemis* Selys | Libellulidae | — | — | — | — | + | — |
| 57. | *Hyalaeothemis* Ris. | ,, | + | — | — | — | — | — |
| 58. | *Cratilla* Kirby | ,, | + | — | — | — | — | — |
| 59. | *Potamarcha* Karsch | ,, | + | — | — | — | — | — |
| 60. | *Libellula* Linn. | ,, | — | + | — | — | — | — |
| 61. | *Orthetrum* Newman | ,, | — | — | + | — | — | — |
| 62. | *Palpopleura* Ramb. | ,, | + | — | — | — | — | — |
| 63. | *Brachydiplax* Brauer | ,, | + | — | — | — | — | — |
| 64. | *Nanophya* Ramb. | ,, | + | — | — | — | — | — |
| 65. | *Acisoma* Ramb. | ,, | + | — | — | — | — | — |
| 66. | *Diplacodes* Kirby | ,, | — | — | + | — | — | — |
| 67. | *Crocothemis* Brauer | ,, | — | — | — | — | + | — |
| 68. | *Bradinopyga* Kirby | ,, | — | — | — | + | — | — |
| 69. | *Brachythemis* Brauer | ,, | — | — | — | + | — | — |
| 70. | *Neurothemis* Brauer | ,, | + | — | — | — | — | — |

Table 2 Contd.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 71. *Sympetrum* Newman | ,, | — | + | — | — | — | — |
| 72. *Trithemis* Brauer | ,, | + | — | — | — | — | — |
| 73. *Zygonyx* Selys | ,, | + | — | — | — | — | — |
| 74. *Rhyothemis* Hagen | ,, | + | — | — | — | — | — |
| 75. *Zyxomma* Ramb. | ,, | + | — | — | — | — | — |
| 76. *Tholymis* Hagen | ,, | — | — | — | — | + | — |
| 77. *Pantala* Hagen | ,, | — | — | — | — | — | + |
| 78. *Tramea* Hagen | ,, | — | — | — | — | — | + |
| | | 40 | 9 | 10 | 7 | 6 | 6 |

Table 3. *Distributional Range of the Odonata*

| Sl. No. | Name of the species | Western Himalaya | | |
|---|---|---|---|---|
| | | J & K | HP | UP |
| | | | (2) | |
| | (1) | (a) | (b) | (c) |
| 1. | *Drepanosticta carmichaeli* (Laid law) | — | — | Almora, Chamoli, Dehradun, Pauri, Tehri & Uttar Kashi |
| 2. | *Caconeura autumnalis autumnalis* Fraser | — | — | Nainital (Corbett National park), Dehradun & Pauri |
| 3. | *Caconeura autumnalis gaudawricus* Sahni | — | — | Almora |
| 4. | *Disparoneura campioni* Fraser | — | — | Dehradun |
| 5. | *Disparoneura bhatnagri* Sahni | — | — | Nainital |
| 6. | *Platycnemis latipes dealbata* Selys | Kashmir | — | — |
| 7. | *Copera annulata* (Selys) | — | Sirmaur | — |
| 8. | *Copera marginipes* (Rambur) | — | Kangra. Sirmaur | Dehradun, Nainital, Pauri. |
| 9. | *Copera vittata* (Selys) | — | Hamirpur, Kangra, Sirmaur | Dehradun |
| 10. | *Calicnemia eximia* Selys | — | Simla, Sirmaur, | Almora Nainital |
| 11. | *Calicnemia miles* Laidlaw | — | Kangra | Chamoli, Dehradun, Pauri, Tehri, Uttar Kashi |
| 12. | *Calicnemia mortoni* Laidlaw | — | — | Nainital |
| 13. | *Calicnemia pulverulans* Selys | — | — | Almora, Tehri, Uttar Kashi |
| 14. | *Calicnemia maheshi* Sahni | — | — | Pithoragarh |
| 15. | *Coeliccia renifera* (Selys) | — | Barogh, Simla Hills (Solan) | Almora |
| 16. | *Coeliccia kumaonensis* Singh & Baijal | — | — | Nainital |
| 17. | *Coeliccia didyma* (Selys) | — | Simla Hills | — |
| 18. | *Pseudagrion rubriceps* Selys | — | Bilaspur, Hamirpur, Sirmaur | Dehradun Nainital, Pauri, Tehri. |

*Species Recorded from Western Himalaya*

| Other Indian limit | Palearctic | Nepal | Burma | Sri Lanka | Oriental, Australian & Ethiopian Region | Faunal element |
|---|---|---|---|---|---|---|
| (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Sikkim (Kalimpong, Pashoke) W. Bengal (Darjeeling) | — | + | — | — | — | 1 (I) |
| Assam | — | + | + | — | Java | 1 (II) |
| | — | — | — | — | — | 1 (IV) |
| Assam | — | — | + | — | — | 1 (I) |
| — | — | — | — | — | — | 1 (IV) |
| — | Egypt, Iran, Asia-Minor, Afganistan | — | — | — | — | 2 |
| Assam, W. Bengal (Darjeeling) | — | — | — | — | Malaysia, Indo-China, Japan. | 1 (II) |
| Coorg, Poona, Mahableshwar Bombay, Deccan, Assam, W. Bengal (Darjeeling) | — | + | + | + | Malaysia, Sumatra Burma Thailand, Java, Sunda Island, Sumba throughout Southern Asia. | 1 (II) |
| West Coast of India Coorg, Nilgiris, Anamalais, Assam, W. Bengal (Darjeeling) | — | — | + | | Thailand | 1 (I) |
| Darjeeling, Sikkim, Assam. | — | + | — | — | — | 1 (I) |
| Sikkim | — | + | + | | — | 1 (I) |
| Sikkim | — | — | — | — | — | 1 (I) |
| Darjeeling, Sikkim | — | + | — | — | — | 1 (I) |
| — | — | — | — | — | — | 1 (IV) |
| Upper Assam, W. Bengal (Darjeeling), Sikkim | — | + | — | — | — | 1 (I) |
| — | — | — | — | — | — | 1 (IV) |
| Darjeeling | — | — | — | — | — | 1 (I) |
| Widely distributed in continental India, W. | — | + | + | | Malaysia, Java, Indo-China, Taiwan, Sunda Island. | 1 (II) |

(Table 3 Contd.)

| | | | | |
|---|---|---|---|---|
| 19. | *Pseudagrion decorum* (Ramb.) | — | Bilaspur, Sirmaur, Una | Dehradun Nainital, |
| 20. | *Pseudagrion laidlawi* Fraser | — | — | Dehradun |
| 21. | *Pseudagrion spencei* Fraser | — | — | Nainital |
| 22. | *Ceriagrion coromandelianum* (Fabr.) | — | Bilaspur Kangra, Hamirpur, Simla, Sirmaur, Una | Chamoli, Dehradun, Nainital, Uttar Kashi, |
| 23. | *Ceriagrion cerinorubellum* (Brauer) | — | Kangra, Sirmaur. | Dehradun |
| 24. | *Ceriagrion fallax* Ris | — | Simla Hills, (Katrain, Manali) Kulu, Solan. | — |
| 25. | *Coenagrion dyeri* (Fraser) | — | Bilaspur, Sirmaur, Una. | Dehradun |
| 26. | *Coenagrion kashmirus* Choudhury & Das | Kashmir | — | — |
| 27. | *Himalgrion pithoragarhicus* Sahni | — | — | Pithoragarh |
| 28. | *Ischnura forcipata* Morton | Kashmir | Bilaspur, Kangra, Kulu, Manali, Sirmaur | Almora, Chamoli, Dehradun Nainital, Pauri, Tehri, Uttar Kashi. |
| 29. | *Ischnura bhimtalensis* Sahni | — | — | Nainital |
| 30. | *Ischnura delicata* (Hagen) | — | Bilaspur, Kangra, Hamirpur, Solan, Una. | Dehradun, Nainital, Tehri. |
| 31. | *Ischnura rufostigma* Selys | — | Kangra | Nainital |
| 32. | *Ischnura senegalensis* (Ramb ) | — | Bilaspur, Sirmaur | Dehradun, Tehri. |
| 33. | *Ischnura inarmata* Calvert | Kashmir | — | |
| 34. | *Aciagrion pallidum* Selys | — | — | Nainital (Corbett National Park) |
| 35. | *Rhodischnura nursei* (Morton) | — | — | Dehradun, Nainital, Pauri |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bengal, (Derjeeling & Jalpaiguri). | | | | | | | |
| Throughout continental India (Nilgiris, Coorg, W. Coast of India) W. Bengal (Darjeeling & Jalpaiguri). | — | + | + | + | | 1 | (I) |
| — | — | — | — | — | Lower Sind & Karachi | 1 | (I) |
| M. P., Bihar. W. Bengal Meghalaya. | — | + | — | — | — | 1 | (I) |
| Throughout India, W. Bengal (Darjeeling) | — | + | + | + | Malaysia, Indo-China South-China. | 1 | (II) |
| Assam, Coorg, W. Bengal (Darjeeling). | — | — | + | + | Thailand, Malaysia, Sumatra, Java, Borneo | 1 | (II) |
| Assam, W. Bengal Sikkim | — | + | — | — | Tibet | 1 | (I) |
| M. P Western Ghat (Coorg, Kanara) | — | — | + | — | — | 1 | (I) |
| — | — | — | — | — | — | 2 | |
| — | — | — | — | — | — | 1 | (IV) |
| W. Bengal | Russia, Iron Afganistan | — | + | — | Pakistan | 2 | |
| — | — | — | — | — | — | 1 | (IV) |
| W. Bengal Darjeeling & Jalpaiguri | — | — | + | + | Throughout Southern Asia, Malayasia Bornio, Philippine, Samoa. Sondaic Archipelego, New Guinea, Australasia. | 1 | (III) |
| Calcutta, Assam, (Tejpur) Bihar, M. P. | — | — | — | — | — | 1 | (I) |
| Throught India | — | — | + | + | Philippines, Java, Borneo, Sumba, Timor,Bali, Sumbawa, Lombok, Moluccas, Sunda Island, Japan, Monoco, African Continent. | 3 | |
| — | Russian, C. Asia. | — | — | — | Pakistan | 2 | |
| W. Bengal (Darjeeling & Jalpaiguri) Dry zones of Assam, Western ghats, Maharastra. | — | + | + | — | — | 1 | (I) |
| W. Bengal, Bihar, M.P., | — | — | — | — | Pakistan (Karachi, Hyderabad, Sindh) | 1 | (I) |

(Table 3 Contd.)

| | | | | |
|---|---|---|---|---|
| 36. | *Enallagma parvum* Selys | — | — | Dehradun, Nainital |
| 37. | *Enallagma cyathigerum* Charp. | Kashmir | — | — |
| 38. | *Agriocnemis pygmaea* (Rambur) | — | Kangra, Sirmaur | Dehradun, Nainital, Pauri. |
| 39. | *Agriocnemis clauseni* Fraser | — | — | Dehradun, Nainital (Corbett National Park) |
| 40. | *Agriocnemis nainitalensis* Sahni | — | — | Nainital, Pithoragarh |
| 41. | *Agriocnemis corbeti* Kumar & Prasad | — | — | Dehradun |
| 42. | *Onychargia indica* Sahni | — | — | Nainital |
| 43. | *Archibasis sushmae* Baijal | — | Kulu (Manali) | — |
| 44. | *Megalestes major* Selys | — | Kulu, Sirmaur | Almora, Chamoli, Dehradun, Nainital. |
| 45. | *Sympycna paedisca annulata* Selys | Jhelum Valley, Srinagar. | — | — |
| 46. | *Sympyena paedisca kashmirensis* Ander. | Kashmir | — | — |
| 47. | *Lestes viridula* Rambur | — | Kangra, Bilaspur | Dehradun, Nainital, Pauri. |
| 48. | *Lestes praemorsa praemorsa* Selys | — | — | Dehradun, Nainital. |
| 49. | *Lestes thoracica* Laid. | — | — | Dehradun |
| 50. | *Lestes barbara* (Fabr.) | Kashmir (Yusi marg) | — | — |
| 51. | *Lestes manaliensis* Singh | — | Manali, Pirpanjal Range | — |
| 52. | *Ceylonolestes cyanea* (Selys) | — | North Punjab Hills, Simla, (Tharoch, Talrotnach) | Dehradun, Nainital |
| 53. | *Ceylonolestes davenporti* Fraser | — | — | Dehradun |
| 54. | *Rhinocypha quadrimaculata quadrimaculata* Selys | Kashmir | Kangra, Bilashpur, Hamirpur, Sirmaur | Almora, Dehradun, Nainital, Pauri, Tehri, Uttarkashi. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Widely distributed throughout India. | — | + | + | + | — | 1 | (I) |
| — | Europ. British Isles. | — | — | — | Central Asia, Tibet, N. America | 2 | |
| Throughout India | — | + | + | + | Throughout oriental region, Singapur, Java, Manila, Philippines, Seychelles, Taiwan, North Celebes, Sunda Island, China, New Guinea, Australia (Queens land, Sydney) | 1 | (III) |
| W. Bengal, Meghalaya (Shillong) | — | — | + | — | Thailand | 1 | (I) |
| — | — | — | — | — | — | 1 | (IV) |
| — | — | — | — | — | — | 1 | (IV) |
| — | — | — | — | — | — | 1 | (IV) |
| — | — | — | — | — | — | 1 | (IV) |
| W. Bengal, Meghalaya, Sikkim, Punjab, Himachal Pradesh | — | + | — | — | — | 1 | (I) |
| — | Asia Minor Mesopotamia, Iran. | — | — | — | Pakistan (N. W. Frontier provinces, Quetta) | 2 | |
| — | — | — | + | — | — | 2 | |
| Deccan, Western India, S. Coorg, Bombay. | — | — | — | — | — | 1 | (I) |
| W. Bengal (Darjeeling, Jalpaiguri) | — | + | + | + | Southern Asia, Philippines | 1 | (II) |
| Orissa, W. Bengal, Bihar. | — | — | — | — | — | 1 | (I) |
| — | S. Europ, Asia | — | — | — | — | 2 | |
| — | — | — | — | — | — | 1 | (IV) |
| W. Bengal (Darjeeling) | — | — | + | — | — | 1 | (I) |
| W. Ghats, Karnataka, Kerala | — | — | — | — | — | 1 | (I) |
| Sikkim, W. Bengal, (Darjeeling) Assam, Sikkim | — | + | + | — | — | 1 | (I) |

