

MISCELLANEOUS PUBLICATION
OCCASIONAL PAPER NO. 99

Records of the Zoological Survey of India

**STUDIES ON THE ODONATE FAUNA
OF MEGHALAYA**

A. R. Lahiri

**Issued by the Director
Zoological Survey of India, Calcutta**

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A. R. LAHIRI
Zoological Survey of India, Calcutta



सत्यमेव जयते

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1987

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Published : December, 1987

PRICE : Inland : Rs. 160.00

Foreign : £ 18.00 \$ 26.00

**PRINTED BY ROMAN PRINTERS PVT. LTD., 37, ANDUL ROAD, HOWRAH-9
PRODUCED BY THE PUBLICATION DIVISION AND PUBLISHED BY THE
DIRECTOR, ZOOLOGICAL SURVEY OF INDIA, CALCUTTA**

RECORDS
OF THE
ZOOLOGICAL SURVEY OF INDIA
MISCELLANEOUS PUBLICATION
Occasional Paper

No. 99	1987	Pages : 1—402

CONTENTS

	PAGE
INTRODUCTION	1
TOPOGRAPHY OF MEGHALAYA	2
HISTORICAL REVIEW OF PREVIOUS WORKS IN MEGHALAYA	4
MATERIAL AND METHOD	7
SYSTEMATICS	8
TAXONOMIC ACCOUNT	16
DISCUSSION	229
SUMMARY ..	235
ACKNOWLEDGEMENTS ..	237
REFERENCES ..	238
MAP OF MEGHALAYA ..	265
FIGURES .. .	281
TAXONOMIC INDEX	397

INTRODUCTION

Odonata, popularly known as dragon-and damselflies are very conspicuous among the flying insects, ranking perhaps in this respect, only next to the butterflies. They occur almost all over the world in varied ecological niches extending from the sea level to over 3,600 m altitude and from brakish, marshy areas to desert lands.

The adult odonates, on account of their completely carnivorous feeding habit, are beneficial to human society, thereby keeping low the intensity of various obnoxious insects. The larvae of odonates serve as food for fishes and ducks, while the adults are preyed upon by other carnivorous insects, e.g. Assilid flies, lizards, birds and other vertebrates.

Besides all odonates in general and specially the large dragonflies and those belonging to the genera *Rhinocypha* Rambur, *Rhyothemis* Hagen and others, are much adored as decorative museum specimens. As paleopterous insects with generalised wing venation, membranous net-veined wings, general features of body, long slender abdomen and unique nature of male genitalia, they appear interesting to the students of entomology. In recent times, result of investigations on freshwater pollution, indicate that Odonates could be definitely used as one of the biological indicators of pollution.

Sometimes, however, the adult odonates and their larvae may turn to be serious pests for culturing honey bees and fingerlings of fishes.

Study of Odonata dates back to pre-historic times. The first mention of Indian dragonfly is available in *Sangam* literature in Tamil written before the eight century A.D. (Bhaduri et. al., 1972). Fraser (1933-1936) provided a good account of Indian Odonate fauna in general, preceeded and followed by contributions of a number of authorities on this subject

The present study initiated with the sorting out and identification of diversified Odonate collection accumulated at the Eastern Regional Station of the Zoological Survey of India, Shillong through surveys conducted by different survey parties over a period from 1959-1971. Subsequently having realised the richness of faunal composition of Meghalaya, a politically defined state of Eastern India that comprises of the Khasi, Jaintia and

Garó Hills of eastwhile Assam province, it was soon felt necessary to study the same in a comprehensive manner. To augment the existing collection, a number of fresh surveys were then undertaken to different parts of the state over a period from 1971-1979. The resulting total collection comprised 112 Odonate species and subspecies under 68 genera. Extensive consultation of available literature on earlier contribution on fauna of the region revealed that, among the known species quite a few were never reported from the area and for a majority of them existing description, in particular the illustrations are inadequate or even erroneous. Consequently adequate illustrations of different body parts of taxonomic importance were prepared for all the species studied to incorporate in this contribution together with additional descriptions, wherever felt necessary, to augment existing descriptions. Six species and one subspecies turned out to be new to science while nine of the rest could not be definitely identified either because of nonavailability of males or because of paucity of materials. The genus *Nihonogomphus* Oguma has been recorded for the first time from India and 48 known species recorded for the first time from the state of Meghalaya. All genera studied have been described in detail and running keys have been provided for the material studied. 35 species and subspecies recorded earlier from the state were however not represented in the collection studied. An attempt has been made to analyse the distribution pattern of the Odonate fauna now known from Meghalaya at the end.

All types are deposited in the National Zoological Collection, Zoological Survey of India, Calcutta.

TOPOGRAPHY OF MEGHALAYA

Meghalaya lies between 23.47' and 26.10' north latitude and 89.0' and 92.47' east longitude. The state is bounded by Bangladesh on the south and west and by Assam on the north (Nowgong, Kamrup and Goalpara districts) and east (Mikir hills and north Cachar hill districts). It comprises an area of 22,549 sq. km. The state consists of three districts, viz. Garó hills, Khasí hills and Jaintia hills.

The state merges almost to sea level in the plains of Bangladesh and Assam on all sides, except in the east, where it extends to the main ranges of the eastern Himalayas by a continuous hill range through Mikir hills, north Cachar hills and Nagaland. The Jaintia hills on its eastern border merges gradually into Barail range (highest altitude c 2,995 m), while its central part is characterised by comparatively lower altitude with flat lands, valleys, and meadows, a great portion of which being converted into wet-

terraced and flat rice fields. The southern part of Khasi and Jaintia hills is formed mostly by gentle slopes. The central and northern parts of Khasi and Garo Hills are hilly, the foot hills gradually merge into Assam valley. The ranges of these hills are intertwined with curved alignments and has the general character of mountain terrain. In Khasi hills, the highest plateau extends from Mawphlong to Raphlong hills, the highest altitude being that of Shillong peak (c 2000 m). In Garo hills, the Tura range (Nokrek, the highest peak c 1412 m) occupies a central position and runs from west to east upto Siju cave.

Geological formation The geological formation of Meghalaya is ancient and belongs to the archean, cretaceous, tertiary and quaternary ages. This land was partially submerged during mesozoic under the sea and was uplifted again at a later date, when Himalayas rose from the bed of Tethys sea. The age of Shillong plateau, which consists of the highlands of Khasi, Jaintia and Garo hills of Meghalaya and Mikir hills of Assam has been estimated to be about 472 million years.

Watersheds The state is watered with innumerable rivulets and streams flowing in the grooves and gorges of the hills and also in the valleys, many of which remain dry during hotter months. Besides, there are a number of lakes, ponds and rivers. The rivers are torrential and follow the direction of ranges and form water falls along the precipitous edges. The Shillong peak and the Nokrek peak form the main watersheds of rivers flowing northward and southward in the plains of Assam and Bangladesh. Each of the three districts mentioned before are traversed by 6-8 main rivers.

Climate and rainfall Climate of Meghalaya varies from place to place, from subtropical in the foothills to temperate at higher elevations. In general, Khasi and Jaintia hills districts have warm summer and cold winter, with average maximum and minimum temperatures as 24°C and 12°C respectively while Garo hills district appears slightly warmer. South-western monsoon lasting from June - July to September, accounts for 75% of the total rainfall. The north-eastern monsoon lasting from Autumn to January accounts for minor percentage of the rainfall. Relative humidity runs lowest between February and April and attains maximum during the rainy season. Southern part of the state receives maximum rainfall (300 cm to 1549 cm) per year and the northern part has the minimum (200 cm.).

Vegetation : The state shows different vegetation zones, ranging from tropical to temperate. Tropical evergreen vegetation, with luxu-

rious growth is met at lower altitude up to 800 m, around the periphery of the state, where one frequently meets with wild bamboo and banana forests. More common plants are *Vitex* sp., *Talauma* sp., *Polyalthia* sp., *Elaeocarpus* sp., *Xerospermum* sp., *Castanopsis* sp., *Carcinia* sp., *Ficus* sp., *Sapium* sp., *Premna* sp., *Canthium* sp., *Carallia* sp., *Hibiscus* sp. etc., some tall shrubs e.g. *Leena* sp., *Abroma* sp., *Boehmeria* sp., *Vahlia* sp., etc. and dense herbs e.g. *Hedyotia auricularia*, *Alpinia allughas*, *Bogonia thomsoni* etc. and numerous species of ferns, *Selaginella* and fungi. At altitude above 800 m, tropical forest is gradually replaced by sub-tropical forest ; this zone is characterised by short and bushy appearance of the trees, the epiphytes becoming more and more prominent. More important plants are *Castanopsis*, *Lithocarpus*, *Elaeocarpus* sp., *Ficus* sp., *Viburnum* sp., *Quercus* sp., *Vernonia* sp., etc. many shrubs e. g. *Aspidonteryia* sp., *Rosa moschata*, *Nycetia longifolia*, various species of Acanthaceae, Araliaceae, fungi, moss, *Selaginella*, *Lycopodium* and herbaceous angiosperms. Temperate vegetation with luxurious growth of *Pinus insularies* is predominant at altitude over 1200 m to 2000 m and above, specially around Shillong, Tura and Nokrek peaks ; in this temperate zone, more common plants are *Quercus* sp., *Castanopsis* sp., various species of Rosaceae, Ranunculaceae, Begoniaceae and Asteraceae, *Corylopsis*, *Exbucklandia*, *Albizia*, *Monglietia* with climbing *Schizandra*, *Kadaura* and *Acar* sp. Trees are heavily loaded with epiphytes, mostly orchids.

Southern part of Khasi hills district, due to heavy rainfall and soil erosion, has rather scanty vegetation, where one usually meets with rolling grassland, frequented with short trees and undergrowth of bushes at places. Natural vegetation is much destroyed in central part of Jaintia hills in particular, and to variable extent at lower altitudes in other two districts, due to terrace cultivation. There are a number of Reserve Forests in the state, specially in the southern part of Khasi and Garo hills, where artificial planting of economically important timber producing plants have been made.

HISTORICAL REVIEW OF THE PREVIOUS WORKS IN MEGHALAYA

Fabricius (1777, 1793 and 1798) and Rambur (1842) described several species from India, mentioning their type locality as "Indes Orientalis". These therefore, do not clearly indicate, any specific locality. Ed. de Selys Longchamps contributed substantially to Indian Odonatology and described several species from localities belonging to Meghalaya. In 1853, Hagen and Selys described *Echo margarita* from a collection, which con-

tained a specimen from Cherrapunjee in Meghalaya. Subsequently, Selys described several species from localities now under the state, namely *Philoganga montana* (as *Anisoneura montana*) (1959), *Gomphus personatus* (1873), *Idionyx optata* and *Hemicordulia asiatica* (1878a), *Euphea ochracea brunnea* (as *Euphea brunnea*), *Bayadera hyalina*, *Echo margarita tripartita* (citing *tripartita* as a race), *Matrona basilaris nigripictus*, *Rhinocypha ignipennis* *R. immaculata*, *R. spuria* and *Vestalaria smaragdina* (as *Vestalis smaragdina*) (1879), *Sympetrum orientale* (as *Diplax orientale*) (1883a), *Sympetrum hypomelas* (as *Diplax hypomelas*) (1884) and *Elatoneura atkinsoni* (as *Disparoneura atkinsoni*) (1886). Selys (1891a) also recorded from Khasia hills *Aciagrion approximans* (Selys), *Orthetrum triangulare triangulare* (Selys) (as *Libella triangularia*) and *Trithemis festiva* Brauer. After the death of Selys in 1890, McLachlan (1896) described *Gynacantha khasiaca* from Khasi hills. Martin (1909) described *Aeshna petalura* and *Austroaeshna intersedens* and Ris (1916) described the subspecies *Neurothemis intermedia atlanta* from Khasi hills. Ris (1909-1919, 1912) confirmed the existence of some Odonate species earlier recorded from Meghalaya and also recorded a number of species, viz. *Bayadera indica* (Selys), *Crocothemis servilia servilia* (Drury), *Orthetrum glaucum* (Brauer), *O. luzonicum* (Brauer), *O. japonicum internum* McLachlan and *Trithemis aurora* (Burmeister) from the state. Laidlaw (1914a, 1917a,b, 1919, 1921, 1922a, 1932) described seven species and recorded three other species from the state ; these are *Coeliccia bimaculata* Laidlaw *Indocnemis kempi* Laidlaw, *Aciagrion tillyardi* Laidlaw, *Onychogomphus aureus* Laidlaw, *Anisogomphus orites* Laidlaw, *Coeliccia fraseri* Laidlaw, *C. vacca* Laidlaw, *Matrona basilaris basilaris* Selys, *Gynacantha hyalina* Selys and *Heliogomphus selysi* [as *H. nietneri* (Selys).] Fraser (1919a, 1921c, 1922e, 1924a, 1925a, 1926a,b,c,e, 1927a, 1929a,c, 1930b, 1935) described 17 new species and one new race and recorded eight other species ; these are *Rhinocypha quadrimaculata* race *hemihyalina* Fraser, *Pradasineura autumnalis* Fraser (as *Caconeura autumnalis*), *Indolestes indica* Fraser, *Pseudagrion spencei* Fraser, *Agriocnemis clauseni* Fraser, *Heliogomphus spirillus* Fraser (as *Leptogomphus spirillus*), *Megalogomphus bicornutus* Fraser (as *Gomphus bicornutus*), *Merogomphus martini* Fraser (as *Platygomphus martini*), *Paragomphus echinogccipitalis* Fraser (as *Onychogomphus echinooccipitalis*), *Idionyx imbircata* Fraser, *I. intricata* Fraser, *Davidius malloryi* Fraser, *Anisogomphus caudalis* Fraser, *Anisopleura subplatystyla* Fraser, *Periaeschna nocturnalis* Fraser, *Petaliaeschna fletcheri* Fraser, *Dubitogomphus bidantatus* Fraser (as *Leptogomphus bidantatus*), *Periaeschna biguttata* (Fraser) (as *Cephalaeschna bigutta*), *Palpopleura sexmaculata sexmaculata* (Fabricius), *Macromia moorei* Selys, *Ceriagrion olivaceum* Laidlaw, *Chlorogomphus atkinsoni* (Selys) (as

Orogomphus atkinsoni Selys), *C. campioni* (Fraser) (as *O. campioni* Fraser), *Zygonyx i. iris* Selys, *Euphaea ochracea* Selys [as *Allophaea ochracea* (Selys)] and *Megalestes major* Selys. Needham (1932), Fraser and Laidlaw in their above mentioned contributions and Fraser (1918, 1919c, 1920c, 1922a, b, c, d, 1923d, 1924e, 1925b, c, d, e, 1927b, c, 1928, 1929b, 1932, 1934a) also confirmed the existence of several Odonate species already known from Meghalaya. Fraser (1933, 1934 and 1936) published accounts of Indian Odonates and these contained all the works referred to above. In these monographs Fraser made detailed treatment of the different taxonomic categories. In the Fauna of India volumes Fraser (1933, 1934, 1936) recorded some Odonate species and subspecies from Meghalaya, namely *Ceriagrion azureum* (Selys), *Caliphaea confusa* Selys, *Onychogomphus modestus* Selys [as *Nepogomphus modestus* (Selys)], *Chlorogomphus fraseri* St. Quentin, *Oligoaeschna martini* (Laidlaw) (as *Jagoria martini* Laidlaw), *Periaeschna magdalena* Martin, *Lyriothemis tricolor* Ris and *Zygonyx iris davina* Fraser. In the same year as the publication of the 3rd volume of that Fauna, Cowley (1936) described a new species from Khasi hills namely, *Bayadera kali*. St. Quentin (1937) described *Anisopleura vallei* and the female of *Indocnemis kempfi* Laidlaw, from Cherrapunjee. Cowley (1937) discussed and illustrated the penile organs of some species of Chlorocyphidae occurring in Meghalaya ; in this work, the author recorded *Rhinocypha quadrimaculata* Selys from Cherrapunjee, besides confirming the existence of some more species already known from the state. Fraser (1940) discussed and illustrated the penile organs of some species of Gomphidae occurring in Meghalaya. Lieftinck (1966a) recorded *Anax guttatus* (Burmeister) from Meghalaya on the basis of a female specimen captured from Khasi hills. Lieftinck (1968) described *Oligoaeschna decorata* and *O. khasiana* from Khasi hills. Asahina (1963), Bhasin (1953), Lieftinck (1948a, 1960b) and Vershney (1971) confirmed the existence of some Odonate species in the state, already recorded from the area. Kimmins (1966, 1968, 1969a, b) designated lectotypes of some Odonate species and subspecies occurring in Meghalaya. Pinhey (1974) while revising the African species of *Agriocnemis* Selys, redescribed *A. pygmaea* (Rambur) and cited the differences between Shillong and Seychelles forms of this species. Lahiri (1975) discussed the behaviour of *Bayadera hyalina* Selys, in Shillong region during the rains. Lahiri (1976) described *Calicnemia mukherjeei* from Shillong. Lieftinck (1977a) described *Somatochlora daviesi* from Khasi hills.

Thus till the present work, 82 Odonate species and sub species under 49 genera belonging to 14 families were known from the state of Meghalaya.

MATERIAL AND METHOD

The present study has been based on Odonate collection from 80 localities spread over the entire state of Meghalaya. Specimens were usually collected during field trips with the aid of aerial nets. In certain cases, smaller damselflies were caught simply by hand. After killing, the insects were put in paper envelopes for further study in the laboratory. In the field, relevant ecological condition and body colour of freshly killed specimens were noted. In the laboratory the specimens were studied under stereo-binocular microscope with eye pieces 5X and 10X and objectives 2X and 5X. Measurements for smaller body-parts have been taken using ocular and stage micrometers and for larger body-parts by ordinary scales. Male penile organs had to be dissected out for study after suitably moistening the 2nd abdominal segment, overnight. The figures were drawn by the candidate by means of camera lucida drawing apparatus. Keys provided in the text are based only for the taxa available from the region under study.

Collection localities : A list of collection localities with their altitudes in parenthesis, is given below. Of these collection localities, Sl. Nos. 1-26 are located in Garo hills, Sl. Nos. 27-74 are located in Khasi hills and Sl. Nos. 75-80 are located in Jaintia hills. (1) Anogiri (430 m) ; (2) Bagmara (175 m) ; (3) Balfagram (125 m) ; (4) Bangsi (200 m) ; (5) Charikuty (175 m) ; (6) Chitmaring beel (350 m) ; (7) Dainadubi (170 m) ; (8) Dambu (175 m) ; (9) Damra (150 m) ; (10) Darugiri (200 m) ; (11) Degrangiri (500 m) ; (12) Kobal (325 m) ; (13) Napak beel (350 m) ; (14) Nongchalma (275 m) ; (15) Nongharm (300 m) ; (16) Ramgiri (130 m) ; (17) Rongjeng (275 m) , (18) Rongtham river bank near Rongjeng (250 m) ; (19) Rongram (550 m) ; (20) c 10 kms east of Rongram (on Rongrengiri road) (425 m) ; (21) Rongrengiri (340 m) ; (22) Songkhama (500 m) ; (23) Songsok (300 m) ; (24) Tebangiri (500 m) ; (25) Wageasi (250 m) ; (26) c 7 kms South of Wageasi (on Rongjeng road) (325 m) ; (27) Balat (150 m) ; (28) c 18 kms north of Balat (on Mawsynram road) (425 m) ; (29) Barapani (1175 m) ; (30) Burnihat (190 m) ; (31) Jakrim (1460 m) ; (35) Lailad (360 m) ; (36) Lailyngkot (1975 m) ; (37) Mairang (1700 m) ; (38) Mawblong (1300 m) ; (39) Mawiong (1200 m) ; (40) Mawlai (1300 m) ; (41) Mawlyndep (1200 m) ; (42) Mawpat (1300 m) ; (43) Mawphlong (1050 m) ; (44) Mawrapat (1400 m) ; (45) Mawroh (1900 m) ; (46) Mawryngkreng (1450 m) ; (47) Mawsynram (1550 m) ; (48) 4 kms south of Mawsynram (on Rinku Road) ; (49) Myllem (1825 m) ; (50) Naya Bunglow (750 m) ; (51) Nonghyllan (600 m) ; (52) Nongklan (1650 m) ; (53) Nongpoh (650 m) ; (54) Nongstoin (1875 m) ; (55) Old Barapani roadside (1175-1430 m) ; (56) Pynursla (1500 m) ; (57) Puksora (125 m) ; (58) Ranikor (160-225 m) ; (59) c 10 kms east of Ranikor (on Balat road) (475 m) ; (60) Satmawdon (125 m)

(61) Shella (170 m) ; (62) Shillong (1600-1650 m) ; (63) Upper Shillong (1850-2000 m) ; (64) Sonapahar (1925 m) ; (65) c 10 kms west of Sonapahar (on Darugiri road) (1950 m) ; (66) Sumer (950 m) ; (67) Unlyngkot (1800m) ; (68) Umran (790 m) ; (69) Umroi (1125 m) ; (70) Umsamlem (675) m ; (71) Umsning (875 m) ; (72) Umtham (850 m) ; (73) Umtynger (1825) m) ; (74) Weiloi (1650 m) ; (75) Garampani (200 m) ; (76) Jowai (1350 m) ; (77) Ratachara (500 m) ; (78) Sonapurdi (175 m) ; (79) Shangphung (600 m) ; (80) Thadlaskain (1460 m).

The collections on which the present study has been based have been made by several scientists of the Survey. A list of collectors along with abbreviations used in the text is given below

A. K. Dutta (AKD) ; A. K. Mandal (AKM) ; A. K. Sen (AKS) ; A. R. Lahiri (ARL) ; A. S. Rajagopal (ASR) ; B. Dutta (BD) , B. K. Tikader (BKT) ; C. V. Srivastava (CVS) ; G. M. Yazdani (GMY) ; K. Deb (KD) ; K. Rai (KR) ; K. R. Rao (KRR) ; M. Dutta (MD) ; M. K. Sen (MKS) ; M. R. Rynth (MRR) ; M. Wankher (MW) ; N. Mazumder (NM) ; R. K. Subhani (RKS) ; R. K. Vershney (RKV) ; R. P. Ghosh (RPG) ; R. S. Giri (RSG) ; R. S. Pillai (RSP) ; R. Zoramthanga (RZ) ; S. Biswas (SB) ; S. Khera (SK) ; S. K. Chanda (SKC) ; S. K. Talukder (SKT) ; S. N. Prasad (SBP) ; S. Rai (SR) ; S. R. Prasad (SRP) ; T. G. Vazirani (TGV) ; V. D. Srivastava (VDS).

SYSTEMATICS

Classified list of Odonate species and subspecies known from Meghalaya :
Following is a list of Odonate species and subspecies known from Meghalaya, arranged in a systematic manner under suborders, superfamilies, families, divisions, subfamilies and genera. Species and subspecies present in the collection and studied are marked with either * (when these are new records from Meghalaya) or ** (when these are not so).

Order ODONATA

Suborder ZYGOPTERA

Superfamily CALOPTERYGOIDEA

Family AMPHIPTERYGIDAE

Subfamily PHILOGANGINAE

Genus 1. *Philoganga* Selys

Species ** 1. *P. montana* (Selys)

Family CHLOROCYPHIDAE

Genus 2. *Libellago* Selys

Species *2. *L. l. lineata* (Burmeister)

Genus 3. Rhinocypha Rambur

- Species *3. *R. beatifica* Fraser
 Species *4. *R. bitorata delimbata* Selys
 Species **5. *R. ignipennis* Selys
 Species **6. *R. immaculata* Selys
 Species 7. *R. quadrimaculata hemihyalina* Fraser
 Species **8. *R. q. quadrimaculata* Selys
 Species **9. *R. spuria* Selys
 Species *10. *R. vitrinella* Fraser

Family EUPHAEIDAE

Genus 4. Anisopleura Selys

- Species **11. *A. subplatystyla* Fraser
 Species 12. *A. vallei* St. Quentin

Genus 5. Bayadera Selys

- Species **13. *B. hyalina* Selys
 Species **14. *B. indica* (Selys)
 Species 15. *B. kali* Cowley

Genus 6. Euphaea Selys

- Species **16. *E. ochracea brunnea* Selys
 Species 17. *E. o. ochracea* Selys

Family CALOPTERYGIDAE
 Subfamily CALIPHAEINAE

Genus 7. Caliphaea Selys

- Species **18. *C. confusa* Selys

Subfamily CALOPTERYGINAE

Genus 8. Echo Selys

- Species 19. *E. m. margarita* Selys
 Species **20. *E. m. tripartita* Selys

Genus 9. Matrona Selys

- Species 21. *M. b. basilaris* Selys
 Species **22. *M. b. nigripictus* Selys

Genus 10. Neurobasis Selys

- Species *23. *N. c. chinensis* (Linnaeus)

Genus 11. Vestalaria May

- Species 24. *V. smaragdina* (Selys)

Genus 12. Vestalis Selys

Species *25. *V. g. gracilis* (Rambur)

Superfamily LESTIDOIDEA

Family CHLOROLESTIDAE

Subfamily MEGALESTINAE

Genus 13. Megalestes Selys

Species 26. *M. major* Selys

Species *27. *M. raychoudhurii* sp. nov.

Subfamily LESTIDAE

Subfamily SYMPECMATINAE

Genus 14. Indolestes Fraser

Species **28. *I. indica* Fraser

Subfamily LESTINAE

Genus 15. Orolestes McLachlan

Species *29. *O. durga* sp. nov.

Genus 16. Lestes Leach

Species *30. *L. concinnus* Selys

Species *31. *L. dorothea* Fraser

Species *32. *L. garoensis* sp. nov.

Superfamily COENAGRIONOIDEA

Family PROTONEURIDAE

Genus 17. Elattoneura Cowley

Species **33. *E. atkinsoni* (Selys)

Species *34. *E. campioni* (Fraser)

Genus 18. Prodasineura Cowley

Species **35. *P. autumnalis* (Fraser)

Family PLATYCNEMIDIDAE

Genus 19. Copera Kirby

Species *36. *C. annulata* (Selys)

Species *37. *C. marginipes* (Rambur)

Species *38. *C. vittata* (S.L.) (Selys)

Genus 20. Calicnemia Strand

Species *39. *C. eximia* (Selys)

Species *40. *C. imitans* Lieftinck

Species **41. *C. mukherjeei* Lahiri

Genus 21. Coeliccia Kirby

Species **42. *C. bimaculata* Laidlaw

Species *43. *C. didyma* (Selys)

Species **44. *C. fraseri* Laidlaw

Species *45. *C. sarbottama* sp. nov.

Species **46. *C. vacca* Laidlaw

Genus 22. Indocnemis Laidlaw

Species **47. *I. kempi* Laidlaw

Family COENAGRIONIDAE

Genus 23. Ceriagrion Selys

Species 48. *C. azureum* (Selys)

Species *49. *C. coromandelianum* (Fabricius)

Species *50. *C. fallax* Ris

Species **51. *C. olivaceum* Laidlaw

Genus 24. Pseudagrion Selys

Species *52. *P. australasiae* Selys

Species *53. *P. r. rubriceps* Selys

Species **54. *P. spencei* Fraser

Genus 25. Aciagrion Selys

Species 55. *A. approximans* (Selys)

Species *56. *A. pallidum* Selys

Species **57. *A. tillyardi* Laidlaw

Genus 26. Enallagma Charpentier

Species *58. *E. Parvum* Selys

Genus 27. Ischnura Ebarpentier

Species *59. *I. a. aurora* (Hagen)

Species *60. *I. r. rufostigma* Selys

Genus 28. Agriocnemis Selys

Species **61. *A. clauseni* Fraser

Species *62. *A. lacteola* Selys

Species **63. *A. pygmaea* (Rambur)

Genus 29. Argiocnemis Selys

Species *64. *A. obscura* Laidlaw

Suborder ANISOPTERA
Superfamily AESHNOIDEA
Family GOMPHIDAE
Subfamily GOMPHINAE

- Genus 30. **Anisogomphus** Selys
Species **65. *A. caudalis* Fraser
Species 66. *A. orites* Laidlaw
- Genus 31. **Burmagomphus** Williamson
Species *67. *B. ? vermicularis* (Martin)
- Genus 32. **Davidius** Selys
Species 68. *D. mallyori* Fraser
- Genus 33. **Dubitogomphus** Fraser
Species 69. *D. bidentatus* (Fraser)
- Genus 34. **Gomphus** Leach
Species **70. *G. personatus* Selys
- Genus 35. **Heliogomphus** Laidlaw
Species 71. *H. selysi* (Fraser)
Species 72. *H. spirillus* (Fraser)
- Genus 36. **Megalogomphus** Campion
Species 73. *M. bicornutus* (Fraser)
- Genus 37. **Macrogomphus** Martin
Species **74. *M. Martini* (Fraser)
- Genus 38. **Nihonogomphus** Oguma
Species *75. *N. indicus* sp. nov.
- Genus 39. **Onychogomphus** Selys
Species **76. *O. aureus* Laidlaw
Species *77. *O. maculivertex* Selys
Species *78. *O. meghalayanus* sp. nov.
Species **79. *O. modestus* Selys
Species *80. *O. sundersi duaricus* Fraser
- Genus 40. **Paragomphus** Cowley
Species **81. *P. echinoccipitalis* (Fraser)
Species *82. *P. lineatus* (Selys)
- Genus 41. **Perissogomphus** Laidlaw
Species *83. *P. stevensi* Laidlaw

Genus 42. Stylogomphus Fraser

Species *84. *S. inglisi* Fraser

Family AESHNIDAE
Division BRACHYTRINI
Subfamily GOMPHAESHNINAE

Genus 43. Oligoaeschna Selys

Species 85. *O. decorata* Lieftinck

Species 86. *O. Khasiana* Lieftinck

Species 87. *O. martini* (Laidlaw)

Subfamily BRACHYTRINAE

Genus 44. Austroaeschna Selys

Species **88. *A. intersedens* Martin

Genus 45. Periaeschna Martin

Species *89. *P. biguttata* (Fraser)

Species 90. *P. biguttata* (Fraser)

Species 91. *P. magdalena* Martin

Species 92. *P. nocturnalis* Fraser

Genus 46. Petaliaeschna Fraser

Species 93. *P. fletcheri* Fraser

Genus 47. Tetracanthagyna Selys

Species *94. *T. waterhousei* McLachlan

Division AESHNINAE
Subfamily AESHNINAE

Genus 48. Aeshna Fabricius

Species 95. *A. petalura* Martin

Subfamily ANACTINAE

Genus 49. Anax Leach

Species 96. *A. guttatus* (Burmeister)

Species *97. *A. sp. A*

Subfamily GYNACANTHAGINAE

Genus 50. Gynacantha Rambur

Species *98. *G. bayadera* Selys

Species 99. *G. hyalina* Selys

Species 100. *G. khasiaca* Mc Lachlan

Species *101. *G. sp. A*

Superfamily CORDULEGASTEROIDEA

Family CORDULEGASTERIDAE

Subfamily CORDULEGASTERINAE

Genus 51. *Anotogaster* Selys

Species *102. *A. sp. A*.

SUBFAMILY CHLOROGOMPHINAE

Genus 52. *Chlorogomphus* Selys

Species **103. *C. atkinsoni* (Selys)

Species 104. *C. campioni* (Fraser)

Species 105. *C. fraseri* St. Quentin

Superfamily LIBELLULOIDEA

Family CORDULIIDAE

Subfamily CORDULIINAE

Genus 53. *Hemicordulia* Selys

Species **106. *H. asiatica* Selys

Genus 54. *Somatochlora* Selys

Species 107. *S. daviesi* Lieftinck

Subfamily MACROMIINAE

Genus 55. *Idionyx* Hagen

Species 108. *I. imbricata* Fraser

Species 109. *I. intricata* Fraser

Species **110. *I. optata* Selys

Genus 56. *Macromia* Rambur

Species **111. *M. moorei* Selys

Family LIBELLULIDAE

Genus 57. *Tetrathemis* Selys

Species *112. *T. platyptera* Selys

Genus 58. *Lyriothemis* Brauer

Species *113. *L. ? bivittata* (Rambur)

Species 114. *L. tricolor* Ris

Genus 59. Orthetrum NewmanSpecies **115. *O. glaucum* (Brauer)Species **116. *O. japonicum internum* McLachlanSpecies **117. *O. luzonicum* (Brauer)Species *118. *O. pruinatum neglectum* (Rambur)Species *119. *O. sabina* (Drury)Species **120. *O. t. triangulare* (Selys)**Genus 60. Potamarcha Karsch**Species *121. *P. congener* (Rambur)**Genus 61. Palpopleura Rambur**Species **122. *P. S. sexmaculata* (Fabricius)**Genus 62. Brachydiplax Brauer**Species *123. *B. sobrina* (Rambur)**Genus 63. Nannophya Rambur**Species *124. *N. pygmaea* Rambur**Genus 64. Acisoma Rambur**Species *125. *A. p. panorpoides* Rambur**Genus 65. Brachythemis Brauer**Species *126. *B. contaminata* (Fabricius)**Genus 66. Crocothemis Brauer**Species **127. *C. s. servilia* (Drury)**Genus 67. Diplacodes Kirby**Species *128. *D. nebulosa* (Fabricius)Species *129. *D. trivialis* (Rambur)**Genus 68. Neurothemis Brauer**Species *130. *N. fulvia* (Drury)Species **131. *N. intermedia atlanta* RisSpecies *132. *N. i. intermedia* (Rambur)Species *133. *N. t. tullia* (Drury)**Genus 69. Sympetrum Newman**Species **134. *S. hymomelas* (Selys)Species **135. *S. orientale* (Selys)**Genus 70. Trithemis Brauer**Species **136. *T. aurora* (Burmeister)

Species **137. *T. festiva* (Rambur)

Species *138. *T. pallidinervis* (Kirby)

Genus 71. **Zyponyx** Hagen

Species 139. *Z. iris davina* Fraser

Species 140. *Z. i. iris* Selys

Species *141. *Z. i. intermedia* subsp. nov.

Genus 72. **Onychothemis** Brauer

Species *142. *O. testaces* (S.L.) Laidlaw

Genus 73. **Rhyothemis** Hagen

Species *143. *R. v. variegata* (Linnaeus)

Genus 74. **Tholymis** Hagen

Species *144. *T. tillarga* (Fabricius)

Genus 75. **Hydrobasileus** Kirby

Species *145. *H. croceus* (Brauer)

Genus 76. **Pantala** Hagen

Species *146. *P. flavescens* (Fabricius)

Genus 77. **Urothemis** Brauer

Species *147. *U. s. signata* (Rambur)

TAXONOMIC ACCOUNT

Order ODONATA

Out of three suborders e. g. Zygoptera, Anisozygoptera and Anisoptera, two i. e. Zygoptera and Anisoptera are represented in the state of Meghalaya. Anisozygoptera is known only by two species, one from India (West Bengal : Darjeeling district) and Nepal, the other from Japan.

KEY TO THE SUBORDERS OF ORDER ODONATA

Distance between inner margins of eyes greater than their own diameter (Fig. 7) ;
in males inferior anal appendage paired and placed below anal opening (Figs. 4-5) ;
fore- and hindwings more or less similar in shape and venation (Figs. 42 and 510-524).
... *Zygoptera*

Distance between inner margins of eyes always less than their own diameter (Figs. 9-12) ;
in males inferior anal appendage single and placed above anal opening (Figs. 27-28) ;
fore- and hindwings different in shape and venation (Figs. 33 and 525-539).
.... .Anisoptera.

Suborder ZYGOPTERA

Diagnostic characters : Head transversely elongated ; middle lobe of labium fissured and subequal to lateral lobe ; distance between inner

margins of eyes greater than their own diameter ; ocelli not set in vesicle, lying free in middle of vertex ; occiput trapezoidal ; male genitalia with deeply cleft lamina, with anterior hamules well developed, posterior hamules inconspicuous and lobe elongated ; both superior and inferior anal appendages in male paired and placed above and below anal opening respectively ; female with fully developed ovipositor. Fore-and hindwings similar in shape and venation ; discoidal cell in the form of a quadrangle.

Distribution : Cosmopolitan.

KEY TO THE SUPERFAMILIES OF THE SUBORDER ZYGOPTERA

1. More than 2 antenodal cross veins present ; postnodals not in alignment with veins beneath (Figs. 510-518). Calopterygoidea
 Only 2 antenodal cross veins present ; postnodals in strict alignment with cross veins beneath (Figs. 33 and 519-524). 2
2. Origin of IR₃ and R₄₊₅ generally more near nodus than or even beyond level of nodus (Figs. 33 and 521-524) ; males with anterior hamules subquadrate (Fig. 18)
 Coenagrionoidea
 Origin of IR₃ and R₄₊₅ generally more near arc than nodus (Figs. 519-520) ; males with anterior hamules elongated. . Lestidoidea

Superfamily CALOPTERYGOIDEA

Diagnostic characters : Medium to large sized insects ; hind margin of posterior lobe of prothorax rounded, trapezoidal, or shallowly tripartite ; prothorax usually with a boss on either side ; males with anterior hamules quadrate. Wings usually petiolated, sometimes not petiolated ; more than two (usually more than 5) antenodal cross veins present ; postnodals not in strict alignment with cross veins beneath ; IR₃ and R₄₊₅ usually beginning nearer arc than nodus ; a number of intercalated sectors present, at least between branches of Rs and MA.

Distribution : Virtually cosmopolitan.

KEY TO THE FAMILIES OF THE SUPERFAMILY CALOPTERYGOIDEA

1. Two primary antenodal cross veins easily distinguishable from the secondaries (Fig. 510-515). 2
 Two primary antenodal cross veins not distinguishable from the secondaries (Figs. 516 - 518). .3
2. Petiolation of wing ending opposite to or slightly proximal to the level of arc (Fig. 43). Amphipterygidae

Petiolation of wing ending far proximal to the level of arc (Figs. 510-515).

. Chlorocyphidae

3. 1st lateral suture of synthorax incomplete and not traceable up to the spiracle
. Euphaeidae

1st lateral suture of synthorax complete and well developed, traceable even beyond spiracle. Calopterygidae

Family AMPHIPTERYGIDAE

Diagnostic characters : Large in size ; ground colour without metallic lusture. Wings hyaline ; petiolation ending, at or slightly proximal to the level of arc ; more than two antenodal cross veins present ; primary antenodals easily distinguishable, other antenodals present either only in costal space or in both costal and subcostal space and then these not coinciding ; discoidal cell short and broad or long and narrow, entire or traversed by cross veins ; base of discoidal cell connected to radius by arc ; are slightly bent, situated in line with distal antenodal cross vein ; sectors of arc arising from above the middle of arc, these being either separated at origin or arising from a common point, or even from a common stalk ; IR_3 arising closer to arc or midway between arc and nodus where it is close or widely spaced with R_{4+5}

Distribution : India ; China ; Burma ; Thailand ; Malaysia ; Indonesia ; Australia ; Africa ; South America.

Subfamily PHILOGANGINAE

Diagnostic characters : Secondary antenodals present both in costal and subcostal spaces ; IR_8 arising midway between nodus and arc, where it is widely spaced with R_{4+5} ; discoidal cell entire, short, straight and about one fifth less in length than the median space.

Distribution : India ; China , Burma ; Thailand.

Genus : *Philoganga* Kirby

Anisoneura Selys, 1859, *Bull. Acad. Belg. Sci.* (2), 7 : 444 (nom. preoc).

Philoganga Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 111. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 114.

Type-species : *Anisoneura montana* Selys

Selys (1859) established the genus *Anisoneura* with *A. montana* Selys as type-species. Kirby (1890) proposed the name *Philoganga* for *Anisoneura* Selys (nom. preoc.). Needham (1903) further elucidated the generic characters. Later, Ris (1912), Laidlaw (1917a), Fraser (1924f, 1929a

and 1934) and Asahina (1967b) also contributed towards the knowledge of this genus.

Diagnostic characters : Large sized insects (usually with abdomen 41.0-54.0 mm and hindwing 37.0-52.0 mm) ; yellowish with brown or black markings ; spines on femora and tibiae very short ; male superior anal appendages subcylindrical with apices curved inwards, nearly two to three times as long as abdominal segment 10 and minutely spined outwardly ; inferior appendages rudimentary, unguate or subquadrate ; terminal fold of penis bifurcated at apex, with branches diverging, each bearing a row of hairs apically; female anal appendages a little longer than segment 10 of abdomen ; vulver scale extending beyond apex of abdomen, with ventral border coarsely serrate on apical half. Wings long and narrow, hyaline, sometimes partly enfumed or tinted with yellow ; nodus situated markedly near base of wing ; 10-19 antenodal and 17-30 post-nodal cross veins in both fore-and hindwings ; secondary antenodal cross veins present both in costal and subcostal spaces ; primary antenodal cross veins coinciding and easily distinguishable, rest not coinciding ; 1-5 basal incomplete antenodal cross veins present ; pterostigma narrow, rectangular, nearly five times as long as broad and slightly swollen medially; arc slightly bent, situated at the level of distal primary antenodal cross vein ; sectors of arc not arising from middle of arc but slightly basad, divergent from origin ; discoidal cell short and straight, only about one fifth the length of median space, with inner margin slightly longer than costal margin ; discoidal cell, as well as, median and cubital space (the latter except cross vein Ac) entire ; R_3 arising a little distal to subnodus, IR_3 placed midway between nodus and arc, latter widely spaced with R_{4+5} at origin ; Ab arising from inner wing margin at a point where Ac meets it ; IA markedly convex and 1-3 rows of cells in anal field.

Distribution : India ; China ; Burma ; Thailand.

***Philoganga montana* (Selys)**
(Figs. 72-74 and 109-110)

Anisoneura montana Selys, 1859, *Bull. Acad. Belg. Sci.* (2), 7 : 445.

Philoganga montana (Selys) : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 111. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 114.

Material studied : 1 ♂, Shillong, 28.v.1973, coll ARL ; 1 ♂, Umran, 30.v.1972, coll ARL ; 1 ♀, Urmoi, 7.vii.1970, coll SKT ; 1 ♀, Garmapani, 26.iv.1972, coll ARL.

Measurements (in mm) and Nodal index

	Length of		Forwarding		Hindwing	
	Abdomen	hindwing	An	Pn	An	Pn
♂♂	51.4-54.4	46.0-49.0	12-15	25-30	11-12	22-24
♀♀	41.0-41.5	46.0-48.0	12-14	28-30	11-13	23-28

Notes : Specimens examined of either sex vary from the description of the species provided by Fraser (1934) in size and nodal index, in the middle lobe of prothorax being yellowish on either side and in the presence of a short upper yellowish stripe on 2nd lateral suture, besides some other variations as noted here under :

Male : Labrum, in one specimen blue bordered with black ; mandibles cheeks and frons black and without yellow markings ; pterostigma extending over 4-5½ cells ; 2-5 incomplete basal antenodal cross veins ; absence of basolateral spots on abdominal segments 6 and 7, or even on segment 5 in one specimen and of lateral stripes on segments 4-7 or even segment 3 in one specimen.

Female : presence of 1-3 and 2 incomplete basal antenodal cross veins in fore- and hindwings respectively ; in one specimen ventral borders of abdominal segments 7 and 8 yellowish and some indistinct patches of same colour on sides of vulver scale.

This species is commonly found along montane streams overhanged with bushes. They have been found either resting with wings spreaded or moving about.

Distribution : India : Assam, Meghalaya, West Bengal.

Family CHLOROCYPHIDAE

Diagnostic characters : Usually medium sized insects ; ground colour nonmetallic ; clypeus markedly projected forming epistome ; abdomen shorter than hindwing, synthorax large in comparison to body. Wings often markedly coloured in males, rarely so in female ; petiolation not reaching the level of arc ; more than 2 antenodal cross veins present ; primary antenodals easily distinguishable and other antenodals not coinciding ; base of discoidal cell connected to radius by arc ; arc angulated (or oblique), situated in a line with the distal primary antenodal cross vein ; sectors of arc arising from above the middle of arc and these either seperated right from origin, or arising from a common point.

Distribution : Virtually cosmopolitan in Old World countries.

KEY TO THE GENERA OF THE FAMILY CHLOROCYPHIDAE

Sectors of arc arising from a common point (Fig. 45). *Libellago* Selys

Sectors of arc separated at origin (Figs. 44 and 510-515). *Rhinocypha* Rambur

Genus : *Libellago* Selys

Libellago Selys, 1840, *Mon. Lib. Eur.*, : 200 (parts). Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 53.

Micromerus Rambur, 1842. *Hist. nat. Ins. Nevrop.*, : 238.

Type-species : *Calopteryx lineatus* Burmeister

The genus has been used here sessu Fraser (1934). Selys (1840, 1853, 1878b, 1889, 1891a), Rambur (1842), Kirby (1890), Williamson (1904), Laidlaw (1917a), Fraser (1928b, 1949b), Cowley (1937), Liefstinck (1937, 1940b, 1954, 1955a, 1971) and Montgomery (1967) have dealt with this genus. Bhasin (1953), Sahní (1973), Kumar and Juneja (1976) and Prasad and Singh (1976) contributed on the Indian species of this genus in recent times.

Diagnostic characters Small in size (usually with abdomen 12.0-22.0 mm) hindwing 15.0-26.0 mm) ; red or black, marked with orange, blue or green : mesothoracic triangle on synthorax usually absent, but reduced and uncoloured when present ; femora and tibiae usually pruinose ; epistome well developed ; male superior anal appendages pincer-like and about twice as long as abdominal segment 10 ; inferiors unguulate, about one third the length of superiors, terminal fold of penis large, with its external branch slightly developed, the internal branch narrow and moderately developed. Wings long and narrow, hyaline, partly tinted yellow and marked with black or blackish brown in males ; usually 4-7 antenodal and 8-18 postnodal cross veins in all wings ; primary antenodal cross veins easily distinguishable, other antenodals not coinciding ; pterostigma narrow, rectangular, about three times as long as broad, sometimes absent in forewing of males ; situated at the level of distal primary antenodal cross vein ; sectors of arc arising from above middle of arc, from a common point ; discoidal cell short, a little less than half the length of median space, usually traversed by one or two veins ; median space entire ; cubital space usually traversed by 2-5 veins ; R_3 arising well distal to subnodus, IR_6 arising from a point nearer arc than nodus and in close proximity to origin of R_{4+5} ; Ab arising from inner wing margin either proximal of or distal to the level of 1st primary antenodal cross vein ; one or two rows of cells in anal field.

Distribution : India ; Sri Lanka ; Nicobar ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; New Guinea ; Philippines.

Libellago lineata lineata (Burmeister)

(Figs. 70-71 and 91-92)

Calopteryx lineata Burmeister, 1839, *Handb. Ent.*, 2 : 826.

Libellago lineata (Burmeister) : Selys, 1840, *Mon. Lib. Eur.*, : 200.

Libellago lineata lineata (Burmeister) : Fraser, 1934, *Fauna Brit. India. Odon.*, 2 : 60.

Material studied : 2 ♂♂, Rongtham river bank, 11.iv.1973 coll ARL ; 2 ♀♀, Umran, 18.iv.1967, coll RKV ; 3 ♂♂, 2 ♀♀, Umrsi, 30.iv.1968, coll RKV ; 2 exs, Umtynger (1 ♂, 29.xi.1967, coll RKV ; 1 ♂, 4.x.1968, coll 58).

Measurements (in mm) and Nodal index

Length		Forewing		Hindwing	
abdomen	hindwing	An	Pn	An	Pn
♂♂ 14.4-16.0	18.0-19.0	4-6	—	4-6	6-11
♀♀ 14.0	27.0	5-6	9-12	4-6	10-11

Notes : Specimens under study vary from the description of the species provided by Fraser (1934) in the following :

Males : labrum and frons unmarked with yellow.

Females : epistome with two yellow spots on anterior surface ; the yellow portion of mesepimeron divided by a black line at middle.

This species is commonly found in comparatively open habitat along streams or small rivers with sandy bottom and clear water.

Distribution : India : Assam, Himachal Pradesh, Kerala, Maharashtra, Meghalaya, Tamil Nadu, Uttar Pradesh, West Bengal. Outside India : Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia.

Genus : Rhinocypha Rambur

Rhinocypha Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 232. Fraser 1934, *Fauna Brit. India. Odon.*, 2 : 5. Lieftinck, 1954, *Treubia*, 22 (suppl.) : 77.

Heliocypha Fraser, 1949, *Bull. Inst. Roy. Sci. nat. Belg.*, 25 : 11.

Aristocypha Laidlaw, 1950, *Trans. R. ent. Soc. London*, 181 : 273.

Heterocypha Laidlaw, 1950, *Trans. R. ent. Soc. London*, 181 : 273 (syn. nov.)

Type-species : *Rhinocypha tinctoria* Rambur

The genus has been used here sensu Lieftinck (1954). The genus *Heterocypha* Laidlaw has been considered as a synonym of *Rhinocypha* Rambur because the characters used by Laidlaw (1950) for separating his genus *Heterocypha* from *Rhinocypha* Rambur, appear to overlap between the two genera. Rambur (1842), Selys (1853, 1854a, 1859a, 1878b, 1889, 1891a), Kirby (1890), Williamson (1904), Ris (1916b), Laidlaw (1917a), Fraser (1927c, d, 1934, 1949b), Navas (1930, 1933), Cowley (1937), Lieftinck (1947, 1948a, c, 1953c, 1954), Asahina (1952-1953, 1964b) and Montgomery (1967) have worked on this genus. Bhasin (1953), Kumar (1927c, 1973a, 1977b), Sahni (1973), Kumar and Juneja (1976), Prasad (1976a), Prasad and Singh (1976), Singh and Prasad (1976b, c) and Lahiri (1977b, 1979) have published accounts of Indian species.

Diagnostic characters : Medium in size (usually with abdomen 15.0-28.0 mm, hindwing 17.0-32.0 mm) ; red or black marked with yellow, green or blue ; mesothoracic triangle usually developed on synthorax, variably extending as far as base of wings, or only upto one fourth this distance, usually pink, blue or green in males, in females black bordered with colours as in males ; epistome moderately developed ; male superior anal appendages pincer-like, about twice as long as abdominal segment 10 ; inferiors unguate, about half the length of superiors ; terminal fold of penis with variably developed and shaped internal and external branches. Wings moderately narrow or well-dilated, hyaline or partly opaque, opaque portion may be marked with metallic blue, violet, green or coppery , usually with 12-23 antenodal and 20-48 postnodal cross veins in all wings ; primary antenodal cross veins easily distinguishable, and other antenodals not coinciding ; pterostigma narrow, five or six times as long as broad, a little swollen medially ; arc angulated, usually situated at the level of distal primary antenodal cross vein, but occasionally either proximal or even distal to that level ; sectors of arc arising from about its middle, separated at origin ; discoidal cell more than half the length of median space, and usually traversed by 2-7 veins ; median space entire ; cubital space usually traversed by 3-8 veins ; R_3 arising a little distal to subnodus, IR_3 from a point nearer arc than nodus and in close proximity to that of R_{4+5} ; Ab arising from inner wing margin a little or quite distal to the first primary antenodal cross vein ; 1-3 rows of cells in the anal field.

Distribution : India ; Nepal ; Tibet ; China ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; New Guinea ; Ryukyu ; Taiwan ; Philippines ; Australia ; Pacific Islands.

KEY TO THE SPECIES AND SUBSPECIES OF THE GENUS RHINOCYPHA RAMBUR

Males

1. Dorsal mesothoracic triangle obsolete or absent (Fig. 66). *.ingipennis* Selys
 Dorsal mesothoracic triangle present (Figs. 64, 65 and 67). .2
2. Dorsal mesothoracic triangle never extending beyond half the length of syn-
 thorax... .3
 Dorsal mesothoracic triangle extending almost upto hind margin of syntohrax
 (Figs. 65 and 67). .5
3. Apical half of hindwing opaque and with two rows of vitreous spots (Fig. 510)
 .beatifica Fraser
 Apical third of hindwing opaque and with one row of vitreous spots (Figs. 511
 and 515).. .4
4. Opaque area in fore—and hindwing nearly equal ; hindwing with an isolated
 vitreous spot distal to the row of vitreous spots (Fig. 515).. *.vitrinella* Fraser
 Opaque area in forewing much smaller than that in hindwing ; isolated vitreous
 spot in hindwing, as mentioned above, absent (Fig. 517). *.biforata delimbata*
 Selys.
5. Wings completely hyaline. *.immaculata* Selys
 Only about basal third of wings hyaline. .6
6. Smaller species with abdomen and hindwing, each less than 23.0 mm in length ;
 apical vitreous spot as in Fig. 513. *.quadrimaculata* Selys
 Larger species, with abdomen and hindwing, each 20.0 mm or more in length ;
 apical vitreous spot of hindwing not as above (Fig. 514). *...spuria* Selys

Females

(Female of *R. vitrinella* Fraser was not available in the collection studied and there-
 fore this species has not been included in the key to the females).

1. Dorsal mesothoracic triangle obsolete or absent. *ignipennis* Selys
 Dorsal mesothoracic triangle present. .2
2. Dorsal mesothoracic triangle never extending beyond half the length of syn-
 thorax... .3
 Dorsal mesothoracic triangle extending almost upto hind margin of syntho-
 rax. .4
3. Mesothoracic triangle smaller (1.25 mm in length) ; epistome without any spot
 on dorsum ; hindwing smaller (23.0 mm in length). *.biforata delimbata*
 Selys.
 Mesothoracic triangle larger (1.50 mm in length) ; epistome with a large yellow-
 ish spot on dorsum ; hindwing longer (26.0 mm in length). *.beatifica* Fraser.

4. Mesothoracic triangle broad (never less than 0.75 mm in width at about middle) ; labrum black ; without any spots. *.immaculata* Selys.

Mesothoracic triangle narrow (0.25-0.50 mm in width at about middle) ; labrum black and with yellow spots. .5

5. Mesothoracic triangle at least 0.50 mm wide at about middle ; labrum marked with a pair of large yellow spots. *.spuria* Selys.

Mesothoracic triangle never exceeding 0.25 mm in width at about middle ; labrum marked with a pair of small yellow spots. *.quadrimaculata* Selys

Rhinocypha beatifica Fraser
(Figs. 68-69, 99-100 and 510)

Rhinocypha perforata beatifica Fraser, 1927, *Rec. Indian Mus*, 29 : 86 ; 1928, *J. Bombay nat. Hist. Soc.*, 32 : 452 ; 1934, *Fauna Brit. India. Odon.*, 2 : 44.

Material studied : 3♂♂, Songsok, 25.iv.1973, coll ARL ; 3♂♂, Rongrengiri, 10.iv.1973, coll ARL ; 1♂, Shella, 23.iii.1961, coll VDS ; 1♀, Umran, 10.v.1967, coll RKV

Measurements (in mm) and Nodal index

	Length of		Forwarding		Hindwing	
	Abdomen	hindwing	An	Pn	An	Pn
♂♂	20.0-23.0	23.0-24.0	13-18	25-30	12-15	23-29
♀	19.0	20.0	11-12	21-23	11-12	20-23

Description : Male (adult) : Labium black, but its center largely bluish yellow ; rest of head black, marked with blue as follows : bases of mandibles, two pairs of small rounded spots, one on outer side of each posterior ocellus, the other postocular, an median oval spot on hind border of occiput. Prothorax black, marked with yellowish largely at center of posterior lobe and by three pairs of bluish spots as follows : small mid-dorsal oval pair on anterior lobe, a lateral large pair and a small ventro-lateral pair on either side of middle lobe. Synthorax black, marked as follows : mesothoracic triangle lilaceous extending slightly more than one third up the dorsum and about 1.25-1.50 mm in length ; on the outer side of mesothoracic triangle a little longer subtriangular blue spot and upper triangular humeral spot of the same colour ; a rounded upper spot and most of anterior two third of mesepimeron with a narrow prolongation running up nearly to wing base beneath the humeral suture and median two third of met epimeron blue ; beneath mainly black with a pair of obscured rounded yellowish spots behind. Legs black, inner surfaces of hind two pairs of femora and tibiae pruinose. Wings hyaline at base, marked with

opaque black and vitreous spots of violaceous reflex as shown in Fig. 510 ; forewings opaque for more than one third apically, with a prolongation of costal streak, between costa and R_1 to within 1-4 cells distal to nodus ; hind border of the body of opaque area serrated and broadly oval, bordered narrowly behind nearly to the apex of wing by vitreous ; the body of the opaque area covers more than two third the distance from apex of wing to nodus and the vitreous border extends along the apex of wing right upto nodus ; hindwings apically from near nodus broadly opaque ; proximal border of the opaque area running obliquely basad, so that even though falling short of the nodus by 1-4 cells on costal side it extends proximal to nodus on inner side ; the opaque area is ragged and indented deeply by a vitreous spot of 7-8 cells long between IR_3 and R_{4+5} ; the opaque area narrowly bordered behind by vitreous which extends round the apex of wing as far as outer border of pterostigma ; the opaque area also marked by 3 series of apical and 3 series of proximal vitreous spots ; the apical series of vitreous spots slightly overlap the proximal and of pterostigma, with costal series 8-12 cells long lying between IR_3 and R_3 , the inner series 4-8 cells long lying between IR_3 and R_{4+5} , while the median spot lying between these is 6-10 cells long ; usually the inner series is deep by 3 cells, the middle by 2 cells and the costal by 1 and 3 cells at its proximal and distal ends ; the series are mostly banded together by 1 or more cells or even entirely so and sometimes followed distally by a fourth series of one cell deep and 2-3 cell long ; proximal series lying nearer nodus than pterostigma, with costal series 8-11 cells long lying between IR_2 and R^3 , the median series 4-10 cells long between IR_3 and R_{4+5} and inner series 6-14 cells long between MA and C_2 ; of these the median series is deep by 2-3 cells, the others by one cell ; discoidal cells traversed by 3-4 cross veins ; pterostigma blackish brown, comparatively paler in outer third. Abdomen black, marked with blue on sides as follows : triangular apical spots on segments 1-8 , elongating in length progressively on segments 1-4 then again decreasing on segments 5-8 ; segment 9 with a vestige of these spots while segment 3 with an additional mid-ventrolateral elongated spot. Anal appendages black, as shown in Figs. 68-69. Penis as shown in Figs. 99-100

Female : Differ from the male in the following points : markings yellow instead of blue and are more extensive ; head with the following extra markings : labrum, frons, upper surface of epistome and anterior ocellus marked by a oval spot on either side ; epistome with a pair of additional spots ; a longitudinal and a transverse narrow stripes crossing each other mid-dorsally on posterior lobe of prothorax ; mesothoracic triangle black margined with yellow, about 1.50 mm in length ; flexor surfaces of

hind femora and that of all coxa and trochanters striped with yellow ; segments 2-8 of abdomen with fine mid-dorsal carinal line ; segments 5-7 with short basolateral spots ; segments 2, 4 and 5 are with ventrolateral median stripes.

Notes : Fraser (1927) considered his *beatifica* as a subspecies of *R. perforata* Percheron, but the same is considered here as a distinct species. This is chiefly done because in *beatifica* the wings are much broader than *perforata* and the opaque areas of wings are of greater extent than the later in forewing covering more than two third (vs one third) the distance between nodus to apex ; in hindwing extending upto (vs falling short of) nodus] ; the vitreous spots of hindwing also vary in extent between the two species.

In Meghalaya, this species has been collected near shaded montane streams in Garo and Khasi hills below 800 m. The bright wing colour and blue abdominal markings are very conspicuous even in shaded location. The specimens when disturbed, move quickly to nearby bamboo twigs or similar high perching spots.

Distribution : India : Meghalaya, Nagaland.

Rhinnocypha biforata delimbata Selys
(Figs. 93, 94 and 511)

Rhinnocypha biforata var *delimbata* Selys, 1879, *Bull. Acad. Belg. Sci.* (2), **47** : 392.

Rhinnocypha biforata delimbata Selys : Fraser, 1928, *J. Bombay nat. Hist. Soc.*, **32** : 453 ; 1934, *Fauna Brit. India, Odon.*, **2** : 45.

Material studied : 4 ♂♂, 1♀, Rongrengiri, 20-21.iv.1973 coll ARL ; 1 ♂, Songsok, 15.iv.1973, coll ARL.

Measurements (in mm) and Nodal index

	Length of		Forewing		Hindwing	
	Abdomen	hindwing	An	Pn	An	Pn
♂♂	21.0-22.0	23.24.0	12-16	26-30	12-15	22-27
♀	19.0	23.0	13	25-26	11-13	22-25

Notes : Mesothoracic triangle of synthorax in male, is rosepink, not extending even upto half the length of synthorax (length 1.25 mm, its sides twice as long as base) and in female it is black at the middle and bordered yellow, nearly as long as in male.

The specimens under study vary from the description of the species provided by Fraser (1934) in size, nodal index and also in the following characters :

Male : length of cell rows in vitreous spots of hindwing : apical series : costal 8-9, 2nd 9-10, 3rd 8, 4th : costal 6-8, middle 7-8, inner 6 ; middle series : costal 8-10, middle 6-7, inner 6-7 ; middle row of vitreous spots may or not touch opaque area ; black colour on sides of synthorax extended with the blue markings as follows : a small upper antehumeral spot, an elongated curved spot below posterolateral suture at its upper end ; lower and upper two thirds of mesepimeron and metepimeron also blue ; abdominal segments 5-7 either without markings or with only apical spots ; body markings in teneral insects as in females given by Fraser (1934), the wing markings ill developed.

Female : epistome with a large yellow basolateral spot ; synthorax and abdominal segments 1-3 marked as in male, besides a fine antehumeral line on synthorax, which on reaching nearly its posterior margin bends outwards ; abdominal segment 4 without ventrolateral stripe, rest of abdomen unmarked.

This species is commonly found along montane streams or rivers. Both sexes are rather shy and usually take refuge inside jungle often at a height beyond the reach of the aerial net. The males are often perching on exposed boulders in mid-streams.

Distribution : India : Assam, Manipur, Meghalaya. Outside India : Nepal ; Burma ; Vietnam.

***Rhinocypha ignipennis* Selys**
(Figs. 66, 95-96 and 512)

Rhinocypha ignipennis Selys, 1979, *Bull. Acad. Belg. Sci.*, (2), 47 : 389. Fraser, 1934, *Fauna Brit. India, Odon.* 2 : 23.

Material studied : 1 ♂, Cherrapunjee, 8.v.1968, coll RKV ; 4 exs, Mawpat, (1 ♀, 14.vii.1967, coll RKV ; 1 ♀, 18.iv.1968, coll RKV ; 1 ♂, 3.ix.1970, coll GMY ; 1 ♂, 16.vii.1971, coll RSP) ; 1 ♂, Mawphlong, 5.x.1963, coll 58 ; 2 ♀♀, Mawrynkrneng, 4.x.1972, coll ARL ; 23 exs, Myllem, coll RKV (3 ♂♂, 9 ♀♀, 24.cx.1967, 6 ♂♂, 4 ♀♀, 25.vii.1968 ; 1 ♂, 18.viii.1971) ; 1 ♂, Shillong, 27.vii.1965, coll BKT ; 1 ♂, Umroi, 30.iv.1968, coll RKV ; 1 ♀, Umsning, 3.viii.1963, coll SB ; 3 exs, Jowai (1 ♂, 3.viii.1972, coll AKG ; 2 ♂♂, 4.x.1972, coll ARL).

Measurements (in mm) and nodal index

	Abdomen	Length of hindwing	Forewing		Hindwing	
			An	Pn	An	Pn
♂♂	24.5-25.5	25.5-27.5	15-19	36-42	14-15	37-40
♀♀	20.5-22.5	28.0-30.0	16-17	32-36	15-16	29-38

Notes : Both sexes of the species under study vary from the description of the species provided by Fraser (1934) in nodal index, in having larger size and also in the following characters :

Male : Synthorax with an extra small oval yellowish spot just above base of posterolateral suture ; yellow colour on sides of synthorax broken into 3 parts (as described by Fraser for female) ; segments 5-6 of abdomen unmarked and in some specimens segments 3-4 also lacking lateral spots. Measurements of hindwing mentioned by Fraser as 22.0 mm on page 23 is obviously an error since he in the running key on page 9, mentions the length of hindwing as 26.0 mm or more.

Female : the mid-dorsal iline on prothorax incomplete, presence of an extra spot above base of 2nd lateral suture as in male and femora not pruinosed.

In Meghalaya the species is restricted in Khasi and Jaintia districts at altitude above 1100 m. They are commonly found along streams and in a comparatively open habitat.

Distribution : India : Meghalaya. Outside India : Burma

***Rhinocypha immaculata* Selys**

(Figs. 67 and 97-98)

Rhinocypha immaculata Selys, 1879, *Bull Acad. Belg. Sci.* (2), 47 : 385. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 35.

Material studied : 2 ♀♂, 1 ♀, Mowsynram, 10.x.1972, coll AKG ; 1 ♂, 4 kms of Mowsynram, 5.xii.1977, coll ARL.

Measurements (in mm) and Nodal index

	Abdomen	Length of hindwing	Forewing		Hindwing	
			An	Pn	An	Pn
♂♂	26.0	27.0-28.0	15-16	31-32	15-17	28-31
♀	22.5	31.0	15-17	30-33	15-17	30-33

Notes : Mesothoracic triangle of synthorax : In male (Fig. 67) very broad, blue, extending upto antealer sinus (1.0 mm or more in width at about middle of its length) ; in female black, finely bordered yellow, of similar extent as in male but slightly narrow (nearly 1.0 mm in width at about middle of its length).

The specimens under study vary from the description of the species provided by Fraser (1934) in the following points :

Male : Two pairs of bluish spots on occiput ; prothorax with 3 yellowish spots on its side viz. one small sublateral and two large lateral ones ; 4 spots beneath synthorax ; segment 2 of abdomen also with a ventrolateral stripe.

Female : antehumeral stripe complete extending as far as wing base and curved slightly outwards ; abdominal segment 2 with additional ventrolateral stripe and a fine mid-dorsal stripe on segments 2-3.

This interesting species with uncoloured wings in males is restricted in the southern slope of Khasi hills in Meghalaya and has been reported from the two most wettest parts of the world, i. e. Cherrapunjee and Mawsynram. Its preferred habitat is near montane streams in comparatively open habitat.

Distribution : India : Meghalaya, Uttar Pradesh.

Rhinocypha quadrimaculata Selys

(Figs. 65, 103-104 and 513)

Rhinocypha quadrimaculata Selys, 1853, *Syn. Cal.*, : 60. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 14.

Aristocypha quadrimaculata (Selys); Laidlaw, 1950, *Trans. R. ent. Soc. London*, 101 : 273.

Material studied : 1 ♂, 1 ♀, Rongtham river bank, 11.iv.1973, coll ARL ; 2 ♂♂, Songsok, 15.iv.1973, coll ARL ; 2 ♂♂, Wageasi, 6, iv.1973, coll ARL ; 4 ♂♂, 3 ♀♀, Barapani, 17.viii.1968, coll RKV ; 1 ♀, Pynursla, 29.viii.1972, coll SKC ; 2 ♂♂, 1 ♀, Ranikor, 10.xii.1977, coll ARL ; 1 ♂, Umran, 7.vii.1970, coll SKT ; 1 ♀, Umroi, 2.xi.1972, coll ARL ; 1 ♀, Umsning, 16.v.1967, coll RKV ; 2 ♂♂, Sonapurdi, 27.viii.1974, coll ARL.

Measurements (in mm) and Nodal index

	Length of		Forewing		Hindwing	
	Abdomen	hindwing	An	Pn	An	Pn
♂♂	20.5-22.5	22.0-23.0	17-18	27-33	16-18	26-27
♀♀	19.0-20.0	25.0-26.0	16-17	23-26	14-16	21-24

Notes : Mesothoracic triangle of synthorax Male (Fig. 65) : pink, extending as far as root of wings. narrow (0.5 mm in width at about middle of their length). Female black, bordered yellow, as long as in males but narrower (0.25 mm in width at about middle of their length).

The specimens under study vary from the description of the species provided by Fraser (1934) in respect of size, nodal index and also in the following points :

Male : Humeral line very short and broken resulting in formation of a small upper humeral spot , stripe on 2nd lateral suture extending two thirds up the dorsum from spiracle and below nearly to anterior border of synthorax ; discoidal cell traversed by 3-4 cross veins in forewing, by 4-8 cross veins in hindwing where vitreous spot invading proximal border of opaque area with 6-8 cells ; abdomen black.

Female prothorax marked with a mid-dorsal line broken into 3 small sections, one on each lobe, a small rounded ventrolateral spot on middle lobe, a small one at outer border and a large sublateral one on either side of posterior lobe , both humeral and antehumeral stripes on synthorax broken ; synthorax ventrally black and marked with 3 pairs of rounded yellowish spots behind legs ; abdomen with a mid-dorsal stripe extending from apical third of segment 2-6 and segment 8-9 are unmarked : each of segments 2-3 marked with an additional mid-ventrolateral elongated spot.

The species has a wide distribution in high as well as low altitude, but has less often been collected in Jaintia hills. These are commonly found near montane streams, in comparatively open habitat.

Distribution : India : Assam, Himachal Pradesh, Kashmir, Meghalaya Sikkim, Uttar Pradesh, West Bengal. Outside India : Nepal ; Burma.

***Rhinocypha spuria* Selys**
(Figs. 105-106 and 514)

Rhinocypha spuria Selys, 1879, *Bull. Acad. Belg. Sci.* (2), **47** : 388. Fraser, 1934, *Fauna Brit. India, Odon.*, **2** : 12.

Aristocypha spuria (Selys) : Laidlaw, 1950, *Trans. R. ent. Soc. London*, **101** : 273.

Material studied : 1 ♂, Barapani, 17.viii.1968, coll RKV ; 6 exs., Cherrapunjee (1 ♂, 8.v.1968, coll RKV ; 4, ♂♂, 1 ♀, 20.vii.1973, coll ARL) ; 1 ♂, Mowblong, 22.ix.1972, coll AKG ; 1 ♂, Nongklan, 1.xii.1977, coll KRR ; 1 ♂, Old Barapani roadside, 6.vi.1973, coll ARL ; 1 ♂.

1 ♀, Shella, 20.vii.1973, coll ARL ; 8 exs, Shillong (1 ♂, 26, viii.1971, coll RSG ; 3 ♂♂, 20.v.1975, coll MSJ ; 1 ♀, 3.vi.1975, coll MSJ ; 1 ♂, 4.vi.1975, coll KD ; 1 ♂, 1 ♀, 9.vi.1975, coll RSG) ; 1 ♂, Umshing, 25.vi.1963, coll VDS.

Measurements (in mm) and Nodal index

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	24.0-26.0	26.5-28.5	17-21	40-48	17-21	36-42
♀♀	22.0-23.0	28.0-30.0	16-18	28-33	14-18	26-30

Notes : Mesothoracic triangle of synthorax in male is pink, extending as far as root of wings and of moderate width (0.75 mm in width at about middle) ; in female the same is black, bordered yellow and as long as in male, but narrower (0.5 mm in width at about middle).

The specimens examined vary from the description of the species provided by Fraser (1934) in size, nodal index and in the following points :

Male : hind margin of occiput with an additional median spot ; prothorax marked with only ventrolateral spots ; synthorax ventrally mostly yellow in teneral, in adults with two pairs of large spots ; coxae yellow on flexor surface ; discoidal cell traversed by 4-5 and 5-6 cross veins in fore- and hindwings respectively ; opaque area of hindwing indented by vitreous spot anteriorly and posteriorly, such indentation marked by 6 cells anteriorly and by 5-8 cells posteriorly.

Female : markings on coxae and beneath synthorax as in male ; segment 1 of abdomen with apical border not yellow ; segment 6 with a basolateral spot.

In Meghalaya this species is restricted only to Khasi hills, but has a wide distribution there, i.e. found in areas situated both at higher as well as lower altitude. However, this species has less often been collected from northern parts of the hills. They are commonly found near montane streams in comparatively open habitat.

Distribution : India : Meghalaya, Nagaland, Uttar Pradesh. Outside India : Burma.

***Rhinocypha vitrinella* Fraser**
(Figs. 64, 107-108 and 518)

Rhinocypha whiteheadi Kirby : Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 39.

Rhinocypha vitrinella Fraser, 1935, *Rec. Indian Mus.*, 37 : 333.

Heterocypha vitrinella (Fraser) : Laidlaw, 1950, *Trans. R. ent. Soc. London*, 101 : 273.

Material studied : 1 ♂, Nongpoh, 25.viii.1972, coll AKG.

Measurements (in mm) and Nodal index

Abdomen	Length of hindwing	Forewing		Hindwing	
		An	Pn	An	Pn
♂ 18.0	21.0	15-16	27-28	14	23-25

Notes : Mesothoracic triangle on synthoracic in male (Fig. 64) pale blue, extending dorsally upto two fifth (1.0 mm in length ; its base three fifths as long as sides).

The single male under study vary from the description of the species provided by Fraser (1934) in the following points : spot on posterior lobe of prothorax triangular ; posthumeral stripe situated on upper third of anterolateral suture not broken ; pterostigma black, outer two-third yellowish ; vitreous spot vary in respect of cell-number as follows : apical series 6-10 ; median series : costal : 11, median and hind spots 7-8 ; proximal : 4 ; beneath synthorax, femora and 2 posterior pairs of tibiae not pruinose ; wings not tinted with yellow at base ; segment 1 of abdomen with apical border not lined with blue, segment 4 without apical spot ; segment 3 with an extra basolateral spot.

Since its find from Cachar, Assam, this is the second record of occurrence of this species.

In Meghalaya, this species is restricted only at Nongpoh (650 m) in Khasi hills and is the only species of the genus found in that locality. Unlike most species of the genus, this species is found near dirty and stagnant water bodies, inside jungles.

Distribution: India : Assam, Meghalaya.

Family EUPHAEIDAE

Diagnostic characters : Usually medium to large in size ; ground colour non metallic ; synthorax with 1st lateral suture incomplete. Wings often coloured in males ; petiolation absent or when present very slight, ending slightly proximal to or even slightly distal to the 1st antenodal cross vein ; antenodal cross vein always more than 2 ; primary antenodal cross vein not easily distinguishable ; antenodal of 1st and 2nd series

coinciding ; base of discoidal cell connected to radius by angulated arc ; sectors of arc arising from about its middle and usually separated or even arising from a common point ; discoidal cell short, less than half the length of median space ; IA markedly curved, several rows of cells in the anal field ; origin of R_3 in relation to subnodus variable.

Distribution : India ; Nepal ; China ; Pakistan ; Sri Lanka ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; New Guinea ; Ryukyu ; Taiwan ; Philippines ; Israel ; Europe.

KEY TO THE GENERA OF THE FAMILY EUPHAEIDAE

1. Discoidal cells traversed ; segment 10 of abdomen produced apically into a prominent mid-dorsal keel (Figs. 75-76). . *Euphaea* Selys.

Discoidal cells usually entire (Fig. 516) ; keel on segment 10 of abdomen absent (Figs 77-82). . 2

2. R_{2+3} fused with R_1 near its origin. . *Bayadera* Selys

R_{1+3} not fused with R_1 near its origin (Fig. 516). . *Anisopleura* Selys

Genus *Anisopleura* Selys

Anisopleura Selys, 1853, *Syn. Cal.*, : 48. Fraser, 1934, *Fauna Brit. India, Odon.* 2 : 84.

Type-species : *Anisopleura lestoides* Selys.

Selys (1853, 1854a) erected this subgenus under his genus *Euphaea* with *Euphaea lestoides* as its type. Later it was elevated to generic rank by Kirby (1890) by further elaboration of the generic concept. There has also been addition of some more species as a result of contributions of several authorities, and specially of Selys (1880, (1891a), Williamson (1904), Laidlaw (1917a), Fraser 1927a, 1934), Needham (1930), Sahni (1965) and St. Quentin (1937). Kumar (1927c) and Prasad and Singh (1976) dealt with some Indian species of this genus in recent times.

Diagnostic characters : Moderately large in size (usually with abdomen 30.0-40.0 mm, hindwing 27.0-34.0 mm) ; black, marked with green, yellow or white, occasionally partly pruinose ; 1st lateral suture of synthorax incomplete ; no keel on abdominal segment 10 of male ; male superior anal appendages a little longer than segment 10 of abdomen, more or less broadened apically and sometimes armed with ventrolateral spine at base ; inferiors obtuse, more or less abortive ; terminal fold of penis produced apically into a moderately long process on either side. Wings hyaline or with apices black in male ; costal border of hindwing in male with an abrupt outward angulation at a point a little before midway from wing-base to nodus, resulting in widening of costal space, abruptly

at the point, then decreasing gradually outwards ; usually with 14-22 antenodal and 17-22 postnodal cross veins ; primary antenodal cross veins not easily distinguishable, antenodals of 1st and 2nd series coinciding ; pterostigma narrow, about four or five times as long as broad, a little swollen medially ; arc slightly angulated, usually situated at about the level of the third antenodal cross vein ; sectors of arc arising from about its middle, separated at origin ; discoidal cell short, about one third the length of median space, usually entire, rarely traversed by a single vein ; median space entire ; cubital space traversed by 1-5 veins ; R_{2+3} not fused with R_1 near its origin ; R_3 arising 1 or 2 cells distal to the level of subnodus ; IR_3 arising from about midway between arc and nodus, well separated from origin or R_{4+5} ; petiolation almost absent, extending to about the level of the 1st antenodal cross vein ; anal field with upto 5 or 6 rows of cells.

Distribution : India ; Nepal , Burma.

***Anisopleura subplatystyla* Fraser**

(Fig. 77-78, 113-114 and 516)

Anisopleura subplatystyla Fraser, 1927, *Rec. Indian Mus.*, **29** : 81 ; 1934, *Fauna Brit. India, Odon.*, **2** : 81

Material studied : 1 ♂, Brapani, 24.vi.1967, coll RKV ; 3 exs, Mawpat (1 ♂, 30.v.1964, coll SB ; 1 ♂, 10.vii.1967, coll RKV ; 1 ♂, 31.viii.1967, coll RKV) ; 1 ♀, Mawphlong, 20.viii.1974, coll AKG ; 128 exs., Shillong (2 ♂♂, 4 ♀, 25.vii.1969, coll SNP ; 2 ♂♂, 1 ♀, 21. ix.1962, coll AKD ; 1 ♂, 15.x.1963, coll VDS ; 1 ♂, 30.v.1964, coll SB ; 2 ♂♂, 4 ♀♀, 9.viii.1965, coll SNP ; 1 ♂, 1 ♀, 21.iv.1967, coll RKV ; 1 ♂, 10.vii. 1967, coll RKV ; 1 ♂, 3. viii. 1967, coll RKV ; 1 ♂, 31.viii.1967, coll RKV , 1 ♂, 5.viii.1969, coll RKV ; 2 ♂♂, 30.v.1972, coll SB ; 1 ♂, 1 ♀, 25.vi.1972, coll ARL ; 2 ♂♂, 4 ♀♀, 6.vii.1972, coll SNP ; 3 ♂♂, 29.vii.1972, coll RSG ; 1 ♂, 1 ♀, 12.vi.1972, coll ARL ; 1 ♂, 7.vii.1973, coll MSJ ; 1 ♂, 1 ♀, 26.vii.1973, coll RSG ; 3 ♂♂, 2 ♀♀, 25.viii.1973, coll MSJ ; 4 ♂♂, 2 ♀♀, 27.viii.1973, coll RSJ ; 1 ♂, 1 ♀, 22.v.1974, coll MSJ ; 1 ♂, 17.vi.1974, coll MSJ ; 1 ♂, 18.vi.1974, coll MSJ ; 2 ♀♀, 28.vi.1974, coll MSJ ; 2 ♂♂, 19.vii.1974, coll MSJ ; 4 ♂♂, 24.vii.1974, coll MSJ ; 4 ♂♂, 24.vii.1974, coll MSJ ; 1 ♂, 2 ♀♀, 12.viii.1974, coll ARL ; 7 ♂♂, 1 ♀, 17.viii.1974, coll RSG ; 1 ♂, 22.viii.1974, coll RZ ; 1 ♂, 19.v.1975, coll MSJ ; 3 ♂♂, 1 ♀, 26.v.1975, coll MSJ ; 1 ♂, 3.vi.1975, coll ARL ; 2 ♂♂, 6.vi.1975, coll MSJ ; 4 ♂♂, 3 ♀♀, 9.vi.1975, coll ARL ; 1 ♀, 16.vi.1975, coll MSJ ; 2 ♂♂, 2 ♀♀, 27.vi.1975, coll ARL ; 3 ♂♂, 2 ♀♀, 3.vii.1975, coll RSG ; 1 ♂, 9.vii.1975, coll MSJ ; 1 ♂, 18.vii.1975 coll MSJ ; 2 ♂♂, 1 ♀,

23.vii.1975, coll MSJ ; 1 ♂, 25. vii. 1975, coll MSJ ; 2 ♂♂, 5 ♀♀, 29.vii. 1975, coll MSJ ; 1 ♂, 1 ♀, 31.vii.1975, coll MSJ ; 1 ♀, 6.viii.1975, coll ARL ; 1 ♂, 1 ♀, 8.vii.1975, coll MSJ ; 2 ♀♀, 12.viii.1975, coll MSJ ; 2 ♀♀, 23.viii.1975, coll MSJ ; 1 ♀, 26.vii.1975, coll MSJ ; 1 ♀, 29.ix.1975 coll MSJ ; 1 ♂, 1 ♀, 23.vi.1976, coll ARL) ; 2 ♀♀, Umtynger, 10.v.1972, coll SB.

Measurements (in mm) and Nodal index

	Length of		Forewing		Hindwing	
	Abdomen	hindwing	An	Pn	An	Pn
♂♂	37.0-38.0	28.0-30.0	16-18	20-27	14-15	19-23
♀♀	31.0-32.0	29.0-30.0	15-18	22-25	15-18	18-21

Notes : The specimens studied vary from the description of the species provided by Fraser (1934) in having larger size and in the following :

(i) in male antehumeral stripes on synthorax confluent with humeral stripe above ; (ii) shape of the male superior anal appendages ; figure of these organs provided by Fraser (1934) on p.88 is altogether different from those provided by Fraser (1927a) and possibly belong to some other species. (iii) vulver scale of female reaching the end of abdomen.

In Meghalaya the species has a restricted distribution only in places lying above ca 110 m in the central Khasi hills. It is one of the most commonly occurring Odonate species around Shillong, occurring near streams, as well as in comparatively dryer habitats inside bushes and forest well away from the streams.

Distribution : India : Meghalaya.

Genus *Bayadera* Selys

Epallage, group *Bayadera*, Selys, 1953, *Syn. Cal.*, : 49
Bayadera Selys : Fraser 1934, *Fauna. Brit. India, Odon.*, 2 : 78.

Type-species : *Epallage indica* Selys

Here the genus *Bayadera* Selys has been used sensu Kirby (1890). Since then several important contributions on this genus have appeared [Williamson (1940), Ris (1912), Laidlaw (1917a), Fraser (1923d, 1928c, 1934), Needham (1930), Cowley (1936), Asahina (1964b, 1965) and St Quentin (1970)]. Bhasin (1953), Kumar (1972c, 1973a), Sahni (1972b), Lahiri (1957b), Kumar and Juneja (1976), Prasad (1976a), and Prasad and Singh (1976) have in recent times published accounts of a few Indian species of this genus.

Diagnostic characters : Moderately large in size (usually with abdomen 31.0-41.0 mm, hindwing 26.0-37.0 mm) ; black, marked with greenish yellow or blue, occasionally partly pruinose ; 1st lateral suture of synthorax incomplete ; no keel present on abdominal segment 10 of male ; male superior anal appendages two to three times as long as segment 10 of abdomen, subcylindrical and forcipate, obtuse or much flattened at apex with outer border usually bearing a few subapical spines, inner border with or without a broad sub-basal spine and submedian tubercle ; inferiors much narrower, simple, about half the length of superiors ; penis shaft occasionally with a subapical row of hairs on either side, the terminal fold of penis well developed with moderately long variably expanded apical processes. Wings hyaline, or tipped with black in males ; usually with 14-15 antenodal and 19-26 postnodal cross veins ; primary antenodals not easily distinguishable, antenodals of 1st and 2nd series coinciding ; pterostigma narrow, about five or six times as long as broad, a little swollen medially ; arc angulated, usually situated at about the level of the third antenodal cross vein ; sectors of arc arising at about middle of arc either from a common point or very slightly separated at origin ; discoidal cell short, entire and about half the length of median space which is also entire ; cubital space traversed only by Ac ; R_{2+3} fused with R_1 at its origin ; origin of R_3 variable, being either at the level of subnodus or proximal or distal to that level by 1 or 2 cells ; IR_3 arising more close to arc than nodus, well separated from origin or R_{4+5} ; petiolation nearly absent, extending at most upto the 1st antenodal cross vein ; anal field with upto 4 or 5 rows of cells.

Distribution India ; Nepal ; China ; Burma ; Ryukyu ; Taiwan.

KEY TO THE SPECIES OF THE GENUS *BAYADERA* SELYS

Male

Wings blackish brown apically ; posterior lobe of prothorax trapezoidal, with hind margin erect and straight at middle. *.indica* (Selys)

Wings hyaline ; posterior lobe of prothorax broadly suboval, with its hind margin arched backward and a little sinuous at middle. *.hyaline* Selys.

[Key to females has not been provided due to nonavailability of females of *B. indica* (Selys) in the collection studied].

Bayadera hyaline Selys (Fig. 81-82 and 117-118)

Bayadera hyalina Selys 1879, *Bull. Acad. Belg. Sci.* (2), 47 : 373. Frassr, 1934, *Fauna Brit. India, Odon.*, 2 : 81. Lahiri 1975, *Odonatologica*, 4 : 255.

Material studied : 7 exs, Shillong, coll ARL (1 ♂, 1 ♀, 20.iv.1975 ; 2 ♂♂, 3 ♀♀, 6.vii.1976).

Measurements (in mm) and Nodal index

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	38.0-39.0	31.0-33.0	20-23	21-22	16-18	19-23
♀♀	33.0-37.0	32.0-36.0	19-21	18-22	15-17	19-21

Notes : The specimens studied vary from the description of *B. hyalina* Selys provided by Fraser (1934) in the following :

Male : (i) larger in size ; (ii) absence of antehumeral stripe and (iii) the presence of a small but prominent median tubercle on inner surface of superior anal appendages besides well developed basal spine.

Female : (i) the antehumeral and humeral stripes on synthorax confluent ventrally and (ii) presence of a mid-dorsal carinal stripe on abdominal segments 1-8.

The arboreal nature of this species has been discussed by Lahiri (1975). For two consecutive years, the species has been noticed at the same place, quite away from aquatic habitat.

Distribution : India : Meghalaya, West Bengal

Bayadera indica (Selys)

(Figs. 79-80 and 115-116)

Epallage indica Selys, 1853, *Syn. Cal* , ; 49.

Bayadera indica (Selys) : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 108.

Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 79.

Material studied : 1 ♂, Barapani, 24.vi.1967, coll RKV

Measurements (in mm) and Nodal index

	Length of		Forewing		Hindwing	
	Abdomen	hindwing	An	Pn	An	Pn
♂	41.0	34.0	23	22	18	23

Notes : The single male under study vary from the description of the species provided by Fraser (1934) and Cowley (1936) in the following : apical wing markings rather pale and less extended in forewing ; origin

of R_3 distal to subnodus ; antehumeral stripe on synthorax separated from humeral stripe ; Superior anal appendages (without a median tubercle, the basal spine shorter and broader, denticulate apically ; penis shaft without hairs and well-developed external fold.

Only a single male specimen of this species was collected near the artificially erected Barapani lake surrounded by deep forests all around.

Distribution : India : Himachal Pradesh ; Meghalaya, Uttar Pradesh, West Bengal. Outside India : Nepal

Genus *Euphaea* Selys

Euphaea Selys, 1840, *Mon. Lib. Eur.*, : 200.

Pseudophaea Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 109.

Allophaea Fraser, 1929, *J. Bombay nat. Hist. Soc.* 33 : 288.

Indophaea Fraser, 1929, *J. Bombay nat. Hist. Soc.*, 33 : 293.

Type species : *Euphaea variegata* Rambur.

The genus has been used here sensu Lieftinck (1954). Selys (1840) 1850, 1853, 1854a, 1859, 1878b, 1879, 1889, 1891a), Rambur (1842), Kirby (1890), Laidlaw (1917a, 1920a, 1931), Fraser and Dover (1922), Fraser (1929a, 1934), Cowley (1934) and Montgomery (1967) also made significant contribution in elucidating the generic concept.

Diagnostic characters : Moderately large in size (usually with abdomen 25.0-47.0 mm, hindwing 23.0-40.0 mm) ; black less often vermilion red, usually marked with yellow, green, blue or red, occasionally partly pruinose ; 1st lateral suture of synthorax incomplete ; segment 10 of abdomen with a median prominent keel in male ; male superior anal appendages usually subequal to or a little longer than segment 10 of abdomen, variably forcipate, unguate or expanded subapically ; inferiors conical, less than half the length of superiors ; penis shaft usually with a robust subapical spine and with terminal fold produced as a robust process on either side. Wings expanded, hyaline, occasionally suffused with reddish or greenish brown, fore or hindwings or both in male partly or entirely suffused or opaque brown with metallic lusture ; such markings usually absent in females or when present less defined and limited to base of wings ; usually 15-36 antenodal and 27-49 postnodal cross veins ; primary antenodal cross veins not easily distinguishable ; antenodals of 1st and 2nd series coinciding ; pterostigma narrow, about four to six times as long as broad, a little swollen medially ; arc straight or slightly angulated, situated variably between 2nd and 7th antenodal cross veins ; sectors of

arc arising from about its middle, separated at origin ; discoidal cell short, less than half the length of median space, traversed by 1-3 cross veins ; median space entire ; cubital space traversed by 2-5 cross veins ; R_{2+3} not fused with R_1 near its origin ; R_3 arising variably either proximally or distally to subnodus ; IR_3 arising from a point equidistant from arc and nodus or even from a point nearer to nodus, well separated from R_{4+5} ; petiolation almost absent, extending variably proximally to 1st or 4th antenodal cross vein ; cells in the anal field upto 8 rows ;

Distribution : India ; China ; Sri Lanka ; Burma ; Thailand, Vietnam ; Malaysia ; Indonesia.

***Euphaea ochracea brunnea* Selys**

(Figs. 75-76 and 111-112)

Euphaea brunnea Selys, 1879, *Bull. Acad. Belg. Sci.* (2), 47 : 374.

Pseudophaea brunnea (Selys) : Kriby, 1890, *Syn. Cat. Neur. Odon.*, : 109.

Allophaea brunnea (Selys) : Fraser, 1929, *J. Bombay nat. Hist. Soc.*, 33 : 290 ; 1934, *Fauna, Brit. India, Odon.*, 2 : 98.

Euphaea ochracea brunnea Selys : Laidlaw, 1931, *J. Fed. Mal. States Mus.*, 16 : 180.

Material studied : 2 ♂♂, Rongrengiri, 21-22, iv.1973, coll ARL ; 1 ♂, Songsok, 17.iv.1973, coll ARL ; 18 exs, Barapani (1 ♀, 23.viii.1962), coll CVS ; 3 ♂♂, 1 ♀, 26.vi.1967, coll RKV ; 4 ♂♂, 2 ♀♀, 17.viii.1968, coll RKV ; 6 ♂♂, 1 ♀, 26.vii.1969, coll BD) ; 9 exs, Cherrapunjee (5 ♂♂, 2 ♀♀, 20.viii.1972, coll AKG ; 2 ♀♀, 20.vii.1973, coll ARL) ; 1 ♂, 3 ♀♀, Mawphlong, 22.ix.1972, coll AKG ; 1 ♀, Old Barapani roadside, 25.viii, 1972, coll AKG ; 2 exs, Pynursla (1 ♂, 29.viii.1972, coll AKG ; 1 ♀, 29.viii.1973, coll SKC) ; 1 ♂, Shella, 20.vii.1973, coll AKG ; 18 exs, Shillong (2 ♂♂, 3.ix.1961, coll SNP ; 1 ♂, 6. vii.1962, coll SNP ; 1 ♀, 8.viii.1968, coll RKV ; 1 ♂, 1 ♀, 2.vi.1970, coll SK ; 1 ♀, 29.vi.1972, coll RSG ; 2 ♀♀, 12.viii.1972, coll ARL ; 5 ♂♂, 2 ♀♀, 2.ix.1972, coll RSG) ; 5 exs, Umran (1 ♂, 2 ♀♀, 2.vi.1970, coll SK ; 2 ♂♂, 7.vii.1970, coll SKT) ; 1 ♂, Umtham, 25.iv.1967, coll RKV

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	36.5-37.5	28.0-29.0	23-27	29-36	23-25	31-36
♀♀	30.5-32.0	28.5-30.0	24-25	30-35	19-22	29-31

Notes : Selys (1859a, 1978) described *Euphaea ochracea* and *E. brunnea* as two distinct species, stating differences in size and depth of wing

markings. The specimens when sent to Late Dr. Lieftinck, for comments, he identified them as *Euphaea ochracea brunnea* Selys.

In Meghalaya the subspecies is more or less widely distributed at variable altitude in Garo and Khasi hills, but has not so far been collected in Jaintia hills. The insects are commonly found along montane streams and are often noticed perching on exposed boulders in mid-streams.

Distribution : India : Meghalaya. Outside India : Burma.

Family CALOPTERYGIDAE

Diagnostic characters : Usually medium to large sized insects with usually metallic green ground colour ; synthorax with 1st lateral suture complete. Wings hyaline or coloured ; petiolation absent or sometimes extending slightly proximal to arc ; antenodal cross veins more than 2 ; primary antenodals not easily distinguishable ; antenodals of 1st and 2nd series usually coinciding ; base of discoidal cell connected to radius by arc which is oblique or angulated ; sectors of are arising from about its middle and either separated at origin or arising from a common point ; discoidal cell, IA and anal field variable in shape, extent and neuration.

Distribution : Virtually cosmopolitan.

KEY TO THE SUBFAMILIES OF THE FAMILY CALOPTERYGIDAE

IA fused at base with inner border of wing ; discoidal cell about half the length of median space and traversed only once (Fig. 517). .Caliphaeinae.

IA free from inner border of wings (Fig. 42) ; discoidal cell subequal to median space in length and traversed at least 4 times (Fig. 518). .Calopteryginae.

Subfamily CALIPHAEINAE

Diagnostic characters : Medium in size. Wings only of moderate width and narrower than in Calopteryginae, fore- and hindwings nearly similar in shape ; petiolation ending a little proximal to level of arc ; discoidal cell a little convex above, traversed once or rarely twice, about half the length of median space ; intercalated sectors restricted on apical half of wing and none present between Cu_2 and IA ; IA simple, not branched or pectinate ; only a single row of cells in anal field ; R_2 at its origin confluent with R_1 .

Distribution : India ; Nepal ; Bhutan ; Tibet ; China ; Burma ; Laos.

Genus *Caliphaea* Selys

Caliphaea Selys, 1859, *Bull Acad. Belg. Sci.* (2), 7 : 430. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 149.

Type-species : *Caliphaea confusa* Selys

Since the establishment of the genus *Caliphaea* by Selys in 1859, some important contributions have been made by Laidlaw (1917a), Munz (1919), Fraser (1929b, 1934, 1943), Liefthinck (1948a) and Asahina (1976).

Diagnostic characters : Moderately large in size (usually abdomen 34.0-40.0 mm, hindwing 30.0-32.0 mm) ; metallic green or coppery with yellow and blackish markings ; posterior lobe of prothorax with shallowly notched posterior border ; male anal appendages subequal to segment 10 of abdomen ; superiors forcipate, when viewed from above expanded at base and apex, with dorsal keel originating at base and outer border bearing a few spines subapically ; inferiors slightly shorter than superiors, deeply bifurcate apically forming inwardly curved acute branches ; terminal fold of penis very broad with long narrow, spirally coiled apical processess. Wings moderately wide, hyaline or uniformly light yellow, usually with 12-17 antenodal and 23-29 postnodal cross veins ; primary antenodals not easily distinguishable, antenodals of 1st and 2nd series coinciding ; pterostigma short, slightly more than twice as long as broad, slightly swollen in the middle ; arc oblique, situated between 4th and 7th antenodal cross veins ; sectors of arc arising from a little below the level of arc, slightly separated at origin ; discoidal cell short, about half the length of median space, a little convex above and usually traversed by a vein ; median space entire ; cubital space traversed by 6 to 7 veins ; R_{2+3} fused with R_1 at its origin ; R_3 arising from a point which is about 2 cells distal to the level of subnodus ; IR_3 arising midway between arc and nodus, well separated from origin of R_{4+5} ; petiolation extending slightly beyond arc ; IA simple ; neither branched nor pectinate ; anal field with one row of cells ; intercalated sectors restricted to apical half of wing and none present between Cu_2 and IA.

Distribution : Same as subfamily

Caliphaea confusa Selys (Figs. 4-5, 31-32 and 517)

Caliphaea confusa Selys, 1859, *Bull Acad. Belg. Sci.* (2), 7 : 440. Fraser 1934, *Fauna Brit. India, Odon.*, 2 : 149.

Material studied : 1 ♂, Mawphlong, 11.v.1973, coll ARL.

Measurements (in mm) and Nodal index

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂	38.5	31.0	13-15	27	12-13	23-25

Notes : The male under study varies from the description of the species provided by Fraser (1934) in having lower range in nodal index, segment 1 of abdomen in being yellow on sides, and in the shape of the superior anal appengages which are distinctly buldged on inner surface subapically.

In Meghalaya, the species is having a restricted distribution only in central Khasi hills. The specimen was collected inside a deep jungle near a small stream.

Distribution : India : Meghalaya, West Bengal. Outside India : Nepal ; Bhutan ; Tibet ; China ; Burma ; Laos.

Subfamily CALOPTERYGINAE

Diagnostic characters : Usually large in size. Wings wide and comparatively wider than in Caliphaeinae ; hindwings usually broader than forewings ; petiolation absent ; discoidal cells straight or sometimes slightly convex, traversed at least 4 times, about as long as median space ; intercalated sectors well developed and these also present between Cu₂ and IA ; IA usually branched and pectinate, sometimes not ; R₂ may or may not confluent with R₁ at its origin.

Distribution : Virtually cosmopolitan.

KEY TO THE GENERA OF THE SUBFAMILY CALOPTERYGINAE

1. Arc oblique ; median space entire. . *Vestalis* Selys
Arc angulated (Fig. 518) ; median space traversed or reticulated. ..2
2. Pterostigma present. .. *Echo* Selys
Pterostigma absent or if present then traversed by nervures (Fig. 518). .3
3. All wings in both sexes opaque. .. *Matrona* Selys
Forewings in both sexes hyaline (Fig. 518). . *Neurobasis* Selys

Genus *Echo* Selys

Echo Selys, 1853, *Syn. Cal.*, : 19. Fraser, 1934, *Fauna Brit. India Odon.*, 2 : 134.

Type-species : *Echo margarita* Selys

Selys (1853, 1854a) established the genus *Echo* with *E. margarita* as the type-species. Selys (1879), Laidlaw (1903, 1917a) and Fraser (1934) made further contribution on the genus.

Diagnostic characters : Large in size (usually with abdomen 36.0-46.0 mm, hindwing 33.0-37.0mm) ; metallic green marked with black ; male superior anal appendages about one and a half times as long as segment 10 of abdomen, this when viewed dorsally forcipate with apex swollen and outer border bearing a few spines ; inferiors about two-third the length of the superiors, narrowing gradually to an acute apex ; terminal fold of penis large, produced on either side into a moderately long apical process which ending in a terminal coil. Wings broad, hyaline or partly opaque ; usually with 29-40 antenodals and 55-77 postnodal cross veins in forewing, 23-30 and 56-64 respectively in hindwing ; primary antenodals not easily distinguishable, antenodals of 1st and 2nd series coinciding ; pterostigma short, about twice as long as broad, with broadened and rounded inner margin ; arc angulated, usually situated at the level of 5th antenodal cross vein ; sectors of arc arising from a little below the level of arc, separated at origin ; discoidal cell nearly straight, narrow, a little longer than median space, usually traversed by 7-10 veins ; median and cubital space usually traversed by 6-9 and 16-20 veins respectively ; R_{2+3} fused with R_1 near base ; R_3 usually arising at or a little proximal to the level of subnodus ; IR_3 arising much nearer arc than nodus, well separated from origin of R_{4+5} ; petiolation absent ; IA simple, not branched ; anal field with upto 5 or 6 rows of cells ; intercalated sectors many, arising proximal to middle of wing and also present between Cu_2 and IA.

Distribution : India ; China (vide Selys (1853, 1854a) ; Burma.

***Echo margarita tripartita* Selys**

(Figs. 85-86 and 121-122)

Echo margarita race *tripartita* Selys, 1879, *Bull Acad. Belg. Sci.*, (2), 47 : 356.

Echo margarita tripartita Selys : Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 137.

Material studied : 37 exs, Mawpat (4 ♂♂, 3 ♀♀, 31.iii.1967, coll RKV ; 1 ♂, 18.vii.1967, coll RKV ; 12 ♂♂, 10 ♀♀, 31.viii.1967, coll RKV ; 1 ♂, 1 ♀, 31.v.1968, coll RKV ; 1 ♂, 2 ♀♀, 3.ix.1970, coll GMY ; 1 ♂, 1 ♀, 27.vii.1974, coll MSJ) ; 3 ♀♀, Mawrapt, 3.xii.1977, coll ARL ; 1 ♂, Mawsynram, 10.x.1972, coll AKG ; 37 exs, Shillong (1 ♂, 3.xi.1961, coll SNP ; 2 ♂♂, 5.vii.1963, coll VDS ; 1 ♂, 5 ♀♀, 15.ix.1965, coll BKT ;

1 ♂, 3 ♀ ♀, 3.vii.1969, coll RKV ; 1 ♂, 1 ♀, 3.viii.1968, coll SB ; 1 ♂, 1 ♀, 5.ix.1968, coll RKV ; 1 ♂, 1 ♀, 18.v.1973, coll ARL ; 1 ♀, 25.viii.1973, coll MSJ ; 1 ♀, 31.viii.1973, coll KD ; 1 ♂, 22.v.1974, coll MSJ ; 1 ♂, 1 ♀, 24.vii.1974, coll MSJ ; 1 ♀, 21.viii.1974, coll RSG ; 2 ♂ ♂, 2 ♀ ♀, 26.v.1975, coll MSJ ; 1 ♀, 27.vi.1975, coll MSJ ; 1 ♀, 31.vi.1975, coll SB ; 1 ♂, 1 ♀, 3.vii.1975, coll RSG ; 1 ♂, 2 ♀ ♀, 23.vii.1975, coll MSJ ; 1 ♂, 29.vii.1975, coll RSG) ; 1 ♀, Umsning, 5.iii.1971, coll GMY.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	Abdomen	hindwing	An	Pn	An	Pn
♂ ♂	43.0-44.0	33.5-36.0	31-37	69-76	29-30	60-69
♀ ♀	36.0-41.5	36.5	29.40	55-67	23-29	59-66

Notes : The specimens under study agree well with description of the species provided by Fraser (1934) excepting in the extent of opaque apical area of wing which covers one fourth to one third of the wing length.

The subspecies is restricted only in central and southern parts of Khasi hills and commonly occur along montane streams with clear water and at such places, where the banks are laden with bushes including ferns.

Distribution : India : Meghalaya.

Genus *Matrona* Selys

Matrona Selys, 1853, *Syn. Cal.*, 17, Fraser, 1934 *Fauna Brit. India, Odon.* 2 : 144.

Type-species : *Matrona basilaris* Selys

Selys (1853, 1854a), established the subgenus *Matrona* with *M. basilaris* as its type. It was elevated to generic rank by Kirby (1890) who further elaborated the generic concept. Later, Selys (1891a), Ris (1916a), Munz (1919), Fraser (1929b, 1934) and Vershney (1971) accepted Kirby's (1890) views dealing with the genus.

Diagnostic characters : Large in size (usually with abdomen 42.0-60.0 mm, hindwing 38.0-45.0 mm) ; metallic green but marked with blue and black ; male superior anal appendages subequal to segment 10 of abdomen, forcipate, broadened basally and also on distal half and outer border bearing a few spines ; inferiors about two third the length of superiors, narrowing to an acute apex ; terminal fold of penis large with its api-

cal process with short and acutely pointed external branch and moderately long internal branch, the latter bearing a row of hairs suapically. Wings very broad, opaque blackish or steely blue or partly hyaline apically ; usually with 40-65 antenodal and 80-150 postnodal cross veins on either wing ; primary antenodals not easily distinguishable, antenodals of 1st and 2nd series coinciding ; in males pterostigma absent but in females the area reticulated and then the reticulated area about three times as long as broad and little broadened medially ; arc angulated, situated at about the level of 10th antenodal cross vein ; sectors of arc arising from a common point a little below the middle of arc ; discoidal cell narrow, slightly convex towards costal side, about one and a half times as long as the median space, usually traversed by 8-10 veins ; median and cubital spaces usually traversed by about 15 and 30 veins respectively ; R_{2+3} not fused with R_1 at its origin ; R_8 arising slightly proximal to the level of subnodus ; IR_8 arising much nearer to arc than nodus, well separated from origin of R_{4+5} ; petiolation absent ; anal field with upto 5-6 rows of cells ; IA strongly forked just after its origin ; intercalated sectors many and scattered.

Distribution : India : China ; Bangladesh ; Burma ; Vietnam ; Taiwan.

Matrona basilaris nigripictus Selys

(Fig. 87-88 and 123-124)

Matrona basilaris race *nigripictus* Selys, 1979, *Bull Acad Belg. Sci.* (2), 47 : 355

Matrona basilaris nigripictus Selys : Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 147.

Material studied : 3 exs, Barapani (2 ♂♂, 24.viii.1967, coll RKV ; 1 ♀, 26.iv.1973, coll SKC) ; 1 ♀, Cherrapunjee, 15.iii.1970, coll SKT ; 14 exs, Mawpat (9 ♂♂, 1 ♀, 31.viii. 1961, coll RKV ; 2 ♂♂, 2 ♀♀, 3.ix.1970, coll GMY) ; 1 ♀, Myllem 25.vii.1968, coll RKV ; 10 exs, Pynersla (3 ♂♂, 29.viii.1972, coll AKG ; 2 ♂♂, 5 ♀♀, 29.viii.1973, coll SKC) ; 10 exs, Shillong (2 ♂♂, 5 ♀♀, 25.viii.1959, coll SNP ; 2 ♂♂, 1 ♀, 29.vi.1960, coll AKD ; 1 ♂, 14.vii.1960, coll SNP ; 4 ♂♂, 3 ♀♀, 28.vii.1960, coll SNP ; 4 ♂♂, 7.vii.1962, coll SNP ; 1 ♀, 24.viii.1962, coll SNP ; 1 ♂, 1 ♀, 25.viii.1962, coll SNP ; 1 ♂, 1 ♀, 28.viii.1962, coll SNP ; 1 ♂, 1 ♀, 20.ix.1962, coll SNP ; 2 ♂♂, 1 ♀, 21.ix.1962, coll SNP ; 1 ♂, 4 ♀♀, 25.ix.1962, coll SNP ; 1 ♂, 1 ♀, 10.x.1963, coll VDS ; 4 ♂♂, 1 ♀, 9.viii.1965, coll SNP ; 8 ♂♂, 23.viii.1967, coll RKV ; 2 ♂♂, 24.viii.1967, coll RKV ; 2 ♂♂, 3 ♀♀, 3.vii.1968, coll SB ; 2 ♂♂, 3 ♀♀, 5.ix.1968, coll RKV ; 1 ♂, 1 ♀, 15.x.1968, coll VDS ; 1 ♂, 9.vi.1971, coll RKS ; 1 ♂, 14.ix.1971, coll RSG ; 1 ♂, 1 ♀, 10.x.1971, coll RSG ;

2 ♂♂, 2 ♀♀, 7.vii.1972, coll ARL ; 1 ♂, 2 ♀♀, 12.viii.1972, coll ARL ; 2 ♂♂, 3.ix.1972, coll ARL ; 1 ♂, 14.viii.1973, coll MSJ ; 1 ♀, 25.viii.1973 coll ARL ; 2 ♂♂, 31.viii.1973, coll KD ; 1 ♀, 17.v.1974, coll RSG ; 2 ♂♂, 1 ♀, 17.vi.1974, coll MSJ ; 2 ♂♂, 1 ♀, 19.vii.1974, coll MSJ ; 1 ♂, 24.vii.1974, coll MSJ ; 2 ♂♂, 1 ♀, 12.viii.1974, coll ARL ; 1 ♂, 17.viii.1974 coll RSG ; 1 ♂, 25.vii.1975, coll MSJ ; 1 ♂, 29.vii.1975, coll MSJ ; 1 ♀, 31.vii.1975, coll MSJ ; 1 ♂, 10.viii. 1976, coll SR) ; 5 exs. Umsning (2 ♂♂, 3.x.1963, coll MRR ; 1 ♀, 17.x.1963, coll MRR ; 3 ♂♂, 27.iii.1968, coll RKV).

Measurements (in mm) and Nodal index

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	59.0-60.5	41.0-42.0	43-44	117-132	42-45	116-135
♀♀	47.5-52.5	38.5-43.5	41-56	80-93	41-46	79-92

No of cross veins in

	Discoidal cell		Median space		Cubital space	
	forewing	hindwing	forewing	hindwing	forewing	hindwing
♂♂	15-19	19-20	10-12	10-12	21-24	24-29
♀♀	13-19	17-19	10-12	10-21	19-21	23-25

Notes : From the description of this subspecies provided by Fraser (1934) the specimens under study vary in size. The females further vary in having longer pterostigma (2.25-2.50 mm in forewing, 2.00-2.25 mm in hindwing).

Habit and distribution of this subspecies in Meghalaya is closely similar to *E. m. tripartita* Selys, but it exhibits less sustained flight.

Distribution : India : Himalayas (exact locality unknown), Meghalaya. Outside India : Burma.

Genus *Neurobasis* Selys

Neurobasis Selys, 1853, *Syn. Cal.*, : 17, Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 119.