(Table 3 Contd.)

| | | | | |
|---|---|---|---|---|
| 55. | *Rhinocypha unimaculata* Selys | — | Mandi, Solan | Chamoli, Dehradun, Nainital, Pauri, Tehri, Uttarkashi |
| 56. | *Rhinocypha trifasciata trifasciata* Selys | — | Kangra, Solan | Dehradun, Nainital, Pauri, Tehri. |
| 57. | *Reinocypha biforata beesoni* Fraser | — | — | Dehradun |
| 58. | *Rhinocypha spuria* Selys | — | — | Nainital |
| 59. | *Rhinocypha immaculata* Selys | — | — | Nainital |
| 60. | *Libellago lineata lineata* (Burm.) | — | Sirmaur | Dehradun, Nainital, Pauri. |
| 61. | *Bayadera indica* (Selys) | — | Kangra, Bilaspur, Sirmaur, Solan | Almora, Chamoli, Dehradun, Nainital, Pauri, Tehri, Uttarkashi. |
| 62. | *Anisopleura lestoides* Selys | — | — | Chamoli, Dehradun, Nainital, Pauri, |
| 63. | *Anisopleura comes* Selys | — | Panjab Hills | Chamoli, Dehradun, Tehri |
| 64. | *Anisopleura kusumi* Sahni | — | — | Nainital |
| 65. | *Epallage fatima* (Charp) | Kashmir | — | — |
| 66. | *Neurobasis chinensis chinensis* (Linn.) | — | Kangra, Bilaspur, Mandi, Simla, Sirmaur | Dehradun, Nainital, Pauri, Tehri, Uttarkashi. |
| 67. | *Anisogomphus occipitalis* (Selys) | — | — | Chamoli, Dehradun, Pauri, Tehri, Uttarkashi. |
| 68. | *Anisogomphus bivittatus* (Selys) | — | Solan | Chamoli, Pauri, Kumaon |
| 69. | *Onychogomphus M-flavum* Selys | — | Kangra | Chamoli, Dehradun, Uttarkashi |
| 70. | *Onychogomphus cerastes* (Selys) | — | — | Dehradun |
| 71. | *Onychogomphus bistrigatus* (Selys) | — | — | Dehradun, Kumaon, Tehri. |
| 72. | *Onychogomphus duaricus* Fraser | — | — | Almora |
| 73. | *Onychogomphus garhwalicus* Singh & Baijal | — | — | Dehradun |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| W. Bengal (Darjeeling) Assam, Sikkim | — | + | — | — | — | 1 | (I) |
| Kailana, W. Bengal (Darjeeling) Assam. | — | + | — | — | — | 1 | (II) |
| — | — | — | — | — | — | 1 | (IV) |
| Meghalaya | — | — | + | — | — | 1 | (I) |
| Cherrpunji, Kashi Hills (Meghalaya) | — | — | — | — | — | 1 | (I) |
| Assam, (Cachar) W. Bengal (Darjeeling, Jalpaiguri). | — | — | + | — | Thailand, Penang Throughout Sundaic Archipelogo, Java, Sumatra, Borneo. | 1 | (II) |
| Meghalaya (Shillong, Khash hills) | — | + | — | — | — | 1 | (I) |
| W. Bengal, Assam. | — | + | — | — | — | 1 | (IV) |
| Sikkim (900-1500 mtrs) W. Bengal (Darjeeling & Jalpaiguri) Assam. | — | + | — | — | — | 1 | (I) |
| — | — | — | — | — | — | 1 | (IV) |
| — | Asia-Minor, Wadi Kalt, Palestine Afganistan; Iran, Macadonra, Pakistan | — | — | — | — | 2 | |
| Throught India except in desert area upto 2300 mtrs. Karnataka, Maharastra, Tamil Nadu, Assam, W, Bengal. | — | + | + | + | Thailand | 1 | (I) |
| W. Bengal (Darjeeling) | — | + | — | — | — | 1 | (I) |
| Sikkim Darjeeling | — | — | — | — | — | 1 | (I) |
| Assam W. Bengal | — | + | — | — | — | 1 | (I) |
| — | — | + | — | — | — | 1 | (I) |
| Assam | — | + | — | — | — | 1 | (I) |
| W. Bengal (Hasimara) Meghalaya (Duars) | — | — | — | — | — | 1 | (I) |
| — | — | — | — | — | — | 1 | (IV) |

(Table 3 Contd.)

| | | | | |
|---|---|---|---|---|
| 74. | *Lamelligomphus biforceps* (Selys) | — | — | Uttarkashi |
| 75. | *Lamelligomphus risi* (Fraser) | — | — | Dehradun |
| 76. | *Nepogomphus modestus* (Selys) | — | Kangra, Sirmaur | Dehradun |
| 77. | *Mesogomphus lineatus* (Selys) | — | Kangra | Nainital, Dehradun |
| 78. | *Anormogomphus kiritschenkoi* Bartenef | — | — | Dehradun |
| 79. | *Anormogomphus heteropterus* Selys | — | Kangra | Dehradun |
| 80. | *Acrogomphus mohni* Sahni | — | — | Nainital |
| 81. | *Platygomphus attenuatus* Fraser | — | — | Dehradun |
| 82. | *Uphiogomphus reductus* Calvert | Kashmir (Gulmarg, Yusimarg) | — | — |
| 83. | *Davidius aberrans aberrans* (Selys) | — | — | Almora |
| 84. | *Davidius kumaonensis* Fraser | — | — | Kumaon Hills, 230 mtrs |
| 85. | *Burmogomphus sivalikensis* Laid. | — | Sirmaur | Dehradun |
| 86. | *Burmogomphus hasimaricus* Fraser | — | — | Dehradun |
| 87. | *Ictinogomphus rapax* (Ramb.) | — | Kangra, Sirmaur | Dehradun |
| 88. | *Gynacanthaeschna sikkima* (Karsch) | — | — | Dehradun |
| 89. | *Cepnalaeschna orbifrons* Selys | — | Simla Hills | — |
| 90. | *Gynacantha khasiaca* MacLachlan | — | — | Nainital |
| 91. | *Aeschna ornithacephala* MacLachan | — | Simla State | — |
| 92. | *Aeshna mixta* Latreille | Kashmir (Srinagar, Gulmarg, Usimarg) | — | — |
| 93. | *Aeshna juncea* (Linn.) | Kashmir | — | — |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| W. Bengal (Darjeeling) | — | + | — | — | — | 1 | (I) |
| Darjeeling, Hasimara, Meghalaya | — | — | — | — | — | 1 | (I) |
| W. Bengal, Meghalaya, Nagaland | — | — | + | — | Malayasia, Sumatra | 1 | (II) |
| W. Bengal, Maharashtra, Karnataka, Tamil Nadu. | — | + | + | — | — | 1 | (I) |
| — | Iran, Persian Gulf, Mesopotamia | — | — | — | Pakistan (Si d, Mekran coast) | 2 | |
| Punjab, Bihar | — | — | — | — | Pakistan (Lahore) | 1 | (I) |
| — | — | — | — | — | — | 1 | (IV) |
| — | — | — | — | — | — | 1 | (IV) |
| — | — | — | — | — | — | 2 | |
| Meghalaya | — | + | — | — | — | 1 | (I) |
| — | — | — | — | — | — | 1 | (IV) |
| W. Bengal, Meghalaya | — | — | — | — | N. W. Provinces | 1 | (I) |
| W. Bengal, Meghalaya | — | — | — | — | — | 1 | (I) |
| Karnataka, Kerala, M. P., W. Bengal, Sikkim | — | + | + | + | Malaysia | 1 | (II) |
| W. Bengal, Sikkim | — | — | — | — | — | 1 | (I) |
| W. Bengal, (Darjeeling) | — | — | — | — | — | 1 | (I) |
| W. Bengal. Sikkim | — | — | — | — | — | | |
| W. Bengal, Sikkim | — | — | — | — | Tibet | 2 | |
| — | Europe, N. Africa, Central & N. Asia. | — | — | — | — | 2 | |
| — | Throughout British Isles, N. Europe, N. Asia. | — | — | — | N. America | 2 | |

(Table 3 Contd.)

| | | | | |
|---|---|---|---|---|
| 94. | *Polycanthagyna erythromelas* (MacLachlan) | — | Simla State | — |
| 95. | *Anax imperator* Leach. | — | Dehradun (Mussorie) | — |
| 96. | *Anax immaculifrons* Rambur | — | Bilaspur, Kangra, Kulu | Dehradun, Pauri |
| 97. | *Anax quttatus* (Burm.) | — | Thorach, Talrathach, Kangra | Dehradun |
| 98. | *Anax nigrofasciatus nigrolineatus* Fraser | — | — | Almora, Uttarkashi. |
| 99. | *Anax parthenope parthenope* (Selys) | Kashmir | Simla | Nainital |
| 100. | *Anaciaeschna kashmirensis* Singh & Baijal | Kashmir | — | — |
| 101. | *Hemianax ephippiger* (Burm.) | — | Kangra | Afzalgarh |
| 102. | *Anotogaster basalis basalis* Selys | — | Manali | Almora, Nainital, Uttarkashi. |
| 103. | *Allogaster parvistigma* (Selys) | — | Simla Hills, (Bhaji) | — |
| 104. | *Cordulegaster brevistigma brevistigma* (Selys) | Kashmir | Monali | Dehradun |
| 105. | *Cordulegaster brevistigma folia* Fraser | — | — | Nainital |
| 106. | *Chlorogomphus atkinsoni* (Selys) | — | — | Nainital |
| 107. | *Chlorogomphus obympicus* Fraser | — | Simla | — |
| 108. | *Macromia moorei* Selys | — | Kangra, Simla Hills. | Almora, D. Dun, Nainital. |
| 109. | *Epophthalmia vittata vittata* Burm. | — | — | Almora |

| | | | | | | |
|---|---|---|---|---|---|---|
| W. Bengal (Darjeeling), Sikkim. | — | — | — | — | — | 1 (I) |
| Maharashtra, Andhra Pradesh, Tamil Nadu, E. Himalayas. | — | — | — | + | — | 1 (I) |
| — | British Isles across to Europe Central Asia & Routhwards to Central Africa & Narth Moracco. | — | — | — | N. W. Provinces | 2 |
| Punjab, Tamil Nadu, Andhra Pradesh, Karnataka. Kerala, E. Himalaya. | — | + | + | + | S. E. Asia, Malaysia, Seychelles, Taiwan, Samoa in Pacific, Lesser Sunda Island, Java, Micronesia, N. Australia· | |
| W. Bengal (Darjeeling) Sikkim, Assam | — | + | + | — | — | 1 (I) |
| Karnataka | South Europe, N. Africa, Asia Minor to Kashmir, Meso-potamia, Iraq, Moracco | — | — | — | — | 2 |
| — | — | — | — | — | — | 2 |
| Maharashtra, Gujarat. | S. E. Europe. N. Asia to India, Iraq, Egypt, Mesopotamia, Moracco | — | — | + | — | 2 |
| W. Bengal | — | — | — | — | — | 1 (I) |
| — | — | — | — | — | — | 1 (IV) |
| Assam | — | + | — | — | — | 1 (I) |
| — | — | — | — | — | — | 1 (IV) |
| W. Bengal, (Darjeeling) Assam, North Punjab. | — | + | — | — | — | 1 (I) |
| — | — | + | — | — | — | 1 (IV) |
| W. Bengal (Darjeeling) Meghalaya | + | — | — | — | — | 1 (I) |
| Andhra Pradesh, Maharashtra, Karnataka, Tamil Nadu | — | — | — | — | — | 1 (I) |