Type species : *Libellula chinensis* Linnaeus

The genus including only the type-species was established by Selys (1853, 1854a). The generic concept was further enlightened and there was addition of another species and several subspecies for the type-species as a result of contributions by Selys (1878b, 1883a, 1889, 1891a), Kirby (1890), Munz (1919), Fraser (1929b), 1934) and Lieftinck (1954). In recent times Bhasin (1953), Lieftinck (1955a, b, 1971a), St. Quentin (1970), Kumar (1972c, 1973a, 1977a), Kumar and Juneja (1975), Prasad (1976a), Prasad and Singh (1976) and Lahiri (1977a, 1979) recorded the type-species from different places in India, Sri Lanka and Nepal.

Diagnostic characters : Large in size (usually with abdomen 42.0-51.0 mm, hindwing 32.0-40.0 mm) ; metallic green marked with blue, yellowish and black ; male superior anal appendages subequal to segment 10 of abdomen, forcipate, broadened basally and again on distal half, outer border bearing a few spines ; inferiors a little shorter than superiors, broadened at base, narrowing thereafter to an acute apex ; terminal fold of penis large, apical process with short and acutely pointed external branch and moderately long internal branch bearing a row of hairs subapically. Wings broad and hyaline, but in males forewing partly opaque metallic blue or green ; usually 31-42 antenodal cross veins on either wing in both sexes and in males 50-65 and 68-80 postnodal cross veins in fore- and hindwings respectively, in females 24-29 cross veins between node and pterostigma in hindwing, such cross veins in forewing as in males ; primary antenodals not easily distinguishable, antenodals of 1st and 2nd series coinciding ; pterostigma absent in males and frequently in forewing of females, but when present in females it is suboval and may or may not be reticulated ; arc angulated, situated at about the level of 10th antenodal cross vein ; sectors of arc arising from a common point at about the middle of arc ; discoidal cell convex in costal side, a little shorter than the median space both the cell and space traversed by about 10 veins ; cubital space traversed by about 20 veins ; R_{2+3} not fused with R_1 at its origin ; R_3 arising a little proximal to the level of subnodus ; IR_3 arising much nearer to arc than nodus, well separated from origin of R_{4+5} ; petiolation absent ; anal field with about 5-6 rows of cells ; IA simple, not branched ; intercalated sectors many and scattered.

Distribution : India ; Nepal ; China ; Sri Lanka ; Burma ; Thailand ; Malaysia ; Indonesia ; New Guinea ; Philippines ; Australia.

***Neurobasis chinensis chinensis* (Linnaeus)**

(Figs. 89-90, 125-126 and 519)

Libellula chinensis Linnaeus, 1753, *Syst. Nat.*, 1 : 545.

Neurobasis chinensis (Linnaeus) : Selys, 1853, *Syn. Cal.*, 18. Kirby, 1890, *Syn. Cal., Neur. Odon.*, : 102.

Neurobasis chinensis chsnensis (Linnaeus) : Ris, 1915, *Tijdschr. Ent.*, 58 : 6 Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 121.

Neurobasis chinensis chinensis (Linnaeus) : Ris, 1915, *Tijdschr. Ent.*, 58 : 6. Frases, 1934, *Fauna Brit. India, Odon.*, 2 : 121.

Material studied : 3 ♂♂, Rongrengiri, 17-21.iv.1973, coll ARL ; 1 ♀, Songkhama, 15.xi.1973, coll SB ; 1 ♂, 1 ♀, Songsok, 14.iv.1973, coll ARL ; 1 ♀, Wageasi, 6.iv.1973, coll ARL ; 2 exs, Barapani (1 ♂, 31.v.1967, coll BKT ; 1 ♂, 17.viii.1968, coll RKV) ; 4 exs, Mawpat (3 ♂♂, 30.x.1964, coll MRR ; 1 ♂, 18.iv.1968, coll RKV) ; 1 ♀, Myllem, 24.x.1967, coll RKV ; 1 ♂, Umran, 12.ix.1967, coll RKV ; 6 exs, Umsning (1 ♀, 30.x.1963, coll MRR ; 2 ♂♂, 16.v.1967, coll RKV ; 3 ♂♂, 27.iii.1968, coll RKV) ; 5 exs, Umthan (1 ♂, 2 ♀♀, 25.iv.1967, coll RkV ; 2 ♂♂, 4.x.1968, coll SB).

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	47.0-60.5	32.0-33.0	34-39	54-64	35-37	68-80
♀♀	42.5-46.0	37.5	31-38	50-57	31-34	24-28
No. of cross veins in						
	Discoidal cell		Median space		Cubital space	
	forewing	hindwing	forewing	hindwing	forewing	hindwing
♂♂	7-9	11-12	6-9	6-9	17-20	20-23
♀♀	8	9-10	6-9	6-9	16-21	17-19

Notes : The males studied vary from the description of the subspecies provided by Fraser (1934) in nodal index and in number of cross veins in discoidal cell.

They are commonly found along montane streams and rivers with exposed surface of the boulders.

Distribution : India ; Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Tamil Nadu,

Uttar Pradesh, and Bengal (exact locality unknown) ; Outside India : Nepal ; Sri Lanka ; Burma ; Thailand ; Malaysia ; Indonesia.

Genus *Vestalis* Selys

Vestalis Selys, 1853, *Syn. Cal.*, : 24. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 124.

Type-species : *Calopteryx luctuosa* Burmeister

Selys (1853, 1854a) established this genus with a new species and incorporated 2 other species which were previously described under the genus *Calopteryx* Leach. The generic concept was further enlightened by Selys (1873a, 1878b, 1879, 1889, 1891a), Kirby (1890), Laidlaw (1917a, 1921), Munz (1919), Fraser (1934) and Lieftinck (1953c, 1954). Bhasin (1953) and Lieftinck (1948a, 1955a, 1971a) have published accounts of a few species occurring in Indian region.

Diagnostic characters : Large in size (usually with abdomen 35.0-59.0 mm, hindwing 31.0-42.0 mm) ; metallic bronze, blue or green marked with yellow or black, occasionally pruinose ; male superior anal appendages a little longer than segment 10 of abdomen, forcipate, broadened at base and again on distal half, outer border bearing a few spines, usually with a variably developed basal spine and a notch at apex ; inferiors about two-third the length of superiors, narrowing gradually from base to apex ; terminal fold of penis large, rather elongated with its apical processes rather short, curved outwards and each bearing a median curved spine on its outer border. Wings moderately broad, hyaline but tinted with yellow or opaque black at apices ; usually 17-37 antenodal and 36-85 postnodal cross veins ; primary antenodal cross veins not easily distinguishable ; antenodals of 1st and 2nd series coinciding ; pterostigma absent ; arc oblique, situated at about the level of 4th antenodal cross vein ; sectors of arc arising from a common point on its lower half ; discoidal cell convex above and a little longer than median space, usually traversed by 2-6 (rarely 1) veins ; median space entire ; cubital space traversed by 8-10 (rarely 4) veins ; R_{2+3} fused with R_1 at its origin ; R_3 arising a little proximal or even slightly distal to the level of subnodus ; IR_3 arising much nearer to arc than nodus, a little separated from origin of R_{4+5} ; petiole absent ; anal field with upto 4 rows of cells ; IA pectinate ; intercalated sectors fewer and generally restricted on apical half of wing.

Distribution : India ; Tibet ; Sri Lanka ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; New Guinea ; Philippines.

Vestalis gracilis gracilis (Rambur)

(Fig. 83-84 and 119-120)

Calopteryx gracilis Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 224.*Vestalis gracilis* (Rambur) : Selys, 1853, *Syn. Cal.* : 26.*Vestalis gracilis gracilis* (Rambur) : Fraser, 1929, *J. Bombay nat. Hist. Soc.*, 33 : 582 ; 1934, *Fuana Brit. India, Odon.*, 2 : 126

Material studied : 1 ♂, Darugiri, 10.xi.1973, coll SB ; 1 ♂, Rongren-giri, 21.iv.1973, coll ARL ; 3 ♂♂, Barapani, 31.v.1967, coll BKT ; 1 ♂, 10 kms east of Ranikor, 7.xii.1977, coll ARL ; 2 ♂♂, 1 ♀, Sumer, 21.iv.1972, coll GMY ; 2 ♀♀, Umroi, 30.iv.1968, coll RKV

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	56.0-69.0	39.0-42.0	27-31	69-77	24-27	63-66
♀♀	52.0	40.0	28-29	59	24-25	53-55

No. of cross veins in

	Discoidal cell		Cubital space	
	forewing	hindwing	forewing	hindwing
♂♂	5-6	4-5	10-11	8-10
♀♀	4-5	4-5	9-10	8-9

Notes : In either sex, 1-2 cell rows between IA and CU₂, 1-5 cell rows between CU₂ and inner wing margin.

From the description of the species provided by Fraser (1934) both sexes studied vary in having abdominal segments 8 and 9 unmarked with yellow on sides.

They are found commonly along montane and submontane streams.

Distribution : India : Andhra Pradesh, Assam, Gujarat, Karnataka, Kerala, Maharashtra, Meghalaya, Tamil Nadu and Bengal (exact locality unknown). Outside India : Burma ; Thailand ; Vietnam ; Malaysia.

Superfamily LESTIDOIDEA

Diagnostic characters : Usually medium to large in size and with simple rounded hind margin of posterior lobe of prothorax ; males with anterior hamules elongated. Wings petiolated ; only 2 antenodal cross veins present ; postnodals in strict alignment with cross veins beneath ;

usually IR_8 and R_{4+5} both originating nearer to arc than nodus, but sometimes IR_8 originating at a point midway between arc and nodus ; intercalated sectors usually present on apical part of wing.

Remarks : Here the name Lestidoidea has been used in place of Lestinoidea as used by Fraser (1957). This has been done at the instance of Late Dr. M. A. Lieftinck, who (in litt.) pointed out that Lestidoidea owes its derivation to the genus *Lestes* Leach. Fraser (1957) distinguished his superfamily Lestinoidea into families Perilestidae, Chlorolestidae and Lestidae and at the same time pointed out that the position of Megapodagruidae was still uncertain in spite of the fact that in venational characters the members of the family together with other Lestid Odonates formed a Lestini complex.

In the present work species of the genera *Indolestes* Fraser, *Lestes* Leach, *Megalestes* Selys and *Orolestes* McLachlan have been considered since these were found from the area under study. *Megalestes* Selys falls under Chlorolestidae and *Indolestes* Fraser, *Lestes* Selys and *Orolestes* McLachlan under Lestidae. Fraser (1957) used the position of the point of origin of IR_8 and R_{4+5} in relation to arc and nodus as distinguishing character for the two families and while doing so, he (op. cit.) put the genus *Megalestes* Selys under Chlorolestidae in spite of the fact that in adults the points of origin of IR_8 and R_{4+5} are nearer to arc. Fraser's (1957) idea has been upheld by Lieftinck (1939a) because of similarity in the forms of nymphal *Megalestes* species and those of other Synlestid (=Chlorolestid) genera. So, in the present work, following Lieftinck (1939a) findings the genus *Megalestes* Selys has been considered under the family Chlorolestidae. Since nymphal stages of any species were not examined by the writer during present study the running key for separation of the families of the superfamily Lestidoidea has not been provided.

Distribution : Cosmopolitan.

Family CHLOROLESTIDAE

Diagnostic characters : Wings hyaline or those of males sometimes banded with dark or blackish brown ; discoidal cell well formed and separated from inner wing margin ; usually both IR_8 and R_{4+5} arising from points nearer nodus than arc or IR_8 arising from a point midway between arc and nodus and R_{4+5} arising a little proximal to the point of origin of IR_8 ; an oblique cross vein usually present between R_8 and IR_8 ; Cu_2 on leaving the discoidal cell usually strongly arched towards the costal margin ; anal vein arising from inner wing margin either at a point

proximal to arc and discoidal cell being at about the level of Ac, or below discoidal cell far distal to Ac ; pterostigma longer than broad (upto 3 times).

Nymphs [after Lieftinck (1939a)] : Mid-lobe of labium with the median cleft well developed, deeply and narrowly incised. Side lobes narrow and straight, cleft into two simple unequal tooth, movable hook long and slender. No mental or lateral setae. Antennae variable, usually with the first and second segments stouter than the remaining (except *Megalestes* Selys). First joint long and slender but not as long as second ; third segment is the longest (*Chlorolestes* Selys), first joint short and broad, second joint (pedicel) stout and very long, remaining joints much shorter than second joint (*Synlestes* Selys) or antennae rather short, segments subequal in length, third joint longest (*Megalestes* Selys). Gizzard with 8 major folds, no minor fold (*Chlorolestes* Selys) or with 4 major and 4 minor folds (*Synlestes* Selys, ? *Megalestes* Selys) ; caudal gills short or moderately long, elongate, oval, narrowed somewhat at their base, apices broadly rounded (*Megalestes* Selys, *Chlorolestes* Selys), or bluntly pointed (*Synlestes* Selys), secondary trachae oblique to the main axis. Pedicel of caudal gills distinct, flattened, forming part of the gill lamella and separated from this by a breaking joint. Gills not caducous. Cercoids acute, conspicuous.

Distribution : India ; Nepal ; Bhutan ; China ; Burma ; Vietnam ; Taiwan ; Australia ; Africa.

Subfamily MEGALESTINAE

Diagnostic characters : Coloured metallic. Wings hyaline ; IR_3 arising from a point midway between arc and nodus ; R_{4+5} arising a little proximal to the point of origin of IR_3 ; anal vein arising from inner wing margin at or slightly proximal to Ac.

Distribution : India ; Nepal ; Bhutan ; China ; Burma ; Vietnam ; Taiwan.

Genus *Megalastes* Selys

Megalastes Selys, 1862, *Bull. Acad. Belg. Sci.* (2), 13 : 293. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 20

Type-species : *Megalastes major* Selys

Selys (1862) erected the subgenous *Megalastes* under *Lestes* Leach with his new species *L. (M) major* as its type. Later, its elevation to generic rank can be credited to Kirby (1890). Further elucidation of the generic

concept and addition of some more species have been done chiefly by Munz (1919), Laidlaw (1920c), Fraser (1929c, 1933), Leifstinck (1939a) and Chao (1947, 1962). In recent times Lieftinck (1949a), Bhasin (1953), Asahina (1963, 1970b), Sahni (1965), St. Qunetin (1970) and Lahiri (1970) published accounts of the type-species of the genus collected from different parts of India and adjoining countries.

Diagnostic characters : Large insects (abdomen usually 43.0-65.0 mm long, hindwing 30.0-37.0 mm long) ; metallic green with yellowish mark, superior anal appendages in males as long as or a little longer than segment 10 of abdomen, forcipate with a basal subquadrate projection, inner margin sometimes dilated and sometimes also with a subapical expansion ; inferiors about one third as long as superiors, triangular or spherical and either with a variously shaped basal spine or with a diverticate spine at apex ; penis with large and much flattened apical fold, the terminal fold being usually short of abortive. Wings long and narrow, hyaline, sometimes partly enfumed ; forewing usually with 16-24 postnodal cross veins and hindwing with 12-18 ; arc at the level of the distal antenodal cross veins ; pterostigma elongated, a little more than twice as long as broad, slightly swollen at middle, with inner proximal end continuous or a little separated from brace ; IR_3 arising at a point midway between arc and nodus ; R_{4+5} arising a little proximal to IR_3 ; IR_3 arising at a point much nearer nodus than pterostigma ; R_s from arc to the point of origin of R_{4+5} two and half times the distance from point of origin of R_{4+5} and nodus in hindwing ; discoidal cell with inner margin about twice as long as the costal margin, the inner distal angle being acute ; discoidal cell of hindwing subequal to that of forewing ; Ab arising from inner wing margin usually proximal to the point where Ac meets it.

Distribution : Same as subfamily.

Megalestes raychoudhuriai sp. nov.

(Figs. 131-132, 298-299 and 519)

Material studied : Holotype ♂ and Allotype ♀, Shillong (Nonghtymmai), 10.vii.1974, coll ARL (Z.S.I. Regd. Nos. 3909/ H_{13} and 3910/ H_{13} respectively) ; Paratypes : 2 ♂♂, Shillong, Tripura Castle Road), 7.vi.1974, coll KD (Z.S.I. Regd. Nos. 3911/ H_{13} and 3912/ H_{13} respectively) ; 8 exs, Mawphlong (1 ♂, 17.xi.1964, coll JKP ; 2 ♂♂, 8.ii.1967, coll RKV ; 1 ♀, 11.v.1972, coll AKG ; 2 ♂♂, 1 ♀, 21.x.1974, coll SKG ; 1 ♂, 27.xi.1974, coll RZ) ; 10 exs, Shillong (1 ♂, 13.vi.1967, coll RKV ; 1 ♂, 21.ii.1973, coll AKG ; 1 ♂, 1 ♀, 26.vi.1974, coll RZ ; 1 ♂,

1 ♀, 12. viii. 1974, coll ARL ; 1 ♂, 1 ♀, 10. xi. 1974, coll MSJ ; 1 ♂, 21.v.1975, coll ARL ; 1 ♂, 28.v.1975, coll MSJ).

Measurements (in mm) and Nodal Index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	52.0-57.5	30.5-33.5	16-18	12.15
♀♀	43.0-45.5	33.0-33.5	19-21	14-16

Description : Male : Labium yellow ; bases of mandibles, cheeks and a median rounded spot at hind margin of occiput citron yellow ; anteclypeus and apical two segments of antennae black ; eyes green, darker above ; rest of head bright metallic green, but occiput and under surface less so. Prothorax black with some metallic greenish hue with a mid-dorsal stripe and lower parts of middle lobe citron yellow ; mid-dorsal stripe in the middle lobe narrow, but widened on anterior and posterior lobe ; posterior lobe broad, rounded and arched backwards at middle ; mesostigmal lamina at its hinder border and the connecting bridge deeply raised. Synthorax glossy metallic green on dorsum upto second lateral suture, citron yellow on sides and ventre, a complete stripe on 1st lateral suture of same colour, the stripe being markedly narrowed above ; anterior end of mid-dorsal carina with a yellow spot ; sutures finely black ; lower parts of sides and under surface of thorax thinly pruinose. Legs black with extensor surfaces of femora and tibiae yellowish to pale brown ; coxae and trochanters citron yellow but those of hind legs with some black patches. Wings (Fig. 519) hyaline ; pterostigma slightly swollen at middle, brown enclosed in thick black nervures, proximal and distal ends slightly black outwardly, a little more than twice as long as broad, covering nearly two and a half cells. Abdomen metallic green, paler and yellowish on dorsum of segments 3-6, on sides of segments 3-5 and on lower parts of sides of segments 6-8 ; extreme bases and sides of segment 1 and sides of segment 2 yellow ; articulating area of abdominal segments and ventre of abdomen black ; segments 8 and 10 variably pruinose. Anal appendages as in Figs. 131-132, black ; superiors slightly longer than segment 10 of abdomen, forcipate, with apices nearly meeting each other, broad at base, then little narrowed and twisted and then again broadening upto apex when viewed dorsally ; inner margin with an expansion beginning from about middle of appendage and ending a little before apex ; on the inner side near base is a quadrate robust process which is slightly expanded and not-

ched on its inner margin ; inferiors subtriangular, approximately one third the length of superiors, tipped with a bunch of whitish hairs ; dorsal margin at about middle provided with a robust spherical outgrowth, which in turn ends in a small pointed spine directed upwards ; when seen from above, the inferiors appear closely apposed, with the small spine bearing outgrowth situated on outer border. Penis as in Figs. 298-299.

Female : More robust than male, coloured similarly, but differ in the following points : median spot on hind margin of occiput transversely elongated. Prothorax with anterior lobe entirely citron yellow. Synthorax with a moderately broad mid-dorsal citron yellow stripe ; the yellow stripe on anterolateral suture confluent with yellow area on sides below the level of spiracle, coxae and trochanters citron yellow ; pterostigma yellow. Segments 8 and 9 with ventral border broadly and segment 10 entirely yellow. Anal appendages yellow, slender, pointed apically, about three fourth as long as segment 10 of abdomen ; ovipositor yellow, robust, extending to the apex of abdomen, the apical third being serrated at ventral border.

Variations : In some paratype males the median yellow spot on hind border of occiput is very small and in some paratype females, the wings are enfumed with brown apically and the ovipositor is variably marked with black.

Notes : This species comes very close to *M. major* Selys, which has previously been recorded from Shillong, but differs from the same in size and the following points ;

Male : the prothorax is mrked with yellow and a median spot of the same colour on hind margin of occiput ; anal appendages differing in shape ; superiors dilated but not provided with any spine apically ; the inferiors with the spine short and situated on a spherical outgrowth.

Female : the synthorax is marked with a mid-dorsal yellow stripe and the anal appendages are also yellow.

This species is known only from the Khasi hills in and around Shillong and Mawphlong and was collected near streams where specimens of either sex were noticed making slow to and fro flights over short distances.

Distribution : India : Meghalaya

Family LESTIDAE

Diagnostic characters Wings hyaline, tinted with yellow or those of males sometimes banded with dark or blackish brown ; discoidal cell well formed and separated from inner wing margin ; both IR_3 and R_{4+5} arising from points nearer arc than nodus ; an oblique cross vein present between R_3 and IR_4 ; Cu_2 on leaving discoidal cell usually not arched towards costal margin ; anal vein arising from inner wing margin at the point of Ac ; pterostigma usually considerably longer than broad (upto 7 times).

Nymph [after Lieftinck (1939a)] : Median lobe of labium with median cleft only incompletely developed, very narrowly incised or closed. Side lobes greatly expanded, usually distinctly concave, mesal margin very irregularly and deeply cleft, Mental and lateral setae present. Antennae long and slender, basal joints of usual size and appearance, pedicel elongate, not conspicuously longer than the distalia. Gizzard with 4 major and 4 minor folds. Caudal gills very long, subparallel, apices ellipsoidal, rounded or bluntly pointed, Secondary trochanters apparently at right angles to the main axis. Pedicel of caudal gills unapparent, annular, no breaking joint. Gills caducous. Cercoids inconspicuous.

Distribution : Cosmopolitan

KEY TO THE SUBFAMILIES OF THE FAMILY LESTIDAE

Discoidal cell of hindwing one and a half times as long as that of forewing ; in hindwing, distance of Rs from arc to the point of origin of R_{4+5} half the distance between the point of origin of R_{4+5} and subnodus. .Sympecmatinae.

Discoidal cell, usually of similar size in fore-and hindwing and then Rs in hindwing from arc to the point of origin of R_{4+5} may be half the distance between the point of origin of R_{4+5} and subnodus ; if however, discoidal cell in hindwing is longer than that of forewing, then Rs in hindwing from arc to the point of origin of R_{4+5} never more than one third the distance between the point of origin of R_{4+5} and subnodus. ...Lestinae.

Subfamily SYMPECMATINAE

Diagnostic characters : Small insects (usually with abdomen 21.0-36.0 mm and hindwing 18.0-24.0 mm in length) ; when at rest wings held vertically closely apposed on dorsum. Wings narrow (usually 5-6 times

as long as broad), hyaline or tinted with yellow ; discoidal cell very narrow (usually 6-8 times as long as wide) with inner distal angle markedly acute ; discoidal cell of hindwing one and half times as long as that of forewings ; R_s from arc to the point of origin of R_{4+5} half the distance from the point of origin of R_{4+5} and subnodus of hindwing ; pterostigma two and half to four times as long as broad with inner proximal end continuous or a little apart from brace.

Distribution : Virtually cosmopolitan in Old World countries.

Genus *Indolestes* Fraser

Indolestes Fraser, *Mem. Dept. Agric. India* (Ent.), 7 : 57 ; 1933, *Fauna Brit. India, Odon.*, 1 : 77.

Type-species : *Indolestes indica* Fraser.

Fraser (1929a), while establishing this genus described 3 new species including the type and incorporated *Lestes bilineata* Selys 1891. The generic concept has since then been further enlightened through the contributions chiefly of Fraser (1930a, 1933) and Lieftinck (1955a, 1960a, 1971a).

Diagnostic characters : Medium in size (usually with abdomen 23.0-33.0 mm, hindwing 19.0-23.0 mm) ; blue or pale brown, marked with black or sometimes partly steel black ; male superior anal appendages either subequal to or nearly one and a half times as long as segment 10 of abdomen, forcipate with outer margin bearing a few spines subapically and inner margin dilated, dilatation extending for variable length and ending in a spine and with or without a tubercle, apices of anal appendages nearly meeting or even sinuous for some distance ; inferiors about half the length of superiors and obtusely triangular ; penis with large and flattened apical fold, terminal part of which short and ending in a pair of moderately long coiled flagella. Wings narrow, usually tinted with pale brown ; forewing usually with 9-14 postnodal cross veins and hindwing with 9-13 ; arc situated at the level of distal antenodal cross vein ; pterostigma about 2-3 times as long as broad ; IR_3 and R_{4+5} arising closer to arc than nodus, R_3 much nearer to nodus than pterostigma ; R_s from arc to the point of origin of R_{4+5} is half the distance from the point of origin of R_{4+5} and subnodus in hindwing ; discoidal cell very narrow, with inner margin about 2-3 times as long as costal margin, with inner distal angle very acute ; Ab arising from inner wing margin from a point where Ac meets it.

Remarks : Lieftinck (1960a) considered *Indolestes* Fraser as a subgenus of *Lestes* Leach basing mainly on the extent of slenderness of wing

together with variations of different structure of the wings and also of abdomen. Here, however, *Indolestes* Fraser has been considered as a genus distinct from *Lestes* Leach not only because members of the 2 genera differ in respect of position of the wings at rest, but also because the point of origin of R_{4+5} is distinctly nearer to arc in *Lestes* than in *Indolestes*.

Distribution : India ; Bhutan ; Sri Lanka ; Burma ; New Guinea ; Australia.

***Indolestes indica* Fraser**
(Figs. 127-128 and 296-297)

Indolestes indica Fraser, 1922, *Mem. Dep. Agric India (Ent.)*, 7 : 58 ; 1933, *Fauna Brit. India, Odon.*, 1 : 78.

Lestes sp. Laidlaw, 1920, *Rec. Indian Mus.*, 19 : 161.

Indolestes buddha (Laidlaw) : Fraser, 1922, *Mem. Dep. Agric. India (Ent.)* 7 : 59

Material studied : 3 ♂♂, 3 ♀♀, Jakrim, 4.xii.1977, coll ARL ; 1 ♂, Mawpat, 18.iv.1968, coll RKV ; 4 exs, Mawphlong (1 ♀, 26.iv.1972, coll ARL ; 2 ♂♂, 1 ♀, 21.x.1974, coll SKG) ; 10 exs, Shillong (2 ♂♂, 6.iv.1967, coll RKV ; 1 ♀, 5.ix.1967, coll RKV ; 1 ♂, 6.iii.1972, coll RSG ; 1 ♂, 1 ♀, 10.xi.1973, coll ARL ; 1 ♂, 18.xi.1973, coll ARL ; 1 ♂, 15.x.1974, coll MSJ ; 1 ♂, 21.xi.1974, coll RSG ; 1 ♀, 20.xii.1974 coll MSJ) ; 3 ♀♀, upper Shillong, 11.iv.1972, coll SB ; 1 ♀, Umtham, 30.v.1972, coll SB ; 1 ♂, 1 ♀, Weiloi, 26.iv.1972, coll ARL.

Measurements (in mm) and Nodal index

Length of		Pn in	
Abdomen	hindwing	forewing	hindwing
♂♂ 27.5-31.0	19.0-20.0	12-13	10-11
♀♀ 26.0-30.0	19.5-21.5	12-14	11-13

Notes : The males under study markedly vary from the description of the species provided by Fraser (1933) in respect of the anal appendages. They do however, agree in general with original description of the species provided by the author (Fraser 1922h) but still differ in that the superiors dilated, directed backwards and sinuous on apical third ; the inferiors comparatively longer, being more than half the length of superiors.

This species is known only from Khasi hills and is more common in dry areas, in fields and hill slopes covered with tall grasses where dull body colour render them very inconspicuous.

Distribution : India ; Meghalaya

Subfamily LESTINAE

Diagnostic characters : Small to large (usually with abdomen 22.0-57.0 mm and hindwing 18.0-39.0 mm) and stoutly built insects ; at rest wings widely open on dorsum. Wings narrow or moderately broad (usually 4-5 times as long as broad), hyaline or partly tinted with yellow or banded with blackish brown , discoidal cell narrow or moderately broad (usually 2-6 times as long as wide) with inner distal angle acute or markedly so ; discoidal cell usually of same size in fore: and hindwings or that in hindwings about one and a half times as long as in forewings ; R_s from arc to the point of origin of R_{4+5} usually one third (always so when discoidal cell of hindwing is longer than that of forewing), sometimes nearly half the distance from the point of origin of R_{4+5} and subnodus in hindwing ; pterostigma as long as or more longer (upto 7 times) than broad, with proximal inner end usually continuous with brace.

Distribution : Cosmopolitan.

KEY TO THE GENERA OF THE SUBFAMILY LESTINAE

R_s arising after 7 or more cells beyond nodus (Fig. 520). *Orolestes* McLachlan.

R_s arising at most after 4 cells beyond nodus. *Lestes* Leach

Genus *Orolestes* McLachlan

Orolestes McLachlan, 1895 *Ann. Mag. nat. Hist.* (6), 16 : 21. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 25.

Type-species : *Orolestes malyai* McLachlan

McLachlan (1895) erected this genus with *Orolestes malyai* as its type. Further contribution on this genus have been rendered by Munz (1919), Laidlaw (1920b), Fraser (1929c, 1933, 1933a) and Lieftinck (1939, 1954).

Diagnostic characters : Large in size (usually with abdomen 47.0-60.0 mm, hindwing 28.0-39.0 mm) ; blue, green or yellowish marked with brown, black or metallic green ; posterior lobe of prothorax usually rounded in either sex ; male superior anal appendages subequal to nearly twice as long as segment 10 of abdomen, forcipate with outer border bearing subapically a few closely set small spines and inner border bearing a sub-basal spine or tubercle which is followed by a dilatation that ends in a

broad, triangular acute spine ; inferiors less than half as long as superiors, triangular and closely apposed ; penis with large, much flattened apical fold which sometimes with subapical median process and an almost abortive terminal fold. Wings hyaline or partly opaque brown ; usually 19-24 postnodal cross veins in forewing, 17-20 in hindwing ; arc situated at the level of distal antenodal cross vein , pterostigma narrow, 4-7 times as long as broad, rectangular slightly swollen in the middle, hardly or not at all braced ; IR_3 and R_{4+5} arising closer to arc than nodus ; R_3 arising after 7 or more cells beyond nodus ; in hindwing distance of Rs from arc to the point of origin of R_{4+5} two and a half times the distance between the point of origin of R_{4+5} and subnodus ; discoidal cell with inner margin about twice as long as costal margin ; discoidal cell in hindwing subequal to that in forewing ; inner distal angle of discoidal cell acute ; Ab arising from inner wing margin at a point where Ac meets it.

Distribution : India ; Indo-China (exact locality unknown) ; Malaysia ; Indonesia ; Taiwan.

***Orolestes durga* sp. nov.**

(Figs. 129-130, 294-295 and 520)

Material studied : Holotype ♂, Rongrengiri, 19.iv.1973, coll ARL (Z.S.I. Registration No. 3913/H₁₃) , *EXTRA LIMITAL* : Paratype, 1 ♂, ARUNACHAL PRADESH ; Sunpura, 3.xi.1969, coll S.K. Tandon (Z.S.I. Registration No. 3914/H₁₃).

Measurements (in mm) and Nodal index

Length of		Pn in	
abdomen	hindwing	forewing	hindwing
♂♂ 52.5-53.0	33.0-35.0	20-22	18-19

Description Male : Labium greenish yellow ; labrum green ; genae, base of mandibles and anteclypeus pale green ; rest of head on dorsum blackish brown with a metallic green lusture specially in the ocellar space ; head ventrally greenish yellow. Prothorax pale greenish yellow clouded with brown on dorsum and thinly pruinose ventrolaterally ; posterior lobe narrow, arched backwards and slightly emergent ; mesothoracic stigma narrow, elongated and connecting bridge prominently raised. Synthorax greenish brown on dorsum and greenish yellow on sides and venter with broad metallic antehumeral stripe on either side which is diffused on inner side. Legs with coxae and trochanters greenish yellow ;

femora pale greenish yellow but distal end and flexor surface striped with black ; tibiae pale brown, changing to black distally, tarsi black. Wings (Fig. 520) hyaline, very palely enfumed at apical ends ; in paratype, an opalescent white spot visible only in reflected light beneath pterostigma in all wings ; pterostigma covering about 5 cells, dark brown between thick black nervures, about 3.5 mm long, a little swollen at middle with proximal inner end being a little separated from brace. Abdomen greenish yellow on segments 1-3, palely so on segments 4-10 ; segments 2-6 with dorsal black stripes, these being complete and finely bisected by a fine carinal greenish yellow line on segment 2 and falling short of base but joining with apical black annules on segments 3-6 ; segment 7 somewhat similar to segments 2-6 in respect of stripes except that the dorsal stripe broadened apically ; segments 8-10 mostly black dorsally and laterally ; segments 3-7 with thick minute spines all over. Anal appendages black, as in Fig. 129-130 ; superiors with the apices overlapping, longer than segment 10 of abdomen, slender, forcipate, regularly curved, but markedly so on apical two-third, outer border with a minute tubercle near base followed by a dilatation ending in an acute tooth a little before apex which is bluntly rounded ; inferiors only one-third the length of superiors, yellowish at apex, broad, triangular with inner borders straight and closely apposed. Penis as in Figs. 294-295

Notes : This species differs from the only known species of the genus *O. selysi* McLachlan from Indian subregion in its smaller size (abdomen 52.5-53.0 mm vs 57.0 mm, hindwing 33.0-35.0 mm vs 36.0-39.0 mm) , in having uncoloured wings and also in the shape of the anal appendages, specially that of the superiors. It is nearer to *O. wallacei* (Kriby), a Malaysian species known from individuals with hyaline as well as coloured wings in general features, but is larger and also differs from the same in details of body markings, the shape of the anal appendages and that of the penis.

The specimens were collected amongst dense and thorny bushes on sloping bank of montane streams.

Distribution : India : Arunachal Pradesh, Mghalaya.

Genus *Lestes* Leach

Lestes Leach, 1815, in Burmeister, *Edinb. Encycl.*, 9 : 137.

Eraser, 1933, *Fauna Brit. India, Odon.*, 1 : 29.

Type-species : *Agrion sponsa* Hansen*

* After Kirby (1890), Fraser (1936) and Davies (1981) but as opposed to Lieftinck's (1954) citation, viz. *Agrion barbara* Fabr.

Leach (1815) while erecting the genus *Lestes* did not provide sufficient characters for generic diagnosis. So his account was amplified by Selys (1840, 1850), Rambur (1842) and other authorities along with descriptions of a number of new species and transfer of quite a few from the genera *Agrion* Fabricius and *Anapates* Charpentier. Selys (1862) synthesised earlier works on this genus and there he published revised descriptions of about 50 species already known then from Africa, America, Asia, Australia, Europe and New Holland. Since then, upto very recent times several authorities have contributed on this genus either by describing new species or elucidating the generic concept, or both. More important of such contributions are those of Selys (1878b, 1883a, 1889 and 1891a), Kirby (1890), Laidlaw (1920b, 1931), Fraser (1923b, 1929c, 1931, 1933, 1951, 1960) Schmidt (1938, 1951a), Lieftinck (1952a, 1954, 1955a, 1960a, b, 1971a, 1975) Pinhey (1962) and Aguesse (1968). Probably for this reason Corbet *et al* (1960) in a discussion of the genus *Lestes* Stated that Leach (1815) while erecting *Lestes* "took *Lestes* away from *agrion*" Bhasin (1953), Singh (1955), Asahina (1965) and St. Quentin (1970) dealt with a few Indian species of this genus in recent times.

Diagnostic characters : Medium to large in size (usually with abdomen 24.0-52.0 mm, hindwing 17.0-40.0 mm) ; blue, green, yellow or orange marked with brown, black or metallic green, occasionally partly pruinose; posterior lobe of prothorax rounded or sometimes shallowly tripartite ; male superior anal appendages subequal to or one and a half times as long as segment 10 of abdomen, with blunt or acute apices curling inwards, outer border bearing a few (3-5) denticles subapically, the inner border usually with a basal spine followed by a dilatation; inferiors about one third to one half the length of superiors, conical or projected as an ungulate process from a broad base ; penis with large, much flattened apical fold, the terminal of which usually very short but sometimes absent. Wings hyaline, rarely partly enfumed ; usually 9-16 postnodal cross veins ; arc situated at the level of distal antenodal cross vein ; pterostigma rectangular, a little swollen at middle, two to five times as long as broad, braced ; IR_3 and R_{4+5} arising closer to arc, R_3 within 4 cells after nodus ; distance of R_s from arc to the point of origin of R_{4+5} one third the distance from the point of origin of R_{4+5} and subnodus in hindwing ; discoidal cell with inner margin about twice as long as costal margin with inner distal angle acute ; discoidal cell of hindwing nearly as long as to

one and a half times as long as that of forewing ; Ab arising from inner wing margin from or slightly proximal to the point where Ac meets it.

Distribution : Cosmopolitan

KEY TO THE SPECIES OF THE GENUS *LESTES* LEACH

Male :

1. Superior anal appendage without a sub-basal spine on inner border and acutely pointed at apex (Figs. 135-136). *.garoensis* sp. nov.
Superior anal appendages prolonged into a sub-basal spine on inner border and rounded at apex (Figs. 133-134, 137-138). .2
2. Larger species, with abdomen never less than 37.0 mm long ; ground colour black.*dorothea* Fraser
Smaller species, with abdomen never more than 33.0 mm long ; ground colour reddish brown. *.concinnus* Selys

Females :

Larger species, with abdomen and hindwing never less than 36.0 mm and 31.0 mm in length respectively. *.dorothea* Fraser
Smaller species, with abdomen and hindwing never more than 29.0 mm and 22.0 mm in length respectively. *.garoensis* sp. nov.

[Female of *L. concinnus* Selys was not represented in the collection studied and this species has therefore not been included in the key to female of the genus *Lestes* Leach].

Lestes concinnus Selys

(Figs. 137-138 and 292-293)

Lestes concinna Hagen:Selys, 1862, *Bull. Acad. Belg. Sci.* (2), 13 : 321 (partim).

Lestes concinnus Selys : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 162 (partim). Lieftinck, 1963, *Mem. Soc. Ent. Ital.*, 38 : 232.

Lestes umbrina Selys, 1891, *Ann. Mus. civ. Genova* (2), 10 (30) : 498 (partim).

Material studied : 1 ♂, 10 kms east of Rongram, 23.iv.1973, coll ARL.

Measurements (in mm) and Nodal index

Length of		Pn in	
abdomen	hindwing	abdomen	hindwing
♂ 33.0	21.0	10-11	10

Notes : Lieftinck (1960b) provided an excellent comparative account of the two closely allied species, namely *L. concinnus* Selys and *L. umbrinus* Selys along with figures of pterostigma and male anal appendages. The single male under study agrees well with the diagnostic characters of *L. concinnus* Selys provided by the author (op. cit.) However, some variations are noticed in respect of the shape of superior anal appendages.

Single specimen of this species was collected from Garo Hills in Meghalaya, from patch of grassy land surrounded by jungle, which is quite far from a stream flowing downhill.

Distribution India Andhra Pradesh, Gujrat, Maharashtra, Meghalaya, Uttar Pradesh, West Bengal. Outside India : China ; Burma ; Indonesia ; Philippines ; Australia.

Lestes dorothea Fraser

(Figs. 133-134 and 288-289)

Lestes praemorsa dorothea Fraser, 1923, *J. Bombay nat. Hist. Soc.*, **29** : 480.

Lestes dorothea Fraser, 1924, *Rec. Indian Mus.*, **26** : 484 ; *J. Bombay nat. Hist. Soc.*, **33** : 844 ; 1933, *Fauna Brit. India, Odon.*, **1** : 35.

Material studied : 2 ♂♂, 1 ♀, 14.iv.1973, coll ARL ; 7 exs, Nongpoh, coll ARL (4 ♂♂, 2 ♀♀, 25.viii.1972 ; 1 ♂, 11.iv.1978).

Measurements (in mm) and Nodal index

Length of		Pn in	
abdomen	hindwing	forewing	hindwing
♂♂ 37.5-41.5	23.5-24.5	11-13	11-12
♀♀ 36.5-37.0	31.0-32.0	12-13	11

Notes : Specimens under study vary from the description of the species provided by Fraser(1933) in size, nodal index and also in the followings : tibiae black and black area on outer surface of hind femora with a fine yellowish line ; pterostigma in hindwing 3 times as long as broad ; segment 1 of abdomen unmarked with black on dorsum ; apical black rings on segments 3-5 incomplete ; dorsal black stripes on segments 6 and 7 reaching base of the segments. Males also vary in having the frons black while in females the dorsal markings of synthorax is black on greenish background.

The specimens were commonly collected from bushes near small stagnant water masses or slow running streams.

Distribution : India : Assam, Maharashtra, Meghalaya. Outside India : Nepal.

***Lestes garoensis* sp. nov.**
(Figs. 135-136 and 290-291)

Material studied : Holotype ♂, Rongrengiri, 20.iv.1973, coll ARL (Z.S.I. Registration No. 3915/H₁₃) ; Paratypes : 1 ♂, same data as the Holotype (Z.S.I. Registration No. 3916/H₁₃) ; EXTRA LIMITAL : 1 ♂, Manipur, Ukhrul, 1 iii.1975, coll P. T. Cherian, (Z.S.I. Registration No. 3733/H₁₃) ; Allotype ♀, Manipur, Moreh, 22.ii.1975, coll P. T. Cherian (Z.S.I. Registration No. 3734/H₁₃)

Measurements (in mm) and Nodal index

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	32.5-34.5	21.0-22.0	14-15	9-11
♀	29.0	22.0	14-15	11

Description : Male : Ground colour brownish (sandy brown) but labium paler and labrum, bases of mandibles, cheeks and abdomen on dorsum variably suffused with bluish tinge ; prothorax with bluish tinge and an anterior elongated black spot on lower edge of middle lobe ; posterior lobe narrow, rounded and arched backwards at middle ; mesothoracic stigma narrow, grooved and with moderately broad connecting bridge ; synthorax pale bluish laterally and ventrally ; two small black spots, one just above upper end of posterolateral suture, another at about middle of ventral border of metepimeron ; bases of posterior legs broadly black ; legs yellowish, the extensor surface of forefemora and distal ends of other femora black. Wings enfumed with pale brown, deeply so along costal border which later sharply deflected beyond pterostigma apically ; pterostigma elongated, about four times as long as broad, covering 2-3 cells, narrowing on distal half in forewing, only slightly so in hindwing, blackish brown, margin yellow, except on inner side. Abdomen marked with elongated subapical lateral spots on segments 2-6 ; in addition, dorsum of abdominal segment 1, apical half and sides of segment 2, mid-dorsal carinal stripes on segments 3-6 and lower half of sides and venter of segments 8-10 also black in the paratype ; Anal appendages (Figs. 135-136)

yellowish ; superiors straight on basal two third, nearly one and a half times as long as segment 10 of abdomen, black at base and apex ; apex rather sharply curved inwards and acutely pointed ; inner border with a dilatation on basal two third ending in a short, outwardly directed spine , outer border bearing a few subapical spines ; inferiors broadly suboval, only about one fourth the length of superiors , penis as in Figs. 290-291.

Female : exactly similar to male in respect of body markings, but without the additional black markings of the paratype. Vulver scale yellowish, robust, extending to end of abdomen.

Notes : The new species is very close to *L. nodalis* Selys as figured by Lieftinck (1960) but differs from the same in the shape of the male superior anal appendages.

Biological Note : The specimens were collected amongst some scanty vegetation inside a dried out ditch.

Distribution : India : Manipur, Meghalaya.

Superfamily COENAGRIONOIDEA

Diagnostic characters : Small to medium sized insects, occasionally very small ; posterior lobe of prothorax variable in shape ; males with anterior hamules quadrate. Wings petiolated , only 2 antenodal cross veins present ; postnodals in strict alignment with cross veins beneath ; usually IR_3 and R_{4+5} originate closer to nodus than arc ; intercalated sectors usually absent.

Distribution : Cosmopolitan.

KEY TO THE FAMILIES OF THE SUPERFAMILY COENAGRIONOIDEA

1. IA reduced (or absent) (Figs. 40-41 and 521) ; Cu_2 reduced or of usual length
 Protoneuridae
- Both IA and Cu_2 never reduced or absent. 2
2. Discoidal cell with costal and inner margins subequal, inner distal angle being obtuse (Figs. 49 and 522-523). Platycnemididae.

Discoidal cell with costal margin considerably shorter than inner one, inner distal angle being acute or subacute (Figs. 33, 50-51 and 524). Coenagrionidae.

Family PROTONEURIDAE

Diagnostic characters : IA usually absent, but when present reduced ; no angulation at medioanal link ; Cu_2 reduced or of normal length ;

Remarks : Fraser (1957) has divided the family into 4 subfamilies, but the distinguishing characters used by him are variable and overlapping. Further, from the description of the different genera it appears that it is hard to group them into distinct subfamilies. Therefore in this work the family has been straightway distinguished into genera.

Ab straight, running nearly parallel to inner margin of discoidal cell (Figs. 40 and 521)
 *Elattonneura* Cowley.

... *Prodasineura* Cowley.

Ftaser, 1933, *Fauna Brit. India, Odon.*, 1 : 228 (partim).

Type-species : *Disparoneura glauca* Selys

Diagnostic characters : Medium in size (generally with abdomen 30.0-33.0 mm, hindwing 25.0-29.0 mm) ; black, sometimes pruinose in aged adults and generally marked with yellow, blue or reddish tinge ; posterior lobe of prothorax generally entire in males, deeply bifid in females where those produced into two triangular processes and these may have accessory process attached to them ; male anal appendages subequal to segment 10 of abdomen, broad at base, tapering at apex ; superiors with a broad ventral basal spine ; inferiors sloping downwards and then again curving upwards at apex ; terminal fold of penis ending in a pair of moderately long branches on either side. Wings hyaline ; pterostigma small with almost equal margins ; generally 10-21 postnodal cross veins in forewings, 9-19 in hindwing ; IR_3 arising at the level of subnodus, R_{4+5}

arising about one cell before that level ; Ab present, arising at or before Ac, running approximately parallel to the inner margin of discoidal cell and ending at the cross vein descending from the inner distal angle of discoidal cell ; Cu₂ reduced, not extending for more than 2-3 cells beyond the discoidal cell.

Distribution : India ; Sri Lanka ; Burma ; Malaysia ; Indonesia ; Africa.

KEY TO THE SPECIES OF THE GENUS *ELTTONEURA* COWLEY
(EITHER SEX)

Adults black but marked with reddish or bluish in tenerals ; an ankle-shaped spot present just beneath upper end of antehumeral stripe. *.atkinsoni* Selys.

Both adults and tenerals black but marked with bluish markings ; upper end of antehumeral stripe without any spot as above. *.campioni* Fraser.

Elattoneura atkinsoni (Selys)
(Figs. 143-144, 204, 236-237 and 521)

Disparoneura atkinsoni Selys, 1885, *Mem. Cour. Acad. R. Belg.*, **38** : 168.
Fraser, 1933, *Fauna Brit. India, Odon.*, **1** : 230.

Material studied : 7 exs. Mawpat (1 ♀, 4.viii.1964, coll RPG ; 1 ♀, 4.vii. 1967, coll RPG ; 2♂♂, 2♀♀, 14.vii.1967, coll RKV ; 1♂, 31.viii.1967, coll RKV) ; 4 ♀♀, Myllem, 25.vii.1967, coll RKV ; 1 ♂, 1♀, Pynursla, 29.viii.1973, coll SKC , 7 exs, Shillong (2 ♂♂, 5.viii.1968, coll RKV ; 3 ♂♂, 1 ♀, 5.ix.1968, coll RKV ; 1 ♀, 28.vi.1975, coll KD) ; 5 exs, Umsning (2 ♂♂, 2 ♀♀, 25.vi.1963, coll VDS ; 1 ♀, 3.viii.1963, coll SB) ; 1 ♂, Umtynger, 11.viii.1964, coll RPG ; 20 exs. weiloi, coll ARL (1 ♂, 1 ♀, 26.iv.1972 ; 10 ♂♂, 8 ♀♀, 14.viii.1974) ; 2 ♂♂, Jowai, 17.vii.1973, coll ARL ; 7 exs, Thadlaskein, coll ARL (3 ♂♂, 2 ♀♀, 3.viii. 1972, 2 ♂♂, 17.vii.1973)

Measurements (in mm) and Nodal index

		Length of		Pn in	
		abdomen	hindwing	forewing	hindwing
From Weiloi	♂♂	34.0-37.0	22.0-24.0	17-18	14-16
From Elsewhere	♀♀	30.0-32.0	20.5-21.5	15-18	12-15
From Weiloi	♂♂	33.0-36.0	24.0-25.0	16-17	14-15
From Elsewhere	♀♀	31.0-32.0	22.5-23.5	16-17	13-15

Notes : The specimens under study vary from the description of the species provided by Fraser (1933) in size, nodal index and also in having labrum and clypeus hairy. The males also vary in having labrum occasionally marked with black at base, on mid-lobe and at tips ; occiput black and unmarked ; abdominal segments 3-10 completely black, unmarked in nearly 50% of specimens, while in about 80% of specimens segments 3-6 marked with fine mid-dorsal carinal line ; inferior anal appendages in 50% of specimens reddish yellow in middle.

This species is fairly well distributed in central high altitude zones of Khasi and Jaintia hills of Meghalaya and appears to be represented by two different and distinct biotypes in the state. Of the two biotypes, the more common one inhabits marshy areas of Khasi and Jaintia hills and is smaller in size, while the other inhabits comparatively dry rocky areas near montane streams at more southern part of Khasi hills and is larger in size.

Distribution : India : Meghalaya. ? Outside India : Burma.

Note : This species was recorded from Burma by Laidlaw (1915, 1917b), but Fraser (1933) considered it to be confined to Khasi hills. Hence an ? has been put against Burma in distribution.

***Elattoneura campioni* (Fraser)**
(Figs. 141-142, 203 and 234-235)

Disparoneura campioni Fraser, 1922, *Mem. Dep. Agric. India (Ent.)* 7 : 44 ; 1933, *Fauna Brit. India, Odon.*, 1 : 242.

Material studied : 3 exs, Barapani (1 ♂, 31.v.1967, coll BKT ; 1 ♂, 1 ♀ 24.vi.1967, coll RKV) ; 1 ♂, Umsning, 12.ix.1967, coll RKV).

Measurements (in mm) and Nodal index

	Length of		Pn in	
	Abdomen	hindwing,	abdomen	hindwing
♂ ♂	33.0	22.0	15	13-14
♀ ♀	34.0	23.0	14	13

Description : Female : Differing markedly from the male as follows : Bases of mandibles, genae, cheeks, clypeus and frons pale blue ; anterior border of postclypeus narrowly black which is extended backward medially. Prothorax with additional black marking on the dorsum of mid-

lobe ; posterior lobe (Fig. 203) emerginate, bearing a pair of nearly triangular processes projected upwards when viewed laterally. Legs with entire flexor surface of femora pale blue. Abdomen more robust than in male and with azure blue markings. Vulver scale black, bordered with blue, reaching apex of segment 10 of abdomen.

Notes The species was so far known by males only. The hitherto unknown female having been discovered has been described stating the differences from males. The males under study vary from the description of the species provided by Fraser (1933) in being larger in size and also in the following points : prothorax unmarked ; synthorax with blue upper humeral spot and two oval spots near antealar sinus ; Cu_2 3-4 cells long in forewing ; Pterostigma brown ; abdominal segment 2 unmarked on sides ; segments 4-6 with basal annules which are incomplete below ; subapical lateral spots present on segments 3-6 but those on 3 and 4 extended basad as ventrolateral stripes ; segment 8 azure blue with apical one fourth black.

The species is rare and has only been collected twice in Meghalaya at the same spot ; i.e., bank of Barapani lake, near Shillong.

Distribution : India : Assam, Meghalaya, Uttar Pradesh. Outside India : Burma.

Genus *Prodasineura* Cowley

Alloneura Selys, 1860, *Mem. Cour. Acad. R. Belg. (B)*, **38** : 160, 176 (nom. praeoc.)

Caconeura Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 134 (nom. nov.). Fraser, 1933, *Faunna Brit. India, Odon.*, **1** : 210 (partim).

Prodasineura Cowley, 1934, *Entomologist*, **67** : 202.

Type-species : *Alloneura dorsalis* Selys

Species of this genus has been dealt with by Laidlaw (1917b, 1920d, 1931), Fraser (1919c, 1921b, 1922e, 1924b, 1927a, 1931, 1933), Lieftinck (1953a, 1954, 1955a, 1971a), and St. Quentin (1970). One Indian species has recently been dealt with by Prasad and Singh (1976).

Diagnostic characters : Medium in size (usually with abdomen 27.0-35.0 mm, hindwing 17.0-23.0 mm) ; black marked with bright red, orange, blue, whitish or yellow ; posterior lobe of prothorax in male simple, usually rounded or sometimes notched in middle, in female deeply cleft at middle and with a robust spine on each lobe ; male anal appendages subequal in length and a little longer than segment 10 of abdomen ; supe-

riors broad at base, swollen midially and then tapering to an acute apex, armed with a basal broad ventral spine ; inferiors broad at base, narrowing and sloping downwards to acute apex which is curled inwards ; terminal fold of penis ending in a pair of short branches on either side. Wings hyaline ; pterostigma about one and a half times as long as broad ; usually 12-17 and 11-15 postnodal cross veins in fore- and hindwings respectively ; $1R_3$ arising at the level of subnodus, R_{4+5} originating at a point about one cell proximal to $1R_3$; Ab usually absent, if present then incomplete and curved to meet hind margin of wing ; Cu_2 reduced, not extending for more than 4 cells beyond discoidal cell.

Distribution : India ; Nepal ; China ; Sri Lanka ; Burma ; Thailand ; Malaysia ; Indonesia ; Africa.

***Prodasineura autumnalis* (Fraser)**

(Figs. 139-140, 202 and 232-233)

Caconeura autumnalis Fraser, 1922, *Mem. Dep. Agric. India (Ent.)*, 7 : 43 ; 1933, *Fauna Birt. India, Odon.*, 1 : 223.

Material studied : 1 ♂, Bangsi, 5.iv.1973, coll ARL ; 1 ♂, 1 ♀, Napak beel, 12.iv.1973, coll ARL ; 1 ♂, Rongtham river bank, 11.iv.1973, coll ARL ; 1 ♀, Old Barapani roadside, 17.viii.1973, coll ARL ; 1 ♂, Shillong, 4.vi.1975, coll KD ; 1 ♂, Umsning, 16.iv.1967, coll RKV

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	Abdomen	hindwing	abdomen	hindwing
♂♂	37.0	18.0-20.0	14-15	13-14
♀♀	35.0	22.0	12	11

Notes : The specimens under study agree broadly with the description of the species provided by Fraser (1933) but vary from the same in size, nodal index and the following points :

Male (teneral) : Labrum pale brown ; reminescence of a pale blue antehumeral stripe present on synthorax.