(Table 3 Contd.)

| | | | | |
|---|---|---|---|---|
| 110. | *Selysiothemis nigra* (Vander Linden) | Kashmir | — | — |
| 111. | *Tetrathemis platyptera* Selys | — | — | Dehradun, Nainital. |
| 112. | *Hylaeothemis gardeneri* Fraser | — | — | Dehradun |
| 113. | *Cratilla lineata calverti* Forster | — | — | Dehradun, Nainital, Pauri. |
| 114. | *Potamacha obscura* (Ramb.) | — | Kangra | Dehradun |
| 115. | *Libellula quadrimaculata* Linn. | Kashmir | — | — |
| 116. | *Orthetrum brunneum brunneum* (Fons.) | Kashmir, (Gulmarg. Yushimarg) | Sirmaur | Almora, Dehradun, Tehri, Uttarkashi. |
| 117. | *Orthetrum taeniolatum* (Schneider) | — | Bilaspur, Kangra, Kinnaur, Una. | Chamoli, Dehradun, Nainital, Pauri, Tehri, Uttarkashi. |
| 118. | *Orthetrum anceps* (Schneider) | — | Bilaspur, Kulu. | — |
| 119. | *Orthetrum chrysostigma luzonicum* (Brauer) | — | Kulu, Kangra | Dehradun, Nainital, Pauri, Tehri, Uttarkashi. |
| 120. | *Orthetrum japonicum internum* MacLachlan | Kashmir | Bilaspur, Kangra, Kinnaur, Kulu | Dehradun, Nainital, Pauri |
| 121. | *Orthetrum guptai* Baijal | — | Manali | — |
| 122. | *Orthetrum garhwalicum* Singh & Baijal | — | Kinnaur | Dehradun (Chakrata) |
| 123. | *Orthetrum cancellatum cancellatum* (Linn.) | Kashmir | Bilaspur, Kulu | — |
| 124. | *Orthetrum chrysis* (Selys) | — | Bilaspur, Sirmaur | — |

| | | | | | | |
|---|---|---|---|---|---|---|
| — | Mesopotamia, Persian Gulf, Iraq. | — | — | — | Pakistan (Karachi, Mekaran coast) | 2 |
| Throughout sub mountane wet area of India, Tamil Nadu, Karnataka, Kerala, Andhra Pradesh | — | — | + | — | Thailand, Malacca, Java, Sumatra. | 1 (II) |
| — | — | — | — | — | — | 1 (IV) |
| W. coast of India, W. Bengal | — | — | + | + | — | 1 (I) |
| Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, M. P., W. Bengal. | — | + | + | + | Ceylon to Tibet, Philippines, Taiwan, Malaya Archipelego, Java, Sumatra, New Guinea. N. Australia. | 1 (III) |
| — | Europe | — | — | — | Lahsa | 2 |
| Bihar | Afganistan, Asia Minor, Mesopotamia S. Europe, N. Africa | — | + | — | Pakistan | 2 |
| Dry zones & hot plains of India, M. P., W. Bengal, Sikkim. | — | + | — | — | Countries bordering mediteranean | 3 |
| M. P. | N. African Coast, Asia Minor, Moracco, Iran, Afganistan | + | + | — | Pakistan (Quatta) | 2 |
| Mountane & sub-mountany area in the South (W. Coast, Tamil Nadu, Andhra Pradesh), W. Bengal, Assam. | — | + | + | + | Philippines, Java, Sumatra. | 1 (II) |
| Submontany area of Assam, Meghalaya, W. Bengal. | — | + | — | — | Tibet, S. W. China | 2 |
| — | — | — | — | — | — | 1 (IV) |
| — | — | — | — | — | — | 1 (IV) |
| M. P. | British Isles, Europe, N. Africa, Asia, Minor. | — | — | — | — | 2 |
| western coast of India, Karnataka, T. Nadu | — | — | + | + | Philippines, Thailand, Celebes, Borneo, Java, Sumbawa, Sumatra | 1 (III) |

(Table 3 Contd.)

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| 125. | *Orthetrum glaucum* (Brauer) | — | Kangra, Solan | Chamoli. Dehradun, Nainital, Pauri, Tehri |
| 126. | *Orthetrum sabina sabina* (Druny) | — | Bilaspur, Kangra, Sirmaur, Solan, Una | Dehradun, Nainital, Pauri |
| 127. | *Orthetrum fraseri* Sahni | — | — | Nainital |
| 128. | *Orthetrum mathewi* Singh & Baijal | — | — | Dehradun (Chakrata) |
| 129. | *Orthetrum pruinosum neglectum* (Ramb.) | — | Bilaspur, Kangra, Hamirpur, Mandi, Sirmaur, Una | Chamoli, D. Dun Nainital, Pauri, Tehri, U. Kashi |
| 130. | *Orthetrum gangi* Sahni | — | — | Dehradun (Chakrata) |
| 131. | *Orthetrum triangulare triangulare* (Selys) | Kashmir (Murree) | Bilaspur Kangra Kinnaur, Kulu, Sirmaur, Solan | Chamoli, Dehradun, Nainital, Pauri, Tehri, U. Kashi |
| 132. | *Palpopleura sexmaculata sexmaculata* (Fabr.) | — | Bilaspur, Hamirpur, Kangra, Kulu | Chamoli, D. Dun, Nainital, Pauri, Tehri, U. Kashi |
| 133. | *Nanophya katrainensis* Baijal, | — | Kulu | — |
| 134. | *Brachydiplax sobrina* (Rambur) | — | Kangra | Dehradun |
| 135. | *Asisoma panorpoides panorpoides* Ramb. | — | Kangra, Sirmaur | Dehradun, Nainital, Pauri, U. Kashi |
| 136. | *Crocothemis servilia servilia* (Drury) | — | Kangra | Chamoli, Dehradun, Nainital, Pauri |
| 137. | *Crocothemis indica* Sahni | — | — | Nainital |
| 138. | *Brachythemis contaminata* (Fabr.) | — | Bilaspur Kangra, Sirmaur, Una | Dehradun, Nainital, Pauri. |
| 139. | *Diplacodes nebulosa* (Fabr.) | — | Kangra, Sirmaur | Dehradun, Nainital |
| 140. | *Diplacodes trivialis* (Rambur) | — | Kangra | Dehradun, Nainital |

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|---|---|---|---|---|---|---|
| Throughout India, except in the plains & above Altitudes 1200. | — | + | — | + | Philippines, Malaya Archipelago, Sumbawa, Sumba New Guinea, Timor, South China | 1 (III) |
| Troughout India. | Mesopotamia, Iraq Iran | + | + | + | Thailand, Java, Oceamia, Samoa, Somali land, Sumba, Timor, New-Guinea, Australia, Egypt, Angola, African continent | 1 (III) |
| — | — | — | — | — | — | 1 (IV) |
| — | — | — | — | — | — | 1 (IV) |
| Throughout India. | — | + | + | + | Tibet, Indo-China, Hong-kong, Thailand, Malaya | 1 (II) |
| — | — | — | — | — | — | 1 (IV) |
| S. Indian Hills, W. Bengal, (Darjeeling), Meghalaya. | — | + | + | + | — | 1 (I) |
| Western India, Assam, W. Bengal, Bihar, Tamil Nadu, Karnataka, Andhra Pradesh | — | + | — | + | Malaysia, Indo-China, China | 1 (II) |
| West coast of India, Maharashtra, Kerala, Karnataka, W. Bengal | — | + | + | + | — | 1 (I) |
| — | — | — | — | — | — | 1 (IV) |
| M. P., Assam, Sikkim, W. Bengal (Darjeeling, Jalpaiguri) | — | + | — | + | Philippines, Malaya, Archipelago, Java, Bali, Sumatra, Celebes, Sumba, Lesser Sunda Island, China, Japan, Thailand, Malaya, Singapore | 1 (III) |
| M. P., Bihar, W. Bengal, | Mesopotamia, S. Asia, Iraq | + | + | + | Throughout Tropical Asia, Philippines, Sumba, Australia, Southwards to Sundaic Archipelago, Japan | 1 (III) |
| — | — | — | — | — | | 1 (IV) |
| Throughout plains of India, M. P., E. Himalaya (W. Bengal), Bihar | — | + | + | + | Thailand, Singapore, Malaya, Taiwan, Philippines, Java, Sumatra, China | 1 (II) |
| M. P. W. Bengal. | — | + | + | + | Penang, Malaya, Sumatra, Java, Australia | 1 (III) |
| Throughout India, in wet and semiwet areas, Karnataka, Maharashtra, M. P., E. Himalaya. | — | + | + | + | Thailand, Malacca, Indo-China, Sumatra | 1 (II) |

(Table 3 Contd.)

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|---|---|---|---|---|
| 141. | *Neurothemis fulvia* (Drury) | — | Sirmaur | Dehradun, Nainital |
| 142. | *Neurothemis intermedia intermedia* (Ramb.) | — | Kangra | Dehradun |
| 143. | *Neurothemis tullia tullia* (Drury) | — | Kangra, Sirmaur, Una | Dehradun |
| 144. | *Bradinopyga geminata* (Ramb.) | — | — | Dehradun, Nainital |
| 145. | *Sympetrum commixtum* (Selys) | Kashmir (Yusimarg) | Bilaspur, Manali, Solan | D. Dun Nainital, Pauri |
| 146. | *Sympetrum haematoneura* Fraser | Kashmir | — | Nainital |
| 147. | *Sympetrum fonscolombei* (Selys) | Kashmir | — | — |
| 148. | *Sympetrum meridionale* (Selys) | Kashmir (Yushimarg Gulmarg) | — | — |
| 149. | *Sympetrum hypomelas* (Selys) | — | Kulu, Simla Sirmaur | Chamoli, |
| 150. | *Trithemis aurora* (Burm.) | — | Bilaspur, Hamirpur, Kangra | Dehradun, Nainital, Pauri, Tehri |
| 151. | *Trithemis festiva* (Ramb.) | — | Bilaspur Hamirpur, Kangra, Sirmaur, Solan | Chamoli, Dehradun Nainital, Pauri, Tehri, U. Kashi |
| 152. | *Trithemis pallidinervis* (Kirby) | — | Kangra | Dehradun, Nainital, Pauri |
| 153. | *Trithemis kirby kirby* Selys | — | Kangra | Dehradun |

| | | | | | | |
|---|---|---|---|---|---|---|
| Throughout India | Iraq | + | + | + | Old world Tropics & sub-tropics South Asia, Taiwan, Thailand, Ryukus, Trimor, Sumba, Seychelles to Pacific, Japan, Australia, Sunda Island, Micronesia, Philippine | 1 (III) |
| Bombay, Deccan, Mahabaleshwar, W. Bengal, Bihar, M. P. | — | + | + | + | Malacca, Indo-China | 1 (II) |
| West coast of India (Peninsular India) Maharastra, Tamil Nadu, Karnataka, Rajasthan, M. P., Bihar, W. Bengal, E. Himalaya | — | + | + | + | Malacca, Indo-China, Thailand, Penang, Malaya | 1 (II) |
| Peninsular India, (from sea level to 450 mtrs) M. P., Bihar, Delhi, W. Bengal, E. Himalaya | — | — | — | + | — | 1 (I) |
| — | — | + | — | + | — | 2 |
| — | — | — | — | — | — | 2 |
| Tamil Nadu, Kerala | British Isles, Europe, Africa, Morocco, Middle Asia, Afganistan | — | — | + | — | 2 |
| — | S. Europe, N. Africa, Asia Minor, Iran | — | — | — | — | 2 |
| W. Bengal, Assam, Sikkim | — | + | + | — | Tibet | 1 (I) |
| Throughout India | — | + | + | + | Penang, Malaya, Sumatra, Java, Borneo, Philippines, Taiwan, Celebes, Timor, Moluccas, Sumba, New Guinea, Pakistan | 1 (III) |
| Assam, W. Bengal, Maharashtra | — | + | + | + | Penang, Singapore, Sumatra, Java, Philippines, Malaysia, Taiwan, Celebes, Lesser Sunda, New Guinea | 1 (III) |
| Throughout India, except in desert areas (Maharashtra, Andra Pradesh, T. Nadu, Karnataka, Bihar, W. Bengal) | — | + | + | + | Philippines, Taiwan, Thailand, Malaysia, Singapore | 1 (II) |
| Maharashtra, Karnataka, Tamilnadu | — | — | — | + | — | 1 (I) |

(Table 3 Contd.)

| | | | | |
|---|---|---|---|---|
| 154. | *Zygonyx torridaisis* Fraser | — | — | Dehradun |
| 155. | *Rhyothemis variagata variegata* (Linn.) | — | Kangra | Dehradun |
| 156. | *Rhyothemis triangularis* Kirby. | — | Hamirpur | — |
| 157. | *Zyxomma petholatum* Rambur | — | Kangra | Dehradun |
| 158. | *Tholymia tillarga* (Fabr.) | — | Kangra | Dehradun |
| 159. | *Tholymis paratillarga* Singh & Prasad | — | — | Biharigarh |
| 160. | *Pantala flavescens* (Fabr.) | — | Kangra, Lahaulspiti, Kinnaur, Sirmaur, Bilaspur, Kulu | Dehradun, Nainital |
| 161. | *Tramea basilaris burmeisteri* Kirby. | — | Kangra | Dehradun |
| 162. | *Tramea virginia* Ramb. | — | Kangra | Dehradun |

| | | | | | | |
|---|---|---|---|---|---|---|
| Karnataka, M. P., Punjab (Nandapur), E. India. | Africa, Canavera, Spain & Palestine | — | — | — | — | 2 |
| Karnataka, Bihar, W. Bengal | — | + | + | + | Malaysia | 1 (II) |
| Western Ghats, Karnataka, Assam | — | — | — | + | Malaysia, Sunda, Java, Borneo | 1 (II) |
| Tamil Nadu, Karnataka, Maharashtra, Lakhadive Islands, W. Bengal, M. P., Kerala, E. Himalaya | — | — | + | + | Thailand, Sumatra, Java Borneo, Malaysia, Ryukus, Seychelles, Indo-China, Micronesia, Australia | 1 (III) |
| Throughout India | Tropical Africa | — | + | + | Southern Asia, Thailand Penang, Java, Bali, Borneo Lombok, Sumba, Micronesia, Australia | 1 (IV) |
| — | — | — | — | — | — | 1 (IV) |
| Throughout India | — | + | + | + | Circum tropical & subtropical Micronesia, Tibet, Morroco, Thailand, Penang, Malaysia, Sumatra, Java, Bali, Borneo | 4 |
| Tamil Nadu, Karnataka, Bihar, W. Bengal, M. P. | — | + | + | + | Malaysia | 1 (II) |
| — | — | — | + | — | Throughout India, China, Taiwan, Thailand, Borneo, Carolina Island, S. Japan | 1 (II) |

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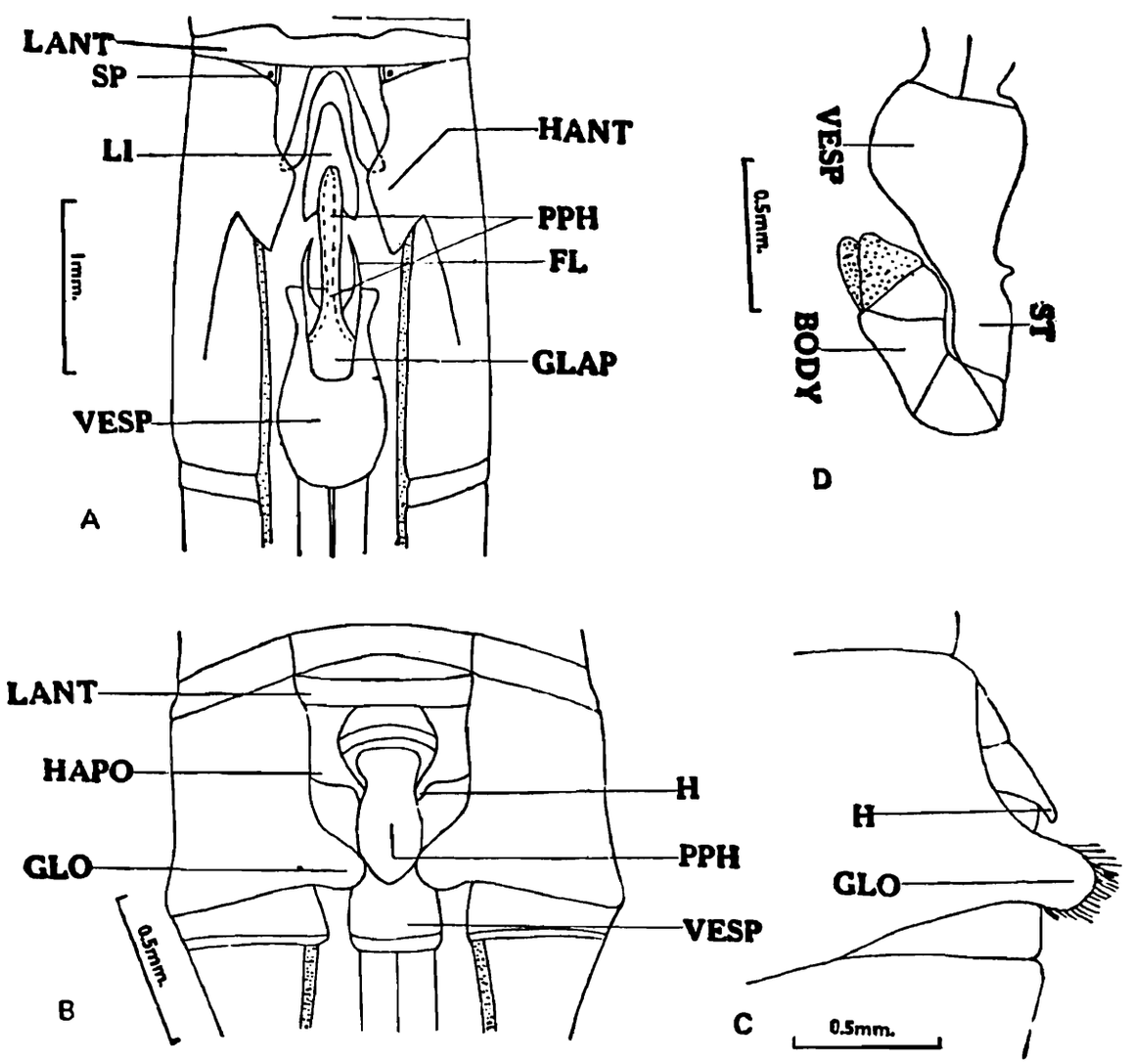
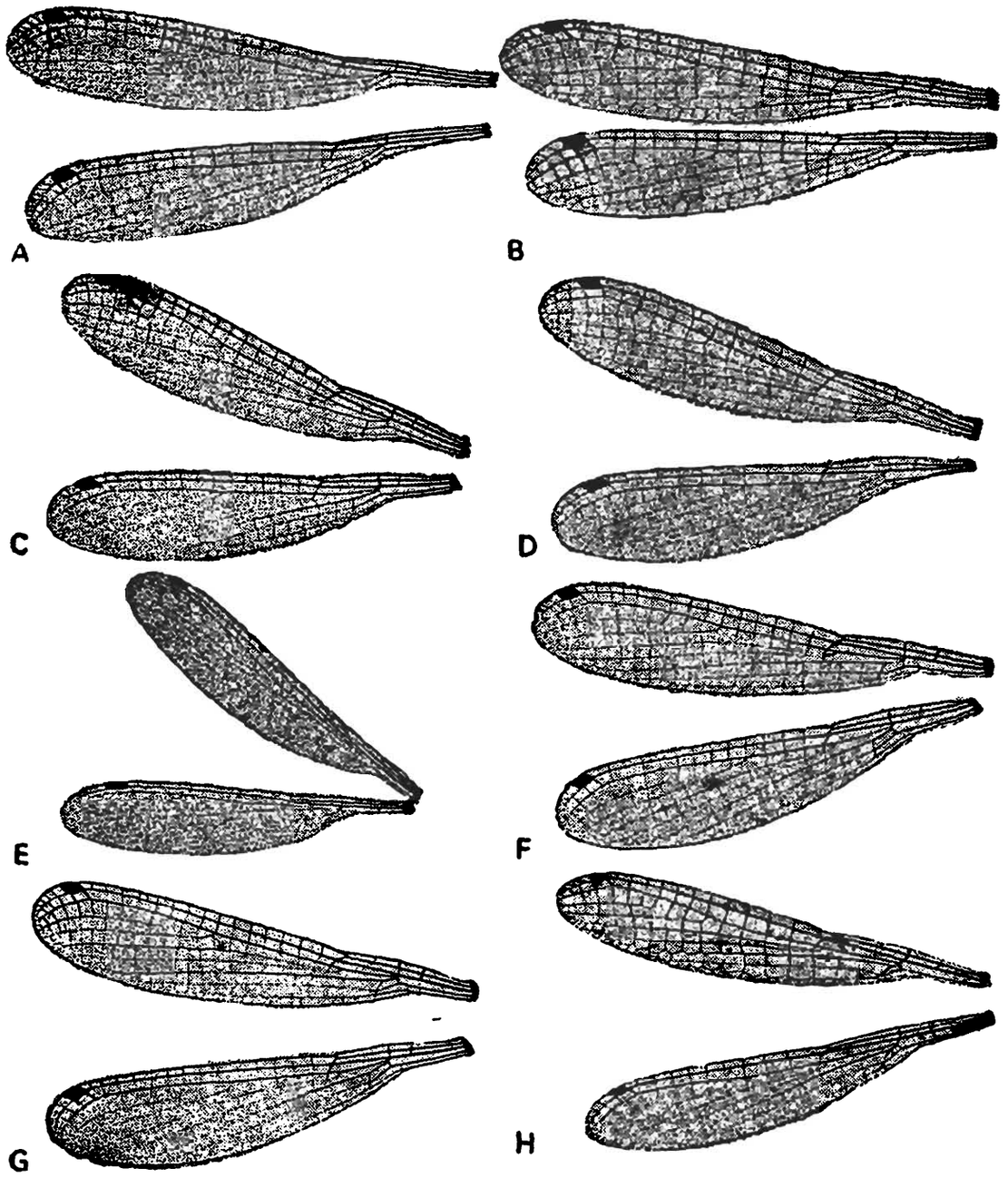
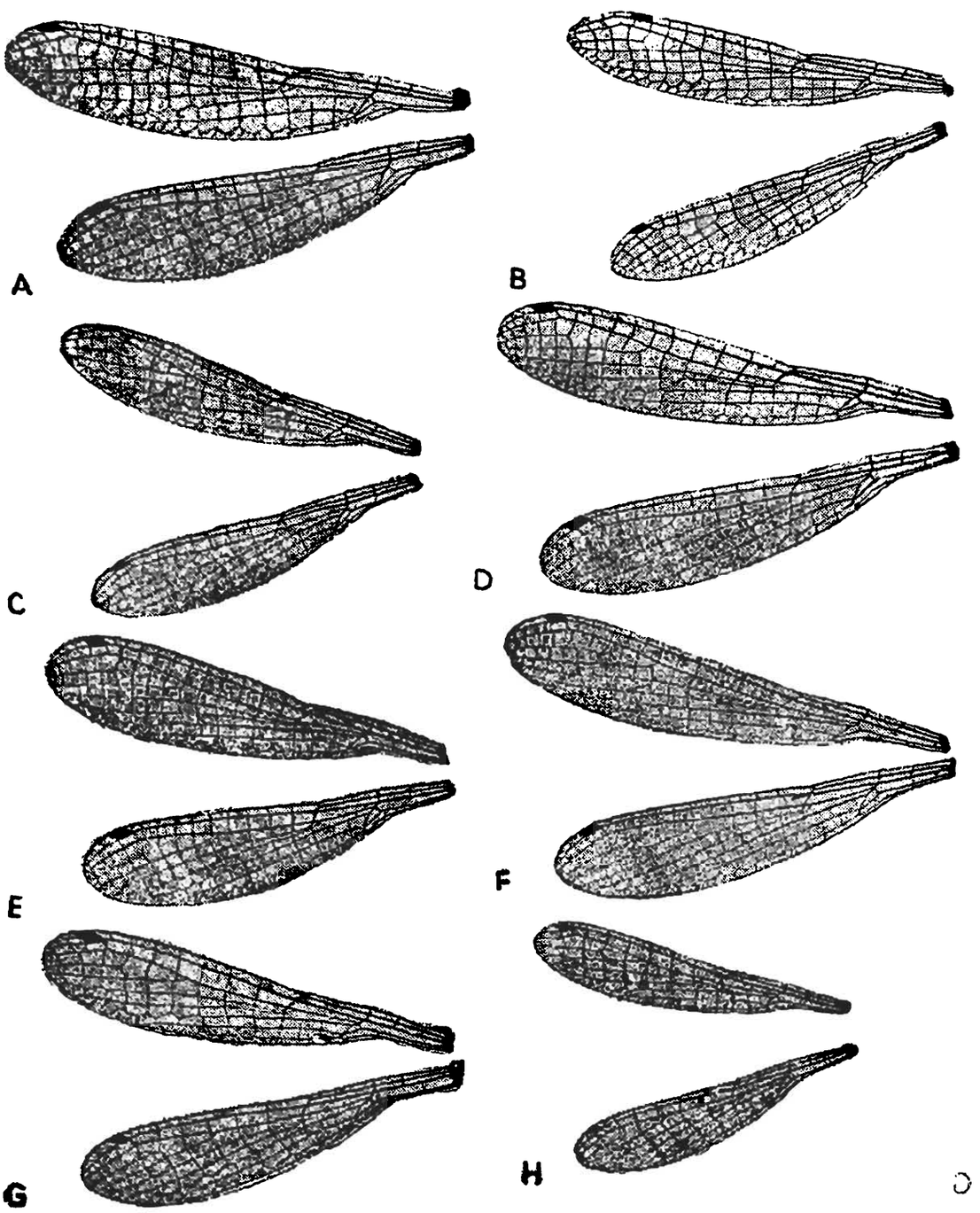



Text-fig. 1. (A-D). Male genitalia illustrating morphological characters in general (A) Zygoptera ; (B-D) Anisoptera.