Male (Adult) : All femora completely black ; abdomen with segment 2 marked with a mid-dorsal whitish fine stripe, segments 5-6 with whitish complete ring at base.

Female : Antealar sinus without any spot ; abdominal segment 8 unmarked ; mid-dorsal marking on segment 9 not spear headed.

They make slow, unsustained flight along the bushy banks of slow running streams or lakes.

Distribution India : Meghalaya , Uttar Pradesh. Outside India : Nepal ; Burma ; Vietnam ; Indonesia.

Family PLATYCNEMIDIADAE

Diagnostic characters : 1A nad Cu₂ of normal length ; no angulation at medio-anal link ; no accessory cross vein in the cubito-anal space basal to Ac ; discoidal cell with costal margin a little shorter than inner one and inner distal angle obtuse , subdiscoidal cell free from inner wing margin.

Remarks : Fraser (1957) divided family Platycnemididae into 2 subfamilies "mainly for convenience" but since that division was based on unstable characters, his division has not been followed in the present work.

Distribution Virtually cosmopolitan except Australia and American countries.

KEY TO THE GENERA OF THE FAMILY PLATYCNEMIDIDAE

1. Costal margin of discoidal cell four-fifth the inner one (Fig. 523) ; tibiae of males not dilated. .. .2
 Costal margin of discoidal cell subequal to the inner one (Figs. 49 and 522) ;
 tibiae of males usually dilated. .. .Copera Kirby
2. Ab arising at the level of Ac (Fig. 523) ; 2-3 postquadrangular antenodal cells .. .Coelicia Kirby
 Ab arising proximal to the point where Ac meets it ; 3-4 postquadrangular antenodal cells. .3
3. Four postquadrangular antenodal cells ; abdomen 45.0 mm or more in length .Indocnemis Laidlaw
 Three postquadrangular antenodal cells ; abdomen 40.0 mm or less in length
 Calicnemia Strand

Genus *Copera* Kirby

Psilocnemis Selys, 1863, *Bull. Acad. Belg. Sci.* (2), 16 : 168 (nom. praeoc).

Copera Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 129. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 191

Type-species : *Platycnemis marginipes* Rambur

The genus (as *Psilocnemis*) was first proposed by Selys (1863) with an abbreviated description with *Platycnemis marginipes* Rambur as type.

He then incorporated some new species in the genus. Subsequently Selys (1883a, 1886, 1889), Kirby (1890), Laidlaw (1917b, 1931), Munz (1919), Fraser (1922e, 1923c, 1932, 1933) and Lieftinck (1940a, 1948a, 1954, 1955a, 1971a) not only broadened the concept of the genus but also included some more species in the genus. In recent times Bhasin (1953), Kumar (1973a), Kumar and Juneja (1976), Sahni (1972), Lahiri (1977a), and St. Quentin (1970) published accounts of different species of the genus from Indian subcontinent.

Diagnostic characters : Medium in size (usually with abdomen 28.0-37.0 mm, hindwing 15.0-24.0 mm) , whitish, bluish, or seldom partly reddish, marked with black or brown ; second segment of antennae as long as or longer than third segment ; posterior lobe of prothorax simple in either sex and rounded, or deeply notched in females where the inferior lip occasionally visible from above as a narrow plate and provided with a triangular notch or a pair of ungulate processes projecting forward and/or upwards ; tibiae of males sometimes dilated but never so in females ; male anal appendages of variable shape and size, superiors triangular or rounded, sometimes hooked subapically, as long as or much shorter than segment 10 of abdomen ; inferiors 2-4 times as long as superiors, ungulate or tapering to an acute apex, curved inwards, upwards or downwards ; terminal fold of penis squarish with or without a pair of short apical flagella. Wings hyaline ; pterostigma a little longer than broad ; usually 11-15 postnodal cross veins in forewing, 9-13 in hindwing , $1R_3$ arising at the level of subnodus, origin of R_{4+5} a little proximal to that level ; discoidal cell with costal and inner margins subequal.

Distribution : India ; Nepal ; Bhutan , China ; Sri Lanka ; Nicobar ; Burma ; Thailand ; Malaysia ; Indonesia ; Japan ; Taiwan.

KEY TO THE SPECIES OF THE GENUS *COPERA* KIRBY

Male :

1. Hind tibiae white and greatly dilated. ... *.annulata* (Selys).
Hind tibiae reddish or yellowish, only moderately dilated or not at all. .2
2. Superior anal appendages only one fourth as long as inferiors (Figs. 147-148) ... *.marginipes* (Rambur)
Superior anal appendages at least half as long as inferiors (Figs. 149-150) *.vittata* (S.L.) (Selys)

Female :

- Posterior lobe of prothorax broadly arched. ... *.annulata* (Selys)
Posterior lobe of prothorax with a pair of divergent spines projecting forward (Fig. 207). *.vittata* (S.L.) (Selys)

[Female of *C. marginipes* (Rambur) was not represented in the collection studied. Hence this species has not been included in the key to females]

Copera annulata (Selys)
(Figs. 145-146 and 238-239)

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

Copera annulata (Selys) : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 129. Fraser, 1933, *Fauna. Brit. India, Odon.*, **1** : 203.

Material studied : 4 ♂♂, 2 ♀♀, Chitmaring beel, 10.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

	Length of abdomen	hindwing	Pn in forewing	hindwing
♂♂	37.5	23.0	13-14	12
♀♀	35.5	24.0	14-15	12-13

Notes : The specimens under study vary from the description of the species provided by Fraser (1933) in having postclypeus broadly black in males, its lateral edges blue ; abdominal segments 9 and 10 black, unmarked in femlae.

In Meghalaya the species has been collected only from Garo hills around Chitmaring beel, a rather small water mass with muddy bottom and unclean water, much of which remains sheded even in mid-day by big trees on its bank. The specimens generally rest on twigs overhanging water, make slow and short flights when chased or beaten up and then these become quite conspicuous with whitish parts of their body.

Distribution : India : Assam, Himachal Pradesh, Manipur, Meghalaya, West Bengal. Outside India : China ; Indo China(exact locality unknown) ; Malaysia ; Indonesia ; Japan ; Taiwan.

Copera marginipes (Rambur)
(Figs. 147-148, 205 and 240-241)

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

Psilocnemis marginipes (Rambur) : Selys, 1863, *Bull. Acad. Belg. Sci.* (2), **16** : 168.

Copera marginipes (Rambur) : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 129. Fraser, 1933, *Fauna. Brit. India, Odon.*, **1** : 192.

Material studied : 1 ♂, Napak beel, 12.iv.1973, coll ARL.

Measurements (in mm) and Nodal index

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂	29.0	18.0	11-12	9

Notes : The single male specimen under study varies from the description of the species provided by Fraser (1933) in having segments 3-6 of abdomen with mid-dorsal carinal lines and segments 6 and 7 with small blue baso-lateral paired spots.

The specimen was collected from the bank of Napak beel in Garo hills, which has more or less the same physical situation as Chitmaring beel. It was collected when it was flying slowly through small patches of bushes on the muddy bank.

Distribution : India : Assam, Bihar, Goa, Himachal Pradesh, Maharashtra, Meghalaya, Tamil Nadu, Uttar Pradesh, West Bengal. Outside India : Nepal ; China ; Sri Lanka , Burma ; Thailand ; Malaysia ; Indonesia ; Taiwan.

Copera vittata (S.L.) (Selys)
(Figs. 149-150, 206-207, 242-243 and 522)

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

Copera vittata (Selys) : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 129 Fraser 1933, *Fauna. Brit. India, Odon.*, 1 : 198.

Material studied : 2 ♀ ♀, Napak beel, 12.iv.1973, coll ARL ; 2 ♂ ♂, 1 ♀, Rongrengiri, 19-21.iv.1973, coll ARL ; 3 ♂ ♂, 2 ♀ ♀, Songsok, 13-15. iv.1973, coll ARL ; 1 ♂, Umran, 2.vii.1970. coll SB.

Measurements (in mm) and Nodal index

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂ ♂	33.0-36.0	17.0-18.0	11-14	9-11
♀ ♀	35.0	20.0	13-14	11

Description : Male : Head black, marked as follows : Labium reddish ; labrum, genae, bases of mandibles, anteclypeus, a stripe on vertex extending from eye to eye between anterior and posterior ocelli, postocular area, sides of head and beneath eyes greenish yellow ; postocular

greenish yellow area intersected by narrow black stripes which run across occiput but falls short of eyes on either side ; the eyes marked with a narrow black equatorial belt. Thorax black dorsally yellowish on sides and venter, marked as follows : a fine mid-dorsal yellow carinal line on synthorax (incomplete in some specimens) with a pair of small spots at anterior end ; narrow reddish yellow humeral stripe extended on prothorax ; sides of synthorax between humeral and anterolateral suture on upper half black striped with yellow, yellow on lower half ; humeral and lateral sutures finely and two irregular stripes of variable extent on anterior part of mesepimeron and middle of metepimeron black ; posterior lobe of prothorax (Fig. 206) simple, broadly arched backwards ; mesostigmal lamina narrow, somewhat rectangular and emerginate on outer side. Legs reddish, the two posterior pairs of tibiae very slightly dilated. Wings (Fig. 522) hyaline ; pterostigma brown with white margin. Abdomen black, marked with bluish yellow as follows : segment 1 with one mid-dorsal basal spot, a pair of mid-dorsal subapical spots and lateral stripe running diagonally from base to apex ; segment 2 with a mid-dorsal narrow stripe on basal two third, a pair of subapical mid-dorsal spots, lower border and a semilunar apicolateral spot on either side besides in one specimen an obscured sublateral stripe ; segments 3-6 at base and with fine mid-dorsal carinal ventrolateral apically incomplete stripes besides paired suboval subdorsal spots ; on segment 3 the ventrolateral stripes expanded apically and extended based to basolateral spot ; segment 7 with much reduced basolateral spot only ; ventrolateral edges of segments 7 and 8 and dorsum of segment 9 either entirely or with a large dorsal triangular spot with its base at apex of segment ; segment 10 blue except on lower half. Anal appendages as in Figs. 149-150, blue but inferiors sometimes black externally ; superiors as long as segment 10 of abdomen, conical and depressed ; inferiors broad at base and tapered to apex, twice as long as superiors, forcipate with a small median obtuse expansion on inner margin. Penis as in Figs. 242-243.

Female ; Differ from male as follows : more robust in built with markings whitish and more extensive ; clypeus entirely, frons but for 3 linear anterior spots and vertex anteriorly whitish. Posterior lobe of prothorax (Fig. 207) much narrower than male, undulated, inferior lip visible from above as a narrow plate and produced on either side as an ungulate process directed forwards and upwards ; mesostigmal lamina broadly triangular, depressed with broad connecting bridge. Black area on mesepimeron and metepimeron reduced to some obscured spots. Tibiae not dilated. Basolateral spots on segments 3-6 larger and connected to lateral

stripes on each segment ; the lateral stripes obscured medially ; segments 8-10 almost entirely blue, except for some obscured lateral and sublateral black spots. Anal appendages small, conical, blue. Vulver scale black with upper border bluish and extending a little beyond the apex of segment 10 of abdomen.

Female (teneral) : Almost entirely whitish, marked with brown only on sides of synthorax.

Notes : The specimens studied were identified as *C. vittata* (Selys) and sent to Late Dr. M. A. Lieftinck for comments. Dr. Lieftinck opined that they might possibly belong to an yet undescribed subspecies of *C. vittata vittata* (Selys). Specific determination has however been avoided in view of non availability of sufficient material and literature.

The specimens were collected amongst bushes near stagnant dirty water masses.

Distribution : India ; Meghalaya

Genus *Calicnemia* Strand

Calicnemis Selys, 1863, *Bull. Acad. Belg. Sci.*, (2), 16 : 159 (nom. praecoc). Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 171.

Calicnemia Strand, 1926, *Arch. Naturgesch.*, 92A : 46.

Type species : *Calicnemis eximia* Selys.

The genus along with the description of its type-species was first proposed by Selys (1863) under the name *Calicnemis*. Later more species were described under it and the generic concept was further elaborated by Selys (1886, 1891a) Laidlaw (1917b, 1931), Kennedy (1920), Fraser (1923e, 1932, 1933), Strand (1926) and Lieftinck (1927, 1948a, 1960, 1977b). It was strand (1926), who proposed the name *Calicnemid* for *Calicnemis* and Strands' proposal has been accepted by Cowley (1934) and other workers. From Indian region different species of this genus have also been dealt with by St. Quentin (1936a, 1970), Bhasin (1953), Sahni (1964a, 1972), Lahiri (1976, 1977b, 1979), Prasad (1976a) and Prasad and Singh (1976).

Diagnostic characters : Medium in size (usually with abdomen 25.0-36.0 mm, hindwing 19.0-29.0 mm) ; red or black, marked with yellow, sometimes pruinose ; posterior lobe of prothorax simple and rounded ; male superior anal appendages as long as or a little longer than segment 10 of abdomen, gently tapering to a blunt or acute apex, a little forcipate

and provided with a broad sub-basal spine ; inferiors a little longer than superiors, after sloping upwards narrowed abruptly from a broad base while the apex abruptly turned downwards in some species ; penis shaft sometimes with a few spines subapically, terminal fold of penis rather deeply cleft and produced into a pair of curled, moderately long apical flagella. Wings hyaline. Pterostigma subquadrate ; usually 14-22 post-nodal cross veins in forewing, 13-20 in hindwing ; 1R3 arising at the level of subnodus, origin of R_{4+5} a little proximal to that level ; discoidal cell with costal margin about four fifths of inner margin ; only 3 postquadranal antenodal cells in all wings ; Ab arising from inner wing margin proximally to the point where Ac meets it.

Distribution : India : Nepal , Bhutan ; Tibet ; Burma ; Vietnam ; Laos ; Malaysia.

KEY TO THE SPECIES OF THE GENUS *CALICNEMIA* STRAND

Male :

1. Head entirely black ventrally ; abdomen mainly black.
.imitans Lieftinck.
 Head coloured as above but marked with yellow ; abdomen mainly red
 .2
2. Abdomen entirely red.
.eximia (Selys)
 Abdomen red upto segment 6, rest black. *.mukherjeei* Lahiri

Female :

1. Head entirely black ventrally ; abdomen mainly black.
.imitans Lieftinck
 Head though black ventrally also with yellow markings ; abdomen mainly red.
2
2. Smaller species with hindwing at most 25.0 mm long.
.eximia Selys
 Larger species with hindwing never less than 28.0 mm in length.
.mukherjeei Lahiri

***Calicnemia eximia* (Selys)** (Figs. 151-152 and 244-245)

Calicnemis eximia Selys, 1863, *Bull. Acad. Belg. Sci.* (2), 16 : 160. Fraser 1933, *Fauna Brit. India, Odon.*, 1 : 174.

Material studied : 2 ♂♂, Barapani, 28.vi.1974, coll ARL ; 5 exs, Shillong (1 ♂, 6.vii.1971, coll RSG ; 1 ♂, 27.vii.1973, coll KD ; 1 ♀, 9.vii.1974, coll ARL ; 1 ♂, 12.viii.1974, coll ARL ; 2 ♂♂, 6.vii.1976, coll MSJ) ; 1 ♀, Upper Shillong, 25.vi.1974, coll RSG.

Measurements (inmm) and Nodal index

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	31.0-34.0	21.0-24.0	14-19	14-16
♀♀	33.0	25.0	17-19	14

Notes : In Meghalaya the species has a restricted distribution at high altitude, in and around Shillong. They are usually found along bank of slow running streams or lakes, in comparatively open habitats.

Distribution : India : Himachal Pradesh, Meghalaya, Uttar Pradesh, West Bengal, Outside India : Nepal ; Burma ; Vietnam.

Calicnemia imitans Lieftinck
(Figs. 153-154 and 246-247)

Calicnemia imitans Lieftinck, 1948, *Arkiv. For. Zoologi*. 41A : 12.

Material studied : 1 ♂, Balat, 8.xii.1977, coll MSJ ; 1 ♂, Pynursla, 29.viii.1972, coll ARL ; 4 ♂♂, 2 ♀♀, Sonapurdi, 28.viii.1974, coll ARL.

Measurements (in mm) and Nodal index

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	30.0-32.0	21.0-22.0	16-18	13-17
♀♀	29.0	20.5	15-17	14

Notes : Specimens under study vary from the description of the species provided by Lieftinck (1948) in size and nodal index. The females also in having a complete black stripe on posterolateral suture.

The species has been collected only in southern Meghalaya, near streams shaded by overhanging bushes and creepers. The specimens are quite inconspicuous against such background with black groundcolour of their body.

Distribution : India : Meghalaya. Outside India : Burma.

Calicnemia mukherjeei Lahiri
(Figs. 155-156 and 248-249)

Calicnemia mukherjeei Lahiri, 1976, *Odonatologica*, 5 : 273.

Material studied : Holotype ♂, Shillong, 12.viii.1974, coll ARL ; Allotype ♀, Shillong, 22.viii.1974, coll KD ; Paratypes, 2 ♂♂, Old Barapani roadside, 6.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	32.5-34.5	24.5-25.0	15-18	14-18
♀	33.5	28.5	17-18	15

Note : They were collected from bushes overhanging streams only at a higher altitude of Khasi hills and in Shillong.

Distribution : India : Meghalaya.

Genus *Coelliccia* Kirby

Trichocnemis Selys, 1857, in Sagra, *Hist. Cuba. Ins.*, : 454 (nom. praeoc).

Coelliccia Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 128. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 152.

Type-species : *Platycnemis membranipes* Rambur.

The genus was formerly very briefly described by Selys in 1857 under the name *Trichocnemis*. Selys (1863) expanded the generic concept further and incorporated *Platycnemis membranipes* Rambur and 2 new species, e.g. *Trichocnemis octogesima* and *T. didyma* under it. Later it was further elaborated with addition of quite a number of species from various regions by Selys (1886), Kirby (1890), Ris (1912), Laidlaw (1914a, 1917b, 1931, 1932), Fraser (1923e, 1932, 1933) and Lieftinck (1948a, 1954). It was Kirby (1990) who proposed *Coelliccia* nom. nov. for *Trichocnemis* Selys (nom. praeoc.). From Indian region, accounts of different species have been published by Bhasin (1953), Asahina (1965) and St. Quentin (1970) in recent times.

Diagnostic characters : Medium in size (usually with abdomen 24.0-46.0 mm, hindwing 22.0-33.0 mm) ; black marked with white, bluish or yellowish ; posterior lobe of prothorax rounded or trapezoidal, deeply or shallowly notched when in some species a pair of horn-like processes present ; male superior anal appendages subequal to or longer than segment 10 of abdomen, narrowed apically or dilated midially, parallel or slightly diverging at apex and with projections on inner margin ; inferiors usually slightly longer than superiors, abruptly narrowed from a broad base,

slopping upwards with apices often curved inwards or downwards ; terminal fold of penis broad or reduced and usually prolonged into a pair of long curled apical flagella. Wings hyaline ; pterostigma subquadrate ; usually 11-23 postondal cross veins ; $1R_3$ arising at or distal to the level of subnodus ; R_{4+5} arising a little proximal or distal to that level ; post-quadrangular antenodal cell 2-3 ; Ab arising from inner wing margin proximal to the point where Ac meets it.

Distribution : India ; Nepal ; Tibet ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; Ryukyu ; Taiwan ; Philippines.

KEY TO THE SPECIES OF THE GENUS *COELICCIA* KIRBY

Male :

1. Dorsum of synthorax marked with one or two pairs of spots (Fig. 168). .2
Dorsum of synthorax marked with a pair of stripes (Figs. 165-167). .3
2. Dorsum of synthorax marked with two, e.g. one anterior and another posterior pairs of spots (Fig. 168). *.didyma* (Selys)
Dorsum of synthorax marked with only one, i.e. anterior pair of spots *.bimaculata* Laidlaw
3. Superior anal appendages with two broad spines or projections on inner border (Figs. 159-160) ; antehumeral stripes when present narrow or absent *.fraseri* Laidlaw
Superior anal appendages with only one small spine or projection on inner border (Figs. 161-162) ; antehumeral stripes broad. *.sarbottama* sp. nov.

Female :

1. Midlobe of posterior lobe of prothorax only slightly projected and is much broader than the lateral lobes (Fig. 212). *.fraseri* Laidlaw
Midlobe of posterior lobe of prothorax markedly projected and is shorter than the lateral lobes (Fig. 208). 2
2. Midlobe of posterior lobe of prothorax deeply notched into a pair of forwardly directed curved spines. . *.vacca* Laidlaw
Midlobe of posterior lobe of prothorax not notched, shaped as an equilateral triangle (Fig. 208). *.didyma* (Selys)

(Male of *c. vacca* Laidlaw and Females of *C. bimaculata* Laidlaw and *C. sarbottama* sp. nov. were not available in the collection studied and therefore, these species have not been included in the key to males and females respectively).

Coelliccia bimaculata Laidlaw

Coelliccia bimaculata Laidlaw, 1914, *Rec. Indian Mus.*, **8** : 341 ; 1932, *Rec. Indian Mus.*, **34** : 11. Fraser, 1933, *Fauna Brit. India, Odon.*, **1** : 154.

Material studied : 1 ♂ “? Type, about Tura, Garo hills, 3,500’-3,900’, S. Kemp, 13.vii.-31.viii.1917, Registration No. 7961/H₁” “returned by Col. (F.C.) Fraser” in the National Zoological Collection, Zoological Survey of India, Calcutta.

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂ broken (36.0)		22.0	18-20	17-18

Notes : The only specimen of the type series. i.e. 3 ♂♂ and 2 ♀♀ mentioned by Laidlaw (1932) still existing is the one cited above (the rest possibly lost) and in all probability it is also the “Type” referred to by Fraser (1933). As already mentioned by Fraser (1933), it is an incomplete male with head, part of abdomen and few legs missing. The pair of spots situated anteriorly on synthorax in close apposition to mid-dorsal carina are however, still very clearly visible. Measurements of missing part (abdomen) has been cited above from Fraser (1933).

Distribution : India : Meghalaya.

Coelicci didyma (Selys)

(Figs. 163-164, 168-169, 208-209 and 256-257)

Trichocnemis didyma Selys, 1863, *Bull. Acad. Belg. Sci.* (2), 16 : 158.

Coeliccia didyma (Selys) : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 128. Laidlaw, 1923, *Rec. Indian Mus.*, 34 : 16. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 159.

Material studied : 1 ♂, 1 ♀, Anogiri, 6.xi.1973, coll SB ; 1 ♂, 10 Kms east of Rongram, 7.xii.1977, coll ARL ; 1 ♂, Ranikor, 7.xii.1977, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	37.5-42.0	23.5-26.0	18-19	16-18
♀	40.5	26.0	17-19	16-17

Notes : From the existing description of the species provided by Laidlaw (1932) and Fraser (1933) the specimens studied vary in size, in having R₄₊₅ arising from the level of subnodus and Ab arising from the point where Ac meets it. The males also vary in having the antehumeral spots

on synthorax semioval or conically extended towards each other, abdominal segments 3-5 marked with fine mid-dorsal carinal line and paired blue subapical spots and also in the extent of apical curvature of the inferior anal appendages. The female differs in having apical half of segment 7 and dorsum of segment 8 blue.

The species is rare. A pair was collected in Northern Garo hills and a male in Southern Khasi hills at a lower altitude near streams.

Distribution : India : Assam, Himachal Pradesh, Meghalaya, Nagaland, West Bengal. Outside India : Tibet, Burma ; Malaysia.

***Coeliccia fraseri* Laidlaw**

(Figs. 159-160, 165-167, 210, 212, and 252-253)

Coeliccia fraseri Laidlaw, 1932, *Rec. Indian Mus.*, **34** : 14. Fraser, 1933, *Fauna Brit. India, Odon.*, **1** : 169.

Material studied : 1 ♀, Mawpat, 14.vii.1967, coll RKV ; 1 ♂, Mawphlong, 13.vii.1973, coll RSP ; 1 ♀, Barapani, 13.vii.1969, coll BD ; 62 exs, Shillong (1 ♀, 26.vii.1961, coll MW) ; 1 ♂, 1.vi.1971, coll ARL ; 1 ♂, 16.vi.1971, coll ARL ; 1 ♀, 1.vii.1972, coll RSG ; 1 ♀, 30.v.1972, coll ARL ; 1 ♀, 1.vii.1972, coll SRP ; 1 ♂, 22.v.1973, coll MSJ ; 3 ♂♂, 25.v.1973, coll ARL ; 1 ♂, 2 ♀♀, 19.vi.1973, coll ARL ; 2 ♀♀, 3.vii.1973, coll MSJ ; 1 ♂, 5.vii.1973, coll RSG ; 1 ♂, 7.vii.1973, coll MSJ ; 1 ♂, 13.vii.1973, coll RSP ; 1 ♂, 26.vii.1973, coll RSG ; 1 ♀, 6.viii.1973, coll MSJ ; 3 ♂♂, 1 ♀, 17.viii.1973, coll RSG ; 1 ♀, 22.v.1974, coll MSJ ; 1 ♂, 1 ♀, 26.vi.1974, coll RZ ; 1 ♀, 10.vii.1974, coll SB ; 3 ♂♂, 19.vii.1974, coll MSJ ; 2 ♂♂, 2 ♀♀, 24.vii.1974, coll MSJ ; 1 ♂, 29.vii.1974, coll MSJ ; 3 ♂♂, 12.viii.1974, coll ARL ; 3 ♂♂, 1 ♀, 17.viii.1974, coll RSG ; 1 ♂, 1 ♀, 26.v.1975, coll MSJ ; 1 ♂, 3.vi.1975, coll MSJ ; 1 ♂, 1 ♀, 9.vi.1975, coll MSJ ; 1 ♂, 16.vi.1975, coll MSJ ; 2 ♂♂, 1 ♀, 20.vi.1975, coll KD ; 2 ♂♂, 27.vi.1975, coll SB ; 1 ♂, 3i.vii.1975, coll MSJ ; 1 ♂, 9.vii.1975, coll KD ; 1 ♂, 23.vii.1975, coll MSJ ; 1 ♂, 29.vii.1976, coll MSJ ; 1 ♀, 31.vii.1975, coll RSG ; 1 ♀, 22.viii.1975, coll MSJ ; 1 ♂, 26.viii.1975, coll RSG ; 1 ♂, 1 ♀, 3.ix.1975, coll RSG ; 1 ♂, 17.vi.1976, coll MSJ) ; 2 ♂♂, 1 ♀, Upper Shillong, 30.v.1972, coll SB , 1 ♂, Weilo, 14.viii.1973, coll ARL.

Measurements (in mm) and Nodal index.

Length of		Pn in	
abdomen	hindwing	forewing	hindwing
♂♂ 36.5-38.0	23.0-25.0	14-17	14-16
♀♀ 35.0-35.5	24.0-25.0	15-19	14-17

Redescription : Male Labium light yellow, tips of palpi black ; bases of mandibles and lower border of anteclypeus green ; rest of head black ; eyes deep bottle green. Prothorax black on dorsum, light yellow on sides and yellow on venter ; posterior lobe (Fig. 210) broadly trapezoidal and slightly emerginate ; mesostigmal laminae broad but simple, slightly protruded on either end and connected with a broad connecting bridge. Synthorax black on dorsum upto 1st lateral suture, marked with a pair of antehumeral narrow green stripes, these running parallel close to mid-dorsal carina, diverging a little from each other anteriorly (antehumeral stripe very variable in the extent of its development as shown in Figs. 165-167) ; laterally and ventrally green, with a narrow black stripe on postero-lateral suture which narrowing to a mere black line beneath spiracle. Legs pale green ; both extensor and flexor surfaces of fore-femora, extensor surface of other femora and flexor surface of all tibiae black. Wings hyaline, venation black ; pterostigma rhomboidal, covering about one cell, pale brown with margin narrowly green and enclosed by thick nervures ; 2 postquadrangular antenodal cells in all wings. Abdomen narrow, pale yellow marked with black on dorsum, which appears pale on segments 3-6 ; narrow black apical annules on segments 1-6 ; black markings on segments 7 and 8 or on 7-10 extended laterally almost entirely replacing the ground colour, that on dorsum of segment 2 may be dumb-bell shaped. Anal appendages as in Figs. 159-160, superiors broadly triangular with the apex nearly as long as segment 10 of abdomen, black, with inner surface pale green, inner border with two projections at about basal and distal third of the organ, basal one being visible from above and distal one from side ; inferiors slightly longer than superiors, black except at base, unguulate, narrowing and sloping upwards, curled at apex. Penis as in Figs. 252-253.

Male (teneral) Differs from adult in the following : vertex anteriorly and cheeks green , anteclypeus green and with a pair of baso-lateral black spots ; distal end of 1st antennal segment also green and a narrow stripe connecting the eyes also of the same colour, though in some specimens slightly interrupted just behind antennae. Synthorax : antehumeral stripes absent, Abdomen : marking on 2nd segment straight. Anal appendages : superiors green, sometimes marked with black only on outer border.

Female : Slightly robust than male ; colour differing from teneral male in the following : Labrum broadly black at base ; black colour of frons approaching vertex at middle ; the green stripe of vertex through anterior ocellus is uninterrupted , occiput with a narrow postocular spot on either side. Prothorax : posterior lobe (Fig. 212) short and narrow,

projected backwards and tripartite ; lateral lobes very short, median lobe much broader. Synthorax : antehumeral stripes absent. Abdomen : dorsal black marking broader and extending half way on to sides on segments 2-6 and covering almost entirely segments 7-10. Vulver scales robust and extending beyond the end of abdomen, yellow with basal half of upper border and distal half of lower border marked with black. Anal appendages short ,conical and black.

Female (teneral) : Differs from adult female in the following : labrum yellow with only a small median black spot at base ; yellow colour on sides of prothorax continued on dorsum of midlobe ; antehumeral stripes of even thickness throughout ; andominal segments 9 and 10 as well as vulver scales yellow and not marked with black.

Notes : The available specimens of both sexes have been redescribed in view of inadequate description of the species provided by Fraser (1933).

The species having restricted distribution in the high altitude areas of Meghalaya is common in bushes along the banks of stream, which are evidently their breeding ground also.

Distribution : India , Meghalaya

Coeliccia sarbottama sp. nov.

(Figs. 161-162, 170, 211, 254-255 and 523)

Material studied : Holotype ♂, Wageasi, 6.vi.1973, coll ARL. (Z.S.I. Registration No. 3908 H₁₃)

Measurements (in mm) and Nodal index.

Length of		Pn in	
abdomen	hindwing	forewing	hindwing
♂ 37.0	22.0	16	15

Description : Male : Labium pale yellow ; labrum pale brown ; bases of mandibles, genae, anteclypeus and frons greenish yellow , postclypeus blackish brown with base on either side greenish yellow; vertex, occiput and under surface of head black and this colour encroaching a little on middle of frons ; antennae black with distal half of 1st segment and proximal half of 2nd greenish yellow ; a narrow greenish-yellow stripe across eyes ; occiput with greenish yellow postocular spots on either side on hind border. Prothorax greenish yellow with dorsum of anterior and poste-

rior lobes black ; posterior lobe (Fig. 211) broad, arched back and rounded at middle, posterior border tilted up vertically. Synthorax black on dorsum, which extends upto anterior half of mesepimeron, greenish yellow laterally and ventrally but marked with a black spot at the upper end of lateral suture, dorsum of thorax (Fig. 170) marked with a pair of greenish yellow stripes running very close to mid-dorsal carina on either side and parallel to each other except at their anterior end where they tend to diverge a little from each other, these stripes being broad below and gradually narrowed above extending up to the antealar sinus ; mesostigmal lamina triangular, simple and depressed at middle. Legs greenish yellow, femora narrowly striped with black on extensor surface. Wings (Fig. 523) hyaline; pterostigma blackish brown with margin narrowly yellow and framed in thick black nervures extending over one and a half cell ; R_{4+5} arising slightly proximal to subnodus and R_3 slightly distal to that level ; only 2 postquadrangular antenodal cells in all wings. Abdomen greenish yellow ; segments 2-6 marked with black stripes, these on segments 3-6 narrowing to a point at base of segments and again at apical ends before becoming confluent with apical black ring ; segments 7 and 8 black except at venter. Anal appendages yellow, as in Figs. 161-162 ; superiors roughly triangular, one and a half times as long as segment 10, broadened a little at base, then gradually narrowing to a blunt apex ; inner margin when viewed from above, with a small black tooth inwardly and downwardly directed at about middle ; inferiors nearly one and a half times as long as superiors, broad on basal third, then of uniform width and unguate, directed backwards and slightly up wards, the apices curved and overlapping. Penis as in Figs. 254-255.

Notes : *C. sarbottama* sp. nov. is closely allied to *C. fraseri* Laidlaw, but differs from it in the shape of posterior lobe of prothorax, shape of dorsal thoracic markings, situated in close apposition to the mid-dorsal carina and also in the shape of anal appendages, the superiors being armed with only one spine placed on its inner border. The two species also differ in their altitudinal distribution, *C. fraseri* Laidlaw being distributed at high altitude in and around Shillong in Khasi hills district, *C. sarbottama* sp. nov. at a much lower altitude at Wageasi in Garo hills district. The specimen was captured in a thick jungle.

Distribution : India : Meghalaya.

***Coeliccia vacca* Laidlaw**

Coeliccia vacca Laidlaw, 1932, *Rec. Indian Mus.*, 34 : 15. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 155,

Material studied : 1 ♀, "Type, above Tura, Garo hills, 3,500'-3,900', Assam, S. Kemp, 13.vii.-31.viii.1917, Registration No. 7965/H₁" in the National Zoological Collection, Zoological Survey of India, Calcutta.

Measurements (in mm) and Nodal index.

Length of		Pn in	
abdomen	hindwing	forewing	hindwing
♀ broken (36.0)	missing (25.0)	19	(17)

Notes : This interesting species is known only from its "Type", the one cited above, and is an incomplete female with hindwings and abdomen but for basal two segments missing. This species differs at once from all other species of the genus by the unique shape of the posterior lobe of prothorax well illustrated by Laidlaw (1932). Measurements of missing parts have been cited above from Fraser (1933).

Distribution : India : Meghalaya.

Genus *Indocnemis* Laidlaw

Indocnemis Laidlaw, 1917, *Rec. Indian Mus.*, **13** : 325. Fraser, 1933, *Fauna Brit. India, Odon.*, **1** : 185.

Type-species : *Indocnemis kempi* Laidlaw

Laidlaw (1917b) established the genus with *Indocnemis kempi* sp. nov. which was further elaborated by Fraser (1932, 1933) St. Quentin (1937) and more recently, Lieftinck, (1954).

Diagnostic characters : Large in size (usually with abdomen 49.0-52.0 mm, hindwing 34.0-38.0 mm) ; black, marked with bluish ; posterior lobe of prothorax rounded and simple ; male superior anal appendages digitate, a little longer than segment 10 of abdomen and with spines on inner margin ; inferiors a little longer than superiors, narrowed after the basal third, the apex curled inwards ; terminal fold of penis broad and produced into a pair of moderately long apical flagella. Wings hyaline ; pterostigma a little longer than broad ; usually 18-22 postnodal cross veins in forewing, 17-21 in hindwing ; IR₃ arising at the level of sub-nodus, origin of R₄₊₅ a little proximal to that level ; inner margin of the discoidal cell a little longer than the costal margin ; 4 postquadrangular antenodal cells ; Ab arising from inner wing margin well proximal to the point where Ac meets it.

Distribution : India ; Nepal ; Malaysia.

Indocnemis kempī Laidlaw
(Fig. 157-158 and 250-251)

Indocnemis kempī Laidlaw, 1917, *Rec. Indian Mus.*, 13 : 325. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 186.

Material studied : 3♂♂, Umran, 7.vii.1970, coll SKT

Measurements (in mm) and Nodal index.

	Length of abodomen	hindwing	forewing	Pn in hindwing
♂♂	49.5-50.0	34.0-35.5	18-22	17-21

Notes : The specimens under study vary slightly from the description of the species provided by Laidlaw (1917) and Fraser (1933) in size and in number of postnodal cross veins and markings of synthorax and shape of male anal appendages.

The species, earlier known only from the southern slopes of Khasi hills, has now been discovered from also the northern part of the same hills at a comparatively lower altitude. The specimens were collected beside a torrential stream with mostly rocky bed and scanty vegetation in the surroundings.

Distribution : India : Meghalaya.

Family COENAGRIONIDAE

Diagnostic characters : IA and Cu₂ of normal length ; medio-anal link almost always well angulated , no accessory cross vein basal to Ac in the cubitoanal space ; discoidal cell with costal margin much shorter than inner margin and with the inner distal angle subacute or acute ; subdiscoidal cell free from inner wing margin.

Remarks : Tillyard and Fraser (1938-1940) divided the family into 2 subfamilies and Fraser (1957) divided the family into 6 subfamilies. But since the distinguishing characters are either not constant or applicable only to one sex, the division of the family into subfamilies has not been followed in the present work.

Distribution : Cosmopolitan

KEY TO THE GENERA OF THE FAMILY COENAGRIONIDAE

Male :

1. Arc situated well distad of the level of the distal antenodal cross vein (Fig. 51)
.. .. .2

- Are situated at or slightly distad of the level of the distal antenodal cross vein (Fig. 33 and 524). 3
2. Abdomen 25.0 mm or more in length. *Argiocnemis* Selys
Abdomen 20.0 mm or less in length. *Agriocnemis* Selys
3. Ab arising from inner wing margin at or slightly proximal to the point where Ac meets it (Fig. 524). 4
Origin of Ab distinctly proximal to the point where Ac meets it. 6
4. Pterostigma in hindwing much smaller than in forewing (Fig. 524).
... .. *Aciagrion* Selys
Pterostigma in both wings nearly equal. 5
5. Frontal ridge present. *Ceriagrion* Selys
Frontal ridge absent. *Pseudogrion* Selys
6. Pterostigma of similar colour in both wings. *Enallagma* Charpentier
Pterostigma differing in colour in fore-and hindwing.
... .. *Ischnura* Charpentier

Female :

1. Arc situated well distad of the level of the distal antenodal cross vein.
Vulver spine absent. 2
Arc situated at or slightly distad to the level of the distal antenodal cross vein.
Vulver spine present or absent. 3
2. Abdomen 28.0 mm or more in length. *Argiocnemis* Selys
Abdomen 25.0 mm or less in length. *Agriocnemis* Selys
3. Anal bridge arising from inner wing margin at or slightly proximal to the point where Ac meets it. Vulver spine present or absent. 4
Origin of anal bridge distinctly proximal to the point where Ac meets it.
Vulver spine present. 6
4. Pterostigma in hindwing much smaller than in forewing. Vulver spine present
... .. *Aciagrion* Selys
Pterostigma in both wings nearly equal. Vulver spine absent. 5
5. Frontal ridge present. *Ceriagrion* Selys
Frontal ridge absent. *Pseudagrion* Selys
6. Labrum narrowly black at base. *Ischnura* Charpentier
Labrum entirely yellow or green. *Enallagma* Charpentier

Genus *Ceriagrion* Selys

Ceriagrion Selys, 1876, *Bull. Acad. Belg. Sci.*, **42** : 525. Fraser, 1933, *Fauna Brit. India, Odon.*, **1** : 313. Asahina, 1967, *Jap. J. Zool.*, **15** : 255.

Type-species : *Agrion cerinorubellum* Brauer

Selys (1876) established *Ceriagrion* as a subgenus in his classification and incorporated under it a new species and a few others considered earlier to the genera *Agrion* Fabricius and *Pyrrhosoma* Charpentier. Later, when it was elevated to generic status its concept was greatly elaborated and many species were included under it from different countries by a number of workers. More important of these upto recent times are those by Selys (1883a, 1889, 1891), Kirby, (1890), Ris (1913), Laidlaw (1916b, 1919, 1931), Fraser (1923e, 1933), Lieftinck (1954, 1955a, 1971a), Pinhey (1962) and Asahina (1967a, 1970a). Different species of this genus occurring in Indian region have in recent times been dealt with by Bhasin (1953), Asahina (1965), St. Quentin (1790), Kumar (1972c, 1973a), Sahni (1972), Kumar and Juneja (1976), Mitra (1976), Prasad (1976a), Prasad and Singh (1976), Kumar and Prasad (1977a), Lahiri (1977a, b, 1979) and Prasad and Kumar (1977b).

Diagnostic characters : Medium in size (usually with abdomen 23.0-41.0 mm, hindwing 15.0-25.0 mm) ; yellow, orange, olivaceous or rarely bluish, sometimes partly marked with black or red. Frons with a well-developed ridge ; posterior lobe of prothorax generally simple and rounded, sometimes very shallowly tripartite ; male anal appendages subequal to or more usually much shorter than segment 10 of abdomen, superiors generally sub triangular, often hooked, inferiors narrowing from base to apex, subequal to superiors ; terminal fold of penis generally unbranched, narrowing apically when viewed laterally ; females without vulver spine. Wings hyaline ; pterostigma rectangular , usually 9-16 postnodal cross veins in forewing, 8-14 in hindwing ; arc situated at or slightly distal to the level of distal antenodal cross vein ; IR_3 arising at the level of sub-nodus, origin of R_{4+5} well proximal to that level ; discoidal cell with inner margin about twice as long as costal margin, inner distal angle acute ; Ab usually arising from inner wing margin at a point where Ac meets it or occasionally slightly proximal to that point.

Distribution : India , Nepal , China ; Sri Lanka ; Burma ; Thailand Vietnam ; Laos ; Malaysia ; Indonesia ; Cambodia ; Japan ; Pacific islands ; Europe ; Mauritius ; Africa , Madagascar ; Seychelles.

KEY TO THE SPECIES FO THE GENUS *CERIAGRION* SELYS (EITHER SEX)

1. Ab arising a little proximal to Ac ; abdomen yellow, changing to black on segments 7-10. ... *fallax* Ris

Ab arising at the point where Ac meets it ; abdomen yellow or brown, unmarked with black. .2

2. Abdomen yellow, 29.0-31.0 mm in length. .*coromandelianum* (Fabricius)

Abdomen plate brown, 31.0-41.0 mm in length.

...*olivaceum* Laidlaw

***Ceriagrion coromandelianum* (Fabricius)**

(Figs. 171-172 and 258-259)

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

Agrion cerinum Rambur, 1842 *Hist. Nat. Ins. Nevrop.*, : 279.

Ceriagrion coromandelianum (Fabricius) : Selys, 1876, *Bull. Acad. Belg. Sci.*, (2), 13 : 528. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 315. Asahina, 1967, *Jap. J. Zool.* 15 : 279.

Material studied : 1 ♂, Bangsi, 5.iv.1973, coll ARL ; 1 ♂, Chitmaring beel, 10.iv.1973, coll ARL ; 1 ♀, Wageasi, 6.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	29.5-32.0	18.5-19.0	11	9-10
♀	29.5	20.0	11	9

Notes : The available male specimens under study vary from the description of the species provided by Asahina (1967) in having dorsum of segments 8-10 of abdomen darker.

The species is rare in Meghalaya ; a few specimens were collected around water bodies having weeds in lower altitude of Garo hills.

Distribution : India : Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Karnatak, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram Orissa, Punjab, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal. Outside India : Nepal ; Sri Lanka ; ? also China ; Burma ; Indochina and Thailand [vide Asahina (1967)].

***Ceriagrion fallax* Ris**

(Figs. 173-174, 213-214 and 260-261)

Ceriagrion fallax Ris, 1914, *Ent. Metteil.*, 3 (2) : 47. Fraser, 1933, *Fauna Brit. India, Odon.* 1 : 321.

Ceriagrion cerinomelas Lieftinck, 1927, *Tijdschr. Ent.*, 70 : 88.

Ceriagrion pendleburyi Laidlaw, 1931, *J. Feder. Malay. States Mus.*, **16** : 198.

Ceriagrion fallax Ris : Asahina, 1967, *Jap. J. Zool.*, **15** (3) : 282.

Ceriagrion fallax cerinomelas Lieftinck : Asahina, 1967, *Jap. J. Zool.*, **15** (3) : 284.

Ceriagrion fallax pendleburyi Laidlaw : Asahina, 1967, *Jap. J. Zool.*, **15** (3) : 286.

Material studied : 1 ♀, Mawlai, 17.v.1960, coll TGV ; 11 exs, Nongpoh (3 ♂♂, 1 ♀, 3.viii.1972, coll ARL ; 2 ♂♂, 1 ♀, 25.viii.1972, coll ARL ; 1 ♀, 19.ix.1973, coll SB ; 1 ♂, 15.x.1975, coll SB ; 2 ♂♂, 11.iv.1978, coll ARL) ; 11 exs., Shillong (1 ♀, 17.v.1960, coll TGV ; 2 ♂♂, 1 ♀, 6.viii.1973, coll ARL ; 3 ♂♂, 22.vi.1973, coll KD ; 2 ♂♂, 28.vi.1974, coll RSG ; 1 ♂, 19.vii.1974, coll MSJ ; 1 ♂, 12.viii.1974, coll ARL).

Measurements (in mm) and Nodal index

Length of		Pn in	
abdomen	hindwing	forewing	hindwing
♂♂ 34.0-35.0	20.0-21.0	13-14	11
♀♀ 29.0-31.0	21.0-22.5	14	11-12

Notes : Asahina (1967a) in a revision in “A revision of the Asiatic species of *Ceriagrion* (Odonata : Agrionidae)” considered *C. pendleburyi* Laidlaw and *C. cerinomelas* Lieftinck as the subspecies of *C. fallax* Ris and there provided a key for separating the two subspecies from the nominate subspecies. A look at the key at once reveals that most of the characters used by him are somewhat overlapping e.g., “absence of dark abdominal rings on proximal abdominal 5 segments in *C. f. fallax* ; abdominal segments 1-6 of *C. f. pendleburyi* with black end ring (seldom lacking) ; abdomen of *C. f. cerinomelas* without black and ring (seldom exceptions)” Moreover, a careful reading of the original description of the 3 species would lead one to suspect that, the 3 species are conspecific. That this suspicion is not unjustified is revealed from Fraser’s (1933) redescription of *C. fallax* Ris where he considered *C. cerinomelas* Lieftinck as a synonym of *C. fallax* Ris. Moreover, the specimens at the disposal of the writer when considered along with the description of the 3 other species lead one to believe that there exists only one species i.e. *C. fallax* Ris showing variation in important taxonomic characters. Therefore *C. cerinomelas* Lieftinck and *C. pendleburyi* Laidlaw have here been treated as a synonyms of *C. fallax* Ris.

In Meghalaya this species is restricted in Khasi hills around Shillong and Nongpoh, but is unknown at altitude lower than Nongpoh and from the more southern parts of the hills. They are commonly found only in

the few months following the monsoon, around ephemeral water pools formed by rain water, where, many pairs could be seen also in coupula.

Distribution : India : Assam, Himachal Pradesh, Meghalaya, Sikkim and Bengal (exact locality unknown). Outside India : Nepal ; China ; Burma ; Thailand ; Malaysia ; Indonesia ; Taiwan.

***Ceriagrion olivaceum* Laidlaw**

(Figs. 175-176 and 262-263)

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

Ceriagrion auranticum Fraser, 1923, *J. Bombay nat. Hist. Soc.*, **29** : 748.

Ceriagrion olivaceum race *auranticum* Fraser, 1933, *Fauna Brit. India, Odon.*, **1** : 325.

Ceriagrion olivaceum olivaceum Laidlaw : Asahina, 1964, *Nature and life in South east Asia.*, **3** : 119 ; 1967, *Jap. J. Zool.*, **15** (3) : 305.

Ceriagrion olivaceum auranticum Fraser : Asahina, 1967, *Jap. J. Zool.*, **15** (3) : 307.

Material studied : 1 ♂, Barapani, 21.vi.1973, coll AKG ; 2 ♂♂, Mawsynram, 10.x.1972, coll AKG ; 1 ♂, Nongpoh, 15.x.1975, coll SB ; 1 ♀, Umroi, 2.xi.1972, coll ARL ; 1 ♀, Umtham, 29.xi.1967, coll RKV

Measurements (in mm) and Nodal index

Length of		Pn in	
abdomen	hindwing	forewing	hindwing
♂♂ 35.0-41.0	25.0	15-16	13-14
♀♀ 35.0	22.0	10-11	10

Notes : Laidlaw (1914) described *C. olivaceum* from north India. Fraser (1923) described *C. auranticum* from south India. In 1933, Fraser, while redescribing *C. olivaceum* considered his *C. auranticum* as a race of *C. olivaceum* Laidlaw. There he stated that "the general build, the uniform coloration, and anal appendages of the same shape are sufficient justification" for considering *auranticum* as a race of *olivaceum*. Asahina (1967a) divided *olivaceum* into two subspecies viz. *o. olivaceum* and *o. auranticum*. A careful reading through the description of the two species given by Fraser (1933) will lead one to conclude that the two species are conspecific. This idea is further strengthened by the specimens collected at Meghalaya. So, in the fitness of things, *C. olivaceum* and *C. auranticum* are treated as synonyms.

The specimens were collected from hill slopes covered mostly with grasses.

Distribution : India : Assam, Kerala, Manipur, Maharashtra, Meghalaya, Uttar Pradesh, West Bengal. Outside India : Burma ; Thailand ; Vietnam ; Laos ; Cambodia ; Malaysia.

Genus *Pseudagrion* Selys

Pseudagrion Selys, 1876, *Bull. Acad. Belg. Sci.* (2), 42 : 490. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 274.

Type-species : *Agrion furcigerum* Rambur

Selys (1876) established *Pseudagrion* as a subgenus of *Agrion* Fabricius and incorporated under it a number of new species. Later Kirby (1890) gave it the generic status. Subsequently it was greatly elaborated and many species were added to it from different countries by a number of authorities. More important of these upto recent times are Laidlaw (1916a, 1919, 1931), Munz (1919), Fraser (1923e, 1931, 1933) Ris and Schmidt (1936, 1938), Lieftinck (1954, 1955a, 1962, 1971a), Pinhey (1962, 1964a) and Watson (1969) Navas (1930), Bhasin (1953), St. Quentin (1970), Kumar (1972c, 1973a), Mitra and Lahiri (1972), Sahni (1972), Kumar and Juneja (1976), Mitra (1976), Prasad and Singh (1976), Kumar and Prasad (1977a), Lahiri and Mitra (1976), Lahiri (1977a) and Prasad and Kumar (1977b) published accounts of different species of the genus occurring in Indian region.

Diagnostic characters : Medium in size (usually with abdomen 23.0-39.0 mm, hindwing 16.0-29.0 mm) ; bluish, marked with black, green, orange or red, occasionally partly pruinosed ; postocular coloured spots usually present. Frons without a ridge ; posterior lobe of prothorax simple and rounded in males, with a pair of forwardly directed ungulate processes, the 'stylets' in females and with inferior lip occasionally visible in the middle in either sex ; male superior anal appendages as long as or shorter than segment 10 of abdomen, occasionally notched or provided with hooks or spines ; inferiors conical, shorter than the superiors ; terminal fold of penis often deeply bifid and usually with a short projection on either side ; females without vulver spine. Wings hyaline ; usually 8-17 postnodal cross veins in forewing, 7-14 in hindwing ; pterostigma narrow, rectangular ; arc situated at the level of the distal antenodal cross vein ; IR_3 arising at the level of the subnodus, origin of R_{4+5} well proximal to that level ; discoidal cell with inner margin nearly two to four times as long as the costal margin, the inner distal angle acute, Ab arising from inner wing margin at the point where Ac meets it.

Distribution : India , Nepal ; China ; Sri Lanka ; Burma ; Thailand Vietnam ; Malaysia ; Indonesia ; New Guinea ; Japan ; Taiwan ; Philippines ; Australia ; Pacific islands ; Syria, Mauritius ; Africa, Madagascar.

KEY TO THE SPECIES OF THE GENUS *PSEUDAGRION* SELYS

Male :

1. Face, frons and vertex bright reddish orange or dark ochreous.
. *rubriceps rubriceps* Selys.
 Face frons and vertex blue or green and marked with black. .2
2. Superior anal appendage only about half the length of segment 10 (Figs. 177-178).
. *australasiae* Selys
 Superior anal appendage nearly as long as segment 10 (Figs. 181-182).
. *spencei* Fraser

(Females of *P. australasiae* Selys and *P. spencei* Fraser were not available in the collection studied and therefore no key to females have been provided).

***Pseudagrion australasiae* Selys**

(Figs. 177-178, 217 and 264-265)

Pseudagrion microcephalum race ? *australasiae* Selys, 1976, *Bull Acad. Belg. Sc.* (2), 42 : 506 (pars)

Pseudagrion australasiae Selys, : Laidlaw, 1916, *Rec. Indian Mus.*, 12 : 21. Lieftinck, 1954, *Treubia*, 22 Suppl : 56.

Pseudagrion bengalense Laidlaw, 1919, *Rec. Indian Mus.*, 16 : 192. Fraser, 1933, *Fauna Brit. India, Odon*, 1 : 282.

Material studied : 1 ♂, 7kms south of Wageasi, 7.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂	31.0	23.0	12	10

Notes : The single male studied varies from the description of the species provided by Fraser (1933) in having longer hindwing and in the shape of the anal appendages.

The species is comparatively rare. Only one specimen was collected from a small roadside tank covered with weeds in the Garo hills. It was patrolling rapidly over the surface of the tank and seldom perching for a short while.

Distribution : India : Assam, Manipur, Meghalaya, West Bengal.
Outside India : Burma ; Indonesia ; Thailand ; Malaysia ; Australia.

***Pseudagrion rubriceps rubriceps* Selys**

(Figs. 179-180, 216 and 266-267)

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

Pseudagrion rubriceps rubriceps Selys : Lieftinck, 1953, *Verh. naturf. Ges. Basel*, 64 : 156.

Material studied : 1 ♂, Bangsi, 5.iv.1973, coll ARL ; 1 ♀, Charikuty, 4.xi.1973, coll SB ; 2 ♂♂, Rongtham river bank, 11.iv.1973, coll ARL ; 1 ♀, Rongrengiri, 20.iv.1973, coll ARL ; 1 ♂, 1 ♀, Songsok, 15.iv.1973, coll ARL ; 2 ♂♂, 2 ♀♀, Wageasi, 5,8.iv.1973, coll ARL ; 8 exs, Shillong (1 ♂, 9.x.1974, coll MSJ ; 6 ♂♂, 1 ♀, 13.x.1974, coll ARL).

Measurements (in mm) and Nodal index.

Length of		Pn in	
abdomen	hindwing	forewing	hindwing
♂♂ 29.5-31.0	17.0-18.5	9	7-8
♀♀ 29.0	19.0	8	7

Notes : Both sexes vary from the description of the species provided by Fraser (1933) in having shorter hindwing besides the following :

Male : Abdomen longer ; vertex bright orange ; fine black lines on synthorax parallel and close to mid-dorsal carinal line sometimes absent ; sides of synthorax only with an upper spot on 2nd lateral suture ; segment 8 of abdomen on dorsum with a triangular mark on apical third ; the figures of the anal appendages.

Female : Labrum, clypeus and bases of mandibles orange ; antennae blue on basal two segments.