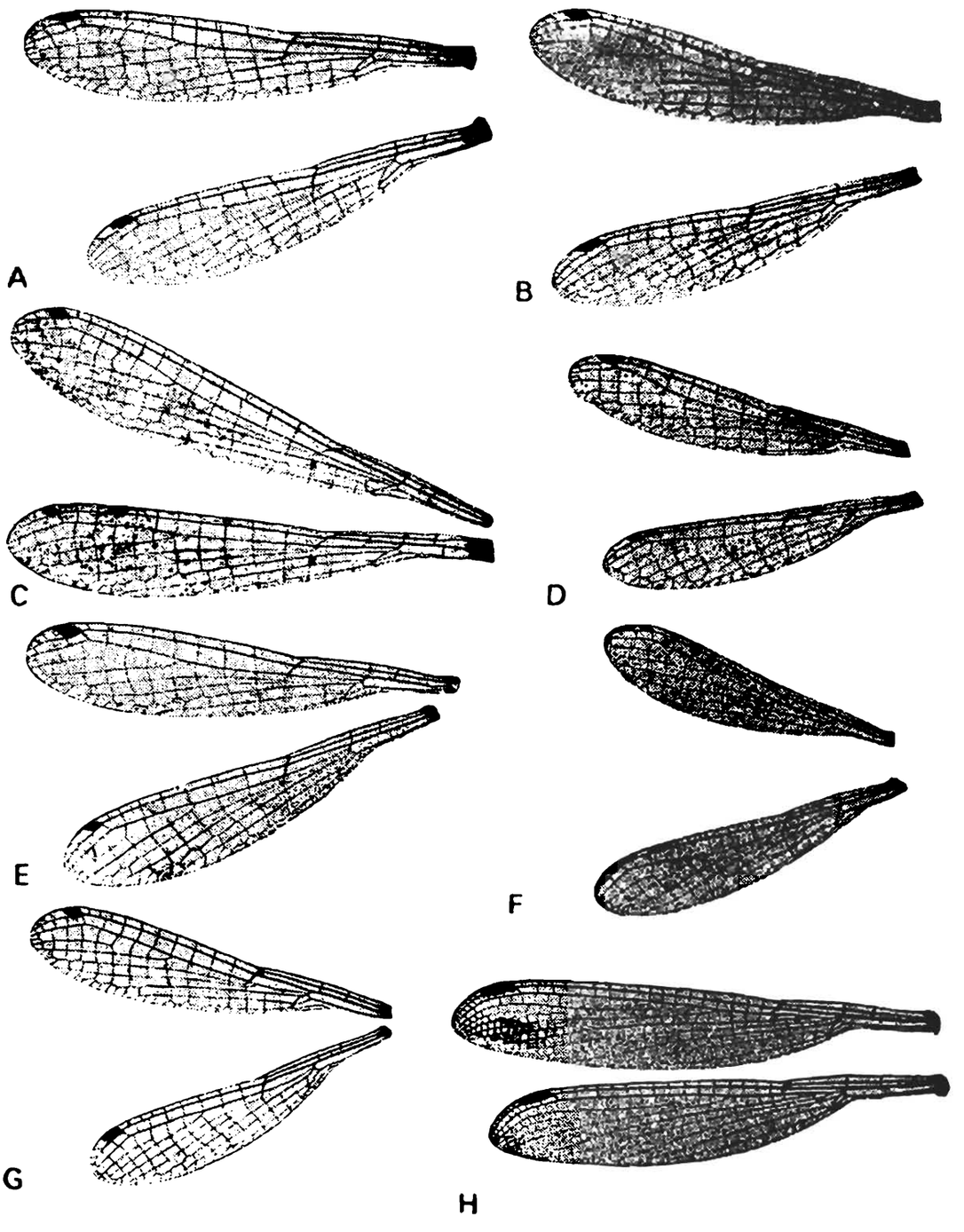
FL—flagella ; GLAP—glans of prophallus ; GLO— genital lobe ; H—hook ; HANT—haoulus anterior ; HAPO—hamulus posterior ; LANT—lamina anterior ; LI—ligula ; PPH—prophallus ; SP—spiricle ; ST—stem ; VESP—vesicula spermalis.



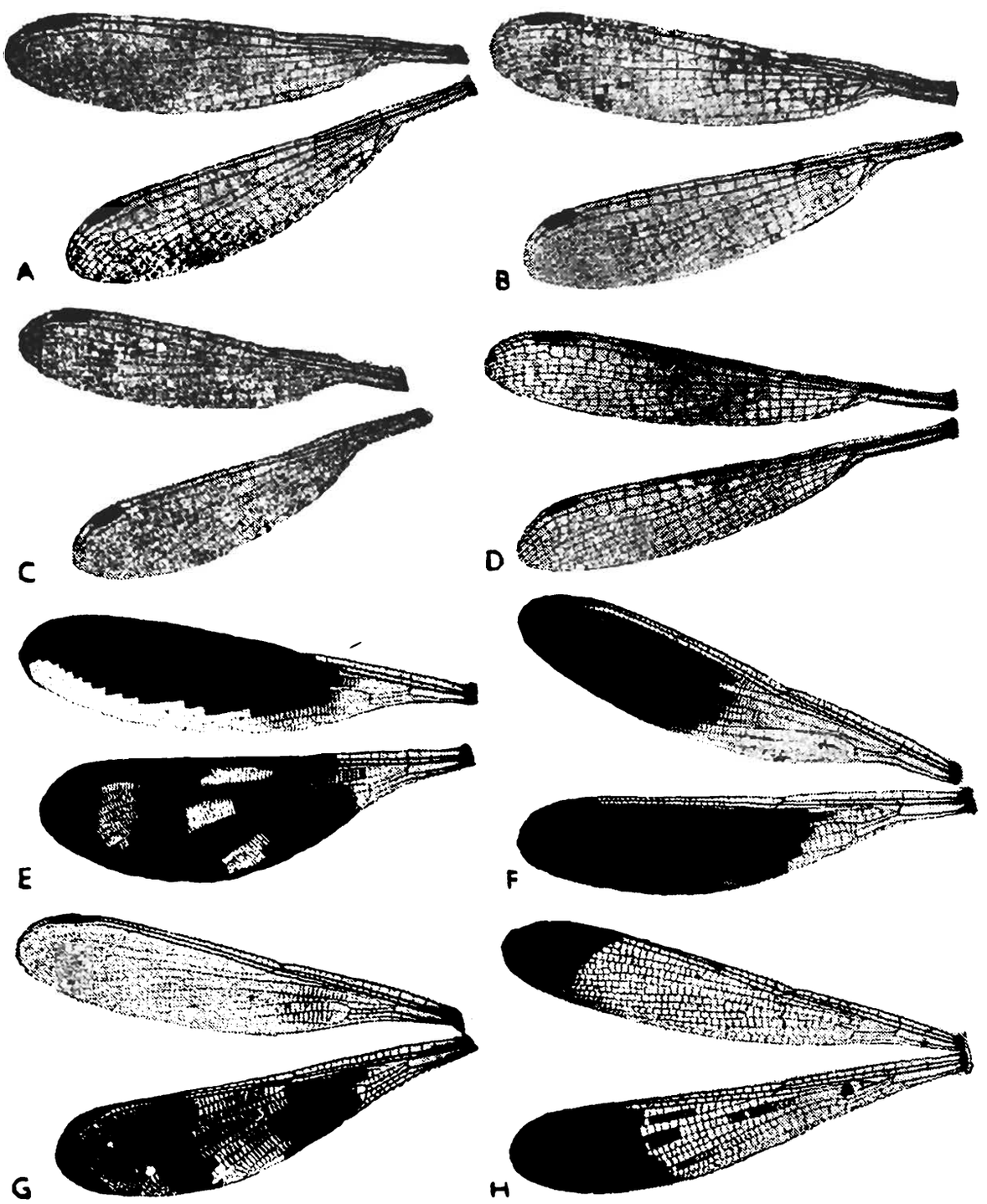

Text-fig. 2. Wings of males : (A) *Drepanosticta carmichaeli* (Laidlaw) ; (B) *Caconeura autumnalis autumnalis* Fraser ; (C) *Copera annulata* (Selys) ; (D) *Copera marginipes* (Rambur) ; (E) *Copera vittata* (Selys) ; (F) *Calicnemia miles* Laidlaw ; (G) *Calicnemia pulverulens* Selys ; (H) *Pseudagrion rubriceps* Selys.



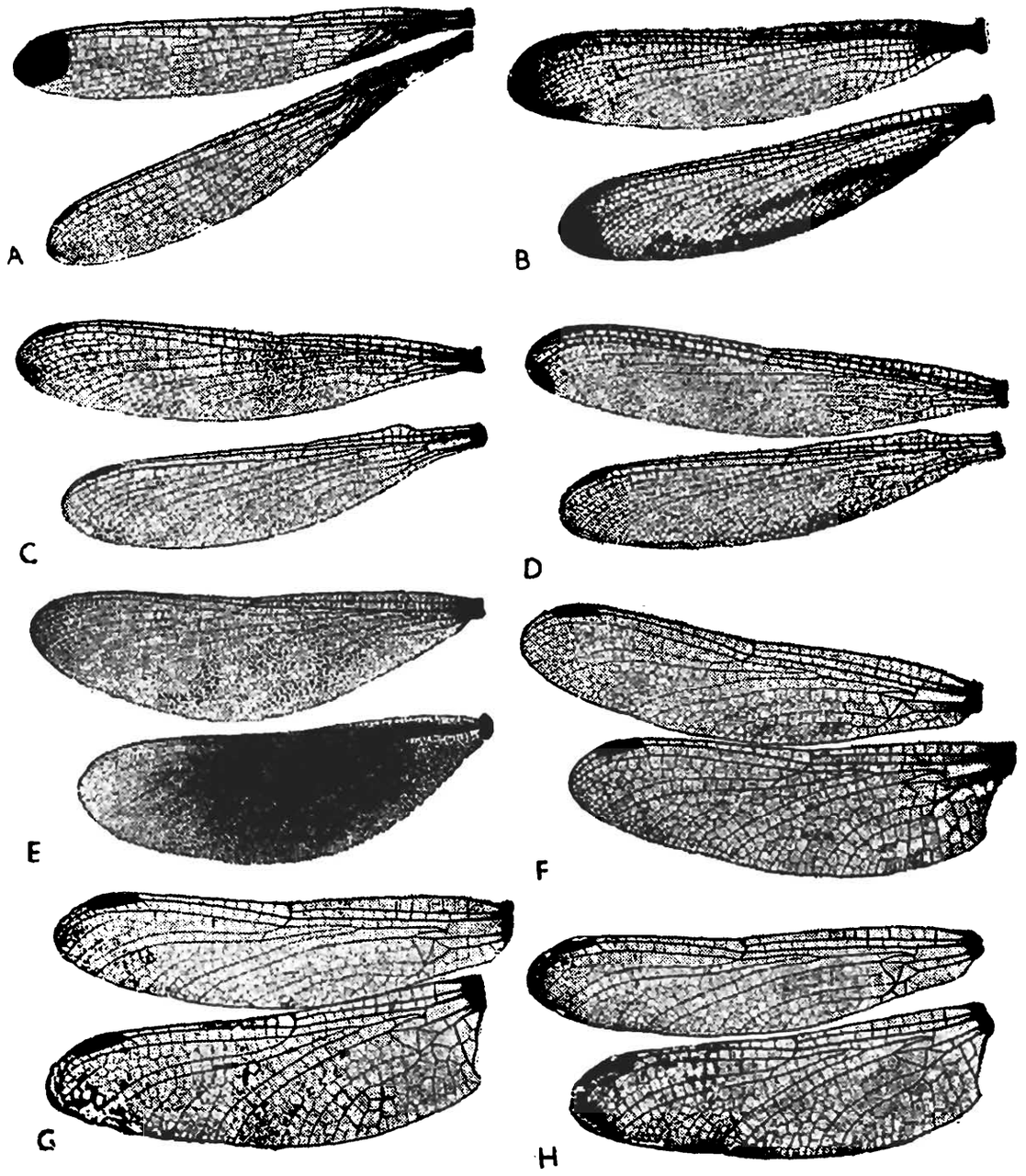

Text-fig. 3. Wings of males : (A) *Pseudagrion decorum* (Rambur) ; (B) *Pseudagrion laidlawi* Fraser ; (C) *Pseudagrion spencei* Fraser ; (D) *Ceriagrion coromandelianum* (Fabricius) ; (E) *Ceriagrion cerinorubellum* (Brauer) ; (F) *Ceriagrion fallax* Ris ; (G) *Ischnura forcipata* Morton ; (H) *Ischnura delicata* (Hagen).



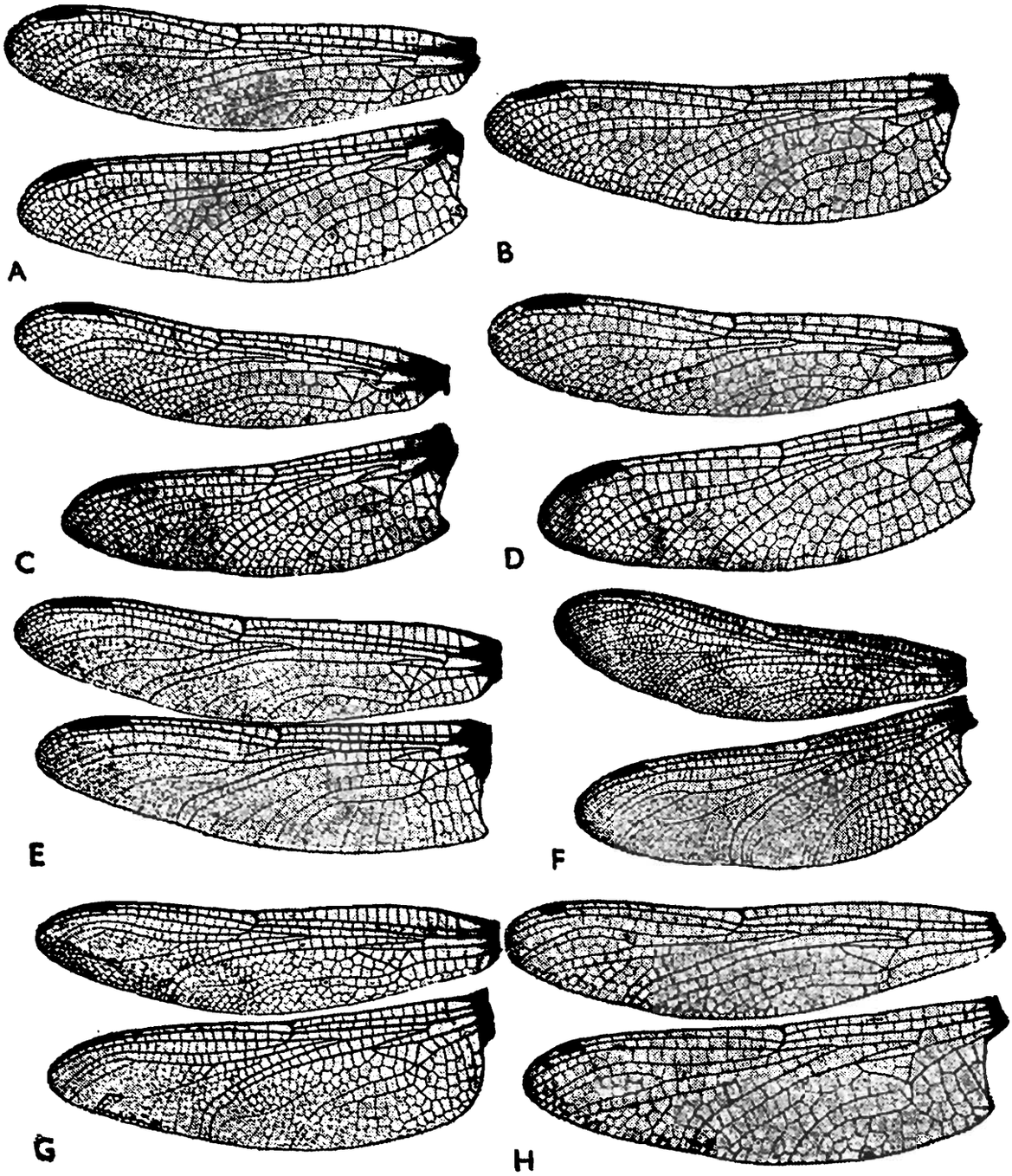

Text-fig. 4. Wings of males: (A) *Ischnura rufostigma* Selys; (B) *Ischnura senegalensis* (Rambur); (C) *Aciagrion pallidum* Selys; (D) *Rhodischmura nurssi* (Morton); (E) *Enallagma paryum* Selys; (F) *Agriocnemis pygmess* (Rambur); (G) *Agriocnemis clauseni* Fraser; (H) *Megalestes mejor* Selys.



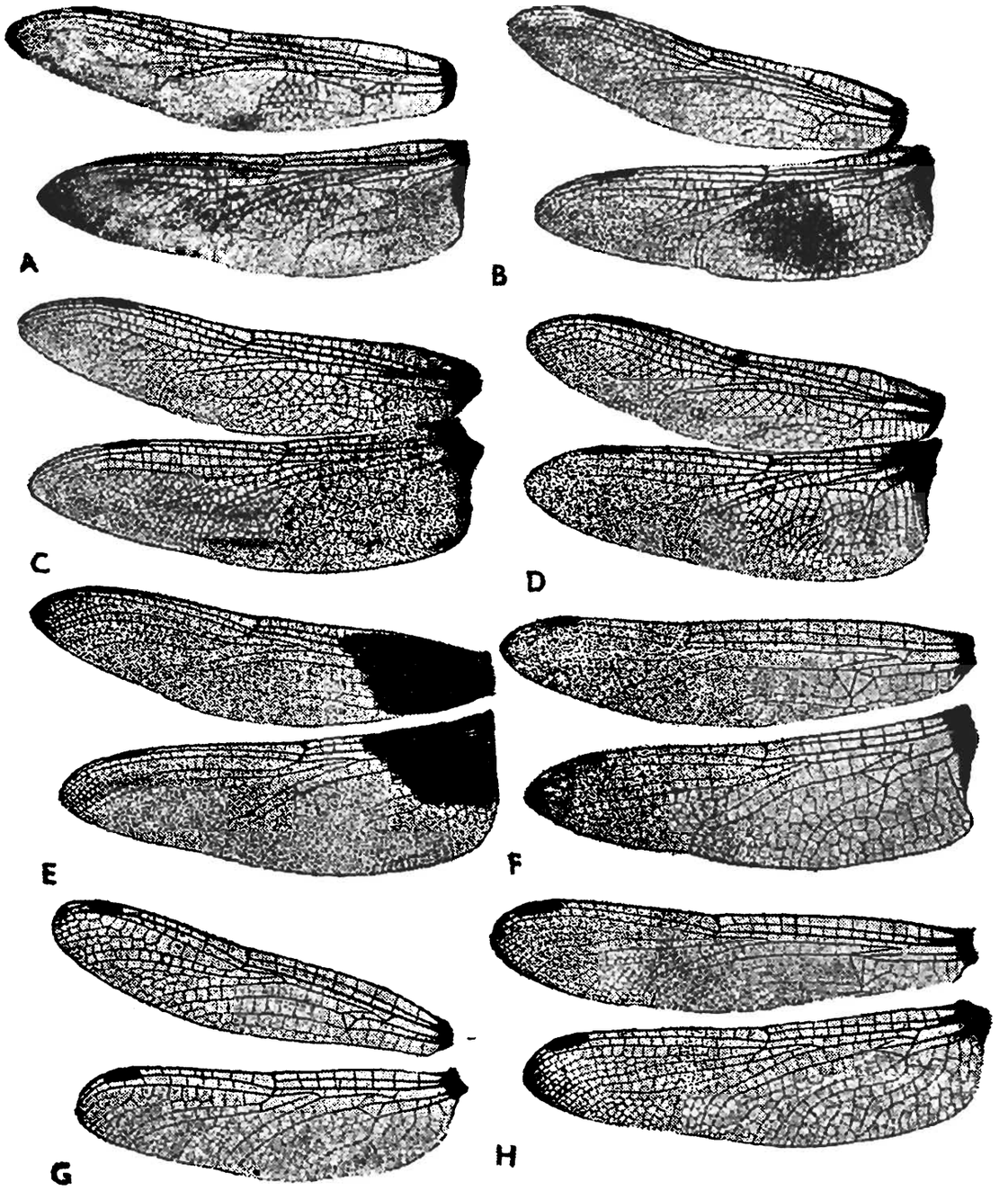

Text-fig. 5. Wings of males : (A) *Lestes viridula* (Rambur) ; (B) *Lestes praemorsa praemorsa* Selys ; (C) *Lestes thoracica* Laidlaw. (D) *Ceylonolestes davenporti* Fraser ; (E) *Rhinocypha quadrimaculata* Selys ; (F) *Rhinocypha unimaculata* Selys ; (G) *Rhinocypha trifesciata* Selys ; (H) *Rhinocypha biforata beesoni* Fraser.