In Meghalaya, the subspecies has been collected from places situated at variable altitudes in Garo hills and Khasi hills. In Ward lake at Shillong, it was commonly found perching on twigs or flying along the edges of water.

Distribution : India : Assam, Himachal Pradesh ; Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal. Outside India : Nepal ; Burma ; Indo-China (exact locality unknown) Malaysia ; Indonesia ; Taiwan ; Philippines.

Pseudagrion spencei Fraser

(Figs. 181-182, 215 and 268-269)

Pseudagrion spencei Fraser, 1922, *Mem. Dep. Agric. India (Ent)*, 7 : 47 ; 1933, *Fauna Brit. India, Odon.*, 1 : 292.

Material studied : 2 ♂♂, Bangsi, 5.iv.1973, coll ARL ; 6 ♂♂, Wageasi, 5.8.iv.1973, coll ARL ; 2 ♂♂, Shillong, 20.xi.1971, coll ARL ; 2 ♂♂, Ratachara, 26.viii.1974, coll ARL,

Measurements (in mm) and Nodal index.

Length of		Pn in	
abdomen	hindwing	forewing	hindwing
♂♂ 24.5-25.5	14.5-15.0	8-9	7-8

Notes : In Meghalaya the species was collected at various altitudes but has not been collected from more southern parts of Khasi hills. Usually these are found near small water bodies, occasionally wandering on grassy ground in such surrounding. But, in Jaintia hills specimens were collected beside a river.

Distribution : India : Assam, Bihar, Madhay Pradesh, Meghalaya, Uttar Pradesh, West Bengal. Outside India : Nepal.

Genus Aciagrion Selys

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

Aciagrion Selys, 1891, *Ann. Mus. civ Genova* (2), 10 (32) : 509. Fraser, 1933, *Fauna Brit. India, Odon* 1 : 333.

Type-species : *Pseudagrion hisopa* Selys.

Selys (1891a) established *Aciagrion* as a subgenus of *Agrion* Fabricius with a new species and 2 other already known ones which were described by Selys (1876) as *Pseudagrion* spp. The generic concept has since then been further elaborated as it was elevated to generic rank and there has been addition of more species to this genus mainly by the contributions of the following authorities : Munz (1919), Laidlaw (1919, 1924a. b), Fraser (1923e, 1933), Lieftinck (1948a, 1954, 1955a, 1971a) and Pinhey (1962, 1972) Bhasin (1953), St. Quentin (1970) and Lahiri (1977a, 1979) dealt with certain species of this genus occurring in Indian region.

Disgnostic characters : Medium in size (usually with abdomen 23.0-35.0 mm, hindwing 15.0-24.0 mm) ; very slender in built ; bluish or reddish, marked with black, sometimes partly pruinose ; postocular coloured

sports present ; posterior lobe of prothorax simple and rounded or shallowly tripartite, with inferior lip generally visible ; male superior anal appendages shorter than segment 10 of abdomen, triangular or squarish, occasionally notched at apex ; inferiors short or rudimentary, generally shallowly notched and sometimes with a prominent tooth at apex ; penis shaft bearing a few spines subapically, the terminal fold broad, sometimes constricted subapically ; vulver spine present in females. Wings hyaline, very narrow ; usually with 9-14 postnodal cross veins in forewing, 8-11 in hindwing ; arc situated at the level of the distal antenodal cross vein ; pterostigma short, rectangular, shorter (about one half) in hindwing than in forewing ; $1R_3$ arising at the level of the subnodus, origin of R_{4+5} a little proximal to that level ; discoidal cell very narrow, with inner margin twice as long as costal margin ; the inner distal angle very acute ; Ab arising from the inner wing margin from the point where Ac meets it.

Distribution : India ; Nepal ; China ; Sri Lanka ; Burma ; Thailand Malaysia ; Indonesia ; New Guinea ; Japan ; Australia ; Africa.

KEY TO THE SPECIES OF THE GENUS *ACIAGRION* SELYS
(EITHER SEX)

- Ground colour pale brown and without black markings on head and thorax.
.....*pallidum* Lelys.
- Ground colour blue with black markings on head and thorax.
...*tillyardi* Laidlaw.

***Aciagrion Pallidum* Selys**
(Figs. 185-186, 228-229 and 272-273)

Aciagrion pallidum Selys, 1891, *Ann. Mus. civ. Genova*, (2), 10 (30) : 512. Fraser, 1933, *Fauna Brit. India. Odon.* 1 : 344.

Material studied : 3 ♂♂, Bagmara, 2.iii.1965, coll ASR ; 1 ♂, Songsok, 17.ix.1973, coll SB ; 2 ♂♂, 1 ♀, 18 kms north of Balat, 8.xii.1977, coll ARL ; 1 ♀, Barapani, 31.v.1967, coll BKT ; 1 ♂, Mawpat, 3.viii.1967 coll RKV ; 2♂♂, 2♀♀, Ranikor, 10.xii.1977, coll ARL ; 4 ♂♂, 5 ♀♀, 10 kms east of Ranikor, 7.xii.1977, coll ARL ; 3 ♀♀, Umroi, 2.xi.1972, coll ARL ; 2 ♀♀, Umtham, 25.iv.1967, coll RKV

Measurements (in mm) and Nodal index

Length of		Pn in	
abdomen	hindwing	forewing	hindwing
♂♂ 29.5	17.0	10.11	9
♀♀ 28.0-30.5	19.0-19.5	11-12	9-10

Notes : Specimens of both sexes examined vary from the description of the species provided by Fraser (1933) in having a fine line at base of anterior lobe and a mid-dorsal black spot on posterior lobe of prothorax ; the females also vary in having a black median spot at base of labrum. Further, nearly 50% of the specimens also vary in having postclypeus and frons brown, abdominal segments 9-10 variably marked with black dorsally and the elongated and cone-shaped black mark on segment 2.

In Meghalaya the species is distributed at various altitude in Garo and Khasi hills. It is essentially a species of comparatively drier habitat. In Meghalaya the species has been found in fields covered with dry grasses and also in surroundings simulating dull, brownish ground colour of the body.

Distribution : India : Arunachal Pradesh, Assam, Bihar, Goa, Karnataka, Madhya Pradesh, Maharashtra, Manipur Meghalaya, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal. Outside India : Nepal ; Burma.

***Aciagrion tillyardi* Laidlaw**

(Figs. 187-188, 230-231, 274-278 and 524)

Aciagrion tillyardi Laidlaw, 1919, *Rec. Indian Mus.*, 16 : 187.

Aciagrion approximans (Selys) : Fraser, 1933. *Fauna Brit. India, Odon.* 1 : 342 (Partim).

Material studied : 1 ♀, Barapani, 6.iv.1967, coll RKV ; 3 ♂♂, 2♀♀, Mawpat, 31.viii.1967, coll RKV ; 2 exs, Nongpoh, (1 ♀, 25.viii.1972, coll AKG ; 1 ♂, 11.iv.1978, coll ARL) ; 1 ♀, Nongstoin, 27.xi.1977, coll KRR ; 1 ♂, Pynursla, 29.viii.1973, coll SKC ; 25 exs, Shillong (1 ♂, 9.ix.1967, coll SNP ; 3 ♂♂, 1 ♀, 20.xi.1971, coll ARL ; 2 ♂♂, 1 ♀, 5.xii.1971, coll ARL ; 1 ♀, 10.vi.1972, coll ARL ; 3 ♂♂, 1 ♀, 12.viii.1972, coll ARL ; 2 ♂♂, 1 ♀, 9.ix.1972, coll ARL ; 1 ♂, 1 ♀, 11.v.1974, coll KD ; 1 ♂, 1♀, 12.v.1974, coll ARL ; 2 ♂♂, 13.x.1974, coll KD ; 1 ♂, 13.xi.1974, coll KD ; 1 ♀, 25.vi.1975, coll MSJ ; 1 ♂, 5.ix.1975, coll MSJ) ; 1 ♂, Sonapahar, 27.xi.1977, coll KRR ; 1 ♂, 1 ♀, Sumer, 21.vi.1973, coll AKG ; 1 ♂, Umran, 12.ix.1967, coll RKV ; 3 exs., Umsning (1 ♂, 3.x.1968, coll MRR ; 1 ♂, 1 ♀, 5.viii.1971, coll GMY) ; 3 ♂♂, Umtham, 29.xi.1967, coll RKV ; 6 ♂♂, 2♀♀, Garampani, 26-29.i.1975, coll AKG ; 3♀♀, Thadlaskein, 3.viii.1972, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	20.0-25.5	16.5-17.5	9-11	8-10
♀♀	22.0-26.5	16.5-18.0	10-11	9-10

Notes : The species is fairly well distributed in Meghalaya except Garo hills in various altitude and are commonly found along grassy edges of small streams or even stagnant water bodies.

Distribution : India : Arunachal Pradesh, Assam, Manipur, Meghalaya. Outside India : Malaysia.

Genus *Enallagma* Charpentier

Enallagma Charpentier, 1840, *Lib. Erop.*, : 21. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 371.

Type-species : *Agrion cyathigerum* Charpentier

Charpentier (1840) while describing *cyathigerum* under *Agrion* Fabricius introduced *Enallagma* as a subgenus. Selys (1876) apparently accepted Charpentiers' view about *Enallagma*. Later Kirby (1890) raised it to the generic status. Subsequently through the works of Ris (1908), Laidlaw (1919), Munz (1919), Fraser (1923e, 1933, 1949a), Lieftinck (1955a, 1971a) and Pinhey (1962) the concept of the genus has been broadened and a few more species have been described under the genus. Accounts of some species of this genus occurring in Indian region have been published by Asahina (1965), St. Quentin (1970), Sahni (1972), Bose and Mitra (1975), Lahiri and Mitra (1976), Kumar and Prasad (1977a), Lahiri (1977a) and Prasad and Kumar (1977b) in recent times.

Diagnostic characters : Small in size (usually with abdomen 17.0-20.0 mm, hindwing 11.0-22.0 mm) ; blue or green, marked with black, sometimes partly pruinose ; postocular coloured spots present ; posterior lobe of prothorax usually simple and rounded ; male anal appendages variable ; superiors shorter than segment 10 of abdomen, conical, squarish or curled plate like ; inferiors as long as or longer than superiors, usually sloping upwards and narrowed to an acute apex ; penis usually with its shaft bearing a few spines subapically, the terminal fold constricted medially and with its apical angles projected a little ; vulver spine present in females. Wings hyaline ; usually with 7-15 postnodal cross veins in

forewing, 6-13 in hindwing ; arc situated at the level of the distal antenodal cross vein ; pterostigma small, rectangular ; $1R_3$ arising at the level of the subnodus, origin of R_{4+5} much proximal to that level ; discoidal cell with inner margin about twice as long as the costal margin, the inner distal angle acute ; Ab arising from inner wing margin well proximal to the point where Ac meets ti.

Distribution : Virtually cosmopolitan all over Africa, America, Asia and European countries.

Enallagma parvum Selys
(Figs. 183-184 and 270-271)

Enallagma parvum Selys, 1976, *Bull. Acad. Belg. Sci.* (2), 41 : 537. Fraser, 1933, *Fauna Brit India, Odon.* 1 : 376.

Material studied : 1 ♂, Napak beel, 12.iv.1973, coll ARL ; 2 ♂♂, 1 ♀, 10 Kms east of Rongram, 23.iv.1973, coll ARL ; 3 ♂♂, 1 ♀, Wageasi, 6,8.iv.1973, coll ARL ; 1 ♂, Barapani, 6.x.1967, coll RKV

Measurements (in mm) and Nodal index

	Length of abdomen	hindwing	forewing	Pn in hindwing
♂♂	19.0-20.0	12.0	6-7	5-6
♀♀	20.0-20.5	12.5	7	6

Notes : The specimens examined vary from the description of the species provided by Fraser (1933) in size. The males also vary in shape of the anal appendages. The females vary in having labrum, clypeus and frons reddish and unmarked.

In Meghalaya the species has been collected at various altitude in northern Garo and Khasi hills. They were found commonly wandering in grassy fields close to partly stagnant water bodies.

Distribution : India : Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Punjab, Uttar Pradesh, West Bengal. Outside India : Nepal ; Sri Lanka ; Burma.

Genus Ischnura Charpentier

Ischnura Charpentier, 1940, *Lib. Europ.*, : 20. Fraser. 1933, *Fauna Brit. India, Odon.*, 1 : 346.

Type-species : *Agrion tuberculatum* Charpentier

Charpentier (1825) described *Agrion Pumilio* as a new species. Later, according to Evans (1845), the species *Pumilio* was named as *Agrion (Ischnura) pumilio* by Charpentier in 1840. Selys (1876, 1883a, 1889) also treated *Ischnura* as a subgenus in his classification and added a few species to it. Later workers like Kirby (1890), Laidlaw (1916b, 1919, 1931), Fraser (1923e, 1933, 1949a), Needham (1930a), Schmidt (1938), Lieftinck (1954, 1955a, 1962, 1971a), Pinhey (1962) and Watson (1969) gave *Ischnura* the generic status, but Kirby (1890) substituted the name *Ischnura* by *Micronympha* because according to him the name *Ischnura* was pre-occupied by *Ischnurus* Koch, 1837, in Arachnida. But all workers subsequent to Kirby retained the name *Ischnura* and here also the name *Ischnura* is kept. In recent times Bhasin (1953), Asahina (1965), St. Quentin (1970), Kumar (1972c, 1973), Bose and Mitra (1976), Mitra (1976), Prasad (1976a), Prasad and Singh (1976), Kumar and Prasad (1977a), Lahiri (1977a, 1979) and Prasad and Kumar (1977a, b) dealt with different species of this genus occurring in Indian region.

Diagnostic characters : Small in size (usually with abdomen 20.0-25.0 mm, hindwing 13.0-18.0 mm) ; yellow, blue, green or reddish, marked with black ; postocular coloured spots present ; females polychromatic ; posterior lobe of protothorax variable, simple and rounded or shallowly tripartite, the mid-lobe sometimes deeply notched ; in males segment 10 of abdomen with a pair of dorsal tubercles at apex ; male anal appendages very variable ; superiors subequal to one fourth the length of segment 10 of abdomen, quadrate or rectangular, sometimes armed with a basal spine ; inferiors usually triangular, minute or subequal to segment 10 of abdomen ; often forcipate and sloping upwards ; penis shaft sometimes bearing a few subapical spines, the terminal fold broad, ending on either side in a pair of unequal flagella ; vulver spine present in females. Wings hyaline ; usually with 8-12 postnodal cross veins in forewing, 6-9 in hindwing ; arc situated at or slightly distal to the level of distal antenodal cross vein ; pterostigma small, rectangular or with inner and distal margins continuous as an arc ; in males pterostigma differing in shape and colour in fore- and hindwing, being yellowish, but partly black or reddish in forewing ; $1R_3$ arising at the level of subnodus, origin of R_{4+5} well proximal to that level ; discoidal cell with inner margin twice or a little less than twice the length of costal margin, the inner distal angle acute ; Ab arising from inner wing margin well proximal to the point where Ac meets it.

Distribution : Cosmopolitan.

KEY TO THE SPECIES OF THE GENUS *ISCHNURA*
CHARPENTIER

Male :

Ground colour orange red ; abdominal segments 8-10 black.
.rufostigma rufostigma Selys.
Ground colour bright yellow ; abdominal segments 7-10 black.
.aurora aurora (Brauer).

Female :

Larger species with abdomen 22.0 mm and hindwing 15.0 mm or more in length ;
posterior lobe of prothorax simple with its hind margin rounded at middle (Fig.
218). *.rufostigma rufostigma* Selys.
Smaller species with abdomen 20.0 mm and hindwing 4.0 mm or less in length ;
posterior lobe of prothorax with its hind margin deeply notched at middle (Fig. 219)
.aurora aurora (Brauer)

***Ischnura aurora aurora* (Brauer)**
(Figs. 189-190, 219 and 278-279)

Agrion delicatum Hagen, 1858, *Verh. zool. bot. Ges. Wein.*, **8** : 479
Agrion aurora Brauer, 1865, *Verh. zool. bot. Ges. Wein.*, **15** : 510.
Ischnura aurora (Brauer) : Ris, 1915, *Nova Caledonia, zool.*, **2** : (4) : 67,
Ischnura delicata (Hagen) : Selys, 1876, *Bull. Acad. Belg. Sci.*, (2), **41** : 281. Fraser, 1933,
Fauna Brit, India. Odon., **1** : 360.
Ischnura aurora aurora (Brauer) : Lieftinck, 1949, *Nova Guinea (New ser.)*, **5** : 220

Material studied : 1 ♂, Damra, 20.xi.1973, coll SB ; 1 ♀, Jakrim, 4.xii.1977, coll ARL ; 1 ♂, Nonghylian, 1 .xii.1977, coll KRR ; 1 ♂, Pynursla, 29.viii.1973, coll SKG ; 4 exs. Shillong (1 ♂, 1.iv.1972, coll ARL ; 1 ♂, 3.ix.1972, coll ARL ; 1 ♂, 30.vi.1973, coll ARL ; 1 ♀, 13.xi.1974, coll KD) ; 1 ♀, Sonapahar, 29.xi.1977, coll KRR ; 2 ♂♂, Weiloi, 14.viii.1973, coll ARL ; 2 ♂♂, 1 ♀, Garampani, 27-29.i.1975, coll AKG ; 4 ♂♂, Jowai, 3.viii.1972, coll ARL ; 1 ♀, Sonapurdi, 14.viii.1973, coll ARL ; 1 ♂, 1 ♀, Thadlaskein, 3.viii.1972, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	23.0-23.5	14.0	7-8	6
♀♀	21.0-22.0	11.0-12.5	6-7	5

Notes : Specimens examined vary from the description of the species provided by Fraser (1933) in size, nodal index, in having the distal 2 antennal segments black. Further, in males a pair of small, fine projections curled a little upwards on synthorax just proximal to mesostigmal laminae are found.

The subspecies is well distributed in many parts of Meghalaya. They are commonly found in marshy areas flying through grasses and weeds, but in the months following rainy seasons these also spread over grassy fields in the neighbourhood of stagnant waterbodies or slow running streams.

Distributions : India : Andhra Pradesh, Arunachal Pradesh, Assam, Himachal Pradesh, Kerala, Maharashtra, Manipur, Meghalaya, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal. Outside India : Nepal ; China ; Sri Lanka ; Malaysia ; Indonesia ; Australia ; New Zealand ; Pacific Islands.

***Ischnura rufostigma rufostigma* Selys**
(Figs. 191-192, 218 and 276-277)

Ischnura rufostigma Selys, 1876, *Bull. Acad. Belg. Sci.* (2), **41** : 283. Fraser 1933, *Fauna Brit. India. Odon.*, **1** : 362.

Ischnura rufostigma rufostigma Selys : Lahiri, 1977, *Rec. zool. Surv. India*, **72** : 413.

Material studied 1 ♂, Rongtham river bank, 11.iv.1973, coll ARL ; 2 ♂♂, Rongrengiri, 21.iv.1973, coll ARL ; 2 ♂♂, Wageasi, 6.iv.1973, coll ARL ; 1 ♂, 7 kms east of Wageasi, 7.iv.1973, coll ARL ; 4 ♂♂, 3 ♀♀, Sonapurdi, 26-28.viii.1974, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	23.0-23.5	14.0	7-8	6
♀♀	22.0-22.5	15.5	8	7

Notes : Lahiri (1977) being advised by Late Dr. Lieftinck treated *I. rufostigma* Selys as a polytypic species and also discussed about the distinguishing characters of various subspecies of the same.

The specimens under study vary a little from the description of the nominate species provided by Fraser (1933) in size. The males also vary in having a pair of oblong reddish dorsal spots extending from base nearly

to middle of segment 8 of abdomen. Approximately 50% of specimens also vary in the absence of black mark at base of labrum and at upper part of posterolateral suture of synthorax, in having synthorax brownish in upper half and pterostigma pale brick red. The females vary in having black markings of segment 1 and 2 of abdomen.

The species, occurring only at lower altitude in Meghalaya. has a much more restricted distribution in the state than *I. a. aurora* (Brauer). Also, it has not so far been collected in Khasi hills. The species is usually found swarming in good numbers on and around weedy stagnant and often ephemeral water bodies like the paddy fields.

Distribution : India : Assam, Bihar, Himachal Pradesh, Madhya Pradesh, Manipur, Meghalaya, West Bengal. Outside India : ? China [vide Fraser (1933)] ; Burma.

Genus *Agriocnemis* Selys

Agriocnemis Selys, 1869, *Pollen and Van Dam, Fauna Mad, Ins.*, : 24. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 379.

Type-species : *Agrion rufipes* Rambur*

Selys after having proposed *Agriocnemis* as a new subgenus in his classification in 1869 elaborated the same added with descriptions of a number of species in 1877. Later, its elevation to generic rank and further elaboration of concept along with addition of many more species has been the outcome of contribution of several authorities. More important of these are Selys (1878b, 1889, 1891a), Kirby (1890), Laidlaw (1919, 1931), Munz (1919), Fraser (1923e, 1933), Schmidt (1938), Lieftinck (1948a, 1954, 1955a, 1962, 1971a), Pinhey (1962, 1974) and Watson (1969). Mention can be made of a few more papers dealing with different species of the genus occurring in Indian region by Navas (1930), Bhasin (1953), Kumar (1972c, 1973a), Bose and Mitra (1975), Mitra (1976), Prasad and Singh (1976), Kumar and Prasad (1977a), Lahiri (1977a, b, 1979) and Prasad and Kumar (1977 b).

Diagnostic characters : Small in size (usually with abdomen 13.0-20.0 mm, hindwing 9.0-17.0 mm) ; whitish, bluish or reddish, marked with black, sometimes pruinose ; postocular coloured spots present ; females polychromatic ; posterior lobe of prothorax usually differing in shape in

* After Kirby (1890), Gloyd (in litt) and Mitra (1893), but as opposed to the citation by Fraser (1949), Lieftinck (1954) and Davies (1981), viz. *Agrion pygmaeum* Rambur.

male and female, tripartite, the mid-lobe being variably produced backwards, subquadrate, triangular or excavated and with or without distinct inferior lip ; male anal appendages very variable, superior shorter than, subequal to or longer than segment 10 of abdomen, triangular, rounded, cylindrical or paddle shaped, often armed with basal or apical spines ; inferiors shorter or longer than and as variable in shape as superiors ; terminal fold of penis ending in a pair of blunt or acuminate short flagella ; female without a vulver spine. Wings hyaline ; usually with 4-12 antenodal cross veins in forewing, 3-9 in hindwing ; arc situated widely distal to the level of the distal antenodal cross vein ; Pterostigma small, rectangular, sometimes differing in male and female, or even in fore- and hindwing of same sex in colour ; $1R_3$ arising at the level of the subnodus, origin of R_{4+5} much proximal to that level ; discoidal cell with inner margin twice or little less than twice the length of costal margin ; Ab arising from inner wing margin much proximal to the point where Ac meets it.

Distribution : India ; Nepal ; China ; Sri Lanka ; Nicobar Islands ; Burma ; Thailand ; Malaysia ; Indonesia ; New Guinea ; Ryukyus ; Taiwan ; Philippines ; Australia ; Pacific Islands ; Mauritius ; Africa ; Madagascar ; Seychelles.

KEY TO THE SPECIES OF THE GENUS *AGRIOCNEMIS* SELYS

Male :

1. Labrum metallic violet. *.pygmaea* (Rambur),
 Labrum bluish, yellowish or whitish, non metallic. .2
2. Abdomen whitish, without black dorsal stripe on segments 4-8. ... *.lacteola* Selys.
 Abdomen blue with black dorsal stripes on segments 4-8. ... *.clauseni* Fraser.

Female :

1. Posterior lobe of prothorax very narrow and shallowly tripartite, with mid-lobe and lateral lobes almost equally produced (Fig. 227). *.pygmaea* (Rambur)
 Posterior lobe of prothorax broad and markedly tripartite, with mid-lobe produced much more than lateral lobes (Fig. 223-225). .2
2. Mid-lobe of posterior lobe of prothorax much less broad than lateral lobes (Fig. 223). *.clauseni* Fraser
 Mid-lobe of posterior lobe of prothorax wider than lateral lobes (Fig. 225) *.lacteola* Selys.

Agriocnemis clauseni Fraser

(Figs. 195-196, 222-223 and 280-281)

Agriocnemis clauseni Fraser, 1922, *Mem. Dep. Agric. India (Ent.)*, 7 : 53 ; 1933, *Fauna Brit. India, Odon.*, 1 : 390.

Material studied : 2 ♂♂, Bangsi, 5.iv.1973, coll ARL ; 1 ♂, Naapk beel, 12.iv.1973, coll ARL ; 2 ♂♂, Rongrengiri, 21.iv.1973, coll ARL ; 2 ♂♂, Songsok, 13.iv.1973, coll ARL ; 6 ♂♂, Wageasi, 6.8.iv.1973, coll ARL ; 2 ♂♂, Barapni, 6.iv.1968, coll RKV ; 2 ♂♂, Mawpat, 3.ix.1970, coll GMY ; 1 ♀, Mawrynkreng, 17.iv.1970, coll SB ; 6 exs, Nongpoh (2 ♂♂, 19.ix.1973, coll SB ; 3 ♂♂, 1 ♀, 11.iv.1978, coll ARL) ; 3 exs, Shillong (1 ♂, 28.vi.1975, coll KD ; 2 ♂♂, 20.vii.1975, coll ARL) ; 2 exs, Upper Shillong (1 ♀, 4.viii.1965, coll BKT ; 1 ♀, 25.vi.1968, coll RKV) ; 2 exs, Umsning (1 ♂, 16.v. 1967, coll RKV ; 1 ♂, 25.viii.1972, coll AKG) ; 2 ♂♂, Umtham, 25.iv.1967, coll RKV ; 7 exs, Jowai (2 ♂♂, 17.vii.1973, coll AKG ; 2 ♂♂, 3 ♀♀, 14.viii.1973, coll ARL) ; 2 ♂♂, 1 ♀, Thadlaskein, 3.viii.1972, coll AKG ;

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	20.0-23.5	14.5-15.0	8-9	7-8
♀♀	21.5-25.0	14.0-17.0	10-12	8-10

Notes : Available specimens of both sexes vary from the description of the species provided by Fraser (1933) in size and nodal index. The teneral males also vary in having anal appendages variably shedded with black while matured specimens differ from adults in the followings : ground colour of head, thorax and abdomen reddish yellow ; thorax and abdominal segments 1-6 unmarked with black except for two upper spots on humeral and lateral sutures.

The species is fairly well distributed in Meghalaya, except in the southern slopes of Khasi hills. It is commonly found near slow running streams or stagnant water bodies, but sometimes also among bushes quite far from such habitat.

Distribution : India : Assam, Meghalaya, Punjab, Uttar Pradesh and 'Bengal' (exact locality unknown). Outside India : Burma ; Thailand.

***Agriocnemis lacteola* Selys**

(Figs. 193-194, 224-225 and 282-283)

Agriocnemis lacteola Selys, 1877, *Bull. Acad. Belg. Sci.* (2), **43** : 144. Fraser, 1933, *Fauna Brit. India, Odon.*, **1** : 381.

Material studied : 2 ♂♂, Burnihat, 31.vii.1973, coll ARL ; 1 ♂, Dawki, 18.v.1972, coll ARL ; 1 ♂, Puksora, 7.xii.1977, coll ARL ; 2 ♂♂, Satmowdon, 5.xii.1977, coll ARL ; 1 ♂, 1 ♀, Ratachara, 24.i.1975, coll SKG ; 12 exs., Sonapurdi, coll ARL (2 ♂♂, 1 ♀, 26.viii.1974 ; 3 ♂♂, 2 ♀♀, 27.viii.1974 ; 3 ♂♂, 1 ♀, 28.viii.1974).

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	18.0-18.5	10.0	6	5
♀♀	17.5-18.0	11.5-12.0	7	6

Notes : The specimens examined vary from the description of the species provided by Fraser (1933) in the following points :

Male : Pterostigma in teneral specimens unmarked with black ; abdominal segment 1 without apical black ring, but the same present on segments 3-6 ; segment 2 with dorsal stripe not reaching the apex, no apical annules ; the stripe on segment 3 not extending subapically on segments 2-5.

In Meghalaya the species is restricted only at lower altitude and has not so far been collected in Garo hills. It is commonly found in grassy lands or paddy fields near river or stagnant water masses, often with *A. pygmaea* (Rambur).

Distribution : India : Assam, Bihar, Meghalaya, Sikkim, Tripura, West Bengal and 'Bengal' (exact locality unknown).

***Agriocnemis pygmaea* (Rambur)**

(Figs. 197-199, 226-227 and 284-285)

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

Agriocnemis pygmaea (Rambur) : Selys, 1877, *Syn. Agr. Sme. Legion : Agrion (Suite et fin)* : 52. Fraser, 1933, *Fauna Brit. India, Odon.*, **1** : 398. Pinhey, 1974, *Occ. Pap. natn. Mus. Rhod.*, **85** (4) : 219.

Material studied : 1 ♂, 2 ♀♀, Balfagram, 24.25.iii.1976, coll SB ; 2♂♂, Wageasi, 6.iv.1973, coll ARL ; 1 ♂, 7 kms south of Wageasi 7.iv.1973, coll ARL ; 2 ♂♂, Burnihat, 31.viii.1973, coll ARL ; 1 ♀, 1 ♀, 5.xii.1977, coll ARL ; m10 exs. Shillong, col. ARL (2 ♂♂, 3 ♀♀, 11-xii.1971 ; 1 ♂, 2 ♀♀, 11.xii.1972, 2 ♂♂, 21.xi.9173) ; 2 ♀♂, Sonapahar, 29.xi.1977, coll KRR ; 2 ♂♂, 2 ♀♀, Weiloi, 14.viii.1973, coll ARL ; 11 ♂♂, 5 ♀♀, Ratachara, 26-28.viii.1974, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	18.5-20.5	10.5-11.0	6-7	6
♀♀	18.0-19.5	12.0-14.0	8	7

Notes : Specimens studied vary from the description of the species provided by Fraser (1933) and that provided by Pinhey (1974) based on specimens from Shillong in size, nodal index and details of male anal appendages.

The species is commonly found on grassy lands, rarely also inside bushes in the vicinity of slow running streams or even stagnant water bodies.

Distribution : India : virtually cosmopolitan. Outside India : China ; Sri Lanka ; Buram ; Malaysia ; Indonesia ; New Guinea ; Taiwan Philippines ; Australia , Pacific Islands ; Seychelles.

Genus *Argiocnemis* Selys

Argiocnemis Selys, 1877, *Bull. Acad. Belg. Sci.* (2), 43 : 138. Fraser, 1933, *Fauna Brit. India, Odon.*, 1 : 405.

Type-species : *Argiocnemis rubescens* Selys.

Selys (1877) established this genus along with description of a few new species. The generic concept has since then been further elaborated and there has also been additions of some more species chiefly by Selys (1878b, 1891a), Kirby (1890), Ris (1913), Laidlaw (1919, 1931), Munz (1919), Fraser (1923e, 1933), Schmidt (1938) and Lieftinck (1954).

Diagnostic characters : Medium in size (usually with abdomen 28.0-32.0 mm, hindwing 16.0-20.0 mm) ; coloured blue, green, yellowish or red, marked with black, sometimes pruinose ; postocular colored spots

present ; posterior lobe of prothorax tripartite, with semicircular mid-lobe and inferior lips visible in female ; male superior anal appendages subequal to segment 10 of abdomen, compressed laterally, obtuse and a little forcipate ; inferiors about one third the length of superiors, squarish with outer angles acute ; terminal fold of penis as in *Agriocnemis* Selys but more elongate ; female without vulver spine. Wings hyaline ; usually with 10-13 postnodal cross veins in forewing, 8-10 in hindwing ; arc situated widely distal to the level of the distal antenodal cross vein ; pterostigma about twice as long as broad, rectangular ; $1R_3$ arising at the level of the subnodus ; origin of R_{4+5} much proximal to that level ; discoidal cell with inner margin twice or a little less than twice as long as the costal margin ; Ab arising from inner wing margin well proximal to the point where Ac meets it.

Distribution : India ; Burma ; Thailand ; Malaysia ; Indonesia ; Australia ; Madagascar.

***Argiocnemis obscura* Laidlaw**
(Figs. 200-201, 220-221 and 286-287)

Argiocnemis obscura Laidlaw, 1914, *Rec. Indian Mus.*, 8 : 345.

Material studied : 1 ♀, Chitmaring beel, 12.iv.1973, coll ARL ; 15 exs, Nongpoh, coll ARL (3 ♂♂, 2 ♀♀, 25.viii.1972 ; 8 ♂♂, 11.iv.1973 ; 2 ♂♂, 19.xi.1975).

Measurements (in mm) and Nodal index

	Length of		Pn in	
	abdomen	hindwing	forewing	hindwing
♂♂	28.5-29.5	16.5-17.0	10-13	8-10
♀♀	28.0-31.8	17.0-19.0	12-13	9

Description : Male : Green, thinly pruinose on coxae, trochanters, flexor surface of femora, sides of thorax and abdomen and dorsum of first two abdominal segments, marked as follows : labium pale yellowish ; labrum, genae, bases of mandibles and clypeus green (in one specimen a fine black line at base of labrum) ; rest of head on dorsum, including antennae black, with a moderately large bluish postocular spot on either side. Prothorax black, with anterior lobe, lower lateral edges and an oblong lateral spot on middle lobe and lateral edges of posterior lobe greenish ; posterior lobe (Fig. 221) of prothorax emerginate and tripartite ; lateral lobes narrow, midlobe rather short and extended backward as semicircular

processes, lower lip not visible, the connecting bridge as well as mesostigmal lamina narrow, the latter sub-rectangular with outer border slightly raised. Synthorax black on dorsum upto 1st lateral suture, marked with narrow antehumeral stripe ; a black narrow stripe on posterolateral suture, broadening into a large spot below spiracle (in one specimen shortly broken before that level). Legs with extensor surface of femora broadly and proximal half of flexor surface of tibiae narrowly black ; wings hyaline ; pterostigma blackish, finely yellow at margin, covering a little more than one cell, inner and distal margins forming a continuous arc, rather narrow, more so in hindwing (slightly more than two times as long as wide in forewing, three times as long, in hindwing. Abdomen marked with black as follows : segment 1 with a complete dorsal stipe, broadening a little at apex and more markedly so at base so as to extend on sides ; segment 2 with a mid dorsal stripe which is pointed at base and thereafter broad, but again narrowed subapically ; on segments 3 and 4 the dorsal stripe pointing basally and contracted subapically, then again expanding to become confluent with a narrow apical ring ; segments 6-7 with dorsal stripes becoming progressively broader, without subapical contraction, but gradually expanding from base to encroach on to sides at apical end ; segments 8-10 black but for lateral patches of variable extent on segments 8 and 9 and under surface of segment 10. Anal appendages (Figs. 200-201) black, the inferiors and inner surfaces of the superiors yellowish ; superiors subequal to segment 10 of abdomen, thin palte-like when seen from dorsum a little forcipate, outer border convex, inner excavate ; when seen from side elongated, subrectangular, outer border obtusely rounded ; inferiors less than half the length of superiors, quadrately produced when seen from dorsum, a little upwards, the outer angles produced as two little short spines ; seen from side, triangular, the outer spine only visible. Penis as in Figs. 286-287.

Female : Differ from male in the following points : labrum narrowly black at base, and this is expanded into a small median spot. Prothorax with lateral lobes of posterior lobe (Fig. 220) very narrow, the midlobe much larger, produced backwards as suboval process, the inner lip being visible as two small rounded processes on either side of the same. Mesostigmal laminae with outer border more markedly raised and with an oblique ridge on it ; the stripe on postero-lateral suture always broken before the level of spiracle. Flexor surface of tibiae black only on basal third, femora less pruinose. Pterostigma blackish grey. Segment 7 of abdomen with an additional ventrolateral black stripe falling short of

apex, but confluent with dorsal black stripe at apical end(in one example segments 5 and 6 also with the ventrolateral stripe) ; segments 8-10 completely black. Anal appendages short, conical, black. Vulver scales yellow, just falling short of apex of abdomen.

Teneral specimens : Reddish in either sex, with few black markings. The green colour and black markings in such specimens develop first on head and spread gradually thereafter on thorax and then on abdomen.

Notes : Lakilaw (1914a) described this species from Upper Burma, but Fraser (1933) considered it synonymous with *A. rubescens* Selys. From the latter species, however, *A. obscura* differs a little in size and markedly so in markings, specially of labrum and abdomen. The species has been redescribed above as per suggestion of Late Dr. Lieftinck, based on specimens under study, in view of existing inadequate description.

This species was collected from some scattered spots in Garo and Khasi hills amongst bushes near small stagnant water bodies.

Distribution : India : Assam, Meghalaya. Outside India : Burma.

Suborder ANISOPTERA

Diagnostic characters : Head compact, more or less globular ; labium with middle lobe usually smaller than lateral lobes and with or without a median fissure ; inner margin of eyes never separated by a space greater than their own diameter ; male genitalia variable, lamina usually arched, both hamules or only the posterior one well developed ; paired superior and single inferior anal appendage present in males, all placed above anal opening ; ovipositor variable in female, either fully developed or aborted. Fore- and hindwing dissimilar in venation and outline, anal field of hindwing broader than that of forewing ; usually more than 5 antenodal cross veins present in all wings ; discoidal cell differentiated into a triangle and a hypertriangle.

Remarks : Families belonging to the sugorder Anisoptera were grouped under three superfamilies viz. Aeshnoidea, Cordulegasteroidea and Libelluloidea by Tillyard-Fraser (1938-1940) and Fraser (1957). Out of 8 Anisopteran families mentioned by Fraser (1957), the families Gomphidae, Aeshnidae, Cordulegas-teridae, Corduliidae and Libellulidae have been considered here because representatives of those five families have been found in the area of study. Of these, the families Gomphidae and Aeshnidae belong to the superfamily Aeshnoidea, the family Cordulegasteriade to superfamily Cordulegasteroidea and the families Cordullidae

and Libellulidae to the superfamily Libelluloidea. Fraser (1957) pointed out that consideration of only the adult characters may lead to confusion about the taxonomic status of the three superfamilies and for that reason, he laid emphasis on nymphal characters. That Fraser (1957) was correct, can be substantiated when one looks into some important taxonomic characters in adults, e.g. distance between the eyes on vertex and the presence or absence of ovipositor. However, the three superfamilies also overlap in respect of some important taxonomic characters in nymphs, e.g. flattened or deeply cupped labial mask with or without setae on the lateral lobes and presence of single robust or numerous small teeth on the folds of the gizzard. Therefore, consideration of nymphal characters alone also leads one to confusion regarding the taxonomic status of the three superfamilies. It is possibly for this reason that neither Tillyard-Fraser (1938-1940), nor Fraser (1957) provided a complete key for all the three superfamilies of the suborder Anisoptera. So, here an attempt has been made to provide a key to the three superfamilies taking both nymphs and adults into consideration. The nymphal characters have been taken from Fraser (1957).

Distribution : Cosmopolitan.

KEY TO THE SUPERFAMILIES OF THE SUBORDER ANISOPTERA

1. Labial mask of nymphs of primitive zygopterous type, flattened and without setae ; lateral lobes narrow, with a long robust movable hook ; gizzard with 4-8 folds, each with numerous small teeth. .Aeshnoidea.

Labial mask of nymph broad and deeply concave or cupped and with numerous setae ; lateral lobes broad, their apposed borders being more or less deeply incised, crenate or serrate and often bordered with tuft of setae ; gizzard with 4 folds, each with a robust tooth. .2.

2. Adults with costal and subcostal cross veins not coinciding (Fig. 532) ; inner margin of eyes in adults very slightly separated or meeting only at a point (Figs. 10-11) ; adult males with anterior and posterior hamules of genitalia well developed (Fig. 26) and females without ovipositor (Fig. 24) or only with pseudoovipositor (Fig. 25). .Cordulegasteroidea

Adults with costal and subcostal antenodal cross veins coinciding (Fig. 533-539) ; inner margin of eyes in adults broadly contiguous (Fig. 12), adult males with obsolete anterior hamules of genitalia (Figs. 376, 379, 385-386 and 387-417) and females with ovipositor usually inconspicuous (Figs., 418-441). . Libelluloidea

Superfamily AESHNOIDEA

Diagnostic characters : Head nearly globular ; inner margins of eyes contiguous or well separated ; vesicle not well differentiated ; occiput

large or small, trapezoidal or triangular ; male genitalia with well-developed hamules ; ovipositor present or absent. Costal and subcostal antenodal cross veins not coinciding ; two primary antenodal cross veins usually well developed.

Nymphs : [After Fraser (1957)] Labial mask of primitive Zygopterous type, flattened and without setae ; lateral lobes narrow, with a long robust movable hook and without setae.

Distribution : Cosmopolitan.

KEY TO THE FAMILIES OF THE SUPERFAMILY AESHNOIDEA

Inner margins of eyes well separated ; occipital plate large and trapezoidal (Fig. 9) ; female without ovipositor (Figs. 332-341). .Gomphidae.

Inner margins of eyes broadly contiguous on vertex ; occipital plate small and triangular ; female with well-developed ovipositor (Figs. 21-23) and 445-446).

Aeshnidae

Family GOMPHIDAE

Diagnostic characters : Head subglobular ; labium with middle lobe lacking median incision, broader than lateral lobes ; inner margins of eyes well separated ; occiput large, transversely elongate and trapezoidal ; male genitalia not covered by 2nd abdominal tergite ; ovipositor absent ; vulver scale usually present. Subtrigone well differentiated, it and hypertrigone entire or traversed by cross veins ; discoidal cell entire or traversed by cross veins, similar or dissimilar in shape in fore- and hindwings ; usually 1-4 cross veins in cubital space and 2-8 cross veins between Rs and MA in hindwing ; forking of Rs symmetrical or asymmetrical ; median space entire ; anal loop rudimentary or absent.

Distribution : Cosmopolitan.

Subfamily GOMPHINAE

Diagnostic characters : Hypertirgone and subtrigone entire ; discoidal cell not markedly elongated lengthwise, this being different in shape in fore- and hindwings and usually entire or sometimes traversed by cross veins ; no prominent supplementary vein running from the distal margin of discoidal cell.

Remarks : Lieftinck (1964) considered Epigomphinae and Gomphinae as synonymous because the characters like number of cross veins between Rs and MA in hindwing and nature of forking of Rs appear overlapping. Here the subfamily Gomphinae has been used sensu Lieftinck (1964).

Distribution : Cosmopolitan.

KEY TO THE GENERA OF THE SUBFAMILY GOMPHINAE

1. Discoidal field in hindwing with 4 rows of cells a little proximal to the level of nodus (Fig. 520). .2
 Discoidal field in hindwing with less than 4 rows of cells proximal to the level of nodus (Fig. 525-527 and 529-530). .3
2. Two cubital cross veins present in hindwing ; discoidal cell frequently traversed by a cross vein (Fig. 528). .*Perissogomphus* Laidlaw.
 Only one cubital cross vein present in hindwing ; discoidal cell always entire .*Gomphus* Leach
3. Hind femora with 6-10 evenly spaced long robust spines in addition to closely set small spines. .4
 Hind femora with only closely set small spines. .5
4. Inner margin of subtrigone extending over 3 cells of adjacent anal field in hindwing. Vulver scale extending over at most the basal third of segment 9 (Fig. 334).
*Anisogomphus* Selys
 Inner margin of subtrigone extending over 2 cells of adjacent anal field in hindwing. Vulver scale extending over the basal half of segment 9 (Fig. 339).
 .*Merogomphus* Martin
5. Hypertrigone distinctly shorter than the space between nodus and origin of IR_s in hindwing (Fig. 525-526). .6
 Hypertrigone as long as or longer than the space between nodus and origin IR_s in hindwing (Figs. 527 and 530). 7
6. Discoidal field beginning with a row of 2 cells in hindwing (Fig. 526). Male inferior anal appendage subequal to superiors, its branches parallel or weakly divergent and usually armed with tooth (Figs. 310-313). .*Onychogomphus* Selys
 Discoidal field beginning with a row of 3 cells in hindwing (Fig. 525). Male inferior anal appendage about half the length of superiors, its branches strongly divergent and never armed with tooth (Figs. 308-309). .*Nihonogomphus* Oguma
7. Distal primary antenodal cross vein in hindwing equidistant from nodus and basal primary antenodal cross vein (Fig. 530). Male superior anal appendages forcipate at base (Fig. 304-305). .*Stylogomphus* fraser.
 Distal primary antenodal cross vein situated much nearer to basal primary antenodal cross vein than nodus (Fig. 527). Male superior anal appendages not forcipate (Figs. 300-303 and 331). .8
8. 4th cell of anal field adjacent to subtrigone extending upto base of subtrigone in hindwing (Fig. 527). Male superior anal appendages much longer than segment 10 of abdomen, closely apposed and curled downward at apex (Figs. 300-303)
 .*Paragomphus* Cowley.
 3rd cell of anal field adjacent to subtrigone extending upto base of subtrigone in hindwing. Male superior anal appendage sub-equal to segment 10 of abdomen and shaper not as above (Fig 331). .*Burmagomphus* Williamson.

Genus *Anisogomphus* Selys

Anisogomphus Selys, 1857, *Mon. Gomph.*, : 102. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 187.

Temnogomphus Laidlaw, 1922, *Rec. Indian Mus.*, 24 : 304. Fraser, 1953, *Proc. R. ent. Soc. Lond. (B)*, 22 : 190.

Type-species : *Gomphus occipitalis* Selys.

Selys (1857) established *Anisogomphus* as a 'group' within the genus *Gomphus* Leach and incorporated 2 species under this group. Later *Anisogomphus* was elevated to generic rank by Kirby (1890). Its concept further elaborated through contributions specially by Williamson (1907), Laidlaw (1922a), Fraser (1923a, 1926b, 1940), Lieftinck (1949b), Chao (1954) and Asahina (1965). In recent times St. Quentin (1970), Kumar (1972c, 1973b) and Sahni (1972) published accounts of different species of this genus occurring in Indian region.

Remarks : Laidlaw (1922a) erected the genus *Temnogomphus* with *Anisogomphus bivittatus* (Selys) as type-species and distinguished his new genus from *Anisogomphus* Selys by the presence of an incomplete basal antenodal cross vein in all wings. Fraser (1934) pointed out that, the character used by Laidlaw for separating *Temnogomphus* from *Anisogomphus* was a highly variable one and therefore considered *Temnogomphus* Laidlaw and *Anisogomphus* Selys congeneric. But Fraser (1953a) again while reviving *Temnogomphus* for Laidlaw's type-species and *A. orites* Laidlaw stated that *Temnogomphus* differed from *Anisogomphus* in having only one cubital cross vein in contrast to 2 such in *Anisogomphus* Selys.

It is interesting to note that, in the same work (p. 190), Fraser pointed out the variation in the number of cubital cross vein even in one female examined by him for each of *A. orites* Laidlaw and *A. caudalis* Fraser, but considered such variation as aberration.

In the specimens of *A. caudalis* Fraser under study it is found that basal incomplete antenodal cross vein may or may not be present and cubital cross vein may or may not be duplicated. Thus it is observed that, the characters used for separation of the two genera are highly variable. Therefore, Fraser's (1934) opinion regarding the status of *Temnogomphus* is upheld in this work.

Diagnostic characters : Medium to large in size (usually abdomen 31.0-52.0 mm, hindwing 30.0-36.0 mm) ; black marked with yellow ; hind femora armed with evenly spaced much larger spines on distal half of

males and 8-10 pair on distal two third of females ; male anal appendages shorter than segment 10 of abdomen ; superiors more or less narrowing towards apex, parallel or a little diverticate and armed with ventral protuberance near base ; inferior very deeply and broadly bifid, the two branches widely diverging and upturned at apex ; male genitalia with lamina deeply and broadly arched, slightly emerginate ; hamules variable, anteriors short and slender, posteriors much larger and robust ; vesicle large ; 2nd segment of penis with large lateral folds, occasionally spon-like in profile, the median lobes sometimes terminating in a pair of small flagella ; vulver scale short, triangular, cleft for about one third its length at apex and extending at most upto basal one third of segment 9 of abdomen. Wings with tornus rounded in both sexes or slightly angulated in males ; usually 13-20 antenodal and 9-15 postnodal cross veins present ; 1st and any one of 6th, 7th and 8th cross veins form primary antenodals ; basal incomplete antenodal cross vein present, or absent ; pterostigma elongated, about 4-5 times as long as broad, a little swollen medially, braced ; discoidal cells entire, situated at a point which is about one cell distal to the level of arc ; the same in forewing with costal margin subequal to basal margin and three fourth as long as distal margin, in hindwing with costal margin about one and one third as long as basal margin and slightly shorter than distal margin ; hyperitrigone shorter than the space between nodus and origin of $1R_3$ in hindwing ; subtrigone covering parts of 3 cells of adjacent anal field at its inner side in hindwing ; 3rd cell of adjacent anal field from wing base extending to base of subtrigone in hindwing ; discoidal field beginning with a row of 2 cells and not widening upto 4 rows of cells proximal to the level of nodus in hindwing ; arc situated between the 2nd and 3rd or at the level of 3rd antenodal cross vein ; anal triangle 3 celled ; anal loop absent ; 1 or 2 cubital cross veins in forewing, 1 in hindwing besides the one forming base of subtrigone ; 1A pectinate in forewing ; 1 or 2 rows of postanal cells in forewing and 4 rows in hindwing ; 2-4 cross veins between sectors of arc in forewing, 1 or 2 in hindwing between arc and the point of bifurcation of R_s .

Distribution : India ; Nepal ; China.

Anisogomphus caudalis Fraser
(Figs. 15, 327-329, 334 and 368-369)

Anisogomphus caudalis Fraser, 1926, *J. Bombay nat. Hist. Soc.*, **31** : 424 ; 1934, *Fauna Brit. India., Odon.*, : 2 : 196.

Material studied : 1 ♂, 1 ♀, Old Barapani roadside, 6.vi.1973, coll ARL ; 1 ♀, Shillong, 26.iv.1973, coll RZ.

Measurements (in mm) and Nodal index

	Length of		forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂	37.0	31.0	18-20	11-12	14	12
♀ ♀	34.5-35.5	32.5-33.5	17-18	13-15	11-13	12-14

Description : Female : Closely similar to male in colouration and markings but differing as follows : Labium with middle lobe almost entirely black ; labrum black, with a pair of large suboval and subbasal greenish yellow spots ; postclypeus black ; posterior margin of occiput slightly emerginate. Prothorax with additional greenish yellow markings on anterior middle and posterior lobes. Wings palely suffused with brown up to arc ; 1st and 6th or 7th of the antenodals in forewing primary ; 1 cubital and 1 incomplete antenodal cross vein in either wing. Abdomen : segment 2 with a mid-dorsal stripe which slightly narrowing towards apex and a complete moderately broad stripe on either side ; segments 7 and 8 with or without any trace of subapical lateral spot ; segment 8 with mid-dorsal carinal stripe extending more than half way from base ; segment 9 with a small rounded subapical spot. Anal appendages greenish yellow ; vulver scale (Figs. 334) black.

Notes : The hitherto undescribed female has been described above.

The single male under study varies from the description of the species provided by Fraser (1934) in the following : (i) middle lobe of labium greenish yellow on basal half ; (ii) postclypeus with an additional median greenish yellow spot ; (iii) absence of basal incomplete cross vein ; (iv) 2 and 1 cubital cross vein in fore- and hindwing respectively ; (v) segment 8 of abdomen unmarked on dorsum.

So far known, the species is restricted to central Khasi hills in Meghalaya. A pair collected at Old Barapnai roadside was noticed to settle over a patch of thorny bushes near a rolling stream.

Distribution : India : Meghalaya, Uttar Pradesh.

Genus *Burmagomphus* Williamson

Burmagomphus Williamson, 1907, *Proc. U. S. Nat. Mus.*, 33 : 298. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 211.

Type-species : *Burmagomphus arboreus* Lieftinck*

Williamson (1907) established this genus for 3 males which were then considered as males of *Gomphus vermiculatus* Martin. Subsequently the generic concept was further elaborated when the type-species was re-named and there was addition of a number of species. This was due to the contributions chiefly of Laidlaw (1922a, 1930), Fraser (1923a, c, 1924b, 1926c, 1931, 1933d, 1934, 1940), Lieftinck (1940 b, 1953a, 1954) and Chao (1955). A few Indian species have recently been dealt with by Kumar (1972c, 1973b).

Diagnostic characters : Medium in size (usually abdomen 25.0-35.0 mm, hindwing 21.0-31.0 mm) ; black, marked with yellow ; hind femora armed only with closely set small spines ; male anal appendages subequal to segment 10 of abdomen ; superiors parallel or divergent, tapered to apex, sometimes twisted, 1-2 angulations on outer surface ; branches of the inferior broadly triangular ; male genitalia with lamina arched and depressed ; anterior hamules short, slim and curved ; posteriors very large, broad, flattened, armed with forwardly directed spines on outer border and sometimes long hairs distally ; vesicle long, tumid, rounded and shallowly grooved in front ; 2nd segment of penis with its median lobe extended into a very long, whip like flagella ; vulver scale triangular, bifid, sometimes ending in two long narrow processes extending at least upto basal two third the length of segment 9 of abdomen. Wings with tornus angulated in males, rounded in females ; usually 8-16 antenodal and 6-13 postnodal cross veins ; the 1st and either 4th or 5th antenodals form primary ; basal incomplete antenodal cross vein usually absent ; pterostigma elongated ; about 3-5 times as long as broad, slightly swollen medially, braced ; discoidal cells entire ; situated at a point which is one cell distal to the level of arc ; the same in forewing with costal margin subequal to basal margin and three fourth the length of distal margin, in hindwing with the costal margin subequal to distal margin and nearly twice the length of basal margin ; hypertrigone as long as or longer than the space between nodus and origin of $1R_3$ in hindwing ; subtrigone covering parts of 2 cells of adjacent anal at its inner side in hindwing ; 3rd cell of adjacent anal field from wing base extending to base of subtrigone in hindwing ; discoidal field not widening upto 4 rows of cells proximal. to level of nodus in hindwing ; arc situated between the first and 2nd or at the level of 2nd antenodal cross vein ; distal primary antenodal cross vein situated at a point which is distinctly nearer to basal primary antenodal corss vein than nodus ; anal tri-

* = *B. williamsoni* Fraser (nom. praeoc.) vide Lieftinck (1940, 1954)

angle 3 celled ; anal loop absent ; only 1 cubital cross vein in all wings, besides the one forming base of subtriangle ; IA pectinate in forewing ; upto 3 rows of postnodal cells in forewing and 4 rows in hindwing ; 2 traversing cross veins between sectors of arc in forewing, only 1 in hindwing between arc and the point of bifurcation of Rs.

Distribution : India ; China ; Sri Lanka ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia.

***Burmagomphus ? vermicularis* (Martin)**

(Figs. 330-331, 338 and 370-371)

Gomphus vermicularis Martin, 1904, *Mission Pavie, Zool.*, 3 : 214.

Burmagomphus vermicularis (Martin) : Lieftinck, 1964, *Zool. Verh.*, 69 : 15.

Material studied 2 ♀♀, Ranikor, 10.xii.1977, coll ARL ; 1 ♀, Sumer, 21.iv.1973, coll RSP ; 3 exs, Umran (1 ♂, 1 ♀, 18.v.1967, coll RKV ; 1 ♂, 13.v.1972, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	33.5	27.0-29.0	13-14	10-11	9-10	10-11
♀♀	34.5-37.0	29.0-30.0	11-14	10-11	9-10	9-10

Description : Male : Labium greenish yellow, apical half of middle lobe and tips of lateral lobes blackish brown ; base of mandibles greenish yellow ; rest of head blackish brown but marked with greenish yellow as follows : a subrectangular spot on either side of base of labrum, narrow basal line on anteclypeus, a small rounded spot on outer corner of postclypeus, a narrow band near base of frons. A strong ridge connecting lateral ocelli. Prothorax blackish brown, the sides as well as anterior and posterior lobes narrowly greenish yellow. Synthorax blackish brown on dorsum and sides upto humeral suture, marked with greenish yellow as follows : a complete mesothoracic collar, a small spot on the alar sinus, an oblique stripe beginning close to mid-dorsal carina and alar sinus and running outwards and downwards up the 2nd pairs of legs, the stripe being broad at middle and narrow basad and distad ; an upper rounded humeral spot close to alar sinus ; greenish yellow on sides and beneath, marked with a complete blackish brown stripe on posterolateral suture and another stripe broadly interrupted at middle on anterolateral suture. Legs brownish, femora paler at middle, all coxae greenish yellow outwardly, Wings

hyaline, membrane whitish, pterostigma whitish within thick yellow nervures, covering $3\frac{1}{2}$ -4 cells in forewing and $4\frac{1}{2}$ -5 cells in hindwing ; cells beneath pterostigma narrowly opaque yellowish along the length of pterostigma ; 1st and 5th antenodals in all wings primary. All veins, specially those of anal field bearing minute spicules. Abdomen blackish brown marked with greenish yellow as follows : dorsum of segment 1 at apex besides sides and ventre ; broad basal annule confluent narrowly along ventrolateral border with a larger lateral apical spot on segment 2 ; broad basal annules expanded to a small basolateral triangular spot on each of segments 2-7 ; large dorsal apical spot on segment 9 ; remaining segments unmarked. Anal appendages (Fig. 331) greenish yellow, superiors blackish at base ; superiors broad on basal half, outer margin elbowed at this point and then tapering to a fine point at apex, with a small tooth a little after the elbow ; inferior with branches sharply upturned into a small black tooth at apex. Genitalia blackish brown, as in Fig. 330 ; anterior hamules small stilet-like processes, posterior hamules long and curved with forwardly directed spine on outer corner ; lobe deeply notched. Penis as in Fig. 370-371.

Female : almost similar to males in colouration and marking but differing as follows : The ridge between lateral ocelli stronger. Apical annule of segment 1 broader, basal annule of segment 2 more broadly confluent laterally with lateral apical spot ; basal annules not expanded as basolateral triangular spots on segments 4-7, narrowly interrupted on mid-dorsum of segment 6 and also on apical half of segment 7- ; segments 4 and 5 with elongated lateral spots between basal annules and apex ; segment 8 with the apical spot interrupted on mid-dorsum. Anal appendages blackish brown ; vulver scale (Fig. 338) triangular and deeply bifid.

In Ranikor specimens ground colour black, markings green, and lateral spot on segments 4 and 5 of abdomen absent.

Notes : The specimens under study come very near to *B. vermicularis* (Martin) in respect of male anal appendages ; but they differ from the same in size, detail shape of the male genitalia and in the absence of median spine on hind border of segment 9 of abdomen. In view of these rather marked differences this species has been treated here as *vermicularis* (Martin) with doubt. Late Dr. Lieftinck when requested for opinion on the identity of the species considered the females as conspecific with *B. vermicularis* (Martin), but the males as doubtful.

This species appears to be restricted only in the southern parts of Khasi hills in Meghalaya. The specimens were collected near a stream in a comparatively open habitat.

Distribution : India : Meghalaya.

Genus **Gomphus** Leach

Aeshna Fabricius, 1775, *Ent. Syst.* : 424 (Partim).

Gomphus Leach, 1815, *Edinb. Encycl.*, 9 : 137. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 197.

Type-species : *Libullula vulgatissima* Linnaeus

Corbet et. al (1960) stated that Leach 'separated *Gomphus*. from *Libellula*. Leach's formal and very brief account was later elucidated by Selys (1840, 1850, 1854b, 1858, 1878c and 1883a.), Rambur (1842) and Hagen (1861) when a number of new species were transferred from different genera. In the present century important contributions on this genus are chiefly those of Williamson (1907), Laidlaw (1922a, 1930), Fraser (1923a, c, 1925c, 1934, 1940) Asahina (1949, 1951, 1956b) and Chao (1953).

Diagnostic characters : Large in size (usually abdomen 26.0-53.0 mm, hindwing 26.0-42.0 mm) ; black, brown or maroon, marked with yellow or green ; hind femora armed only with closely set small spines ; male anal appendages subequal to or slightly longer than segment 10 of abdomen, superiors divergent, gradually narrowed from base to apex, the apex sometimes notched ; inferior cleft nearly to base, each branch similar to superiors, but broader and upturned at apex ; male genitalia with lamina arched and slightly emerginate ; anterior hamules slim, narrowed to apex ; posteriors very large with pointed apex and recurved basad ; vesicle large, long and flusk shaped with outer border slightly notched midially ; 2nd segment of penis with moderately long and closely apposed median lobes ; vulver scale variable, rudimentary or broadly triangular and bifid at apex and then extending upto basal half or more than basal half of segment 9 of abdomen. Wings with tornus angulated in males, rounded in females ; usually 10-20 antenodal cross veins in forewing, 8-11 in hindwing and 7-15 postnodal cross veins in either wing ; basal incomplete antenodal cross vein present or absent ; the 1st and any one of 4th to 7th cross veins form primary antenodals ; pterostigma elongated, about 4 times as long as broad, slightly swollen medially, sometimes braced ; discoidal cells entire, situated at a point which is about one cell distal to the level of arc ; the same with costal margin shorter than distal margin and about one and one

fourth as long as the basal margin in forewing, nearly one and a half time as long as the basal margin in hindwing ; hypertrigone subequal to the space between nodus and the point of origin of $1R_3$ in hindwing ; subtrigone covering parts of 2 cells of adjacent anal field at its inner side in hindwing ; 3rd cell of adjacent anal field from wing base extending to base of subtrigone in hindwing ; discoidal field widening upto 4 rows of cells a little proximal to the level of nodus in hindwing ; arc situated between the 1st and 2nd or at the level of 2nd antenodal cross vein ; anal triangle 3-5 celled ; anal loop absent ; only 1 cubital cross vein besides the one forming the base of subtrigone ; IA pectinate in forewing ; upto 3 rows of post-anal cells in forewing and 5 rows in hindwing ; 1-3 cross veins between sectors of arc in forewing, 1 or 2 in hindwing, between arc and the point bifurcation of Rs.

Distribution : Virtually cosmopolitan in north America, Europe and Asian Countries.

Gomphus personatus Selys

(Figs. 324-326, 341 and 366-367)

Gomphus personatus Selys, 1873, *Bull. Acad. Belg. Sci.*, (2), 36 : 497. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 200.

Material studied : 1 ♂, 1 ♀, Mawpat, 14.vii.1967, coll RKV ; 1 ♀, Mawphlong, 26.iv.1972, coll SB ; 1 ♂, Nongpoh, 11.iv.1978, coll ARL ; 3 exs, Shillong (1 ♀, 25.v.1968, coll RKV ; 1 ♂, 24.v.1974, coll ARL ; 1 ♀, 3.vii.1975, coll RSG) ; 4 exs, Upper Shillong (1 ♀, 3.vi.1967, coll RKV ; 1 ♀, 13.vi.1967, coll RKV ; 1 ♂, 1 ♀, 24.vi.1974, coll ARL) ; 1 ♂, 1 ♀, Umsning, 8.vii.1963, coll ARL.

Measurements (in mm) and Nodal index.

Length of		Forewing		Hindwing	
abdomen	hindwing	An	Pn	An	Pn
♂♂ 44.0-45.5	37.0-38.0	14-15	13	9	12
♀♀ 45.0-45.5	37.5-40.0	14-20	12-15	10-12	12-14

Notes : The specimens under study vary from the description of the species provided by Fraser (1934) in the following : (i) postclypeus unmarked in males, in 50% of females with a lateral yellow spot ; (ii) synthorax : only humeral upper spot present ; (iii) segment 3 of abdomen with a basolateral spot on either side ; (iv) hind margin of occiput of 25% of females armed with 2 or 3 spines on either side ; (v) vulver scale bifid only on apical fourth.

In Meghalaya, the species is restricted only to central Khasi hills. They are commonly found near montane streams, but occasionally far away from aquatic habitat, patrolling rapidly some distance along the streams or footpaths.

Distribution : India : Meghalaya. Outside India : Bhutan ; Burma

Genus *Merogomphus* Martin

Merogomphus Martin, 1904, *Mission Paviae, Zool.*, 3 : 214. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 309.

Indogomphus Fraser, 1922, *Rec. Indian Mus.*, 24 : 422.

Platygomphus Fraser, 1922, *Mem. Dept. Agric. India (Ent.)*, 7 : 68.

Type species : *Merogomphus paviai* Martin.

Martin (1904) established this genus along with description of its type. Since then, its generic concept has further been enlightened and there has also been addition of some more species as a result of contributions chiefly of Asahina (1968), Fraser (1934, 1940, 1953), Laidlaw (1930) and Lieftinck (1954).

Diagnostic characters : Medium in size (usually abdomen 27.0-48.0 mm, hindwing 22.0-30.0 mm) ; black, marked with greenish yellow ; hind femora armed with 5 or 6 pairs of very large and evenly spaced spines in addition to closely set small spines ; the large spines spaced over the distal half of hind femora in males, but almost over the entire hind femora in females ; male superior anal appendages subequal to or shorter than segment 10 of abdomen, divergent, sometimes curled at apex, tapering from base and with or without a basal spine ; inferior shorter than superiors, deeply and broadly cleft into widely diverticate branches ; male genitalia variable, lamina arched, depressed or emerginate ; anterior hamules directed backwards slender, narrow and curved, sometimes aboarted ; posteriors robust, sometimes with a mid-rib and ending in a recurved spine ; vesicle shaped like a spout, prominent, emerginate and sometimes cleft ; 2nd segment of penis with median lobes closely apposed and sometimes bearing a small lateral flagella on either side ; vulver scale broadly triangular and very slightly bifid at apex. and extending upto basal half of segment 9 of abdomen.

Wings with tornus angulated in males, rounded in females ; usually 14-21 antenodal cross veins in forewing, 9-14 in hindwing and 9-15 postnodal cross veins in either wing ; the 1st and one of 5th-8th cross veins form primary antenodals ; basal incomplete antenodal cross

vein usually present ; pterostigma elongated, about 4-6 times as long as broad, braced ; discoidal cells entire, situated at a point one and a half cell distal to the level of arc ; the same in forewing with costal margin subequal to basal margin and a little shorter than the distal margin, in hindwing about twice the length of basal margin and nearly as long as the distal margin ; hypertrigone as long as or longer than the space between nodus and the point of origin of IR_s in hindwing ; subtrigone covering parts of 2 cells of adjacent anal field at its inner side in hindwing ; 3rd cell of adjacent anal field from wing base extending to base of subtrigone in hindwing ; hypertrigone not widening to 4 rows of cells proximal to level of nodus in hindwing ; arc situated at the level of 2nd or between the 2nd and 3rd antenodal cross veins ; anal triangle 3 celled ; anal loop absent ; only 1 cubital cross vein in all wings besides the one forming base of subtrigone ; IA pectinate in forewing ; upto 3 rows of postanal cells in forewing, upto 4 rows in hindwing ; 3 or 4 traversing cross veins between sectors of arc in forewing, only 1 in hindwing, between arc and the point of bifurcation of Rs .

Distribution : India ; Nepal ; China ; Burma ; Indo-china (exact locality unknown) ; Malaysia ; Indonesia ; Taiwan.

Merogomphus martini (Fraser)

(Figs. 314-315, 321, 339 and 364-365)

Platygomphus martini Fraser, 1922, *Mem. Dept. Agric. India (Ent.)*, 7 : 68.

Burmagomphus duarensis Fraser, 1922, *J. Bombay nat. Hist. Soc.*, 24 : 421.

Indogomphus duarensis Fraser, 1925, *J. Bombay nat. Hist. Soc.*, 30 : 112.

Indogomphus martini Fraser, 1926, *J. Bombay nat. Hist. Soc.*, 30 : 403.

Merogomphus martini (Fraser) : Laidlaw, 1930, *Trans. Rent. Soc. Lond.*, 78 : 185. Fraser 1934, *Fauna Brit. India, Odon.*, 2 : 313.

Material studied : 1 ♂, Barapani, 31.v.1967, coll BKT ; 1 ♂, 1 ♀, Mawryngkreng, 17.vi.1970, coll SB ; 1 ♂, 1 ♀, Old Barapani roadside, 6.vi.1973, coll ARL ; 1 ♂, Umran, 26.v.1971, coll SB : 10 exs, Thadlaskein (3 ♂♂, 2 ♀♀, 3.viii.1972, coll ARL ; 2 ♂♂, 1 ♀, 4.x.1972, coll ARL ; 2 ♀♀, 17.vii.1973, coll AKG).

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	25.5-36.0	25.0-30.0	14-17	9-15	9-12	10-14
♀♀	36.0-37.0	30.0-31.0	15	10-14	10-12	10-12

Notes : The specimens under study vary from the description of the species provided by Fraser (1934) in size, nodal index and in the following (i) base of labium narrowly greenish yellow and so also outer edges of labrum ; (ii) middle lobe of prothorax bearing additional ventrolateral and dorsal geminate greenish yellow spots ; (iii) segment 2 of abdomen in male with mid-dorsal stripe not trilobed, greenish yellow basal annule on segment 4 and mid-dorsal carina of same colour on segment 8 ; (iv) in female segments 4-6 with greenish yellow basolateral triangular spots ; (v) 8-10 spines on hind margin of occiput and the frequent presence of an incomplete cross vein in all wings in female.

In Meghalaya, the species has a restricted distribution in central Khasi and Jaintia hills. In Jaintia hills, the species was collected from shrubby bushes overhanging the bank of a permanent but rather small lake at Thadlaskein. Apparently the species formed a colony there, using the lake for breeding purposes. In Khasi hills, however, the species has been, collected in deep jungles near streams.

Distribution : India : Meghalaya.

Genus *Nihonogomphus* Oguma

Nihonogomphus Oguma, 1926, *Ins. Matsumurana*, 1 : 97.

Type-species : *Nihonogomphus viridia* Oguma

Oguma (1926) established this genus along with the description of the type species. Late Dr. Lieftinck (in litt.) opined that a few Burmese *Onychogomphus* spp., e.g. *O. circularis* Selys, *O. annularis* Selys and *O. pulcherrimus* Fraser also belong to this genus.

Diagnostic characters : Medium in size (usually abdomen 33.0-43.0 mm, hindwing 28.0-38.0 mm) ; black or brown, marked with yellow, green or ochreous ; femora armed with closely set small spines ; male superior anal appendages 2-3 times as long as segment 10 of abdomen, variably forcipate as seen from dorsum, tapering or compressed apically, apex variably curved downwards ; inferior about one half the length of superiors, deeply bifid with dorsally recurved and strongly diverging branches ; male genitalia with slightly projecting lamina, concave at its free border ; hamules moderately broad with pointed recurved apex ; vesicle large and deeply notched ; 2nd segment of penis with median and lateral lobes well developed, the later narrowed apically ; vulver scale short, falling well short of segment 9, triangular, broadly and shallowly bifid at apex Wings with

tornus angulated in males, rounded in females ; usually 12-16 antenodal and 9-14 postnodal cross veins ; 1st and 5th veins form primary antenodals ; basal incomplete antenodal cross vein absent ; pterostigma about 4 times as long as broad, a little swollen medially, braced ; discoidal cells entire, situated at a point which is about one cell distal to the level of arc ; the same with its margins subequal in forewing. the basal a little shorter than the rest in hindwing ; hypertrigone shorter than the space between nodus and origin of $1R_3$ in hindwing ; subtrigone covering parts of 2 or 3 cells of adjacent anal area at its inner side in hindwing ; 3rd or 4th cell of adjacent anal area extending to base of subtrigone in hindwing ; discoidal field beginning with a row of 3 cells and not widening upto 4 rows of cells proximal to the level of nodus in hindwing ; anal triangle 4 celled ; anal loop rudimentary ; usually 1, (sometimes 2 in hindwing) cubital cross veins besides the one forming the base of subtrigone ; IA pectinate in forewing ; upto 3 rows of postanal cells in forewing, upto 4 rows in hindwing ; usually 3 traversing cross veins between sectors of arc between arc and the point of bifurcation of Rs.

Distribution : India ; Burma ; Japan.

***Nihonogomphus indicus* sp. nov.**

(Figs. 1, 9, 308-309, 316, 337, 358-359 and 525)

Material studied : Holotype ♂ and Allotype ♀, Rongrengiri, 19. iv.1973, coll ARL (Z.S.I. Registration No. 3917/H₁₃ and 3918/H₁₃).

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂ ♂	43.0	32.0	14-15	10-12	11-12	11
♀ ♀	40.0	36.0	18-20	12-14	14-15	12-14

Description : Male : Labium yellow, blackish apically ; labrum black, with a large transversely oval subbasal greenish yellow spot on either side ; bases of mandibles and anteclypeus greenish yellow ; rest of head black, marked with greenish yellow as follows : a small rounded subbasal spot near outer margin on each side and a transverse stripe running across upper surface of frons ; eyes greenish. Prothorax black with middle lobe having a sublateral greenish yellow oblong spot on each side. Synthorax (Fig. 1) black on dorsum and also laterally a little beyond humeral suture, marked with greenish yellow as follows : narrow mesotho-

racic collar slightly interrupted medially and separated from a narrower oblique antehumeral stripe on either side ; medially greenish yellow tergum having large greenish yellow spot at each wing base and a median projection extending upto the base of middorsal carina ; synthorax greenish yellow on sides and on venter with narrow black stripe on each lateral suture ; black stripe on anterolateral suture broader and ventrally confluent with its fellow from other side, the stripe also joining dorsal black colour by a line a little below spiracle ; black stripe on posterolateral suture becoming narrower downwards and obsolete at the region of spiracle. Legs black ; all coxae and trochanters on inner surfaces, anterior and posterior femora on outer lateral surface broadly striped with greenish yellow ; trochanters with minute spines on distal half of inner surface. Wings (Fig. 525) hyaline, extreme base upto 1st primary antenodal cross vein enfumed with brown ; pterostigma black covering $5\frac{1}{2}$ - $6\frac{1}{2}$ cells in forewing $4\frac{1}{2}$ - $5\frac{1}{2}$ cells in hindwing ; 1st and 5th antenodals in all wings primary. Abdomen black, marked with greenish yellow as follows : sides and venter of segment 1 besides an apical triangular spot on dorsum ; sides of segment 2 including oreillets besides a mid-dorsal stripe shaped like a wine glass ; basal annules of segments 3-7, those narrowly interrupted on mid-dorsum of segments 4-6 and much broader on segment 7 covering nearly basal half of the segment ; basal annule on segments 3-5 followed by a lanceolate mid-dorsal stripe ; a basolateral triangular spot on segment 8 and a vestige of same on segment 9 ; Anal appendages (Fig. 308-309) black, apical third and tips of inferiors greenish yellow ; superiors nearly 3 times as long as segment 10 of abdomen, curving a little downwards near apex where somewhat laterally compressed and bluntly pointed at tip ; inferior anal appendage a little more than half the length of superiors with divergent evenly narrowing branches without any tooth at base. Genitalia (Fig. 316) black ; anterior hamules hook like at end, posteriors sharply pointed and abruptly turned backwards ; lobe large, rather deeply notched medially at free border. Penis as in Figs. 358-359.

Female : Very closely similar to the male in colouration and markings, differing from the same as follow : Posterior margin of occiput (Fig. 9) yellowish and armed with a robust spine on either side. Prothorax with sides of middle lobe greenish yellow and so also a lateral spot on either side of posterior lobe. Synthorax with an additional upper greenish yellow humeral spot close to antealar sinus ; antehumeral stripe extending nearly upto base of antealar sinus. Pterostigma covering 6-7 cells in all wings ; the 1st and 5th, or 7th antenodals in forewing and 1st and 5th or 6th in hindwing primary. Mid-dorsal stripe on 2nd segment of abdomen

is trilobed ; the basal annule on 3rd segment connected to mid-dorsal lanceolate stripe by a fine mid-dorsal carinal line ; mid-dorsal lanceolate stripes shorter ; basolateral spot on segment 8 only narrow. Anal appendages greenish yellow, slightly longer than segment 10 of abdomen. Vulver scale (Fig. 337) black, broadly triangular and bifid at apex for about half its length, not extending even upto half the length of segment 9 ; ventral surface of segment 9 with a broad depressed impression extending over basal two-third, outer margin being rounded and strongly ridged.

Notes : This species comes very close to *N. circularis* (Selys) but differs from the same in details of male anal appendages, vulver scale and in the following ;

Male : (i) Superior anal appendages relatively shorter (two and a half times vs three and a half times as long as segment 10 of abdomen) ; (ii) inferior anal appendage relatively longer (two third vs less than half the length of superiors) ; (iii) larger in size ; (iv) labium yellow, blackish apically ; (v) anteclypeus greenish yellow ; (vi) postclypeus black with a subbasal spot on either side ; (vii) 2nd segment of penis with rudimentary internal lobe, the lateral lobes not expanding beyond the apex of the median lobe distally ; (viii) absence of humeral spot on synthorax.

Female : (i) smaller in size ; (ii) labium and anteclypeus as noted for males ; (iii) hind margin of occiput armed with a prominent robust spine on either side ; (iv) antehumeral stripes not confluent with mesothoracic collar ; (v) stripe on anterolateral suture well developed ; (vi) segment 8 unmarked on dorsum.

The species is restricted only at southern Garo hills in Meghalaya. The specimens were collected inside a patch of deep forest on the bank of a river having cultivated lands nearby.

Distribution : India : Meghalaya.

Genus *Onychogomphus* Selys

Onychogomphus Selys, 1854, *Bull Acad. Belg. Sci.*, (2), 21 : 30. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 239. Lieftinck, 1954, *Treubia*, 22 (suppl) : 91.

Lamelligomphus Fraser, 1922, *Rec. Indian Mus.*, 26 : 426 (partim).

Nepogomphus Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 282.

Phaenandrogomphus Lieftinck, 1964, *Zool. Verh.*, 69 : 4 ; 1969, *Dt. ent. Zeit.*, 16 : 214 (partim).

Type-species : *Libellula forcipata* Linnaeus

Selys (1854b) established *Onychogomphus* as a subgenus of *Gomphus* Leach along with description of a number of new species and also incorporated in it a few species from other genera. Kirby (1890) raised it to generic status. Since then a number of authorities worked on this genus. However, the more important publications are of Selys (1858, 1891a, 1894), Williamson (1907), Laidlaw (1922a, 1930a), Fraser (1923b, c, 1924c, 1934, 1940, 1953), Lieftinck (1937, 1941a, 1948a, 1954), Chao (1954) and Pinhey (1962). Navas (1930), Bhasin (1953), St. Quentin (1970), Bose and Mitra (1975), Prasad (1975), Kumar and Juneja (1976) and Singh and Prasad (1976a) published accounts of some species of the genus occurring in Indian region.

Diagnostic characters : Small to medium in size (usually abdomen 27.0-50.0 mm, hindwing 21.0-38.0 mm) ; black or brown marked with yellow or green ; femora armed only with closely set small spines but, those on hind femora comparatively longer at distal end ; male superior anal appendages nearly twice as long as or longer than segment 10 of abdomen, cylindrical or a little compressed laterally, forcipate, the apices variably curled ; inferior subequal to the superiors, bifid almost to base, the branches closely apposed or a little divergent, sometimes with a basal or median tooth, the apex variably curled, pointed or notched ; male genitalia with lamina projecting a little, arched ; hamules sharply pointed at apex, anteriors slim, posteriors much broader ; vesicle variable, large to very large, its free border sometimes variably notched ; 2nd segment of penis with median and lateral lobes variably developed, either or both sometimes terminating in a pair of short, slender flagella ; vulver scale variable, rudimentary or even extending beyond segment 9 of abdomen, subtriangular or variably narrowed apically. Wings with tornus angulated in males, rounded in females ; usually 9-18 antenodal and 5-14 postnodal cross veins ; 1st and either 5th or 6th cross veins form primary antenodals ; basal incomplete antenodal cross vein absent ; pterostigma elongated, about 3-5 times as long as broad, a little swollen medially, braced ; discoidal cells entire, situated at a point which is a little more than one cell distal to the level of arc ; the same with its margins subequal or with costal (in forewing) or basal (in hindwing) margin a little shorter than the rest ; hypertrigones shorter than the space between nodus and origin of 1R₅ in hindwing ; subtrigone covering parts of 2 or 3 cells of adjacent anal area at its inner side in hindwing ; usually 3rd cell of adjacent anal area extending to base of subtrigone in hindwing ; discoidal field beginning with 2 cells and not widening to 4 rows of cells proximal to the level of nodus in hindwing ; are usually situated at the level of 2nd antenodal cross vein

or a little proximal or distal to that level ; anal triangle 3 or 4 celled ; anal loop rudimentary ; usually 1 (rarely 2) cubital cross vein in all wings besides the one forming base of subtriangle ; IA usually but variably pectinate in forewing ; usually upto 3 rows of postanal cells in forewing, 4 rows in hindwing ; 2-5 traversing cross veins between sectors of arc in forewing, 1-4 in hindwing, between arc and the point of bifurcation of Rs.

Distribution : India ; Nepal ; China ; Nicobar ; Burma ; Vietnam ; Malaysia ; Indonesia ; Taiwan ; Turkey ; Iran ; Iraq ; Europe ; Africa ; Madagascar.

KEY TO THE SPECIES OF THE GENUS *ONYCHOGOMPHUS* SELYS

Male :

1. Antehumeral stripes separated from mesothoracic collar ; species smaller with hindwing 25.0 mm or less in length. *.modestus* Selys.
Antehumeral stripes confluent with mesothoracic collar ; species larger with hindwing 30.0 mm or more in length. .2
2. Anterolateral stripe on thorax vestigial ; inferior anal appendage without a basal tooth. *.aureus* Laidlaw
Anterolateral stripe on thorax well marked ; inferior anal appendage with a basal tooth. *..saundersi duaricus* Fraser

Female :

Larger species with abdomen 44.0 mm and hindwing 35.0 mm in length ; vulver scale extending to apex of abdomen. *?..maculivertex* (Selys)

Smaller species with abdomen 39.0 mm and hindwing 30.0 mm in length ; vulver scale extending nearly to apex of segment nine of abdomen. *.meghalayanus* sp. nov.

(Male of *O. ? maculivertex* (Selys) and female of *O. aureus* Laidlaw and *O. saundersi duaricus* Fraser were not available in the collection studied. Therefore, these species have not been included in the key to the male and female respectively).

***Onychogomphus aureus* Laidlaw**

(Figs. 306-307, 319 and 356-357)

Onychogomphus aureus Laidlaw, 1922, *Rec. Indian Mus.*, 24 : 406. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 254.

Phaenandrogomphus aureus (Laidlaw) : Lieftinck, 1969, *Dt. ent. Zeit.*, 16 : 214.

Material studied : 1 ♂, Songsok, 16.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂	33.0	28.0	16	12	11-14	12

Notes : Lieftinck (1969) referred *O. aureus* Laidlaw to his genus *Phaenandrogomphus* (Lieftinck, 1964). Here its original generic status has been restored in consideration of the fact that *O. aureus* Laidlaw exhibits closer affinity to the genus *Onychogomphus* Selys in respect of ground colour (greenish yellow vs pink) and armature of femora (absence of duplicate series of longer spines).

The single male specimen under study (a teneral one) varies from the description of the species provided by Fraser (1934) in size, nodal index, yellow tinge at bases of wings and preponderance of yellow ground colour.

In Meghalaya, the species is having restricted distribution only in central and southern Garo hills. The male under study was collected, near a stream, just after its emergence and not strong enough to take to rapid sustained flight.

Distribution : India : Meghalaya.

***Onychogomphus* ? *maculivertex* (Selys)**

(Fig. 335)

Leptogomphus maculivertex Selys, 1891, *Ann. Mus. civ. Genova*, (2) : 10 : 476. Fraser, 1934, *Fauna Brit. India, Odon.*, 2 : 369.

Material studied : 1 ♀, Barapani, 24.vii.1967, coll RKV

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♀	44.0	35.0	15	12	11	13

Description : Female : Labium and bases of mandibles greenish yellow ; labrum and clypeus reddish yellow ; labrum narrowly black at base and along anterior border ; postclypeus with a larger black median transverse spot ; rest of head black but marked with greenish yellow as follows : a broad median stripe across frons, a small triangular spot in between posterior ocelli and occiput ; posterior margin of occiput

shallowly concave and with a small spine on either side. Prothorax greenish yellow but marked dorsally with black as follows : a large transverse bilobed spot covering part of anterior and middle lobes and a fine line between middle and posterior lobes. Synthorax black dorsally and also laterally a little beyond humeral suture but marked with greenish yellow as follows : mid-dorsal carina ; a medially interrupted narrow mesothoracic collar confluent on either side with moderately broad oblique antehumeral stripe ; antehumeral stripe narrowed posteriorly, where the same bending anteriorly to become confluent with a still narrow but complete humeral stripe ; synthorax greenish yellow on sides and venter, but upper third of anterolateral and upper half of posterolateral suture narrowly black. Legs black but marked with greenish yellow as follows : all coxae, trochanters and either side of posterior femora. Wings hyaline, tinted with light yellow upto arculus except in anal area ; pterostigma yellow covering 5-6 cells ; 1st and 5th antenodals in all wings primary. Abdomen black, marked with greenish yellow as follows : segment 1 on sides and a triangular apical dorsal spot ; segment 2 on sides and trilobed mid-dorsal stripe ; segments 3 and 4 with a basal narrow ring confluent with mid-dorsal and ventrolateral stripes both falling short of apex of the segment ; ventrolateral stripe narrowed apically, mid-dorsal stripe broader and partly interrupted by black at jugal suture ; segments 5 and 6 similar, but ventrolateral stripes widely confluent beyond jugal suture not confluent with basal annule ; sides of segments 8 and 9 and whole of segment 10 greenish yellow, Anal appendages greenish yellow, slightly shorter than segment 10 of abdomen. Vulver scale (Fig. 336) large, extending slightly beyond apex of abdominal segment 10, yellow, blackish on apical third, strongly grooved lengthwise, narrowed on apical half, slightly bifid with few hairs at paex.

Notes : Late Dr. Lieftinck, when requested for opinion on the identity of the specimen considered it as *O. maculivertex* (Selys) suggesting thereby, a change in the generic status of the species from *Leptogomphus* Selys to *Onychogomphus* Selys and his opinion has been uphold here. Although the specimen studied comes close to *O. maculivertex* (Selys) in the shape of the vulver scale, but is much larger (abdomen 44.0 mm vs 33.0 mm, and hindwing 35.0 mm vs 31.0 mm). It also differs from *maculivertex* in having more elaborate greenish yellow markings and a complete humeral stripe.

Only one female specimen of this species was collected near Barapani lake in central Khasi hills.

Distribution : India : Meghalaya. Outside India : Burma.

***Onychogomphus meghalayanus* sp. nov.**

(Fig. 336 and 529)

Material studied : Holotype ♀, Rongrengiri, 19.iv.1973, coll ARL (Z.S.I. Registration No. 3919/H₁₃).

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♀	38.0	31.0	15-17	11	11-13	11-12

Description : Female : Labium, Labrum, bases of mandibles and anteclypeus greenish yellow ; labium black at apices, labrum finely black at base and narrowly so at apex with a median projection that fails to reach the basal line ; rest of head black, marked with greenish yellow as follows : a large basal triangular spot on either side of postclypeus ; a broad but medially interrupted stripe traversing crest of frons ; a median patch against each eye beneath head ; eyes greenish, dark brown in preserved specimen. Protohrax greenish yellow, the posterior lobe and sides of mid-lobe ventrally blackish. Synthorax black on dorsum and laterally upto a little below the humeral suture marked with greenish yellow as follows : a moderately broad medially interrupted mesothoracic collar confluent on either end with equally broad antehumeral stripe extending to base of antealar sinus ; a narrow humeral stripe broken into an isolated upper spot lying above the humeral suture ; greenish yellow on sides and beneath except at upper third of anterolateral suture which is finely black. Legs black but coxae, trochanters and inner surface of femora greenish yellow. Wings hyaline, palely tinted with golden yellow as far as arculus at base ; pterostigma yellow, framed in brown nervures, covering $5\frac{1}{2}$ cells in forewing and $4\frac{1}{2}$ - $5\frac{1}{2}$ cells in hindwing ; the first and fifth antenodals in forewing, the first and fifth or sixth antenodals in hindwing primary. Abdomen greenish yellow, marked with black as follows : sublateral blackish stripes on segment 2 falling short of base and apex of the segment ; segments 2-7 with apical broad annules confluent with ventrolateral stripes and variably developed mid-dorsal stripes ; segment 8 entirely and basal half of segment 9 black. Anal appendages slightly longer than segment 10 of abdomen, greenish yellow. Vulver scale (Fig. 336) blackish, extending over basal two third of segment 9, somewhat fusiform and slightly bifid at paex.

Notes : From closely related species of the genus *O. meghalayanus* sp. nov. differs in having very restricted black markings and in the shape of its well developed vulver scale.

So far known *P. meghalayanus* sp. nov. is restricted to southern Garo hills where the type was collected near the outskirts of a forest on the bank of a river.

Distribution : India ; Maghalaya.

***Onychogomphus modestus* Selys**
(Figs. 312-313, 318 and 362-363)

Onychogomphus modestus Selys, 1878, *Bull Acad. Belg. Sci* (2), 46 : 423. Lieftinck, 1954, *Treubia*, 22 (Suppl), : 91.

Onychogomphus diminutivus Draser, 1934, *J. Bombay nat. Hist. Soc. Soc.*, 30 : 110.

Nepogomphus modestus (Selys) : Fraser, 1934, *Fauna Brit. India, Odon*, 2 : 284.

Material studied : 1 ♂, Barapani, 17.viii.1968, coll RKV ; 1 ♂, Umran, 12.ix.1967, coll RKV

Measurements (in mm) and Nodal index.

Length of		Forewing		Hindwing	
abdomen	hindwing	An	Pn	An	Pn
♂♂ 30.5-34.0	23.5-24.5	13-14	10-11	9-10	10-11

Notes : The material studied vary from the description of the species provided by Fraser (1934) in having longer abdomen and abdominal segments 3-6 marked only with basal spots.

In Meghalaya the species is restricted only to central and southern Khasi hills. The specimens were collected from forested areas near streams.

Distribution : India : Himachal Pradesh ; Meghalaya ; Uttar Pradesh.

***Onychogomphus saundersii duaricus* Fraser**
(Figs. 310-311, 317 and 360-361)

Onychogomphus duaricus Fraser, 1924, *J. Bombay nat. Hist. Soc.*, 29 : 10001 ; 1934, *Fauna Brit. India, Odon.*, 2 : 245.

Onychogomphus saundersii duaricus Fraser : Tyagi, 1977, *Odonatologica*, 6 : 278.

Material studied : 1 ♂, Rongrengiri, 19.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

Length of		Forewing		Hindwing	
abdomen	hindwing	An	Pn	An	Pn
♂ 39.0	30.0	14-16	10-11	11	11-13

Notes : Fraser (1924c) described *duaricus* as a distinct species and treated the same in further details in Fauna of British India volume (Fraser, 1934). However, Late Dr. Lieftinck (in litt.) and Tyagi (1977) considered it as a subspecies of *O. saundersii* Selys, 1851.

The single male studied varies from the description of *duaricus* provided by Fraser (1934) in size, in nodal index and in the following : (i) anteclypeus black ; (ii) dorsal carina of synthorax unmarked with yellow ; (iii) distal half of inner lateral surface of middle femora greenish yellow ; (iv) pterostigma yellow, covering 4 cells ; (v) segment 1 of abdomen yellow unmarked with black ; (vi) mid dorsal stripe on segment 2 trilobed ; (vii) abdominal segments 3-6 with large dorsolateral yellow spots at base ; (viii) abdominal segment 6 with a small mid dorsal yellow spot ; (ix) segment 7 with dorsal spot at base.

The species is restricted to only southern Garo hills in Meghalaya. The specimen was collected while perching on shrubs at the fringe of a forest on a river bank.

Distribution : India : Meghalaya, West Bengal.

Genus *Paragomphus* Cowley

Mesogomphus Forster, 1905, *Jahrb. Nassau. Ver Naturk., Wiesb.*, **59** : 323. Fraser, 1934, *Fauna Brit, India., Odon.*, **2** : 228.

Paragomphus Cowley, 1934, *Entomologist*, **67** : 201.

Type-species : *Mesogomphus nguelicus* Forster*

The genus was proposed by Forster (1906a) under the name *Mesogomphus* with *Gomphus cognatus* Rambur as the type-species. Later, the generic name was changed, its concept further enlightened and there

* Gloyd (1983) in correcting Cowley's (1934) selection of type species, still considered *Gomphus cognatus* Rambur to be the type-species following Pinhey's (1962) observation that *Mesogomphus nguelicus* Forster is a variety of *G. cognatus* Rambur. However, Gloyd (in litt.) informed present worker Mr. Neville's suggestion that *M. nguelicus* Forster remains the type-species of *Paragomphus* Cowley irrespective of its taxonomic status.

has also been addition of a number of species as a result of contributions Chiefly of Fraser (1924c, 1934, 1940), Laidlaw (1930), Cowley (1934), Chao (1953), Lieftinck (1954, 1955a, 1971a) and Pinhey (1962). Bhasin (1953), St. Quentin (1970), Kumar (1922c, 1973b), Prasad (1976a), Singh and Prasad (1976a) and Prasad and Kumar (1977b) dealt with certain species of this genus occurring in Indian region in recent times.

Diagnostic characters : Medium in size (usually abdomen 27.0-40.0 mm, hindwing 24.0-31.0 mm) ; black marked with greenish yellow or orange ; femora armed only with closely set small spines ; segments 8 and 9 of abdomen in male with broad lateral extensions ; male superior anal appendages nearly twice as long as segment 10 of abdomen, closely apposed, basal half flattened, thereafter curled strongly downwards and narrowing towards apex ; inferior less than half the length of superiors, bifid nearly to base, the branches closely apposed, curled first downward and then upward, shallowly notched at apex ; male genitalia with lamina depressed, broadly arched ; hamules sloping blackwards, somewhat flattened, narrowing to and curled at apex, anteriors short, the posteriors much broader and longer, armed at apical third with a small spine on inner surface ; vesicle spout like, deeply emerginate ; 2nd segment of penis with median lobe terminating in a pair of long flagella ; vulver scale broadly triangular, extending upto basal third of segment 9 of abdomen, notched at apex for at most the apical half ; ventral surface of segment 9 of abdomen with a broad depression around the vulver scale, extending upto basal two third of the segment, with strongly ridged outer margin. Wings with tornus angulated in males, rounded in females ; usually 12-16 antenodal cross veins in forewing, 9-11 in hindwing and 6-10 postnodal cross veins ; 1st and 5th cross veins form primary antenodals ; basal incomplete cross vein absent ; pterostigma elongated, about 5-6 times as long as broad, a little swollen medially, braced ; discoidal cells entire situated at a point which is one cell distal to the level of arc, with costal and basal margins respectively subequal and a little shorter than the distal margin ; hyapertigone subequal or longer than the space between nodus and origin of $1R_3$ in hindwing ; subtriagones covering parts of 2 cells of adjacent anal area at its inner side in hindwing ; 4th cell of adjacent anal area from wing base extending to base of subtrigone in hindwing ; discoidal field not widening upto 4 rows of cells proximal to the level of nodus in hindwing ; distal primary antenodal cross vein situated at a point which is distinctly nearer to basal primary antenodal cross vein than nodus ; anal triangle 4-5 celled ; anal loop absent ; only 1 cubital cross vein in all wings, besides the one forming base of subtrigone ; IA pectinate in forewing ; upto 3 rows of post-

anal cells in forewing and 4 rows in hindwing ; 2 or 3 traversing cross veins between sectors of arc in foresing, 1 in hindwing, between arc and the point of birufcation of Rs.

Distribution : India ; Nepal ; China ; Sri Lanka ; Burma ; Malaysia ; Indonesia ; Africa ; Madagascar.

KEY TO THE SPECIES OF THE GENUS *PARAGOMPHUS* COWLEY
(EITHER SEX)

Synthorax on either side marked by 3 narrow parallel balck stripes ; pterostigma greenish yellow *.lineatus* (Selys))
Synthorax marked by a median broad black stripe on either side ; pterostigma black. *.echinooccipitalis* (Fraser)

***Paragomphus echinooccipitalis* (Fraser)**
(Figs. 300-301, 323, 332, 350-351 and 527)

Onychogomphus echinooccipitalis Fraser, 1922, *Mem. Dep. Agric. India (Ent.)*, 7 : 75 ; 1934, *Fauna Brit. India, Odon*, 2 : 287

Material studied : 1 ♂, Rongrengiri, 25.iv.1973, coll ARL ; 1 ♂, 1 ♀, Songsok, 15.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	36.5-39.5	26.0-27.0	13-14	6-7	9-10	7-8
♀	33.0	26.0	13-14	8	10	8

Description : Male : labium and labrum greenish yellow ; labrum broadly black at base, black mark extended forward as a marginal line along sides ; bases of mandibles and clypeus greenish yellow with a transverse black band running along anterior margin of post clypeus ; rest of head black with a large oval dorsal greenish yelllw spot on either side of frons ; 10-14 minute spines arranged in 2-3 rows across frons just behind crest ; occiput armed with 1-3 minute spines on either side of posterior margin ; eyes dark brown in preserved specimen, greenish in life. Prothorax black. Synthorax black, yellowish beneath and marked with gree-nish yellow as follow : a broad mesothoracic collar interrupted narrowly and medially ; a short oblique antehumeral stripe close to mid-dorsal ca-rina at upper end and falling well short of alar sinus and outer end of meso-thoracic collar ; an upper triangular humeral spot almost apposed to alar

sinus ; in one specimen traces of lower humeral line separated from upper spot ; two broad lateral stripes, one between humeral and 1st lateral suture and broken into a small spot below just above 2nd pairs of legs and another covering large part of middle of metepimeron. Legs black ; all coxae, inner surface of anterior femora except at its distal end and outer lateral surface of anterior and posterior femora except at proximal and distal ends greenish yellow. Wings (Fig. 527) hyaline, costa greenish yellow from base to proximal end of pterostigma ; membrane blackish, short ; anal triangle 5 celled, but only 4-celled in left hindwing of one specimen ; pterostigma black covering $4\frac{1}{2}$ - $5\frac{1}{2}$ cells ; 1st and 5th antenodals primary. Abdomen black, marked with greenish yellow as follows : segment 1 with an apical annule broadly interrupted on sides and in one specimen also on dorsum ; segment 2 with broad mid dorsal and ventrolateral stripes, the latter falling short of base of the segment ; in one specimen mid dorsal stripe of even width, but in other roughly trilobed, basal lobe being much larger than other two ; segment 3 with a large dorsal and a small ventrolateral triangular spot on either side at base ; segments 4-7 with broad basal annules ; spots and annules at bases of segments 3-7 extending upto jugal suture beneath, but crossing that level on dorsum of segments ; segment 8 with a small basolateral spot, segment 9 with a ventrolateral narrow stripe and segment 10 with a small dorsal subapical spot. Anal appendages (Figs. 300-301) black, superiors yellowish on inner side on basal two this in one specimen ; inferior slightly more than one third the length of superiors. Genitalia (Fig. 323) black ; lobe very deeply notched at its outer border. Penis as in Figs. 350-351.

Female : closely similar to male in colouration and markings but differing from the same as follows : Postclypeus broadly black medially ; frons with only one minute spine on either side behind crest ; occiput yellowish. Synthorax without either humeral spot or lower line of the same. Apical annule on segment 1 of abdomen broadly interrupted on sides ; segment 2 with mid dorsal stripe narrower and with an additional oblique lateral stripe ascending slightly posteriorly and falling short of base ; segment 9 with a small basolateral spot ; segment 10 black, unmarked. Anal appendages and vulver scale (Fig. 332) black, the latter very broadly cleft at middle on apical third.

Notes : The material studied was identified by the writer as *P. henryi* (Laidlaw) and sent to Late Dr. Lieftinck for confirmation. He then informed that the material belong to *P. echinoccipitalis* (Fraser). Incidentally, it may be mentioned that *P. echinoccipitalis* so far known, belonged to the

genus *Onychogomphus* Selys. Both sexes have been described here in view of the fact that, the male was unknown so far and the female, although considered conspecific with the type by Late Dr. Lieftinck, show some marked variations from the published account of the species.

So far known, the species has a restricted distribution only in northern Garo hills at lower altitude. The specimens were collected near streams passing through light forest.

Distribution : India : Meghalaya.

***Paragomphus lineatus* (Selys)**

(Figs. 302-303, 322, 333 and 352-353)

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

Onychogomphus luneatus Selys, 1854, *Bull. Acad. Bldg., Sci.*, 21 (2) : 36

Lindenia lineata Kirby, 1890, *Syn. Cat. Neur. Odon.* : 59.

Macrogomphus lneatus (Selys) : Fraser, 1924, *Rec. Indian Mus.*, 26 : 477, 1934, *Fauna Brit. India, Odon.*, 2 : 230.

Material studied : 1 ♀, Charikuty, 4.xi.1973, coll SB ; 1 ♂, 1 ♀, Rongrengiri, 20.iv.1973, coll ARL ; 3 ♂♂, 1 ♀, Songsok, 14.17.iv.1973, coll ARL ; 2 ♂♂, Wageasi, 8.iv.1973, coll ARL.

Measurements (in mm) and Nodal indes.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	38.5-39.0	25.0-25.5	13-14	6-7	9	7-8
♀♀	34.0-35.0	26.0-27.0	13-14	6-7	10	7-8

Notes : The species is recorded for the first time from Meghalaya. Examined specimens of both sexes vary from the description of the species provided by Fraser (1934) in having on either side 7-8 small black spines in a row on upper surface of frons just behind the crest, but often with a row of 2-3 spines lying posteriorly ; fewer spines on vertex in males, 3-8 in females. The males also vary in having longer abdomen.

So far known, the species is restricted to Meghalaya in the lower altitude of northern Garo hills. They were found near streams, often settling on sandy shores of the streams and then becoming very inconspicuous on account of dull body colour.

Distribution : India : Himachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Punjab, Tamil Nadu, Uttar Pradesh and Bengal (exact locality unknown). Outside India : Nepal ; Burma.

Genus *Perissogomphus* Laidlaw

Perissogomphus Laidlaw, 1922, *Rec. Indian Mus.*, **24** : 384. Fraser, 1934, *Fauna Brit. India, Odon*, **2** : 319

Type-species : *Perissogomphus stevensi* Laidlaw.

Laidlaw (1922 a) established this genus along with description of its type-species. Since then, some more contributions on this genus have been made by Fraser (1923b, c, 1926d, 1934, 1940) and Laidlaw (1930).

Diagnostic characters : Medium in size (usually abdomen 36.0-43.0 mm, hindwing 33.0-38.0 mm) ; green or yellowish, marked with brown and black ; male superior anal appendages subequal to segment 10 of abdomen, divergent, narrowed to an acute apex ; inferior about two-third the length of superiors, deeply cleft into two short, conical, divergent branches ; male genitalia with lamina narrowly and deeply arched, projected prominently ; long, narrow anterior hamules, terminating in fine, backwardly curved spines ; posteriors much more robust, stout at base, terminating in a robust, forwardly directed spines ; vesicle shaped like a pitcher, with its spout strongly emerginate ; 2nd segment of penis with median lobe terminating in a pair of moderately long divergent flagella ; vulver scale short, extending upto less than basal half of segment 9 of abdomen, cleft at apex into a pair of short, somewhat ungulate, subtriangular processes. Wings hyaline, sometimes enfumed, base with a yellowish tint ; tornus angulated in males, rounded in females ; usually 16-19 antenodal cross veins in fore- wing, 12-14 in hindwing, and 11-14 postnodal cross veins ; the 1st and any one of 6th or 7th cross veins form primary antenodals ; no basal incomplete antenodal cross vein present ; pterostigma elongated, about 5-6 times as long as broad, a little swollen medially, braced ; discoidal cells transversely traversed once in hindwing, entire in forewing (often vice versa or entire in all wings) and situated at a point which is one and a half cells distal to the level of arc ; the same with costal margin a little shorter than the distal and subequal to basall margin in forewing, about one and a half times as long as basal margin in hindwing ; hypertrigone shorter than the space between nodus and origin of 1R₃ in hindwing ; subtrigone covering parts of 2 cells of adjacent anal area in hindwing ; 4th cell of adjacent anal area from wing base extending to base of subtri-

gone in hindwing ; discoidal field widening upto 4 rows of cells a little proximal to the level of nodus in hindwing ; arc situated at the 2nd or between the 2nd and 3rd antenodal cross veins ; anal triangle 4 celled ; anal loop rudimentary ; 2-3 cubital cross veins in all wings besides the one forming base of subtrigone ; IA pectinate in forewing ; upto 4 rows of postanal cells in forewing and 5 rows in hindwing ; 4-5 traversing cross veins between arc and the point of bifurcation of Rs.

Distribution : India.

Perissogomphus stevensi Laidlaw
(Figs. 340 and 528)

Perissogomphus stevensi Laidlaw, 1922, *Rec. Indian Mus.*, **24** : 384. Fraser, 1934, *Fauna Brit. India. Odon.*, **2** : 321.

Material studied : 1 ♀, Upper Shillong, 13.vi.1967, coll RKV

Measurements (in mm) and Nodal index.

Length of		Forewing		Hindwing	
abdomen	hindwing	An	Pn	An	Pn
♀ 43.0	34.0	17-19	11-12	13-14	12-13

Description : Female : Labium reddish yellow, middle lobe on distal third and lateral lobes at tips black ; bases of mandibles and anteclypeus greenish yellow ; labrum pale brown but narrowly blackish along anterior border ; frons pale brown but dorsally greenish yellow and at base narrowly black ; antennae and vesicle black, the latter brownish at center ; occiput and venter of head pale brown ; eyes dark brown in preserved specimen. Prothorax greenish yellow, sides and area between anterior and middle lobe black. Synthorax dorsally and laterally upto a little beyond humeral suture black but marked by a large M-shaped greenish yellow mark formed by the confluence of mesothoracic collar, narrow mid-dorsal carina and broad antehumeral stripe extending from alar sinus ; humeral suture also finely yellow ; synthorax greenish yellow on sides and venter, but 2nd lateral suture narrowly black. Legs black, marked with greenish yellow as follows : anterior coxae and trochanters ; inner surface of 1st and 2nd femora except base and pair of narrow lateral stripes on 3rd femora. Wing (Fig. 528) hyaline, with a basal golden yellow tint excepting anal area extending along subcostal and cubital space upto the arc ; membrane whitish ; pterostigma brownish covering 4 cells ; 1st and 7th antenodals primary. Abdomen black, marked with greenish yellow as follows : a

mid-dorsal stripe on segments 1-7, this very broad and confluent on segments 1 and 2, on other segments falling short of base narrowly and of apex broadly and gradually narrowing from base to apex ; a ventrolateral stripe on segments 1-7, which broken into a basal spot and a distal stripe on segments 5-7 ; segment 8 greenish yellow but narrowly black at base and apex. Anal appendages greenish yellow. Vulver scale (Fig. 340) black.

Notes : The single female studied differs from the description of the species provided by Laidlaw (1922) and Fraser (1934) in having a little longer abdomen, and in details of body markings, In view of inadequate description, it has been redescribed.

So far known, the species is having a restricted distribution in Meghalaya, only at high altitude areas of central Khasi hills. The single female was collected near a stream flowing across a grassy land.

Distribution : India : Meghalaya, West Bengal.

Genus *Stylogomphus* Fraser

Stylogomphus Fraser, 1922, *Mem. Dep. Agric. India (Ent.)*, 7:69 ; 1934, *Fauna Brit. India Odon.*, 2 : 288.

Type-species : *Stylogomphus inglisi* Fraser

Fraser (1922e) established this genus along with description of its type-species. The generic concept has since then been enlightened and there has also been addition of a few more species as a result of contribution chiefly of Fraser (1923b, c, 1925b, 1934, 1940), Laidlaw (1930), Asahina (1951, 1956a, 1966, 1968) and Chao (1954).

Diagnostic characters : Small ins size (usually abdomen 22.0-31.0 mm, hindwing 21.0-27.0 mm) ; yellowish marked with black ; hind femora armed only with closely set small spines ; male superior anal appendages a little longer than segment 10 of abdomen, broad at base, basal two third gradually narrowed and semi forcipate, thereafter abruptly narrowed, cylindrical and divergent ; the outer border produced into a prominent angle near base, and again into a less prominent angle at about middle ; inferior about two-third the length of the superiors, narrowly triangular, cleft in apical half, the two branches subcylindrical, closely apposed, parallel and upturned at apex ; male genitaliil with lamina arched, emerginate, projecting a little ; hamules curved, the anteriors long and cylindrical, the posteriors broad and spatulate, with apex narrowed and turned outward ; vesicle elongate, emerginate and purse-shaped at apex ; 2nd segment of

penis with rather short median lobe ; vulver scale short and triangular. Wings hyaline, pale yellow at extreme base, with tronus angulated in males, rounded in females ; usually 11-12 antenodal cross veins in forewing, 7-9 in hindwing and 7-12 postnodal cross veins ; basal incomplete antenodal cross vein absent ; 1st and any one of 5th or 6th cross veins form primary antenodals ; pterostigma elongated, about 4-5 times as long as broad, a little swollen medially, braced ; discoidal cells entire, situated at a point which is nearly one cell distal to the level of arc with costal margin a little shorter than the distal margin, but subequal to basal margin in forewing and a little more than one and half times as long as basal margin in hindwing ; hypertrigone subequal or longer than the space between nodus and origin of 1R₃ in hindwing ; subtrigone covering parts of 2 cells of adjacent anal area at its inner side in hindwing ; 3rd cell of adjacent anal area from wing base extending to base of subtrigone in hindwing ; discoidal field not widening upto 4 rows of cells proximal to level of nodus in hindwing ; arc situated at or a little proximal to the level of 2nd antenodal cross vein ; distal primary antenodal cross vein situated at a point which is equally distant from nodus and basal primary antenodal cross vein ; anal triangle 3 celled ; anal loop absent ; only 1 cubital cross vein in all wings besides the one forming base of subtrigone ; IA pectinate only in distal half in forewing ; upto 2 rows of postanal cells in forewing, and 3 rows in hindwing ; 2 or 3 traversing cross veins between sectors of arc in forewing, only 1 in hindwing, between arc and the point of bifurcation of Rs.