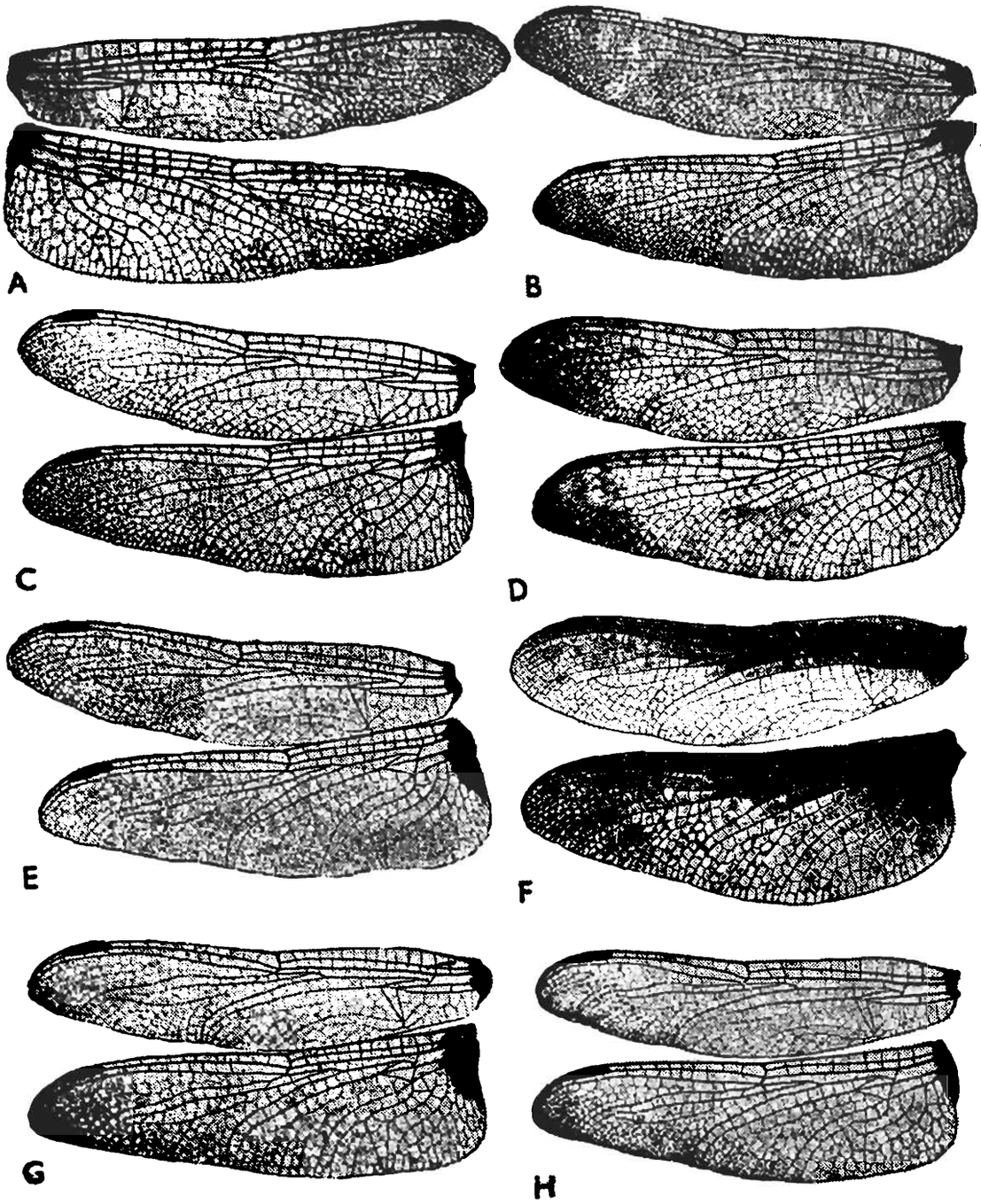

Text-fig. 6. Wings of males : (A) *Libellago lineata lineata* (Burm.) ; (B) *Bayadera indica* (Selys) ; (C) *Anisopleura leatoides* Selys ; (D) *Anisopleura comes* Selys ; (E) *Neurobasis chinensis chinensis* (Linn ) ; (F) *Anisogomphus occipitalis* (Selys) ; (G) *Onychogomphus M-flavum* Selys (H) *Onychogomphus cerastes* (Selys).



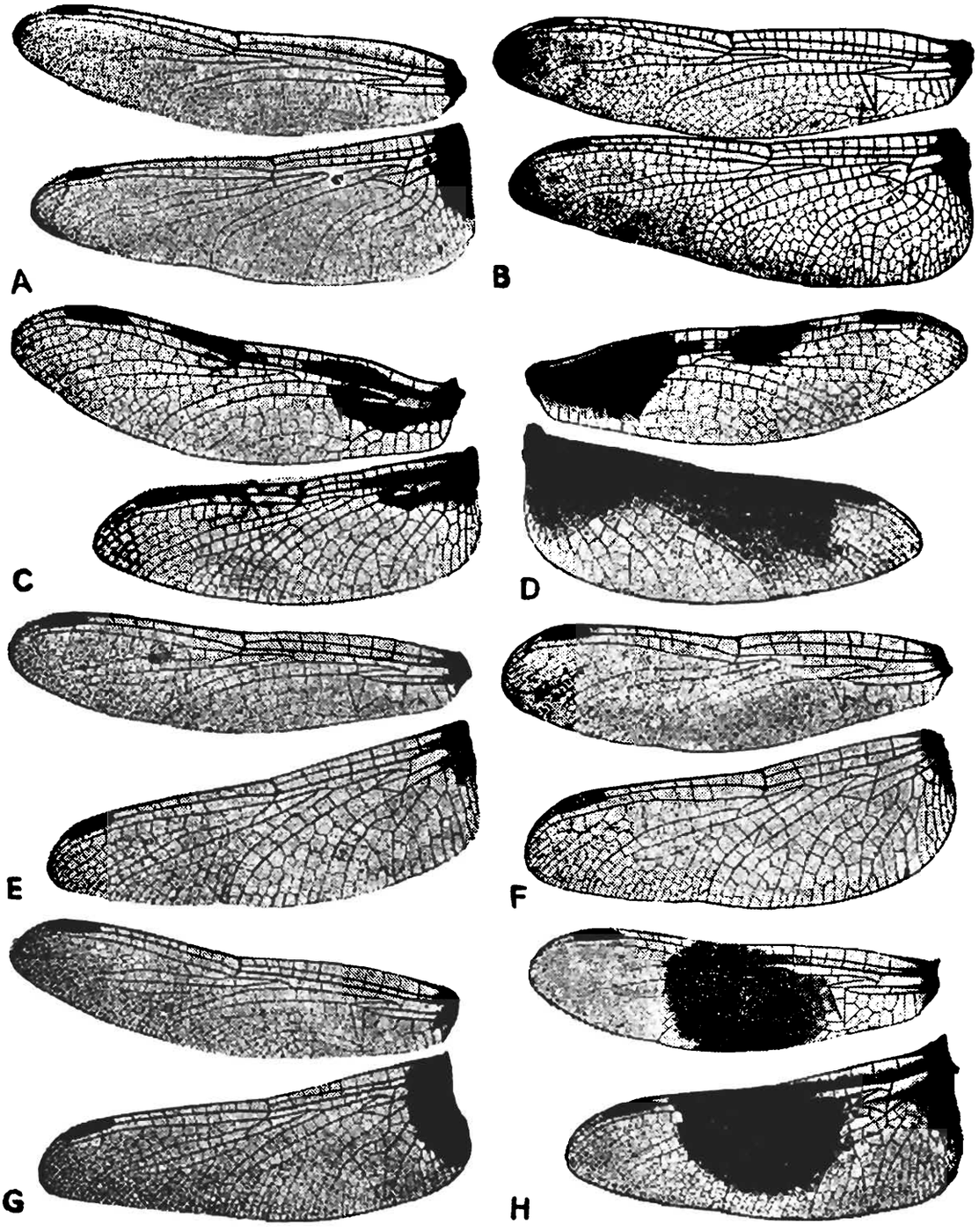

Text-fig. 7. Wings of males : (A) *Lamelligomphus biforceps* (Selys) ; (B) *Lamelligomphus risi* (Fraser) ; (C) *Nepogomphus modestus* (Selys) ; (D) *Mesogomphus lineatus* (Selys) ; (E) *Ictinogomphus rapex* (Rambur) ; (F) *Gynacanthaeschna sikkima* (Karsch) ; (G) *Gynacantha khasiaca* MacLach. ; (H) *Aeshna ornithrocephala* MacLach.



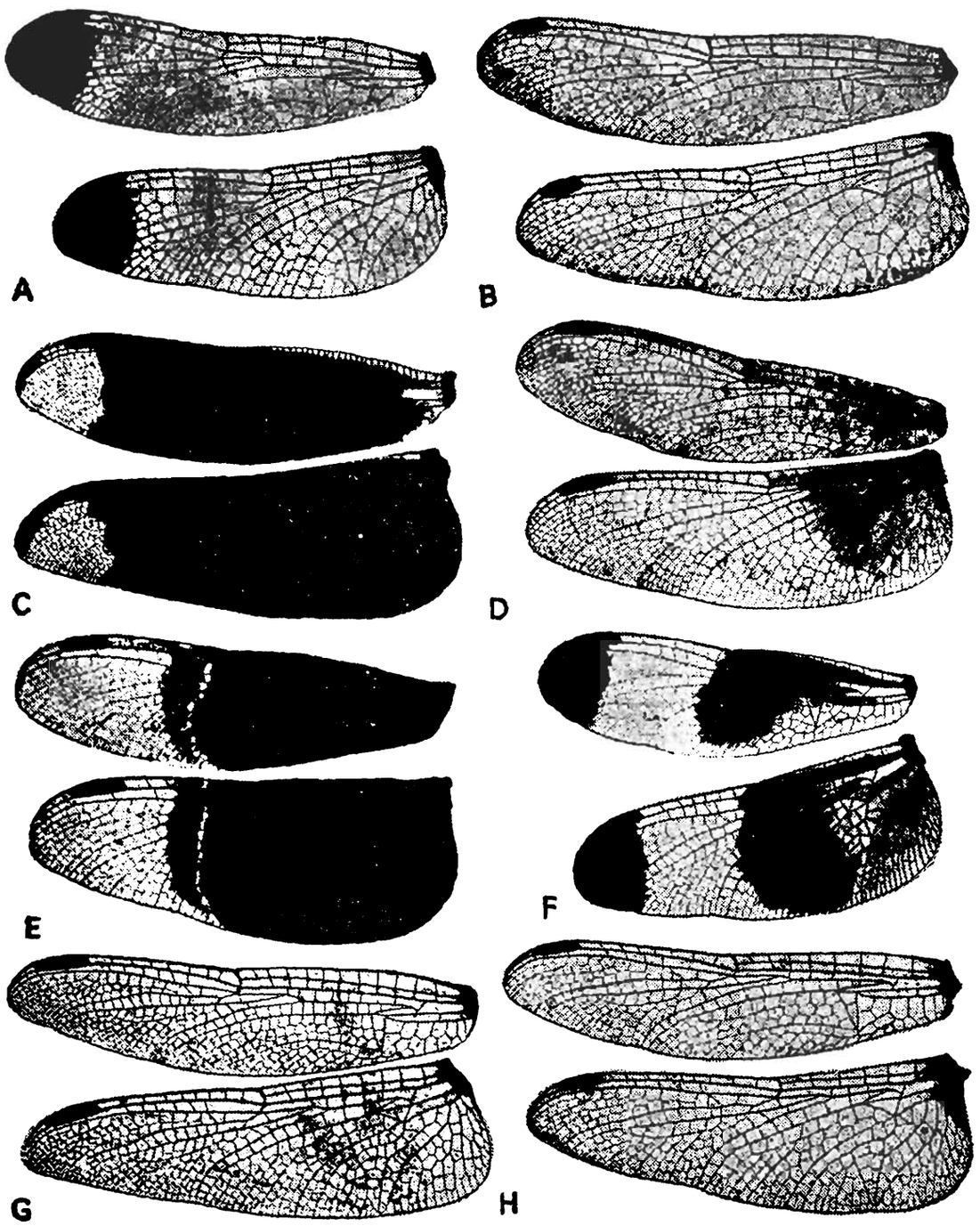

Text-fig. 8. Wings of males: (A) *Anax immeculifrons* Rambur; (B) *Anax guttatus* (Burm.); (C) *Anax nigrofasciatus nigrolineatus* Fraser; (D) *Hemianax ephippiger* (Burm.); (E) *Anatogoster basalis basalis* Selys; (F) *Macromia moorei* Selys; (G) *Tetrathemis platyptera* Selys; (H) *Cratilla lineata* (Brauer).