Distribution : India : China ; Ryukyu ; Taiwan ; North America.

Stylogomphus inglisi Fraser
(Figs. 304-305, 320 and 354-355)

Stylogomphus inglisi Fraser, 1922, *Mem. Dep. Agric. India (Ent.)*, 7 : 70 ; 1934, *Fauna Brit. India. Odon.*, 2 : 290.

Material studied : 3 exs, Shillong, (1 ♂, 18.vii.1968, coll RKV ; 2 ♂♂, 3.vii.1968, coll SB).

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	29.0-30.5	25.0	11-12	12	8	10-11

Notes : The specimens examined differ from the description of the species provided by Fraser (1934) in being larger in size, in having

higher postnodal index and in the following : (i) apical half or more of labium black ; (ii) postclypeus with lateral suboval greenish yellow spots ; (iii) legs : trochanters black, anterior femora greenish yellow on inner surface ; (iv) pterostigma greenish ; (v) abdomen : segment 3 with mid-dorsal basal triangular spot ; segments 4-6 with basal ring complete and projecting apically on mid-dorsum ; segment 7 marked as segments 4-6 ; (vi) anal appendages : superiors brownish on apical third with its 2nd angulation situated more basally.

The find of the material of this species in Meghalaya has extended the knowledge of its distribution from West Bengal to this state.

The specimens were collected near a small stream flowing close to maize field.

Distribution : India ; Meghalaya, West Bengal.

Family AESHNIDAE

Diagnostic characters : Head globular ; labium with middle lobe nearly as wide as lateral lobes and bearing a median incision ; inner margin of eyes on vertex very broadly contiguous ; occiput small and triangular ; male genitalia hidden, being variably overlapped by the expanded tergite of segment 2 of abdomen ; a robust complete ovipositor present, often associated with well formed accessory apparatus. Subtrigone not well differentiated ; median space entire or traversed ; anal loop well developed, compact and usually subquadrate.

Distribution : Cosmopolitan.

KEY TO THE DIVISIONS OF THE FAMILY AESHNIDAE

R_{4+5} and MA running parallel to one another, MA without bulging shortly after nodus	..	..	Brachytrini
MA gradually converging towards R_{4+5} and shortly after nodus distinctly bulged.	..	..	Aeshnini

Division BRACHYTRINI

This division is distinguished into 3 subfamilies viz. Brachytrinae, Neopetalinae and Gomphaeshninae. Such distinction is based on branching of $1R_3$, presence or absence of anal loop and of reddish spots along the costal border of wings. Only the members of the subfamily Brachytrinae have been found by the writer in Meghalaya.

Distribution : Virtually cosmopolitan.

Subfamily BRACHYTRINAE

Diagnostic characters : Female genitalia rounded or produced into 2 or more robust spines. Base of hindwing rounded in both sexes or angulated and excavated in male ; R_3 with or without an abrupt curve towards proximal end of pterostigma ; $1R_3$ symmetrically forked ; median space entire or traversed by veins ; arc situated usually proximal to, but sometimes distal to outer primary antenodal cross vein ; one or more cell rows between $1R_3$ and R_{spl} , between MA and M_{spl} and also between Cu_2 and IA.

Distribution : Virtually cosmopolitan except Africa.

KEY TO THE GENERA OF THE SUBFAMILY BRACHYTRINAE

1. Median space in wings traversed by one or more veins. *Periaeschna* Martin
Median space in wings entire. .2
2. Only one row of cells between $1R_3$ and R_{spl} and also between MA and M_{spl} .
Austroaeschna Selys
Cells between $1R_3$ and R_{spl} and between MA and M_{spl} arranged always in more than one row. *Tetracanthagyna* Selys.

Genus *Austroaeschna* Selys

Austroaeschna Selys, 1883, *Bull. Acad. Sci.* (4), 3 : 732, Fraser 1936, *Fauna Brit. Ind.a, Odon.*, 3 : 61.

Type species : *Austroaeschna parvistigma* Selys

Selys (1883b) established *Austroaeschna* as a subgenus along with the description of its type-species. Later it was elevated to generic rank by Kirby (1890). The generic concept has further been elaborated and a few more species have been added as a result of contributions chiefly of Karsch (1891d), Martin (1909), Tillyard (1916), Laidlaw (1921, 1923), and Fraser (1922c, 1934, 1960).

Diagnostic characters : Large in size (usually abdomen 40.0-92.0 mm, hindwing 36.0-68.0 mm) ; brown, black or maroon marked with yellow, blue or green ; frons elevated, rounded or occasionally pointed at crest ; 3rd abdominal segment constricted in male ; male superior anal appendages with or without a basal tooth, subequal to or about twice as long as segment 10 of abdomen, variably undulated, parallel, forcipate or divergent, dilated apically, but the apex sometimes narrowed, blunt or notched ; inferior subequal to or about one third the length of superiors, bifid at apex ; ovipositor large, but usually not extending beyond abdomen ; dentigerous plate formed by prolongation of sides of abdominal segment 10, rounded with finely spined free border. Wings hyaline, sometimes

tinted with yellow at base or enfumed with brown ; base of hindwing in male slightly or not excavated, nearly right angled tornal angle ; anal triangle 3 celled ; usually 10-31 antenodal and 9-27 postnodal cross veins ; 1st and 5th antenodal cross veins primary ; pterostigma short and about twice as long as broad, may or may not be braced ; arc situated nearer basal than distal primary antenodal cross vein ; discoidal cell situated about 1 cell distal to level of arc, usually 3-4 celled in forewing, 2-3 celled in hindwing where it is shorter and broader ; hypertrigones traversed by 3-4 cross veins ; median space entire ; cubital space basal to subtrigone usually traversed by 4-5 or more veins ; 4-9 cells in anal loop ; R_3 not showing an abrupt curve towards pterostigma ; R_3 not showing an abrupt curve towards pterostigma ; IR_3 forked ; R_{4+5} and MA running parallel to one another, MA not buldged away from R_{4+5} ; a single row of cells between IR_3 and R_{spl} , MA and M_{gpl} as well as between Cu_2 and IA.

Distribution : India ; Japan ; Taiwan ; Australia.

Austroeschna interesedens Martin

(Figs. 347-349 and 372-373)

Austroaeschna intersedens Martin, 1909, *Cat. Coll. Selys (Aeschnines)* 19 : 101. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 62.

Material studied : 1 ♂, Shillong, 5.viii.1967, coll RKV

Measurements (in mm) and Nodal index.

Length of		Forewing		Hindwing	
abdomen	hindwing	An	Pn	An	Pn
♂ 51.0	41.0	17-19	11-12	13-14	12-13

Notes : The single male specimen studied varies from the description of the species provided by Fraser (1936) in size, nodal index and also in the following : (i) oblique stripe between humeral suture and spiracle broken ; (ii) discoidal cell in forewing with 3-4 cells and in hindwing with 2-3 cells ; (iii) hypertrigones in forewing traversed 4 times.

So far known, the species is restricted to central Khasi hills in Meghalaya. The specimen under study was collected near a montane stream.

Distribution : India : Meghalaya. Outside India : Burma.

Genus Periaeschna Martin

Periaschna Martin, 1909, *Cat. Coll. Selys (Aeschnines)*, 20 : 157. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 81.

Type-species : *Periaeschna magdalena* Martin.

Martin (1909) established this genus along with description of its type-species. The generic concept has later been further enlightened and there has also been an addition of a few more species through the works of Laidlaw (1921, 1923), Fraser (1922b, 1936, 1936a), and Asahina (1956a)

Diagnostic characters : Large in size (usually abdomen 48.0-57.0 mm, hindwing 30.0-51.0 mm) ; brown or black, marked with yellow or green ; frons elevated and usually cone shaped ; 3rd abdominal segment constricted in male ; male superior anal appendages a little more than twice as long as segment 10 of abdomen, lacneolate with basal third narrowed ; inferior a little more than half the length of superiors, broadly triangular and curved upwards a little ; ovipositor large, but not extending beyond abdomen ; dentegerous plate formed by the prolongation of sides of abdominal segment 10 into a 2-pronged fork. Wings hyaline, sometimes palely enfumed with brown, with bases tinted with amber or blackish brown ; bases of hindwing nearly straight in male, right angled tornal angle ; anal triangle 3 celled ; usually 23-27 and 17-22 antenodal cross veins in forewing and hindwing respectively and 19-26 postnodal cross veins ; the 1st and 4th or 5th antenodals primary ; pterostigma short and about twice as long as broad, may or may not be braced ; arc situated slightly distal to the level of distal primary antenodal cross veins ; discoidal cell situated about one cell distal to level of arc, usually 6-7 celled in forewing, 5-7 celled in hindwing, where it is shorter and broader ; hypertrigone, median and cubital space basal to subtrigone traversed by 3-7, 4-7 and 7-9 cross veins respectively ; 8-15 cells in anal loop : R_8 not showing an abrupt curve towards pterostigma ; IR_8 forked, R_{4+5} and MA running parallel to one another, MA not bulged away from R_{4+5} ; a single row of cells between IR_8 and R_{sp1} , MA and M_{sp1} , as well as between Cu_2 and IA.

Distribution : India ; China ; Vietnam.

***Periaeschna ? biguttata* (Fraser)**
(Figs. 21 and 531)

Cephaleaeschna biguttata Fraser, 1935, *Rec. Indian Mus.*, 37 : 321 ; 1936. *Fauna Brit. India Odon.*, 3 : 75.

Material studied : 1 ♀, Rongtham river, bank, 10.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

Length of		Forewing		Hindwing	
abdomen	hindwing	An	Pn	An	Pn
♀ 50.0	44.0	26-27	22	20-22	23-24

Description : Female : Labium, labrum and bases of mandibles reddish yellow, lateral lobes of labium blackish on outer half ; eyes dark brown ; rest of head yellowish ; crest of frons cone-shaped and blackish. Prothorax yellowish, but brownish on dorsum. Synthorax blackish brown ; two broad lateral yellow stripes, one being between lateral sutures and another on metepimeron ; venter of synthorax yellow. Legs greenish yellow, extensor surfaces of femora on distal half black. Wings (Fig. 531) hyaline, at base reddish brown ; membrane whitish ; pterostigma blackish grey enclosed in reddish nervures, covering 4 cells ; discoidal cell in forewing with 6-7 cells, in hindwing with 7 cells ; hypertrigone traversed by 6-7 veins, cubital space by 8 and 7-8 and median space by 6-8 and 5-6 veins in fore- and hindwing respectively ; the 1st and 5th or 6th antenodals in forewing, 1st and 5th antenodals in hindwing primary ; 10-13 cells in anal loop. Abdomen compressed laterally from segment 4 caudad, greenish yellow but blackish brown on dorsum and gait marked with greenish yellow as follows : segment 1 on basal half besides a large apical mid-dorsal spot ; apical narrow, subdorsal paired spots on segments 2-5, those on segment 2 connected to a narrow complete mid-dorsal stripe ; narrow vestigial paired subdorsal post jugal spots on segments 4 and 5. Ovipositor and genital plate as in Fig. 21.

Notes : Fraser (1935) described a male dragonfly as *Cephaleaeschna biguttata*. Later, Asahina (1952-1953) described from Nepal the female of the same species. The specimen under study was tentatively identified as *Periaeschna magdalena* Martin and sent to Late Dr. Lieftinck for confirmation, who identified the same as *Periaeschna ? biguttata* (Fraser). So, here, Late Dr. Lieftinck's opinion has been upheld.

The single female was collected near a montane stream at dusk, while the same was rapidly patrolling.

Distribution : India : Meghalaya.

Genus *Tetracanthagyna* Selys

Tetracanthagyna Selys, 1883, *Bull. Acad. Belg. Sci.* (3), 5 : 744, Fraser, 1936, *Fauna Brit. India, Odon.* 3 : 115.

Type-species : *Gynacantha plsgyata* Waterhouse

Selys (1883b) established *Tetracanthagyna* as a subgenus in his classification when he included only the type-species. Later, it was elevated to generic rank by Kirby (1890). Its concept has been further elaborated and there has also been an addition of a few more species as a result of contributions chiefly of Selys (1889), Martin (1909), McLachlan (1898), Ris (1911), Laidlaw (1923) and Fraser (1936).

Diagnostic characters : Large in size (usually abdomen 52.0-80.0 mm, hindwing 50.0-84.0 mm) ; maroon, black or brown, marked with yellow and green ; frons rounded or cone shaped, projecting, but not elevated ; 3rd abdominal segment not constricted in male ; male superior anal appendages about one and a half to three times as long as segment 10 of abdomen, lanceolate ; inferior a little more than half the length of superiors, broadly triangular and a little curved upwards ; ovipositor large, but not extending beyond abdomen ; dentigerous plate large and 4 spined, of which the median two larger. Wings hyaline, sometimes variably marked or enfumed with brown ; base of hindwing oblique in male with obtuse tornal angle and 3 celled anal triangle ; usually 20-41 antenodal 20-27 postnodal cross veins ; the 1st and any one of 8th-10th antenodals primary ; pterostigma short, not braced, sometimes subequal, but usually distinctly shorter in hindwing than in forewing, where it is about twice as long as broad ; in males one or two cells immediately beneath pterostigma black ; arc situated nearer basal than the distal primary antenodal cross vein ; discoidal cell situated about three cells distal to the level of arc, usually 6-7 celled in forewing, shorter and 5-6 celled in hindwing ; median space entire ; hypertrigone and cubital space basal to subtrigone traversed by 6-8 and 6-9 veins respectively ; 13-20 cells in anal loop ; R_3 showing an abrupt curve towards and a little before pterostigma ; IR_3 forked ; R_{4+5} and MA running parallel to one another, MA not bulged away from R_{4+5} ; cells between IR_3 and R_{sp1} and between MA and M_{sp1} arranged in 1-4 rows ; cells between Cu_2 and IA arranged in 1-2 rows.

Distribution : India ; Thailand ; Vietnam ; Malaysia ; Indonesia.

***Tetracanthagyna waterhousei* McLachlan**
(Fig. 23)

Tetracanthagyna waterhousei McLachlan, 1898, *Trans. Ent. Soc. Lond.*, 4 : 441. Fraser, 1936, *Fauna, Brit. India, Odon.*, 3 : 117.

Aeschna quadrilateralis Fraser, 1927, *Rec. Indian Mus.*, 29 : 70.

Material studied : 1 ♀, Barapani, 15.v.1971, coll RSP.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♀	59.0	60.0	27-29	20-22	20	22

Notes : The single female studied varies from the description of the species provided by Fraser (1936) as follows : (i) absence of antehumeral stripes on synthorax, of basal annules on abdominal segments 4-6 and of apical annules on abdominal segments 5-7 and (ii) pterostigma in forewing (4.0 mm) longer than that in hindwing (3.0 mm).

The species was collected in forested areas near a stream flowing to the Brapani reservoir.

Distribution : India : Meghalaya, West Bengal. Outside India : Vietnam ; Malaysia ; Indonesia.

Division AESHNINI

Diagnostic characters : Oreillete present or absent ; dentigerous plate rounded or produced into 2-4 robust spines. Base of hindwing rounded in both sexes or excavated in males ; R_3 may or may not be bent towards pterostigma ; MA gradually converging on R_{4+5} , shortly after nodus with a distinct bulging away from R_{4+5} and becoming thereupon attached to the R_{4+5} by a short, oblique cross vein ; MA may sometimes be indistinct or atrophid.

Distribution : Cosmopolitan.

KEY TO THE SUBFAMILIES OF THE DIVISION AESHNINI

MA distinctly fused with R_{4+5} shortly after nodus becoming thereafter indistinct ;
 R_3 not abruptly bent just proximal to inner end of pterostigma. ..
 Anactinae.

MA imperfectly joined with R_{4+5} shortly after nodus and not atrophid beyond that
 point ; R_3 with an abrupt curve just proximal to the inner end of pterostigma
 Gynacanthaginae.

Subfamily ANACTINAE

Diagnostic characters : Dentigerous plate rounded and with fine spines ; oreillets small or atrophid ; abdominal segments 4-8 with or without supplementary longitudinal ridges. Base of hindwing rounded in both sexes or angulated in males ; anal triangle present or absent ; MA

distinctly fused with R_{4+5} by an oblique vein shortly after nodus and more or less atrophied beyond that point ; R_3 without an abrupt bent just proximal to inner end of pterostigma.

Distribution : Cosmopolitan.

Genus *Anax* Leach

Anax Leach, 1815, *Edinb. Encycl.*, 9 : 137. 1935, *Fauna Brit. Inyia, Odon.*, 3 : 134. Fraser *Cryptosoma* Burmeister, 1839, *Handb. Ent.* 2 : 839.

Type-species : *Anax imperator* Leach

Leach (1815) established the genus *Anax* but provided only a very brief description for the same. The generic concept was, however, amplified later chiefly by Selys (1840, 1950, 1878b, 1883a, b), Brauer (1866) and Hagen (1875), who also incorporated into it quite a few species from nearly all parts of the world. Martin (1908), Tillyard (1917), Fraser (1921d, 1936, 1949a), Laidlaw (1921, 1923), Needham (1930a), Schmidt (1938), Lieftinck (1942, 1954, 1955a, 1962, 1971a, 1975), Asahina (1962), Pinhey (1962) and Aguesse (1960), among others, have also worked on this genus. Bhasin (1953), St. Quentin (1970), Kumar (1972c, 1973c), Singh and Prasad (1976a), Kumar and Prasad (1977a) and Prasad and Kumar (1977b) dealt with a few species of this genus occurring in Indian region in recent times.

Diagnostic characters : Large in size (usually abdomen 46.0-70.0 mm, hindwing 46.0-60.0 mm) ; black or brown, marked with blue, green, red or yellow ; frons projecting, but not elevated ; in male oreillet absent and 3rd abdominal segment sometimes a little constricted ; abdominal segments 5-6 with supplementary lateral ridges ; male superior anal appendages about twice as long as segment 10 of abdomen, lanceolate and with a strong ridge on upper surface, inferior a little less than half the length of superiors, subquadrate, sometimes notched and furnished apically with two or more imbricated spines ; female anal appendages about twice or more in length than segment 10 of abdomen, lanceolate ; ovipositor short, falling well short of apex of abdomen ; dentigerous plate simple, rounded and coated with short spines. Wings hyaline, sometimes enfumed with pale yellow or brown ; bases of hindwing straight ; tornus rounded ; usually 13-21 and 10-15 antenodal cross veins in fore- and hindwings respectively and 8-12 postnodal cross veins in either wing ; usually the 1st and either 6th or 7th antenodals primary ; pterostigma very narrow, about 4-5 times as long as broad, braced ; arc situated much nearer basal primary antenodal than distal ; discoidal cell situated about one cell distal to the level of

arc, 5-7 celled in forewing, shorter and broader and 4-5 celled in hindwing ; median space entire ; hypetrigone and cubital space basal to subtrigone traversed by 2-4 and 4-7 cross veins respectively ; 10-12 cells in anal loop, R_8 with an abrupt curve towards the outer end of pterostigma ; IR_3 not forked or imperfectly so ; MA gradually converging on R_{4+5} , with a distinct bulging away from R_{4+5} shortly after nodus and thereupon becoming weakened or atrophid ; cells between IR_8 and R_{spl} and between MA and M_{spl} arranged in 1-6 rows ; cells between Cu_2 and IA arranged in 1-2 rows.

Distribution : Cosmopolitan.

Anax sp. A

(Fig. 22)

Material studied : 1 ♀, Shillong, 6.ix.1975, coll KD.

Measurements (in mm) and Nodal index

	abdomen	Length of		Forewing		Hindwing	
		anal app.	hindwing	An	Pn	An	Pn
♀	52.0	5.5	50.0	16	9	11-12	9-10

Description : Female : Labium green ; bases of mandibles black ; labrum, clypeus and frons dark greenish yellow ; anterior border of labrum, a 'T' shaped spot on frons (the stem of which expanded into a triangular basal spot), vespicle, antenna and occiput black, the latter with a central rounded yellow spot ; eyes dark green in front and on dorsum, greenish yellow behind ; beneath head pale greenish yellow. Thorax dark green ; mid-dorsal carina finely black, but narrowly enclosed in pale brown ; antealar sinus and tergum green ; an upper humeral spot, a narrow stripe on posterolateral suture and venter of thorax black ; lower third of metepimeron blackish. Legs black, marked with green as follows : broad outer stripe on 1st and 2nd coxae, anterior trochanters and narrow inner stripe on basal third of anterior femora. Wings hyaline, bases except anal area nearly upto 1st antennodal cross vein amber yellow ; costal and subcostal space palely suffused from arc to nodus ; the 1st and 7th in forewing, the 1st and either 6th or 7th antennodal in hindwing primary ; pterostigma reddish yellow, covering nearly 3 cells and strongly braced ; discoidal cells 5-celled in forewing, 4-5 celled in hindwing ; 4-5 cubital cross veins in forewing, 4 in hindwing ; hypertrigones traversed twice ; costa green, venation black otherwise. Abdomen brown on segments 1-3, with apical borders and jugal sutures narrowly black, blackish there-

after and marked with bright greenish yellow as follows : segment 1 with a large lateral spot ; segment 2 on sides ; apical lateral rounded spots growing progressively larger from segment 3-10 ; a lateral lanceolate transverse spot at base of segment 8 ; a lateral rounded spot on segment 7 at about one third distance from base ; isolated ventrolateral stripes on segments 6-8 ; vestiges of the same on segment 5 ; venter of segments 9 and 10 ; segment 9 except at base armed with close small black spines. Anal appendages (5.5 mm) and genitalia as shown in Fig. 22. Ovipositor black at lower border, its styles whitish at base.

Notes : The specimen under study was supposed close to *A. nigrolineatus* Fraser. Late Dr. Lieftinck, Netherlands, when requested to confirm pointed out that it was *A. ? cf nigrolineatus* Fraser. In view of insufficient literature and material for comparison, the specimen is described here as *Anax* sp. A.

The specimen was collected from Ward lake, Shillong, apparently resting on the grassy bank.

Distribution : India : Meghalaya.

SUBFAMILY GYNACANTHAGINAE

Diagnostic characters : Dentigerous plate produced into a robust two pronged fork ; oreillets usually well developed. Base of hindwing excavated and angulated in males, rounded in females ; Sc may or may not be prolonged beyond nodus ; MA imperfectly joined with R_{4+5} shortly after nodus and not atrophied beyond that point ; R_3 showing an abrupt curve just proximal to the inner end of pterostigma.

Distribution : Virtually cosmopolitan.

Genus *Gynacantha* Rambur

Gynacantha Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 209, Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 94.

Type-species : *Gynacantha nervosa* Rambur.

Rambur (1842) established this genus including only the type-species. The generic concept has been further enlightened and there has also been addition of a number of new species from different parts of the world as a result of contributions chiefly of Selys (1878b, 1882, 1889, 1883a, 1891a) and Hagen (1861, 1875). Karsch (1891c), Krugger (1898), Martin (1909), Ris (1911), Laidlaw (1921, 1923, 1931), Fraser (1922b, 1927a, 1935, 1936), Williamson (1923), Needham (1930a), Schmidt (1938), Lieftinck (1953a, b, 1954, 1960b, 1975) and Pinhey (1962) have also worked on this genus.

Different species of this genus occurring in Indian region have also been dealt with by Navas (1933), Lieftinck (1948a), Bhasin (1953), St. Quentin (1970) and Lahiri and Mitra (1973, 1975).

Kirby's (1980) and Cowley's (1934) proposal for a different generic name for *Gynacantha* Selys nec Rambur has not been accepted by most authorities.

Diagnostic characters : Large in size (usually abdomen 42.0-79.0mm, hindwing 35.0-59.0 mm) ; brown or black marked with maroon, yellow or green ; 3rd abdominal segment in male usually constricted ; male superior anal appendages long and narrow, about 2-3 times as long as segment 10 of abdomen, dilated apically for variable extent where these are usually coated with long hairs on inner surface, inferior less than half the length of superiors, narrow and triangular ; less than half the length of superiors, narrow and triangular ; female anal appendages lanceolate and usually longer in comparison to those of male superior anal appendages ; ovipositor large, usually extending to apex of abdomen ; dentigerous plate shaped as a 2-pronged fork. Wings hyaline, sometimes tinted with yellow or brown ; usually in males base of hindwing obtusely notched, tornus angulated and anal triangle 3-celled ; usually 13-42 antenodal and postnodal cross veins ; the 1st and any one of 6th-10th antenodals primary ; pterostigma narrow about 4-5 times as long as broad, braced ; discoidal cell 5-9 celled and situated about 2-3 cells distal to the level of arc ; median space entire ; hypertrigone and cubital space basal to subtrigone traversed by 4-9 and 6-10 veins respectively ; generally 8-17 cells in anal loop ; R_s with an abrupt curve towards proximal end of pterostigma ; IR_s forked ; MA distinct upto wing margin, gradually converging on R_{4+5} and with a bulging away from R_{4+5} shortly after nodus ; cells between IR_s and $Rspl$ and between MA and $Mspl$ arranged in 17 rows ; usually only one row of cells between Cu_2 and IA.

Distribution : Virtually cosmopolitan.

KEY TO THE SPECIES OF THE GENUS *GYNACANTHA* RAMBUR (FEMALES)

Frons greenish yellow and unmarked ; smaller species with abdomen 45.0-45.5 mm and hindwing 41.0-42.0 mm in length. *.bayadera* Selys
Frons greenish yellow but on upper surface marked with a black T-shaped spot ; larger species with abdomen 49.5 mm and hindwing 45.0 mm in length... .. *..sp. A*

(Due to nonavailability of males of either species studied, no key to males has been provided.)

Gynacantha bayadera Selys
(Fig. 346)

Gynacantha bayadera Selys, 1891, *Ann. Mus. Civ. Genova*, 30 : 47. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 103.

Material studied : 2 ♀ ♀, Rongrengiri, 22.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

Length of			Forewing		Hindwing	
abdomen	anal app.	hindwing	An	Pn	An	Pn
♀ ♀ 45.0-45.5	2.5	43.3-44.0	20-21	13-15	15-16	13-16

Notes : The specimens studied vary from the description of the species provided by Fraser (1936) a little in size, nodal index and in the following : (i) pterostigma covering 3-4 cells ; (ii) discoidal cells 5 celled in forewing ; (iii) hypertrigones traversed 4 times in forewing (iv) 8-9 cells in anal loop ; (v) abdomen brown, but darker on segments 3-9 ; segment 1 and sides of segment 2 green ; apical border and jugal suture black on all segments.

So far known, the species is restricted to Meghalaya only at lower altitude of northern Garo hills. The specimens were collected at dusk when noticed hovering over a small ephemeral pond with unclean water.

Distribution : India : Meghalaya, Sikkim, West Bengal. Outside India : Burma ; Thailand ; Indonesia ; New Guinea ; Philippines.

Gynacantha sp. A
(Fig. 345)

Material studied : 1 ♀, Songsok, 16.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

Length of			Forewing		Hindwing	
abdomen	anal app. (broken)	hindwing	An	Pn	An	Pn
♀ 49.5	4.0	45.0	24-27	16-17	19-21	20

Description : Female : Head greenish yellow but labium and labrum pale yellow ; vesicle black and a black T-shaped mark on upper surface on frons somewhat like an anchor with its stem much broader and little longer than the short and pointed arms ; antennae pale brown with a yellow apical ring on 1st segment ; fine black hairs on clypeus and frons ; longer hairs

on vesicle. Thorax brownish dorsally, greenish yellow otherwise ; synthorax with mid-dorsal carina finely black. Legs yellowish, the tibiae and the distal ends of femora brown. Wings hyaline ; membrane whitish grey ; pterostigma yellow ; discoidal cells with 6-7 cells in forewing, 5-6 cells in hindwing ; the 1st and either 8th or 9th antenodals primary ; 6-7 traversing cross veins in hypertrigones in forewing, 5-7 in hindwing ; 8 cubital cross veins in forewing, 7 in hindwing ; 9-10 cells in anal loop. Abdomen dark brown to almost black on dorsum, pale brown on venter, marked with green as follows : segment 1 pale brown and with broad green apical annules ; segment 2 with mid-dorsal carina and an isolated stripe bordering jugal suture proximally green ; segments 3-6 with similar but, less prominent stripes bordering jugal sutures apically ; segments 3-7 with paired apical and segments 5-7 and segment 10 with paired subbasal transverse spots ; segments 6-8 with ventrolateral stripes confluent with basal spots, falling short of apex of segments ; apical border of all segments as well as all jugal sutures finely black ; segment 3 moderately constricted ; Anal appendages fructured off at apex, brown but black at outer edge with straight inner and slightly convex outer border ; ovipositor and dentigerous plate (Fig. 345) as for genus, pale brown, but the styles and two diver-ticate spines black.

Notes : Late Dr. Lieftinck, when requested to comment on the material reported it as *Gynacantha* sp. However, the specimen under study comes very close to *G. hyaline* Selys, in size, in having black 'T' shaped markings on the frons and untinted wings, but differs from the description of the species provided by Fraser (1936) in details of markings on face, thorax and abdomen. The female of *G. hyaline* Selys in turn has close similarity to that of *G. subinterrupta* Rambur and *G. bainbriggei* Fraser, as stated by the same author, and hence it is impossible to make sure the true identity of the species in absence of a male.

It was collected long after dusk when it flew inside a room apparently being attracted by light.

Distribution : India : Meghalaya.

Superfamily CORDULEGASTEROIDEA

This superfamily contains only one family, i.e. family Cordulegasteridae.

Family CORDULEGASTERIDAE

Diagnostic characters : Head globular ; labium with middle lobe cleft or notched at the middle, narrower than lateral lobes ; inner margin of eyes meeting at a point only or but slightly separated ; occiput small and triangular ; male genitalia hidden, being variably overlapped by the expanded tergite of segment 2 of abdomen ; ovipositor absent, but usually well developed psuedoovipositor or vulver scale present. Wings similar or dissimilar in both sexes, hyaline or coloured at base ; subtri-gone not well differentiated ; median space entire or traversed ; anal loop variable ; rudimentary or well developed.

Nymphs : [after Fraser (1957)] : Labial musk broad and deeply concave or cupped with numerous setae ; lateral lobes broad, their apposed borders being more or less deeply incised, crenate or serrate and often bordered with tuft of seate ; gizzard with 4 fold, each with a robust tooth.

Distribut.on : Virtually cosmopolitan.

KEY TO THE SUBFAMILIES OF THE FAMILY CORDULEGAS-TERIDAE

Median space entire ; tibiae of males without a keel or only foretibiae with a distal keel ; females with a well developed pseudoovipositor (Fig. (24).

Cordulegasterinae.

Median space traversed by one or more veins ; all tibiae of males with well developed keel ; females without ovipositor (Fig. 24). Chlorogomphinae.

Subfamily CORDULEGASTERINAE

Diagnostic characters : Tibiae of males without a keel, or only fore-tibiae with a distal keel ; in females a well developed pseudoovipositor made up of two greatly elongated apposed laminae steadily narrowing to apex. Basal incomplete antenodal cross vein absent ; median space entire ; discoidal cell elongated along length of wing, these similar in shape in either wing ; anal loop rudimentary.

Distribution : Same as family.

Genus *Anotogaster* Selys

Anotogaster Selys, 1954. *Bull. Acad. Belg. Sci.*, (2), 21 : 101. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 44.

Type-species : *Anotogaster nipalensis* Selys

Selys (1854b) estalibhed *Anotogaster* for a few of his new species and gave it the status of a subgenus in his classification Later, it was

elevated to generic rank by Kirby (1890). Its concept has been further elaborated and there has also been addition of some more species as a result of contribution chiefly of Selys (1858, 1873, 1883a), Williamson (1907), Needham (1930a) and Fraser (1923a, 1924a, 1929d, 1936). Bhasin (1953) and St. Quentin (1970) dealt with a few species of the genus occurring in Indian region.

Diagnostic characters : Large in size (usually abdomen 52.0-80.0 mm, hindwing 42.0-67.0 mm) ; black, marked with yellow or green, more rarely with some shades of brown or red ; frons elevated, but not higher than occiput, shallowly notched above and fringed with hairs ; antennae 7 segmented ; in males, only the foretibiae with a short distal keel and slightly constricted 2nd abdominal segment without oreillet ; male superior anal appendages subequal to segment 10 of abdomen, acuminate, occasionally twisted or a little compressed laterally and armed with a pair of ventral teeth, inferior about three fourth the length of superiors, subquadrate, shallowly notched at apical border ; male genitalia with broadly arched lamina, stout, foliate anterior hamules with inner border curled strongly inwards, slender, stilet shaped posterior hamules and short variably notched lobe ; female with greatly hypertrophied pseudoovipositor. Wings hyaline, sometimes amber tinted at base or enfumed with brown ; base of hindwing straight, tornus rounded in either sex ; anal triangle indistinct or 4-5 celled ; usually 15-27 and 10-18 antenodal cross veins in fore- and hindwings respectively and 8-21 postnodal cross veins ; the 1st and any one amongst 5th-10th antenodals primary ; pterostigma narrow, that of hindwing a little longer than forewing, about 5-7 times as long as broad, not braced ; arc situated much nearer to the basal than the distal primary antenodal cross vein ; discoidal cell situated about one cell distal to the level of arc, usually traversed once, rarely 2-3 times, similarly shaped in either wing, with costal and inner margins subequal and nearly double the length of basal margin ; median space entire ; hypertrigone entire, or the same and cubital space basal to subtrigone traversed by 1-2 and 2-4 cross veins respectively ; 3-7 cells in anal loop ; IA markedly pectinate.

Distribution : India ; Nepal ; Tibet ; China ; Burma ; Japan ; Ryukyu ; Taiwan.

Anotogaster sp. A

(Figs. 3, 10 and 25)

Material studied : 1 ♀, Mawpat, 14.vii.1967, coll RKV ; 1 ♀, Shillong, 3.vii.1974, coll ARL ; 1 ♀, Upper Shillong, 30.viii.1968, coll JKP.

Measurements (in mm) and Nodal index

Length of			Forewing		Hindwing	
abdomen	ovipositor	hindwing	An	Pn	An	Pn
♀ ♀ 61.0-68.0	10.0-10.5	52.0-57.0	19-22	16-17	14-16	15-17

Description : Female : Labium and bases of mandibles brown ; labrum citron yellow sometimes brownish at center, with a median longitudinal line and the edges broadly marked with black ; frons brown, but black above ; antennae, vesicle and occiput black ; beneath head dark brown to black ; eyes green during life, brown in preserved specimen ; clypeus and frons with short fine hairs, those on sides more thick ; hind margin of occiput (Fig. 10) fringed with thick fine, black and moderately long erect hairs. Prothorax black, anterior lobe with a narrow dorsal yellow stripe and posterior lobe with a pair of subdorsal narrow transverse yellowish stripes. Synthorax black but paler beneath and marked with greenish yellow as follows ; a pair of pyriform antehumeral stripes, reaching close to antealar sinus, falling well short of mesothoracic collar and widely divergent below ; two broad oblique stripes on either side, one post humeral, the other covering most of metepimeron ; some spots on tergum at bases of wings. Legs black but coxae brown at base. Wings hyaline, apices sometimes enfumed with brown and bases of all wings tinted with golden amber from base to distal end of discoidal cells and variably over anal area ; pterostigma black, covering nearly 4 cells ; membrane greyish white ; discoidal cells 2-3 celled in all wings ; hypertrigones transversed once only, but sometimes entire in forewing ; the 1st and any one of 7th-9th antenodals in forewing, the 1st, and 5th, 7th or 8th in hindwing primary ; 3-4 cubital cross veins in forewing, only 3 in hindwing ; 5-7 cells in anal loop. Abdomen black, marked with greenish yellow as follows : segment 2 with a narrow annule covering jugal suture, traversing dorsum at about middle of the segment, broader and oblique on sides ; segments 3-8 with similar, but narrower post-jugal annules, interrupted on dorsum narrowly on segments 3-7, broadly on segment 8, complete ventrally only on segments 7 and 8 ; segment 9 with a narrow basal annule and some obscured spots on sides ; segment 10 unmarked. Anal appendages black, shaped as for genus ; ovipositor (Fig. 25) brownish to black, subcylindrical and a little compressed laterally.

Notes : The specimens studied appear to be intermediate in size between *A. gigantea* Fraser known from Burma and *A. nipalensis* Selys known from Nepal, Sikkin, and West Bengal. Besides, these also vary

from both in details of colouration. No specific determination has been possible in absence of males.

So far known the species is restricted in central Khasi hills. The specimens were collected from forested areas in the vicinity of human dwellings.

Distribution : India : Meghalaya.

Subfamily CHLOROGOMPHINAE

Diagnostic characters : All tibiae of males with well-developed keel ; females with a short vulver scale but without a pseudoovipositor. Basal incomplete antenodal cross vein present ; median space traversed by cross veins ; discoidal cells may or may not be elongated along length of wing, these are differing in shape in fore- and hindwings ; anal loop well developed.

Distribution : India ; Nepal ; Burma ; Vietnam ; Malaysia ; Indonesia ; Japan ; Ryukyus ; Taiwan.

Genus *Chlorogomphus* Slys

Chlorogomphus Selys, 1854, *Bull. Acad. Belg. Sci.* (2), **21** : 98. Fraser, 1936, *Fauna Brin. India, Odon.*, **3** : 5.

Orogomphus Selys, 1878, *Bull. Acad. Belg. Sci.* (2), **46** : 681.

Type-species : *Chlorogomphus magnificus* Selys

Selys (1854b, 1978c) established respectively the genus *Chlorogomphus* and its subgenus *Orogomphus* along with descriptions of some new species. Kirby (1890) gave *Orogomphus* generic status. Further contribution on these genera and addition of some more species came chiefly from Selys (1891a), Martin (1904, 1910), Williamson (1907), Laidlaw (1914b, 1915, 1920d), Fraser (1923a, 1924a, 1925a, f), and Oguma (1926). Fraser (1929d) suppressed *Orogomphus* under *Chlorogomphus* along with a revisionary account of the genus and all its known species. All later workers have accepted Fraser's opinion. Fraser (1931, 1933b, c, 1936, 1936b), St. Quentin (1936), Asahina (1949, 1973) and Lieftinck (1954, 1960b) have also worked on this genus. Navas (1930) and Bhasin (1953) dealt with a few, species of the genus occurring in Indian region.

Diagnostic characters : Large to very large in size (usually abdomen 45.0-74.0 mm, hindwing 38.0-70.0 mm) ; black, usually marked with yellow, but sometimes also with red ; frons raised, rounded above, as high

as or higher than occiput ; antennae 6-7 segmented ; all tibiae with well developed keel in males ; male 2nd abdominal segment with oreillets, rarely constricted and then only slightly ; mel superior anal appendages a little longer than segment 10 of abdomen, separated at base, a little converging and of even width, but sometimes narrowed apically or armed with ventral spines ; inferior subequal to superiors, deeply cleft into slightly diverticate branches ; male genitalia with depressed lamina having two low rounded bossess, backwardly directed hamules curled at apex and small grooved vesicle ; 2nd segment of penis with median lobe projected forward, narrowed and diverged at apex. lateral lobe having similar, but backwardly directed shorter branches ; female with small, but conspicuous, variably wide vulver scale notched at free border. Wings hyaline, sometimes, specially in female, tinted with yellow along costal border or at base, rarely enfumed with brown, marked with black fasciae or tipped with black ; base of wings rounded, those of males with shallow excavations filled in by membrane, anal triangle indistinct or 3 celled ; usually 18-33 and 9-20 antenodal and postnodal cross veins in forewing, 12-26 and 11-24 respectively in hindwing ; 1st or 2nd and any one among 7th-10th antenodals primary ; pterostigma narrow, about 4-5 times as long as broad, poorly braced or not at all ; arc situated much nearer to basal than distal primary antenodal cross vein ; discoidal cell situated about 2-4 cells distal to the level of arc, similar or dissimilar in shape in fore- and hindwings, entire, or 2-5 celled, with distal margin usually subequa to costal and variably longer than basal margin ; median space, hypertrigone and cubital space basal to subtrigone usually traversed by 1-5, 2-6 and 4-9 cross veins respectively ; usually 8-20, but sometimes upto 35 cells in anal loop ; IA forked, but sometimes pectinate in hindwing.

Distribution : Same as subfamily.

***Chlorogomphus atkinsoni* (Selys)**

(Figs. 2, 8, 11,24, 26-28, 374-753 and 532)

Orogomphus atkinsoni Selys, 1878, *Bull. Acad. Belg. Sci.*, (2), **45** : 682.

Chlorogomphus atkinsoni (Selys) : Fraser, 1936, *Fauna, Brit. India. Odon.*, **3** : 26.

Material studied : 1 ♂, Cherrapunjee, 8.v.1968, coll RKV ; 1 ♀, Shillong, 6.x.1961, coll SNP.

Measurements (in mm) and Nodal index.

Length of		Forewing		Hindwing	
abdomen	hindwing	An	Pn	An	Pn
♂ 58.5	40.0	18-19	11	16-17	15
♀ 56.0	42.0	21-22	11-13	15-19	14

Notes : Both sexes studied vary a little from the description of the species provided by Fraser (1936) in nodal index, details of body markings and wing venation. The male is also a little larger in size.

So far known, in Meghalaya, the species is restricted to high altitude areas of Khasi hills. The specimens were collected during short interval of rest on bushes between speedy soaring flights and at places quite away from streams.

Distribution : India : Assam, Meghalaya, Uttar Pradesh, West Bengal

SUPERFAMILY LIBELLULOIDEA

Diagnostic characters : Head globular ; inner margins of eyes broadly contiguous ; vesicle well defined ; occiput small and triangular ; tibiae in males with or without keel on flexor surface ; oreillet usually absent ; male genitalia with anterior hamules more or less abortive ; ovipositor usually inconspicuous. Base of hindwing rounded or sometimes in males angulated ; costal and subcostal antenodal cross veins coinciding ; two primary antenodal cross veins usually not distinguishable from other antenodal cross veins ; distal antenodal cross vein complete or incomplete ; sectors of arc fused or separated at origin ; median space usually entire.

Nymphs : [after Fraser (1957)] : Labial mask broad and deeply concave or cupped and with numerous setae ; lateral lobes broad, their apposed borders being more or less deeply incised, crenate or serrate and often bordered with tuft of setae ; gizzard with 4 folds, each with a robust tooth.

Remarks : Fraser (1957) erected the family Macrodiplactidae under the superfamily Libelluloidea which, however, is not generally accepted.

Distribution : Cosmopolitan.

KEY TO THE FAMILIES OF SUPERFAMILY LIBELLULOIDEA

Eyes with a small sinuous projection at middle of the posterior border (Fig. 12) ; synthorax metallic blue or green ; tibiae of males with a long membraneous keel on flexor surface (Fig. 16). Corduliidae.

Eyes without a projection at posterior border ; thorax rarely of metallic colour ; tibiae of males without a keel on flexor surface. Libellulidae.

Family CORDULIIDAE

Diagnostic characters : Body colour, specially of synthorax, partly or wholly metallic blue or green ; eyes with a small sinuous projection

at middle of the posterior border ; males usually with oreillets and a membraneous keel on flexor surface of tibiae. Wings usually hyaline ; hindwing usually in males notched at base and anal triangle well formed.

Remarks : Lieftinck's (1971b) concept of the family Corduliidae has been followed here.

Distribution : Cosmopolitan.

KEY TO THE SUBFAMILIES OF THE FAMILY CORDULIIDAE

Sectors of arc in both wings arising from a common point and without any stalk at origin (Fig. 533). .Corduliinae.

Sectors of arc in both wings fused for a short distance at origin to form a stalk ; in hindwing stalk elongated (Fig. 534). .Macromiinae.

Subfamily CORDULIINAE

Diagnostic characters : Sectors of arc in either wing arising from a common point but not forming a stalk ; discoidal cell entire or traversed by cross veins and with straight costal margin ; base of discoidal cell in hindwing situated at or a little proximal to the level of arc ; subtrigone made of 2-3 cells ; anal loop elongate with well developed mid-rib.

Distribution : Cosmopolitan.

Genus *Hemicordulia* Selys

Hemicordulia Selys, 1870, *C. R. Soc. Ent. Belg.*, **14** : 5. Fraser, 1936. *Fauna Brit. India, Odon.*, **3** : 211.

Type-species : *Cordulia australiae* Rambur

Selys (1870) established *Hemicordulia* for a few of his new species and a few others earlier considered to the genus *Cordulia* Leach. This generic concept has further been enlightened and there has also been an addition of some more species, as a result of contribution chiefly of Selys (1871, 1878a, b), Kirby (1890), Martin (1906), Fraser (1921c, 1936, 1944), Lieftinck (1933, 1953b, 1954, 1975), Chao (1962), Pinhey (1962) and and Watson (1969).

Diagnostic characters : Medium in size (usually abdomen 28.0-42.0 mm, hindwing 25.0-37.0 mm) ; metallic green, blue or black, marked with yellow ; vesicle small and simple ; posterior lobe of prothorax not erected as a collar and usually not bearing specialised tuft of hairs ; in males, fore- and hind pairs of tibiae on flexor surface with membraneous keel, the same

extending nearly to base of hind tibiae ; tibial claws with inner arm shorter than outer ; in males, oreillets absent and segment 10 of abdomen not carinated or bearing a mid-dorsal spine ; male superior anal appendages 2-3 times as long as segment 10 of abdomen, constricted a little near base, laminated thereafter, forcipate or sinuous apically for variable extent, sometimes twisted or armed with a median spine ; inferior a little shorter than superiors, narrow, triangular and curved a little upwards at apex ; male genitalia with lamina depressed, hamules with broad base and narrowed strongly curved apex, and short, triangular lobe projected a little in profile ; 2nd segment of penis with moderately broad and closely apposed median lobes, the apical lobes produced into a long, whip-like flagella ; vulver sacle small, extending over basal third of segment 9, shortly triangular, bifid at apex and deeply emerginate. Wings hyaline, sometimes partly saffronated or enfumed with yellow ; apices of wings moderately pointed ; base of hindwing rounded in either sex ; usually 7-9 and 5-6 antenodal cross veins in fore- and hindwings respectively and 5-9 postnodal cross veins in either wing ; pterostigma about 3-4 times as long as broad, not braced ; discoidal cells roughly the shape of bilateral triangles, that of forewing traversed by a vein, shorter than subtrigone, elongated in breadth of wing, situated far distal to level of arc, with costal margin a little shorter than other margins, of hindwing entire, elongated in length of wing, situated slightly proximal to the level of arc, with basal margin about half the length of other margins ; arc situated between the 1st and 2nd antenodal cross-veins ; discoidal field commencing with a row of 2-3 cells ; Cu_2 and MA covering at wing margin in forewing ; hypertrigones entire in either wing ; subtrigone 3 celled ; sectors of arc arising from a common point, but not fused at base ; only 1 cubital cross vein in either wing ; anal loop elongated, usually made of 14-18 cells ; upto 4 rows of postanal cells in forewing.

Distribution : India ; China ; Burma ; Malaysia ; Indonesia ; New Guinea ; Japan ; Ryukyus ; Taiwan ; Philippines ; Australia ; New Zealand ; Pacific Islands ; Mauritius ; Africa ; Madagascar ; Seychellis.

***Hemicordulia asiatica* Selys**

(Figs. 12, 16, 379-381, 442-443 and 533)

Hemicordulia asiatica Selys, 1878, *Bull. Acad. Belg. Sci.* (2), **45** : 186. Fraser, 1936, *Fauna Brit. India, Odon.*, **3** : 213.

Material studied : 1 ♂, Jowai, 4.x.1972, coll ARL

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂	34.0	30.0	7-8	5	5	5-6

Notes : From the description of the sepcies provided by Fraser (1936) the male under study varies in having shorter hindwing, sides of segment 4 unmarked and that on segments 5-8 marked only with basola-teral triangular spots.

The species has been noticed to patrol very swiftly over slow running shallow streams or lakes with muddy bottom.

Distribution : India : Assam, Kerala, Maharashtra, Meghalaya, Tamil Nadu. Outside India : Africa.

Subfamily MACROMIINAE

Diagnostic characters : Sectors of arc in both wings form a common stalk at base ; discoidal cell usually entire with costal margin in either wing nearly always straight ; base of hindwing situated distal to the level of arc ; subtrigone variable, entire or traversed by cross veins ; anal loop quadrate or elongate with moderately developed or indistinct mid-rib.

Distribution : Virtually cosmopolitan.

KEY TO THE GENERA OF THE SUBFAMILY MACROMIINAE

In males anal triangle present and hindwing notched at base ; stalk at base of sectors of arc in hindwing longer than that of forewing ; discoidal field proximally with usually 3 transverse rows of cells (Fig. 534).
... ..*Macromia* Rambur.

In males anal triangle absent and hindwing rounded at base ; length of stalk at base of sectors of arc almost similar in either wing ; discoidal field proximally with at most 2 transverse rows of cells.,.
... ..*Idionyx* Hagen.

Genus *Idionyx* Hagen

Idionyx (Selys MS) Hagen, 1867, *Verh. zool. bot. Ges. Wien.*, 17 : Abh., 58.

Idionyx Hagen Selys : Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 218.

Tyep-species : *Idonyx yolanda* Selys.

Hagen (1867a) published only a very short account of the genus *Idionyx* and he was followed by Brauer (1868b, c). Selys (1871) treated the genus in some further detail along with description of the only then known species i. e. *I. Yolanda* Selys. The generic concept has been further elaborated and there has also been an addition of quite a number of species

as a result of contribution chiefly of Selys (1878a), Kirby (1890), Karsch (1891a), Martin (1905), Fraser (1921c, 1924a, 1926a, 1931, 1936, 1939) and Lieftinck (1939b, 1953b, 1954, 1960b, 1971b). Asahina (1965) Bhasin (1953) and St. Quentin (1970) also made some contribution on different species of the genus occurring in Indian region.

Diagnostic characters : Medium in size (usually abdomen and hindwing 27.0-38.0 mm) ; metallic green or blue, marked with yellow, or black ; vesicle simple, rounded or sometimes, specially in females, highly specialised, forming cones of variable shape frequently surmounted by an obtuse tubercle and apex bifid or produced into a variably shaped spine ; posterior lobe of prothorax not earected as a collar and usually not bearing specialised tuft of hairs ; tibiae of males on flexor surface with membranous keel, a long one on hind tibiae, short, distal on others ; tibial claws with arms equal in length ; oreillet present, segment 10 of abdomen carinated and sometimes produced into a mid-dorsal apical spine in male ; male anal appendages subequal and either as long as or upto more than twice as long as the segment 10 of abdomen ; superiors forcipete, sometimes with subapical excavation on inner margin and bearing robust tooth or spines on ventral surface ; inferior broad at base, narrowed thereafter, blunt, bifid or trifid at apex, with or without lateral spines ; male genitalia with lamina depressed, large hamuls bearing a robust strongly curved hook and small, rounded lobe bearing a tuft of hairs ; 2nd segment of penis with rather short, triangular median and long apical lobes, the lateral projecting forwards and with long, whip like flagella produced from near its base ; vulver scale short, triangular and projecting markedly in profile. Wings hayline, sometimes, specially in females, saffronated at base or deeply enfumed ; apices of wings moderately pointed ; base of hindwing shallowly notched in males, rounded in females ; usually 11-17 and 7-10 antenodal cross veins in fore- and hindwings respectively and 5-11 postnodal cross veins ; pterostigma about 3-4 times as long as broad, not braced ; discoidal cell entire, the same equilateral and smaller than subtrigone in forewing, situated a little distal to the level of arc, with basal margin slightly shorter than other margins in hindwing ; arc situated at the 2nd or between 2nd and 3rd antenodal cross-veins ; discoidal field commencing with a single row of cells ; Cu_2 and MA parallel or divergent at wing margin in forewing ; subtrigone entire, hypertrigone traversed by 1 or 2 veins in forewing, entire or traversed by 1 vein in hindwing ; sectors of arc with a long fusion ; 1 or 2 cubital cross veins in either wing ; anal loop elongated, usually made of 4-10 cells ; upto 2 rows of postanal cells in forewing.

Distribution : India ; Nepal ; China ; Burma ; Malaysia ; Indonesia ; Philippines.

***Idionyx optata* Selys**
(Figs. 376-378 and 446-447)

Idionyx optata Selys 1878, *Bull. Acad. Belg. Sci* (2), 45 : 196. Fraser 1936, *Fauna Brit. India, Odon.*, 3 : 219.

Idionyx ornata Fraser, 1922, *Mem. Dep. Agric. India (Ent.)*, 7 : 66.

Material studied : 1 ♂, Cherrapunjee, 16.v.1976, coll SB.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂	35.0	32.5	12-13	7-9	8	9-10

Notes : The single male under study varies from the description of the species provided by Fraser (1936) in having entire hypertrigone and detail shape of the anal appendage.

The specimen studied was collected from the type locality. Cherrapunjee near the entrance of Mawsmai cave, while it was noticed perching on a twig of a small bush.

Distribution : India : Meghalaya.

Genus *Macromia* Rambur

Macromia Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 37. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 161.

Type-species : *Macromia cingulata* Rambur

Rambur (1842) established this genus for 2 of his new species. The generic concept has further been elaborated and there has also been addition of a number of species as a result of contributions rendered chiefly by Selys (1870, 1871, 1874, 1878a, 1889), Hagen (1875), Kirby (1890), Kruger (1899), Martin (1904, 1906), and Williamson (1909). Fraser (1921c, 1922c, 1924b, f, 1927a, 1935a, 1936), Laidlaw (1920d, 1922b), Lieftinck (1929, 1941b, 1950, 1952b, 1954, 1955a, c, 1971a, b), Needham (1930a), Asahina (1949, 1964a), Gloyd (1959) and Pinhey (1962) have also worked on this genus. Bhasin (1953), Asahina (1963), St. Quentin (1970), Vershney (1971), Kumar (1972c, 1973b), Prasad (1976a) and Singh and Prasad (1976a) published accounts on different species of this genus occurring in Indian region.

Remarks : Gloyd (1959) proposed elevation of *Macromia* group of genera to family rank but Lieftinck (1971, 1977) favoured their placement under a subfamily of Corduliidae as has been followed in the present work.