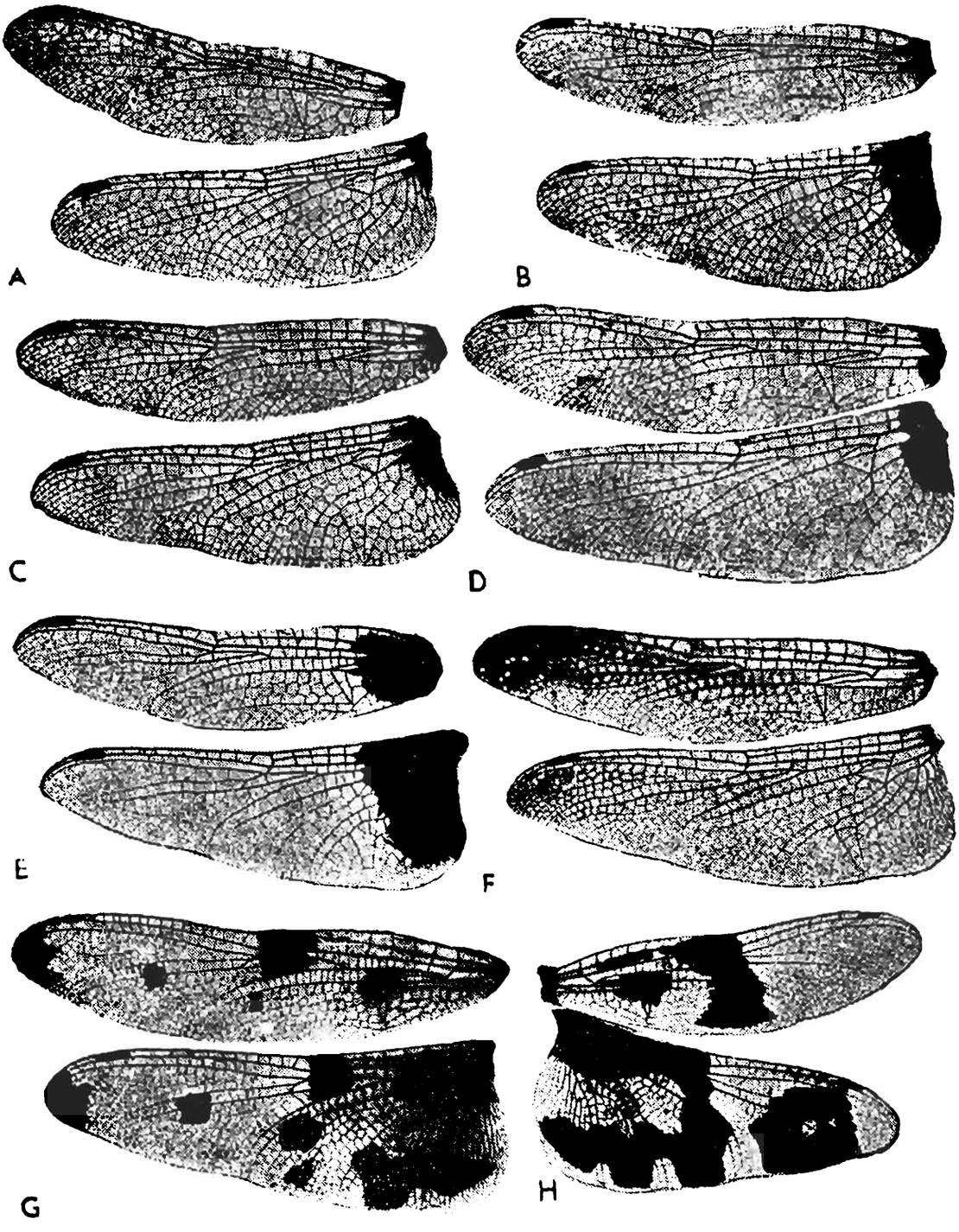

Text-fig. 9. Wings of males : (A) *Potamarcha obscura* (Ramb.) ; (B) *Orthetrum brunneum brunneum* (Fons.) ; (C) *Orthetrum taenioletum* (Schneider) ; (D) *Orthetrum chrysostigma luzonicum* (Brauer) ; (E) *Orthetrum japonicum internum* MacLach ; (F) *Orthetrum garhwalicum* Sing & Baijal ; (G) *Orthetrum glaucum* (Brauer) ; (H) *Orthetrum sabina sabina* (Drury).



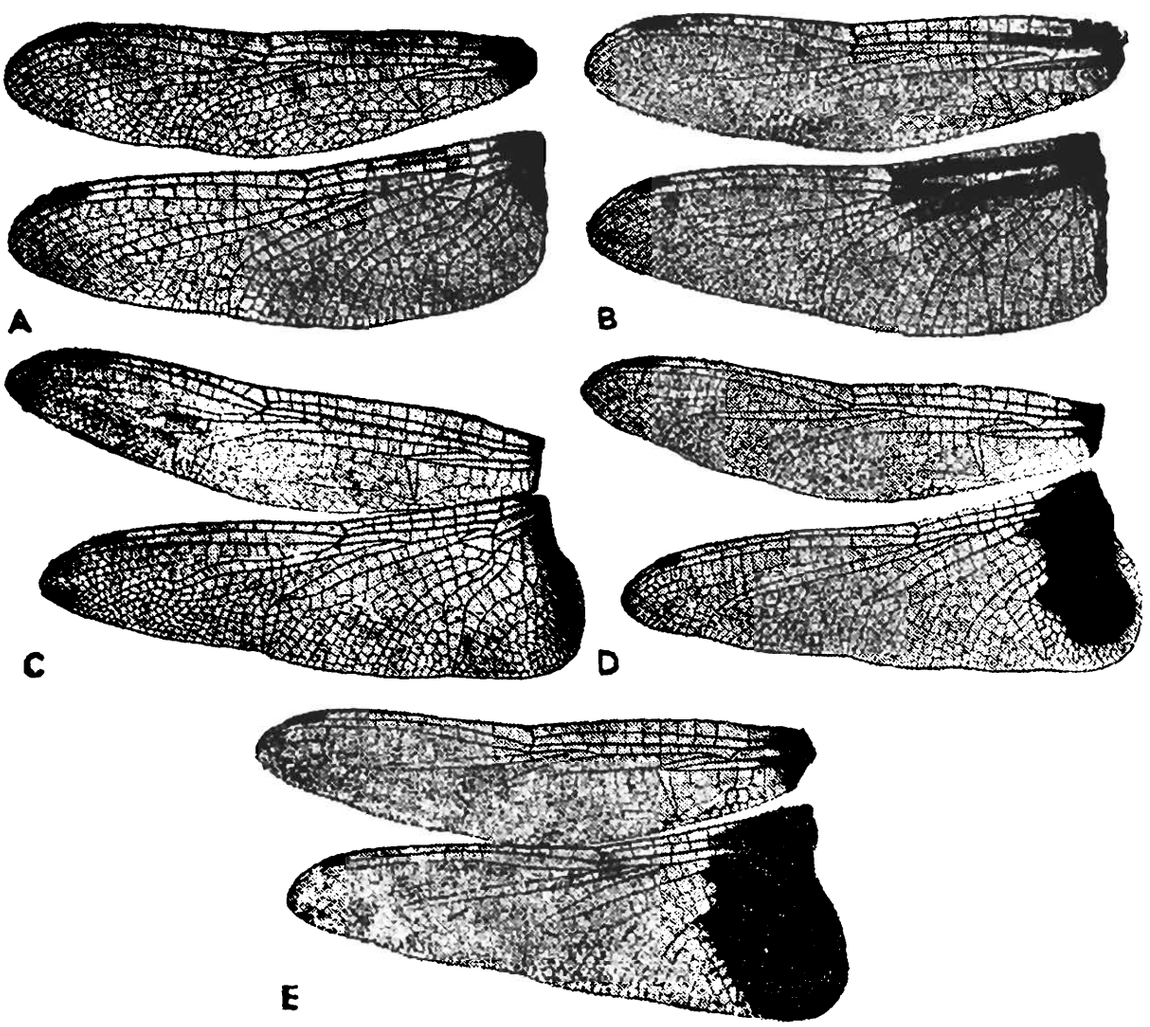

Text-fig.10. Wings of males : (A) *Orthetrum pruinosum neglectum* (Ramb.) (B) *Orthetrum triangulare triangulare* (Selys) ; (C) *Palpopleura sexmaculata sexmaculata* (Fabricus) ; (D) *Palpopleura sexmaculata sexmaculata* (Fabricius) (Female) ; (E) *Brachydiplax sobrina* (Rambur) ; (F) *Acisoma panarpoides panarpoides* Ramb. ; (G) *Crocothemis servilia servilia* (Drury) ; (H) *Brachythemis contaminata* (Fabricius).




Text-fig. 11 Wings of males : (A) *Diplacodes nebulosa* (Fabricius) ; (B) *Diplacodes trivialis* (Rambur) ; (C) *Neurothemis fulvia* (Drury) ; (D) *Neurothemis intermedia intermedia* (Rambur) ; (E) *Neurothemis tullia tullia* (Drury) ; (F) *Neurothemis tullia tullia* (Drury) ; (Female) ; (G) *Bradinopyga geminata* (Rambur) ; (H) *Sympetrum commixtum* (Selys).




Text-fig.12. Wings of males : (A) *Sympetrum hypomelas* (Selys) ; (B) *Trithemis aurora* (Burm ) ; (C) *Trithemis festiva* (Rambur) ; (D) *Trithemis pallidinervis* (Kirby) ; (E) *Trithemis kirbyi kirbyi* Selys ; (F) *Zygonyx torrida isis* Fraser ; (G) *Rhyothemis variegata variegata* Kirby ; (H) *Rhyothemis variegata variegata* Kirby (Female).




Text-fig.13. Wings of males : (A) *Zyxomma petiolatum* Rambur ; (B) *Tholymis tillarga* (Fabricius) ; (C) *Pantala flavescens* (Fabricius) ; (D) *Tramea basilaris burmeisteri* Kirby ; (E) *Tramea virginia* (Rambur).

Plate I

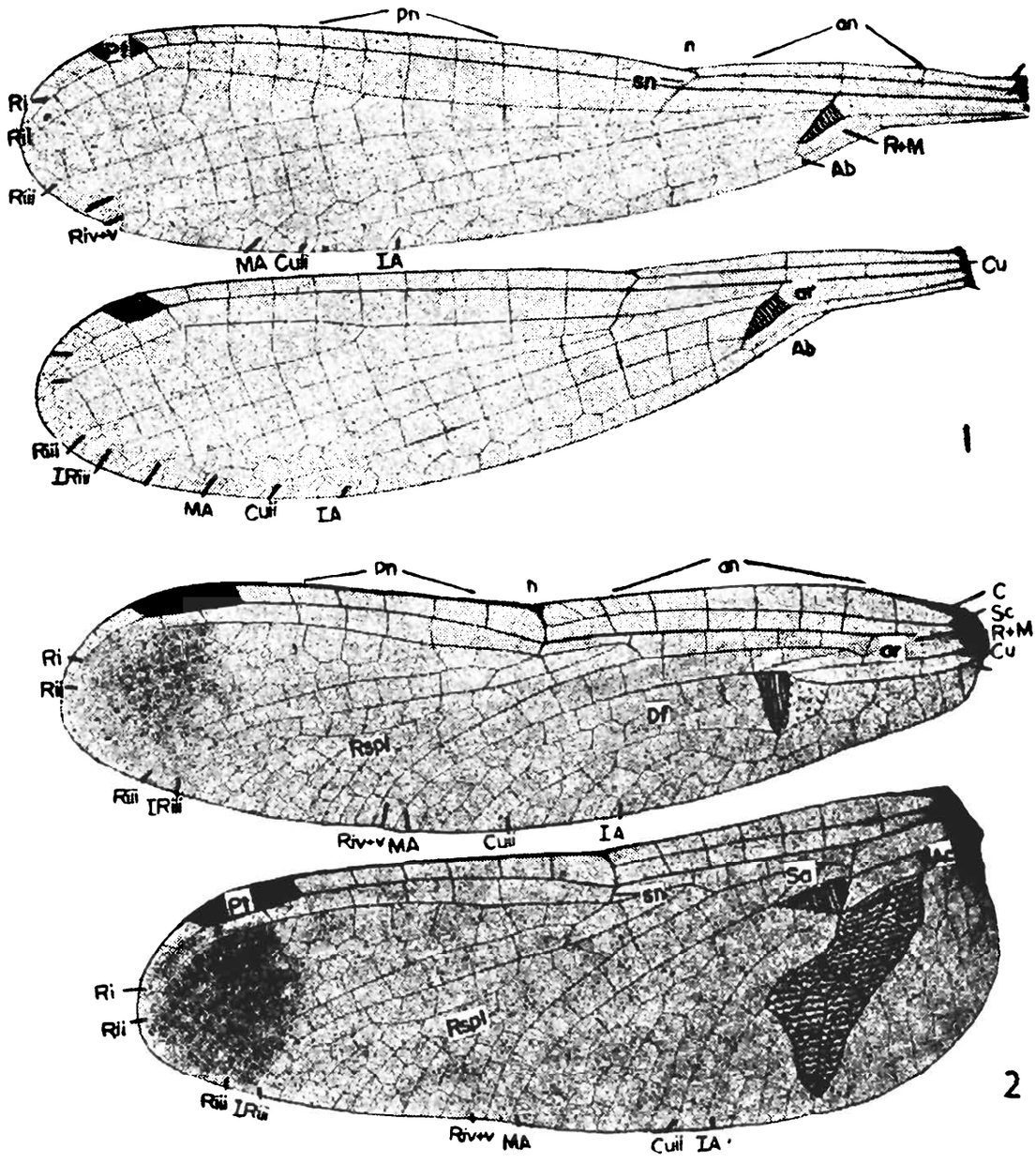



Fig. 1. Wings of *Ceriagrion cerinorubellum* (Brauer) (Rygoptera)

Fig. 2. Wings of *Diplecodes nebulosa* (Fabricius) (Anisoptera), illustrating venational chracters.

A-anal : Ab-anal bridge ; Ac-anal crossing ; an-antenodal nervures ; IA-first anal ; ar-arc ; C-cosia ; Cu-cubitus Cui-first cubitus ; Cuii-second cubitus Df-discoidal field ; MA-anterior median ; n-node ; pn-postnodal nervures ; Pt-pterostigma ; Ri-radius ; Rii, Riii, IRiii, Riv-V-Branches and intercalated branches of radius ; Rspl-supplementary nervure to redius ; Sa-sectar of arc ; Sn-subnode ; discoidal cells striated ; subtrigone dotted ; anal loop wavy lined.