Diagnostic characters : Medium to large in size (usually abdomen 32.0-59.0 mm, hindwing 29.0-59.0 mm) ; metallic green or blue and black, marked with yellow ; vesicle small and simple ; posterior lobe of prothorax not erected as a collar and usually not bearing specialised tuft of hairs ; in males, membranous keel on flexor surface extending nearly to the base of hind tibiae, limited only on the distal half on fore-tibiae and either atrophied or of variable extent on middle tibiae ; tibial claws with inner arms stouter and longer than the outer arms ; in male, a small oreillet present and segment 10 of abdomen carinated with apical margin with or without a prominent keel or a pair of tubercles ; male superior anal appendages subequal to or longer than segment 10 of abdomen, narrowed from base, to an acute apex, the outer border usually bearing a variably developed median or subapical spine, inferior as long as or slightly longer than superiors, narrow, trigonular and curved a little upwards at apex ; male genitalia with lamina depressed, long hamules more or less narrowed from base to strongly curved apex and sometimes with undulated ventral margin and either broad or rather narrow lobe ; 2nd segment of penis with large, moderately long and almost fused median lobes, the apical lobes produced into a long, whip-like flagella ; vulver scale variable, inconspicuous or even extending to more than halfway along the length of segment 10 of abdomen, oval or triangular and sometimes followed by a transverse ridge with a short ungulate process on either side. Wings hyaline, sometimes partly enfumed with brown or tinted with yellow or amber ; apices of wings well pointed ; base of hindwing markedly angulated in males, rounded in females ; in males tornal angle pronounced, rounded or sharply acute ; usually 13-18 and 8-15 antenodal cross veins in fore- and hindwings respectively and 8-13 postnodal cross veins ; pterostigma about 3-4 times as long as broad, not braced ; discoidal cell usually entire and roughly the shape of bilateral triangles, that of forewing subequal to subtrigone, elongated in breadth of wing, situated for distal to the level of arc, with costal margin a little more than half the length of other margins, of hindwing elongated in length of wing, situated well distal to the level of arc, with basal margin half the length of other margins ; arc situated between the 1st and 2nd antenodal cross veins ; discoidal field commencing with a row of 2-3 cells ; hypertrigone traversed by 1-2 cross veins in forewing, by 1-4 cross veins in hindwing ; subtrigone entire ; Cu_2 and MA diverging at wing margin in forewing ; sectors of arc fused at base, a longer fusion in hind-

wing ; 2-3 cubital corss veins ; anal loop quadrate, made of 6-14 cells ; upto 3 rows of postanal cells in forewing.

Distribution : Virtually cosmopolitan.

Macromia moorei Selys
(Figs. 382-385, 444-445 and 534)

Macromia moorei Selys, 1874, *Bull. Acad. Belg. Sci* (2), 37 : 28. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 164.

Material studied : 2 exs, Mawphlong (1 ♂, 6.viii.1963, coll VDS ; 1 ♂, 26.iv.1972, coll SB) ; 2 ♂♂, Myllem, 25.vii.1968, coll RKV ; 4 exs, Shillong (1 ♂, 8.vi.1967, coll SB ; 1 ♀, 10.v.1975, coll KD ; 1 ♀, 13.vii.1975, coll ARL ; 1 ♂, 9.viii.1975, coll RSG) ; 2 exs, Upper Shillong, coll RKV (1 ♂, 19.vi.1964 ; 1 ♀, 13.vi.1967).

Measurements (in mm) and Nodal index

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	51.0-52.0	44.5-46.0	14-15	9-10	9-11	11-13
♀♀	50.0-53.0	47.0-48.5	14-16	8-11	9-11	10-11

Notes : From the description of the species provided by Frasser (1936) the specimens under study vary in having longer pterostigma (2.50-2.75 mm in males, 2.00-2.75 mm in females).

Solitary specimens of this species were often noticed making to and fro patrolling over a distance of 40'-70'; near streams, lakes and even open ground or foot paths.

Distribution : India : Himachal Pradesh, Meghalaya, Uttar Pradesh, West Bengal.

Family LIBELLULIDAE

Diagnostic characters : Body colour usually non metallic or even metallic ; eyes without a sinuous projection at middle of the posterior border ; in males oreillets and membraneous keel on flexor surface of tibiae absent, Wings usually hyaline or even markedly coloured ; hindwing rounded at base ; anal triangle absent.

Remarks : No subfamily has been recognised under this family because the characters of separation of the subfamilies as suggested by Fraser-Tillyard (1938-1940) and Fraser (1957) appear overlapping.

Distribution : Cosmopolitan.

KEY TO THE GENERA OF THE FAMILY LIBELLULIDAE

1. Anal loop well formed, with borders meeting the inner margin of wing, apex of loop open (Fig. 62). ...*Tholymis* Hagen
 Anal loop absent or rudimentary, or well developed ; when well developed, the borders covering and meeting before inner margin of wing and apex of loop closed (Figs. 63 and 535-539). .2
2. Claw simple, not bifid. .*Onychothemis* Brauer
 Claw bifid into inner and outer arms. .3
3. Aarms of claw equal in length. .*Zygonyx* Hagen
 Claw with inner arm shorter than outer. .4
4. Sectors of arc in either wing separated almost from origin and without definite stalk (Fig. 47). .*Urothemis* Brauer
 Sectors of arc in forewing separated almost from origin and without a definite stalk ; these in hindwing form a common stalk. .*Rhyothemis* Hagen
 Sectors of arc in both wing forming a common stalk at base (Figs. 536-539). .5
5. Costal margin of discoidal cell in forewing angulated ; anal loop absent, or when present very small and formed of 4 or less cells (Figs. 536-and 538). .6
 Costal margin of discoidal cell in forewing straight ; anal loop well developed and formed of 6 or more of cells (Figs. 536-537 and 539). .7
- 6 Anal loope absent ; Cu_2 arising from distal margin of discoidal cell and well removed from the inner angle of the same (Fig. 538). .*Namnophya* Rambur.
 Anal loop present ; Cu_2 arising from inner angle of the discoidal cell (Fig. 535). .*Tetrathemis* Brauer
7. Distal antenodal cross vein of forewing complete (Fig. 536). .i
 Distal antenodal cross vein of forewing incomplete (Fig. 539). 11
8. Posterior lobe of prothorax msall and tumid and same not emerginate as a collar .*Lyriothemis* Brauer
 Posterior lobe of prothorax large and emerginate as a collar (Fig. 13). .9
9. Discoidal cell and hyperitrigone traversed by one or more cross veins in forewing and always more than 10 antenodal cross veins..*Ortheitrum* Newman
 Discoidal cell and hypertrigone entire in forewing and never more than 6 antenodal cross veins. .10
10. Abdomen dilated on segments 1-6 and thereafter slim and compressed upto the tip.*Acisoma* Rambur
 Abdomen variable, but never shaped as above.*Brachyoiplax* Brauer.
11. Posterior lobe of prothorax large and emerginatee as a collar. 12
 Posterior lobe of prothorax amall, tumid and not emerginate as a collar (Fig. 14). .14

12. Cu_2 in hindwing arising from distal margin of discoidal cell being well removed from inner angle of the same. . *Diplacodes* Kirby
 Cu_2 in hindwing arising from the inner angle of discoidal cell. .. .13
13. Hypertrigone in forewing traversed by 1 or more cross veins ; in the same wing Cu_2 and MA diverging at wing margin (Fig. 537). . *Palpoleura* Rambur
Hypertrigone in forewing entire ; in the same wing Cu_2 and MA strongly converging at wing margin. . *Sympetrum* Newman
14. Cu_2 and MA in forewing strongly converging at wing margin (Fig. 539). .15
 Cu_2 and MA in forewing parallel or diverging at wing margin. .16
15. Discoidal cell of forewing with costal margin about at most one third in length of basal margin (Fig. 539). . *Pantala* Hagen
Discoidal cell of forewing with costal margin not less than half in length of basal margin. . *Trithemis* Brauer
16. Hypertigone in forewing traversed by 1 or more cross veins. . *Neurothemis* Brauer
Hypertrigone in forewing entire. .17
17. Antenodal cross veins in forewing $7\frac{1}{2}$ or less. . *Brachythemis* Brauer
Antenodal cross veins in forewing $10\frac{1}{2}$ or more. .18
18. Arc situated between 2nd and 3rd antenodal cross veins ; wings narrow. . *Potamarcha* Karsch
Arc situated between 1st and 2nd antenodal cross veins ; wings of normal width. .19
19. R_s not undulated ; antenodal cross veins in forewing $11\frac{1}{2}$ or less. . *Crocothemis* Brauer
 R_s markedly undulated ; antenodal cross veins in forewing $14\frac{1}{2}$ or more.
... .. *Hydrobasileus* Kirby

Genus *Tetrathemis* Brauer

Tetrathemis Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, **18** : 369. Fraser 1936, *Fauna Brit. India, Odon*, **3** : 248.

Neophlebia Selys, 1859, *Pollen and van Dam, Mad., Ins.*, : 18.

Type-species : *Tetrathemis irregularis* Brauer

The genus has been used here sensu Ris (1909). Brauer (1868a, b, c), Selys (1869a, 1878b, 1896), Karsch (1889b), Kirby (1889, 1890), Krueger (1902), Foerster (1906), Fraser (1918c, 1924a, f, 1931, 1936), Laidlaw (1926, 1931), Lieftinck (1954, 1955a, 1971a) and Pinhey (1962) also worked on this genus. On Indian species, there appeared two papers by Bhasin (1953) and Prasad and Kumar (1977a).

Diagnostic characters : Small in size (usually abdomen 14.0-22.0 mm, hindwing 18.0-27.0 mm) ; black or metallic green marked with yellow or green ; vesicle high ; posterior lobe of prothorax large, emerginate and provided with specialised tuft of hairs ; tibial claws with inner arms much shorter than outer ; male genitalia with depressed, arched lamina, distally hooked hamules with a little broadened base and moderately wide lobe rounded at outer margin and projected beyond the hamules in profile ; 2nd segment of penis broadened apically with thin short median lobes having minute hairs on outer free margin ; in females, borders of segment 9 of abdomen not dilated ; vulver scale markedly projected in profile ; 9th ventral plate tongue like reaching apex of segment 10 of abdomen with minutely spined distal free margin. Wings hyaline, or sometimes partly marked with yellow or opaque blackish brown ; usually 9-12 and 6-11 antenodal cross veins in fore- and hindwings respectively and 5-10 postnodal cross veins ; pterostigma about 4 times as long as broad, not braced ; discoidal cells entire, that of forewing appearing as a rectangle, situated a little distal to level of arc with costal margin markedly angulated, of hindwing elongated in length of wing, roughly shaped as a bilateral triangle, situated slightly distal to level of arc with costal margin a little longer than the other margins ; arc situated usually between the 1st and 2nd or at 2nd or between 2nd and 3rd antenodal cross veins ; discoidal field commencing with a row of single cell ; hypertrigone in hindwing entire or traversed once, in forewing traversed by 1-2 veins or distorted, being arrested at the point of angulation of costal margin of discoidal cell ; subtrigone a single cell in forewing ; sectors of arc forming a common stalk ; Cu_2 and MA parallel at wing margin in forewing ; 1-5 cubital cross veins ; R_{spl} and M_{spl} not clearly differentiated ; anal loop short, made of 3-4 cells ; upto 2 rows of postanal cells in forewing.

Distribution : India ; Sri Lanka ; Burma ; Thailand ; Malaysia ; Indonesia ; New Guinea ; Philippines ; Australlia ; Africa ; Madagascar.

***Tetrathemis platyptera* Selys**

(Figs. 416, 502-503 and 536)

Tetrathemis platyptera Selys, 1878, *Mitt. Mus. Dresden*, : 316. Fraser 1936, *Fauna Brit. India, Odon.*, 3 : 250.

Tetrathemis flava Kruger, 1902, *Stett. Ent. Zeit.*, 63 : 190.

Tetrathemis pulchra Laidlaw, 1902, *Proc. zool. Soc. Lond.*, 1 : 71.

Tetrathemis aurea Fraser, 1924, *Mem. Dep. Agric. India (Ent)*, 8 : 69.

Material studied : 2 ♂♂, Songsok, 15.vi.1973, coll ARL ; 8 exs, Nongpoh, coll ARL (5 ♂♂, 2 ♀♀, 25.viii. 1972 ; 1 ♂, 11.iv. 1978) ; 2 ♂♂, Umran, 7.vii.1970, coll SKT

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	15.0-18.0	23.0-24.0	10-11	7	6-7	8
♀♀	17.0-18.0	23.0-24.0	8-9	7	7-8	7

Notes : Specimens of both sexes studied vary from the description of the species provided by Fraser (1936) in having labrum entirely black ; the males vary further in having entirely black prothorax, longer hindwing and higher nodal index.

The specimens were collected only near stagnant, usually small dirty water masses where these were mostly noticed to perch on tall weeds or branches of trees overhanging such water masses.

Distribution : India : Karnataka, Kerala, Maharashtra, Meghalaya, Tamil Nadu and "Bengal" (exact locality unknown). Outside India : Burma ; Thailand ; Malaysia ; Indonesia.

Genus *Lyriothemis* Brauer

Lyriothemis Brauer, 1868, *Verh. zool. bot. Ges. Wien*, **18** : 180, 365, 728. Fraser, 1936, *Fauna Brit. India, Odon.*, **3** : 263.

Calothemis Selys, 1978, *Mitt. Mus. Dresden*, : 305-311.

Type - species : *Lyriothemis cleis* Brauer.

Brauer (1868a, b, c) and Selys (1878 b) established the 2 genera *Lyriothemis* and *Calothemis* for some of their new species, but Selys also included in his genus *Libellula bivittata* Rambur 1842. Further contribution on the two genera came from Selys (1882, 1883a), Karsch (1889a, 1900) , Kirby (1889, 1890), Krueger (1902), Laidlaw (1902) and Martin (1904), Ris (1909) suppressed *Calothemis* Selys under *Lyriothemis* Brauer and his opinion was accepted by all later workers. Since then, amongst others Ris (1916, 1916a), Fraser (1918, 1921a, 1936), Lieftinck (1954) and Chao (1962) also worked on this genus.

Diagnostic characters : Small to large in size (usually abdomen 19.0-37.0 mm, hindwing 24.0-42.0 mm) ; coloured black or red, partly marked with yellow and metallic blue ; vesicle bifid ; posterior lobe of prothorax not erected as a collar and usually not bearing specialised tuft of hairs ; tibial claws with inner arms shorter than outer ; male genitalia

with a little projected hood shaped lamina, markedly projected large, foliate hamules, with very short inner spine and small lobe with rounded or angulated free margin ; in females, borders of segment 8 of abdomen only slightly dilated or not at all ; vulver scale small but deeply cleft, or inconspicuous. Wings hyaline or partly marked with yellow, amber or blackish brown ; usually 10-19 and 9-16 antenodal cross veins in fore- and hindwings respectively and 6-13 postnodal cross veins ; pterostigma about 6-7 times as long as broad, a little dialted medially, not braced ; discoidal cells appearing roughly as bilateral triangles, traversed once in hindwing, entire or traversed by 1-2 cross veins in forewing, in forewing elongated in bredth of wing, situated far distal to the level of arc, with costal margin about half the length of other margins, in hindwing elongated in length of wing, situated at or slightly distal to the level of arc with basal margin about half the length of other margins ; arc situated between 2nd and 3rd or even between 1st and 2nd antenodal cross veins ; discoidal field commencing with a row of 2-3 cells in forewing, or 2 cells in hindwing ; hypertrigone entire or traversed by 1-2 cross veins ; subtrigone 2-5 celled ; Cu_2 and MA converging at wing margin in forewing ; sectors of arc forming a common stalk ; usually 1-5 cutibal cross veins ; R_{spl} and M_{spl} poorly formed and are superated by a single row of cells from IR_3 and MA respectively ; anal loop stocking shaped, usually made of 18-24 cells ; upro 4 rows of postanal cells in forewing.

Distribution : India ; Tibet ; China ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; New Guinea ; Japan ; Ryukyus ; Philippines ; Pacific Islands.

Lyriothemis ? bivittata (Rambur)

(Fig. 427-and 536)

Libellula bivittata Rambur, 1842, *Hist. nat. Ins., Nevrop.* : 75.

Lyriothemis bivittata (Rambur) : Ris, 1909, *Cat. Coll. Selys.*, 9 : 118. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 296.

Material studied : 1 ♀, Rongrengiri, 19.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♀	33.0	42.0	17-18	10-11	13	21

Notes : The female specimen reported here was identified as *L. bivittata* (Rambur) and sent to Late Dr. Lieftinck for comments. He

then identified it as *L. ? bivittata* (Rambur) and his instance has been followed here. However, the specimen comes very close to *bivittata* as described by Fraser (1936), varying from the same only in having abdominal segments 1 and 2 unmarked with black and 2 cubital cross veins in hindwing.

The specimen studied was collected inside a small but thick patch of forest surrounded by cultivated field on the bank of Simsang river in Garo hills.

Distribution : India : Assam, Meghalaya, West Bengal. Outside India : Burma ; Thailand ; Vietnam ; Malaysia.

Genus *Orthetrum* Nawman

Orthetrum Newman, 1833, *Ent. Mag.*, 1 : 511. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 291.

Type-species : *Libellula coerulescens* Fabricius

Newman (1833) and Brauer (1868a, b, c) established the 2 genera *Orthetrum* and *Libella* but the accounts provided by these authors were very brief. Kirby (1889) while revising the genus *Orthetrum* suppressed *Libella* Brauer under it and all later workers accepted his opinion. Later, a number of authorities worked on this genus but the more important contributions are of Kirby (1890), Foerster (1906b), Ris (1909, 1916, 1916a), Fraser (1918, 1936), Needham (1930b), Laidlaw (1931), Pinhey (1951, 1961, 1962, 1970) and Lieftinck (1954, 1975). Different Indian species of the genus have been dealt with by Navas (1930), Lieftinck (1948a, 1955a, 1971a) Bhasin (1953), Asahina (1964b), St. Quentin (1970), Kumar (1971, 1972b, 1973b), Vershney (1971), Mitra and Lahiri (1974), Mitra and Sen (1975), Ghosh *et. al* (1975b), Kumar and Juneja (1976), Singh and Prasad (1976a), Jumar and Prasad (1977a), Lahiri (1977a, b, 1979) and Prasad and Kumar (1977a).

Diagnostic characters : Small to medium in size (usually abomen 20.0-40.0 mm, hindwing 22.0-50.0 mm) ; coloured white, yellow, green, orange, red or brown, marked with black, sometimes markings obscured by pruinescence ; vesicle raised, rounded or notched above ; posterior lobe of prothorax large, emerginate as a collar and provided with specialised tuft of hairs ; tibial claws with inner arms shorter than outer ; abdomen sometimes very broad, markedly swollen at base, such swelling followed by an abrupt constriction, or laterally compressed ; male genitalia with

well developed, hood shaped and emerginate lamina, sometimes bearing minute spines or specialised tuft of hairs and broad or narrow, entire or bifid lip, hamules with variably developed hooks sometimes forming a ridge below the normally more developed inner hooks, and variably developed lobes sometimes bearing specialised tuft of hairs ; 2nd segment of penis swollen distally, with very short or long, variably apposed, median lobes and normally longer apical lobes, sometimes supplemented by a ventral whip like flagella ; in females, usually the borders of segment 8, rarely that of segment 9 of abdomen variably dilated ; vulver scale small or inconspicuous, lips of vulver aperture thin or swelled, variably splayed out or forcipate ; 9th ventral plate timid, sometimes variably carinated. Wings hyaline, sometimes enfumed with brown and marked at base with golden yellow, amber or blakish brown ; usually with 11-21 and 8-15 antenodal cross veins ; in fore- and hindwings respectivcty and 8-16 postnodol cross veins ; pterostigma about 3-5 times as long as broad, not braced : discoidal cells roughly the shape of bilateral triangles, that of forewing elongated in bredth of wing, traversed by 1-2 cross veins, situated far distal to level of arc with costal margin less than half the length of other margins, of hindwing elongated in length of wing, entire or traversed once, situated at the level of arc with basal margin about half the length of other margins ; arc situated between 2nd and 3rd or between 1st and 2nd antenodal cross veins ; disciodal field commencing with a row of 3 cells in forewing, of 2 cells in hindwing ; hypertrigone traversed by 1-2 cross veins in forewing, eintire or traversed once in hindwing ; subtrigone 3-4 celled ; Cu_2 and MA diverging at wing margin in forewing ; sectors of arc forming a common stalk ; only one cubital cross vein ; R_{spl} and M_{spl} poorly developed and are mostly separated by a single row of cells from IR_s and MA respectively ; anal loop stocking shaped, usuaally made of about 14-30 cells ; upto 4 rows of postanal cells in forewing.

Distribution : Virtually cosmopolitan all over the Old World countries and the Pacific Islands.

KEY TO THE SPECIES OF THE GENUS *ORTHETRUM* NEWMAN

Male

1. Abdomen enoromously sollen at base and then abruptly slender and compressed laterally upto the tip. .s. *sabina* (Drury)
 Abdomen variable, but never abruptly slender and compressed as above. .2
2. Body violaceous red. .pruinoseum neglectum (Rambur)
 Body brown or black, with yellow markings. 3

3. Discoidal cell in hindwing entire. .4
Discoidal cell in hindwing traversed by a cross vein. .5
4. In hindwing Cu₂ arising from distal margin of discoidal cell well away from its inner angle ; sides of thorax yellow or pale green with sutures finely black
.. *.Luzonicum* (Brauer)
In hindwing Cu₂ arising from the inner angle of discoidal cell ; sides of thorax with two narrow whitish stripes separated by a broad reddish brown stripe.
.glaucum (Brauer)
5. A large black triangular mark at base of hindwing ; face and frons glossy black.
.t. triangulare (Selys)
Only extreme base of hindwing tinted with amber yellow ; face and frons greenish
... *.japonicum internum* McLachlan

Female

1. Abdomen enormously swollen at base and then abruptly slender and compressed laterally up to tip. *.s. sabina* (Drury)
Abdomen variable, but never abruptly slender and compressed as above. .2
2. Discoidal cell in hindwing entire. .3
Discoidal cell in hindwing traversed by a cross vein. .4
3. In hindwing Cu₂ arising from distal margin of discoidal cell well away from its inner angle ; lip of vulver aperture as in Fig. 420. *.luzonicum* (Brauer)
In hindwing Cu₂ arising from the inner angle of discoidal cell ; lip of vulver aperture as in Fig. 418. *.glaucum* (Brauer)
4. Base of all wings tinted with amber yellow ; vulver aperture as in Fig. 419.
.japonicum internum McLachlan
Only base of hindwing tinted with golden yellow at base ; lip of vulver aperture as in Fig. 421. *.pruinsum neglectum* (Raumbur)
Base of wings unmarked ; lip of vulver aperture as in Fig. 423.
.t. triangulare (Selys)

***Orthetrum glaucum* (Brauer)**

Libellula glauca Brauer, 1865, *Verh. zool. bot. Ges. Wien.*, 15 : 1012.

Libella glauca Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, 17 : 732.

Orthetrum glaucum (Brauer) ; Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 39. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 307.

Material studied : 1 ♂, 1 ♀, Anogiri, 8.xi.1973, coll SB ; 1 ♀, Kobal, 11.v.1973, coll ARL ; 1 ♂, Remgiri, 5.xi.1973, coll SB ; 1 ♂, Rongtham river bank, 11.v.1973, coll ARL ; 4 exs, Rongrengiri (1 ♂,

1♂, 8.iv.1973, coll ARL ; 2 ♂♂, 13.xi.1973, coll SB) ; 1 ♂, Songsok, 17.iv.1973, coll ARL ; 3 ♂♂, Balat, 8.xii.1977, coll ARL ; 5 exs, Barapani (1 ♂, 24.vi.1967, coll RKV ; 2 ♂♂, 4.vii.1968, coll RKV ; 1 ♂, 21.viii.1968, coll RKV ; 1 ♂, 24.vii.1969, coll BD) ; 1 ♂, Burnihat, 31.vii.1973, coll MD ; 1 ♂, Mawblong, 22.ix.1972, coll AKG ; 2 exs ; Mawpat (1 ♂, 7.v.1969, coll BD ; 1 ♂, 16.vii.1971, coll RSP) ; 1 ♂, Mawsynram, 10.x.1972, coll AKG ; 1 ♂, Nonghylian, 11.xii.1937, coll ARL ; 1 ♂, Old Barapani roadside, 9.xi.1970, coll SKC ; 1 ♂, Pynursla, 29.viii.1972, coll AKG ; 1 ♂, Ranikor, 7.xii.1977, coll ARL ; 9 exs, Shillong (1 ♂, 3.xi.1970, coll RKV ; 1 ♂, 8.ix.1971, coll RSG ; 2 ♂♂, 13.ix.1972, coll ARL ; 1 ♂, 5.v.1973, coll MSJ ; 1 ♂, 18.v.1974, coll MSJ ; 1 ♂, 26.v.1975, coll MSJ ; 1 ♀, 8.viii.1975, coll MSJ ; 1 ♀, 23.ix.1975, coll MSJ) ; 2 ♂♂, Upper Shillong, 25.viii.1968, coll SB ; 1 ♂, Sonaphar, 6.vi.1974, coll MV ; 3 exs, Umran, (1 ♂, 12.ix.1967, coll RKV ; 1 ♂, 2.vii.1970, coll SK ; 1 ♂, 7.xii.1970, coll SKT) ; 1 ♂, Umroi, 2.xi.1972, coll ARL ; 2 exs, Umsning (1 ♂, 16.vi.1967, coll RKV ; 1 ♂, 24.viii.1969, coll BD) ; 3 ♂♂, Sonapurdi, 27-28.viii.1974, coll ARL ; 1 ♂, Shangphung, 6.xii.1975, coll SKC.

Measurements (in mm) and Nodal index.

Length of		forewing		Hindwing	
abdomen	hindwing	An	Pn	An	Pn
♂♂ 30.0-34.0	32.5-38.0	13-14	9-11	9-11	10-11
♀♀ 28.5-31.0	34.0-35.0	13-14	10-12	10-11	11-12

Notes : Nearly 50% females studied vary from the description of the species provided by Fraser (1936) in having sides of synthorax and abdomen marked by pale brown stripes and hindwing unmarked or nearly so at base.

In Meghalaya the species was noticed to be very common except in southern part of the state. They appear to prefer paddy fields with narrow irrigation channels.

Distribution : India : Andhara Pradesh, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Tamil Nadu, Sikkim, Uttar Pradesh, West Bengal. Outside India : Nepal ; China ; Sri Lanka ; Burma ; Thailand ; Malaysia ; Indonesia ; New Guinea ; Philippines.

***Orthetrum japonicum internum* McLachlan**
(Figs. 392, 419 and 476-477)

Orthetrum japonicum internum Mc Lachlan, 1894, *Ann. Mag. nat. Hist.*, (6), 13 : 314.
Ris, 1909, *Cat. Coll. Selys*, 9 : 232. Fraser, 1936, *Fauna Brit. India, Odon*, 3 : 304.

Orthetrum interman McLachlan, 1896, *Ann. Mag. nat. Hist.* (6), 17 : 365.

Material studied : 1 ♂, 1 ♀, Cherrapunjee, 9.v.1976, coll SK ; 2 exs, Mawphlong (1 ♂, 13.iv.1967, coll RKV ; 1 ♂, 7.v.1969, coll BD) ; 2 ♂♂, Old Barapani roadside, 3.v.1975, coll MD ; 4 exs, Shillong, coll ARL (1 ♂, 13.v.1972 ; 1 ♂, 1 ♀, 12.viii. 1.1972 ; 1 ♂, 31.iii.1973) ; 29 exs, Barapani (1 ♂, 6.iv.1967, coll RKV ; 1 ♂, 11.v.1967, coll RKV ; 5 ♂♂, 3.vi.1967, coll RKV ; 6 ♂♂, 3 ♀♀, 25.v.1968, coll RKV ; 2 ♂♂, 1 ♀, 20.vii.1971, coll RSP ; 4 ♂♂, 30.v.1972, coll SB ; 3 ♂♂, 1 ♀, 6.vi. 1974, coll MV ; 1 ♂, 1 ♀, 27.v.1975, coll KD) ; 1 ♂, Umsning, 27.iii.1968, coll RKV ;

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	30.0-32.0	33.0-34.5	12-14	11-14	10-11	13-14
♀♀	27.0-28.0	32.0-32.5	13-15	11-13	9-10	11-14

Notes : The species was collected in Meghalaya only in Khasi hills above 88 m. It is however, more common above 1300 m around Shillong.

Distribution : India : Himachal Pradesh, Kashmir, Meghalaya, Nagaland, Uttar Pradesh, West Bengal. Outside India : Nepal ; Tibet ; China ; Vietnam.

***Orthetrum luzonicum* (Brauer)**
(Figs. 367, 420 and 478-479)

Libellula luzonica Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, 18 : 169, 732.

Orthetrum chrysostigma luzonicum (Brauer) : Ris, 1909, *Cat. Coll. Selys*, 9 : 210. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 298.

Material studied : 1 ♂, Songsok, 17.xi.1973, coll SB ; 2 exs, Wag-easi) 1 ♂, 7.iv.1973, coll ARL ; 1 ♂, 11.xi.1973, coll SB) ; 2 ♂♂, Barapni, 21.viii.1968, coll RKV ; 1 ♂, Mawphlong, 22.vi.1964, coll SB ; 2 exs, Mawryngkreng, (1 ♂, 14.v.1972, coll KD ; 1 ♂, 4.x.1972, coll ARL) ; 10 exs, Shillong (1 ♂, 29.vi.1960, coll AKD ; 1 ♂, 10.x.1963, coll VDS ;

1 ♂, 16.viii.1967, coll RKV ; 1 ♂, 25.viii.1968, coll RKV ; 1 ♂, 30.v.1972, coll KD ; 1 ♂, 3.ix.coll ARL ; 1 ♂, B.vi.1973, coll ARL ; 3 ♂♂, 5.ix.1975, coll MSJ) ; 4 exs, Upper Shillong (1 ♂, 10.vi.1974, coll RSG ; 2 ♂♂, 1 ♀, 10.vii.1974, coll RSG) ; 2 exs, Umsing (1 ♂, 16.v.1967, coll RKV ; 1 ♂, 28.vii.1969, coll BD) ; 11 exs, Thadlaskein (6 ♂♂, 1 ♀, 3.viii.1972, coll ARL ; 1 ♂, 1 ♀, 4.x.1972, coll ARL ; 2 ♂♂, 17.vii.1973, coll AKG).

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	28.5-31.5	39.5-32.0	12-13	8-10	9-10	9
♀♀	28.5-31.5	29.5-31.5	12-14	9-10	9-10	9-11

Note : Distribution in Meghalaya and habitat of this species appear to be very similar to those of *G. glaucum* (Brauer).

Distribution : India : Virtually cosmopolitan. Outside India : Nepal ; Sri Lanka ; Burma ; Vietman ; Malaysia ; Indonesia ; Philippines.

***Orthetrum pruinorum neglectum* (Rambur)**

(Figs. 390, 421 and 480-481)

Libellula neglecta Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 86.

Libellula pruinosa Burmeister, 1839, *Handb. Ent.* : 858. Brauer, 1865, *Verh. zool. bot. Ges. Wien.*, **15** : 1013.

Orthetrum pruinorum (Burmeister) : Kirby, 1886, *Proc. zool. Soc. Lond.*, : 327.

Orthetrum neglectum (Rambur) : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 182.

Orthetrum pruinorum neglectum (Rambur) : Ris, 1909, *Cat. Coll. Selys.*, **9** : 239. Fraser 1936, *Fauna Brit. India, Odon.*, **3** : 311.

Material studied : 5 ♂♂, 2 ♀♀, Anogiri, 7.xi.1973, coll SB ; 1 ♀, Darugiri, 5.vi.1973, coll ARL ; 4 ♂♂, 3 ♀♀, Rongrengiri, 18-22.iv.1973, coll ARL ; 1 ♂, Songsok, 15.iv.1973, coll ARL ; 3 ♂♂, 1 ♀, Wageasi, 6-7.iv.1973, coll ARL ; 1 ♀, 10 kms north of Balat. 8.xii.1977, coll ARL ; 2 exs, Barapani, Coll SB (1 ♂, 16.vi.1964 ; 1 ♂, 6.x.1968) ; 1 ♂, Burnihat, 31.vii.1973, coll MD ; 1 ♂, Cherrapunjee, 20.vii.1973, coll AKG ; 1 ♂, Lailad, 24.viii.1973, coll MD ; 1 ♂, Nongpoh, 25.viii.1972, coll AKG ; 6 exs, Old Barapani roadside (1 ♂, 16.vi.1967, coll RKV ; 2 ♂♂, 1 ♂, 5.iii.1971, coll GMY ; 1 ♂, 21.iv.1972, coll GMY ; 1 ♂, 25.vii.1972, coll AKG) ; 2 ♂♂, 1 ♀, Puksoara, 7.xii.1977, coll ARL ; 12 exs, Shillong (1 ♂, 23.viii.1962, coll SNP ; 1 ♂, 27.vii.1965, coll BKT ;

2 ♂♂, 16.viii.1967, coll RKV ; 1 ♂, 8.ix.1967, coll SKC ; 1 ♂, 26.viii.1971, coll RSG ; 1 ♂, 28.xi.1971, coll AEL ; 2 ♂♂, 3.ix.1972, coll ARL ; 1 ♂, 27.viii.1973, coll MSJ ; 1 ♂, 6.vi.1975, coll MSJ ; 1 ♂, 5.ix.1975, coll MSJ ; 1 ♂, Umran, 26.v.1931, coll SB ; 1 ♂, 1 ♀, Umaroi, 2.xi.1972, coll ARL ; 6 exs, Umsning (1 ♂, 16.vi.1967, coll RKV ; 2 ♂♂, 1 ♀, 5 iii. 1971, coll GMY ; 1 ♂, 21.vi.1972, coll GMY ; 1 ♂, 25.vii.1972, coll AKG ;), 1 ♂, Umtham, 4.x.1968, coll SB ; 1 ♂, Umtynger, 17.xii.1964, coll RPG ; 2 ♂♂, 1 ♀, Jowai, 3.viii.1972, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	31.0-32.5	36.0-37.5	15	10-11	10-12	10-12
♀♀	27.0-30.0	32.0-35.0	14-16	9-11	10-12	10-11

Note : This species was noticed to be very common in Meghalaya except in southern part of the state.

Distribution : India : Virtually comsopolitan, Outside India : Nepal ; Tibet ; China ; Sri Lanka ; Burma ; Malaysia ; Indonesia ; Taiwan.

***Orthetrum sabina sabina* (Drury)**

(Figs. 13, 391, 422 and 484-485)

Libellula sabina Drury, 1770, I 11. *Exot. Ins.*, 1 : 114.

Orthetrum sabina (Drury) : Kirby, 1889, *Trans. zool. Soc. Lond.*, 12 : 302. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 300.

Orthetrum sabina sabina (Drury) : Lieftinck, 1942, *Treubia*, 18 : 475.

Material studied : 8 ♂♂, 6 ♀♀, Balfagram, 23-29.iii.1975, coll SB ; 2 ♀♀, Anogiri, 7.xii.1973, coll SB ; 1 ♂, 3 ♀♀, Charikuty, 4.xi.1973, coll SB ; 1 ♀, Chitmargin beel, 10.iv.1973, coll ARL ; 1 ♂, Damra, 20.xi.1973, coll SB ; 1 ♂, Remgiri, 5.xi.1973, coll SB ; 7 exs, Barapani (1 ♀, 17.viii.1968, coll RKV ; 1 ♀, 21.viii.1968, coll RKV ; 3 ♂♂, 9.x.1968, coll SB ; 1 ♂, 19.ix.1972, coll AKG ; 1 ♀, 21.vi.1973, coll AKG) ; 1 ♂, Burnihat, 31.vii.1973, coll MD ; 1 ♂, Cherrapunjee, 28.iii.1967, coll RKV ; 1 ♀, Dawki, 18.v.1972, coll SB ; 1 ♂, 2 ♀♀, Mawblong, 22.ix.1972, coll AKG ; 1 ♀, Mawphlong, 2.v.1959, coll BD ; 2 ♂♂, Myllem, 25.vii.1967, coll RKV ; 1 ♀, Nonghyllan, 11.xii.1977, coll ARL ; 1 ♂, 1 ♀, Nongpoh, 9.iv.1973, coll SB ; 1 ♂, Pyrursla, 29.viii.1972, coll AKG ; 1 ♀, Puksorak 7.xii.1977, coll ARL ; 3 ♂♂, 2 ♀♀, Ranikor, 9-10.xii.1977,

coll ARL ; 1 ♂, Shella, 22.ix.1972, coll AKG ; 11 exs. Shillong (1 ♂, 29.ix.1962, coll SNP ; 1 ♀, 18.vii.1963, coll MRR ; 1 ♂, 16.viii.1967, coll RKV ; 1 ♂, 12.xii.1971, coll ARL ; 1 ♀, 19.ix.1972, coll AKG ; 1 ♂, 29.ix.1972, coll RSG ; 1 ♀, 25.xi.1972, coll SB ; 2 ♀ ♀, 12.viii.1972, coll ARL ; 1 ♂, 12.v.1974, coll KD ; 1 ♂, 20.x.1975, coll MSJ) ; 1 ♂, Upper Shillong, 10.vii.1974, coll RSG ; 2 exs, Umran (1 ♂, 12.ix.1967, coll RKV ; 1 ♂, 26.v.1971, coll SB) ; 1 ♂, Umsning, 25.viii.1972, coll AKG ; 5 exs, Umthan (1 ♂, 25.iv.1967, coll RKV ; 1 ♀, 29.ix.1967, coll RKV ; 2 ♂ ♂, 1 ♀, 25.ix.1973, coll SKG) ; 6 exs, Garampani (1 ♂, 21.i.1975, coll AKG ; 1 ♀, 29.i.1974, coll AKG ; 1 ♂, 1 ♀, 9.xii.1975, coll SKC ; 1 ♀, 10.xii.1975, coll SKC ; 1 ♂, 12.xii.1975, coll SKC) ; 2 ♂ ♂, Jowai, 3.viii.1972, coll AKG ; 7 ♂ ♂, 6 ♀ ♀, Sonapurdi, 27-28, viii, 1974, coll ARL ; 3 ♂ ♂, 5 ♀ ♀, Shangphung, 6-7.xii.1975, coll SKC.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	36.0-40.0	33.5-36.5	12-13	8-10	9-11	9-11
♀♀	31.5-34.0	30.0-31.5	12-14	9-11	9-11	8-10

Notes : The males under study vary from the description of the species provided by Fraser (1936) in nodal index and in having longer abdomen with more extensive black markings.

This is very widely distributed species in all parts of Meghalaya.

Distribution : Virtually cosmopolitan except America.

***Orthetrum triangulare triangulare* (Selys)**

(Figs. 389, 423 and 482-483)

Libella triangularis Selys, 1878, *Mitt. Mus. Dresden*, : 314.

Orthetrum triangulare (Selys) : Kirby, 1886, *Proc. zool. Soc. Lond.*, : 327.

Oethetrum triangulare triangulare (Selys) : Ris, 1909, *Cat. Coll. Selys*, 9 : 244. Fraser 1936, *Fauna Brit. India, Odon.*, 3 : 305.

Material studied : 1 ♂, 2 ♀ ♀, Charikuty, 4.xi.1973, coll SB ; 1 ♂, Damra, 20.xi.1973, coll SB ; 1 ♂, Remgiri, 5.xi.1973, coll SB ; 1 ♂, Rongrengiri, 20.iv.1973, coll ARL ; 1 ♂, Brapani, 19.ix.1972, coll AKG ; 3 ♂ ♂, Lailad, 24.viii.1973, coll ARL ; 1 ♂, Mawiong, 3.v.1968, coll RKV ; 1 ♂, 1 ♀, Mawphlong, 27.xi.1964, coll SB ; 1 ♂ Mowroh

17.xii.1963, MRR ; 2 exs., Nongpoh, coll ARL (1 ♂, 25.viii.1972 ; 1 ♂, vii. 1972, 1 ♂, 15.x.1975) ; 42 exs, Shillong (1 ♂, 21.viii.1959, coll SNP ; 1 ♂, 24.v.1960, coll SNP ; 1 ♂, 1 vi.1960, coll SNP ; 4 ♂♂, 1 ♀, 29. vi. 1960, coll SNP ; 1 ♂, 27.xi.1960, coll SNP ; 2 ♂♂, 8.viii.1960, coll SNP ; 1 ♂, 10.viii.1960, coll SNP ; 1 ♂, 21.viii.1960, coll SNP ; 2 ♂♂, 20.viii. 1960, coll SNP ; 1 ♂, 6.vii.1963, coll VDS ; 1 ♂, 17.x.1963, coll MRR ; 1 ♂, 27.vii.1965, coll BKT ; 1 ♂, 16.viii,1967, coll RKV ; 1 ♂, 24.viii. 1967, coll RKV ; 1 ♂, 14.v.1972, coll KD ; 1 ♂, 28.v.1972, coll ARL ; 1 ♂, 8.vi.1973, coll KD ; 1 ♂, 4.vii.1973, coll MSJ ; 3 ♂♂, 6.vii.1973, coll KD ; 1 ♂, 22.v.1974, coll MSJ ; 1 ♂, 14.vi.1974, coll MSJ ; 1 ♀, 18.vi.1974, coll MSJ ; 3 ♂♂, 28.vi.1974, coll RSG ; 1 ♀, 10.vii.1974, coll KD ; 1 ♂, 8.x.1974, coll MSJ ; 1 ♀, 9.x.1974, coll MSJ ; 1 ♀, 12. vi.1978, coll MSJ ; 2 ♀♀, 16.vi.1975, coll MSJ ; 1 ♀, 12.viii.1975, KD ; 1 ♂, 27.viii.1975, coll MSJ ; 1 ♂, 23.ix.1975, coll MSJ) ; 3 exs, Upper Shillong, coll RSG (1 ♂, 10.vi.1974 ; 2 ♂♂, 10.vii.1974) ; 2 exs, Umsning (3 ♀♀, 27.iii.1968, coll RKV ; 4 ♂♂, 28.vii.1969, coll BD ; 1 ♂, 7.vii.1970, coll SKT ; 1 ♂, 5.viii.1971, coll GMY) ; 1 ♀, Weilo, 26. iv.1972, coll SB.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	31.5-35.0	37.0-41.0	16-17	11-12	12	11-13
♀♀	31.0-33.0	41.0-42.0	16-18	11-13	12-14	11-13

Notes : Nearly 80% of males studied vary from the description of the species provided by Fraser (1936) in having synthorax black, unmarked, discoidal cell in forewing 2 celled and subtrigone entire or 2-3 celled.

The species noticed to be more common at higher altitude was collected from several localities in Meghalaya except Jaintia hills and southern part of the state.

Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh, Karnataka, Kashmir, Kerala, Maharashtra, Meghalaya Mizoram, Sikkim, Tamil Nadu, Uttar Pradesh. Outside India : Nepal ; Sri Lanka ; Burma ; Vietnam.

Genus *Potamarcha* Karsch

Potamarcha Karsch, 1889, *Berlin Ent. Zeit.*, 33 : 370. Fraser, 1936, *Fauna Brit. India.*, *Odon.*, 3 : 288.

Type-species : *Libellula obscura* Rambur

Karsch (1889a) established this genus incorporating only the type-species. Later, Kirby (1890), Karsch (1890), Krueger (1902), Martin (1904), Ris (1909, 1916), Fraser (1918, 1936), Laidlaw (1920d, 1930b) and Lieftinck (1954) also worked on this genus. Lieftinck (1955a, 1971a), St. Quentin (1970), Kumar (1972c, 1973b), Prasad (1975), Singh and Prasad (1976a), Kumar and Prasad (1977a) and Lahiri (1977a, b, 1979) have in recent times published accounts on the type-species collected from different parts of Indian region.

Diagnostic characters : Medium in size (usually abdomen 29.0-32.0 mm, hindwing 33.0-37.0 mm) ; black or brown, marked with yellow ; markings sometimes obscured by pruinescence ; vesicle shallowly bifid ; posterior lobe of prothorax not erected as a collar and usually not provided with specialised tuft of hairs ; tibial claws with inner arms shorter than outer ; male genitalia with a little projected, hood shaped and minutely spined lamina, broad base and distally strongly curved hamules and broad, slightly projected, lobe rounded at free border ; 2nd segment of penis broadened apically with short and thin median lobes ; in females, borders of segment of 9 of abdomen dilated, vulver scale inconspicuous and feebly keeled 9th ventral plate having a row well spaced marginal hairs, Wings narrow and hyaline but sometimes the apices clouded with brown and costal area tinted with yellow ; usually $13\frac{1}{2}$ - $14\frac{1}{2}$ and 9-12 antenodal cross veins in fore- and hindwings respectively and 9-11 postnodal cross veins ; pterostigma about 5-6 times as long as broad, not braced ; discoidal cells roughly the shape of bilateral triangles and traversed once, that the forewing elongated in breadth of wing, situated far distal to the level of arc with costal margin barely half the length of other margins, of hindwing elongated in length of wing, situated at the level of arc, with basal margin a little more than half the length of other margins ; arc situated between the 2nd and 3rd antenodal cross veins ; discoidal field commencing with a row of 3 cells in forewing, with a row of 2 cells in hindwing ; hypertrigone entire ; subtrigone 3 celled ; Cu_2 and MA slightly diverging at wing margin in forewing ; sectors of arc forming a common stalk ; only 1 cubital cross veins ; R_{s+1} and M_{s+1} poorly formed and are separated by a row of mostly single cells from IR_3 and MA respectively ; anal loop stocking shaped, usually made of about 15-20 cells ; upto 3 rows of postanal cells in forewing.

Distribution : India ; Nepal ; Bangladesh ; Sri Lanka ; Burma ; Thailand ; Malaysia ; Indonesia ; New Guinea ; Taiwan ; Philippines ; Australia.

Potamarcha congener (Rambur)

(Figs. 393 and 454-455)

Libellula obscura Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 64 (nom. praeoe).*Libellula congener* Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 70.*Potamarcha obscura* (Rambur) : Karsch, 1890, *Berlin Ent. Zeit.*, 33 : 371. Fraser, 1936 *Fauna Brit.. India., Odon.*, 3 : 289.*Potamarcha congener* (Rambur) : Selys, 1891, *Anal Soc. Esp. Hist. nat.*, 20 : 221. Lief-
tinck, 1971, *Ent. Scand. Suppl.*, 1 : 202.*Material studied* : 1 ♀, Balfagram, 23.iii.1976, coll SB ; 1 ♂, Rongrengiri, 20.iv.1973, coll ARL ; 1 ♂, Nongpoh, 19.ix.1973, coll SB ; 1 ♂, Umsning, 27.iii.1968, coll RKV

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	31.0-32.0	33.0-34.0	14½	10-11	11	10-11
♀	30.0	34.0	14½	10	11	10

Notes : It appears to be a rare insect in Meghalaya. Specimens were collected around bushes near strems*Distribution* : India : Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal. Outside India : As for genus.**Genus Palpopleura Rambur***Palpopleura* Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 129. Fraser, 1936, *Fauna Brit India, Odon.*, 3 : 316.*Hemistigmoides* Calvert, 1899, *Proc. Acad. Philad.*, : 239.Type-species : *Palpopleura vestita* RamburRambur (1842) established this genus for some of his new species and also included in it a few species which were earlier referred to the genus *Libellula* Linnaeus. Brauer (1868b, c) ; Selys (1869a), Krasch (1889a), Kirby (1889, 1890), Foerster (1906b), Ris (1910), Fraser (1919a, 1936a, 1936) and Pinhey (1962) also worked on this genus. Indian species of the genus have also been dealt with by Bhasin (1953), St. Quentin (1970),

Vershney (1971), Ghosh *et. al.* (1975b), Mitra and Sen (1975), Prasad (1976a), Singh and Prasad (1976a), Kumar and Prasad (1977a) and Lahiri (1977a, 1979).

Diagnostic characters : Small in size (usually abdomen 12.0-19.0 mm, hindwing 14.0-26.0 mm) ; yellowish, marked with brown, black or metallic blue, the markings sometimes obscured by pruinescence ; vesicle markedly raised, notched above ; posterior lobe of prothorax subquadrate, large, emerginate and provided with specialised tuft of hairs ; tibial claw with inner arms smaller than outer ; male genitalia small with arched, depressed hooks and distally narrowed large and projected lobe ; 2nd segment of penis swollen distally, with short, broad, closely apposed median lobes ; female with borders of segment 8 of abdomen not dilated, vulver scale small or inconspicuous and tumid 9th ventral plate having a pair of small subbasal angulate processes. Wings hyaline, sometimes partly yellowish, amber tinted, brown or black ; usually $10\frac{1}{2}$ - $12\frac{1}{2}$ and 7-9 antenodal cross veins in fore- and hindwings respectively and 4-9 postnodal cross veins ; pterostigma about 3-5 times as long as broad, not braced ; costal border in forewing with a sharp convexity lying nearer base than nodus ; discoidal cells roughly the shape of bilateral triangles and usually traversed by 1-2 cross veins, elongated in breadth of wing, situated well away from the level of arc in forewing with costal margin a little more than half the length of other margins, sometimes entire, elongated in length of wing, situated at or slightly distal to the level of arc with basal margin about half the length of other margins in hindwing ; arc situated between 1st and 2nd antenodal cross veins ; discoidal field commencing with a row of 3 cells in forewing, of 2 cells in hindwing ; hypertrigone traversed by 1-2 cross veins in forewing, entire in hindwing ; subtrigone 3 celled ; Cu_2 and MA diverging at wing margin in forewing ; sectors of arc arising from a common point or these forming a small stalk at base in forewing, these always forming a common stalk in hindwing ; usually only 1 cubital cross vein ; R_{s+1} and M_{s+1} not well differentiated ; anal loop nearly straight, made of about 12-15 cells ; upto 3 rows of postanal cells in forewing.

Distribution : India ; Nepal ; Tibet ; Bangladesh ? Sri Lanka ; Burma Vietnam ; Malaysia ; Africa ; Madagascar. (The genus although recorded from Sri Lanka and Malaysia by Fraser (1936), it was not so by Liefstinck (1954, 1971). Hence an ? has here been put against these countries.)

***Palpoleura sexmaculata sexmaculata* (Fabricius)**

(Figs. 414, 430, 498-499 and 537)

Libellula sexmaculata Fabricius, 1787, *Mant. Inst.* 1 : 338.

Aeshna minuta Fabricius 1787, *Mant. Ins.*, 1 : 339.

Palpopleura sexmaculata (Fabricius) : Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, 18 : 716.

Palpopleura sexmaculata sexmaculata (Fabricius) : Fraser, 1936, *Fauna Brit. India*, *Odon.*, 3 : 318.

Material studied : 1 ♀, Darugiri, 10.iv.1973, coll ARL ; 3 ♂♂, 1 ♀, Degrangiri, 10.xi.1973, coll SB ; 1 ♀, Nongchalma, 18.ii.1975, coll SB ; 1 ♀, Rongtham river bank, 9.iv.1973, coll ARL ; 1 ♀, Rongrengiri, 21.iv.1973, coll ARL ; 4 ♂♂, 1 ♀, Songsok, 16-17.iv.1973, coll ARL ; 1 ♂, 3 ♀♀, Tebangiri, 11.xi.1973, coll SB ; 3 ♂♂, 1 ♀, Wageasi, 6-7. iv.1973, coll ARL ; 5 exs, Barapani (1 ♀, 11.xii.1964, coll SB ; 1 ♂, 6.iv. 1967, coll RKV ; 1 ♂, 1 ♀, 31.v.1967, coll BKT ; 1 ♂, 21.iv.1973, coll AKG) ; 2 ♂♂, Dympep, 24.x.1967, coll RKV ; 1 ♂, 3 ♀♀, Jakrim, 4. xii. 1977, coll ARL ; 1 ♂, Mawlyndep, 3.vi.1971, coll GMY ; 7 exs, Mawpat (1 ♂, 4.viii.1964, coll RPG ; 1 ♂, 2 ♀♀, 31.viii.1967, coll RKV ; 1 ♂, 2 ♀♀, 16.vii.1971, coll RSP) ; 4 exs, Mawphlong (2 ♂♂, 1 ♀, 31.viii. 1967, coll RKV ; 1 ♂, 12.i.1973, coll AKG) ; 2 ♂♂, Mawryngkreng, 4.x.1972, coll ARL ; 1 ♀, 15.x.1975, coll SB) ; 7 exs, Pynursla (3 ♂♂, 1 ♀, 29.viii.1972, coll AKG ; 2 ♂♂, 1 ♀, 29.viii.1973, coll SKC) ; 1 ♀, Ranikor, 10.xii.1977, coll ARL ; 20 exs, Shillong (1 ♀, 15.ix.1965, coll BKT ; 2 ♂♂, 1 ♀ 11.iv.1972, coll ARL ; 1 ♂, 12.vii.1972, coll ARL ; 1 ♂, 1 ♀, 3.ix.1972, coll ARL ; 3 ♂♂, 24.iii.1973, coll ARL ; 2 ♂♂, 8. iv.1973, coll KD ; 1 ♂, 25.vi.1975, coll MSJ ; 1 ♂, 1.viii.1976, coll KD ; 2 ♂♂, 4 ♀♀, 5.ix.1975, coll MSJ) ; 4 exs, Upper Shillong, (1 ♂, 6.vi.1974, coll MV ; 2 ♂♂, 1 ♀, 10.vii.1974, coll RSG) ; 1 ♂, 2 ♀♀, Sonapahar, 27-29.xi.1977, coll KRR ; 2 ♂♂, 1 ♀, Sumer, 21.vi.1973, coll AKG ; 2 exs, Umroi (1 ♀, 12.xi.1967, coll RKV ; 1 ♀, 2.xi.1972, coll ARL) ; 6 exs, Umsning (3 ♂♂, 1 ♀, 5.viii.1971, coll GMY ; 1 ♂, 1 ♀, 25.vii.1972, coll AKG) ; 2 exs, Umtham (1 ♀, 22.iii.1968, coll BD ; 1 ♀, 25.viii.1972, coll AKG) ; 2 ♀♀, Umtynger, 9.vii.1964, coll SB ; 3 ♂♂, Weiloi, 14. viii. 1973, coll ARL ; 6 exs, Garampani, coll AKG (1 ♂, 4 ♀♀, 21.i.1975 ; 1 ♀, 29.i.1975) ; 1 ♂, Jowai, 3.viii.1972, coll AKG ; 10 exs, Thadlaskein (5 ♂♂, 2 ♀♀, 17.vi.1960, coll SB ; 1 ♀, 3.viii.1972, coll ARL ; 2 ♂♂, 4.x.1972, coll ARL).

Measurements (in mm) and Nodal index.

	Length of		forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	16.0-17.0	17.0-18.0	10½-11½	5	8	4-5
♀♀	14.5-15.0	18.0-18.5	10½-11½	5-6	7-9	5
			(12)			

Notes : The males studied vary from the description of the species provided by Fraser (1936) in having cubital spot extended into anal area over 1-4 cells and the females vary in not having "third" stripe interposed between the subcostal and intersector spots.

In Meghalaya the species was noticed to be well distributed but comparatively rare in southern parts of the state. They usually occur in large number near open grassland.

Distribution : India : Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal Outside India : Tibet ; China ; ? Sri Lanka ; Burma ; Vietnam ; ? Malaysia.

(*Note :* An ? has been put against Sri Lanka and Malaysia for the same reason as mentioned under generic distribution).

Genus **Brachydiplax** Brauer

Brachydiplax Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, **18** : 172, 368, 728. Fraser, 1936, *Fauna Brit. India, Odon.*, **3** : 323.

Microthemis Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, **18** : 724.

Type-species : *Diplax denticauda* Brauer

The genus has been used here sensu Ris (1909, 1910). Brauer (1868 a, b, c), Kirby (1889, 1890), Selys (1878b, 1889, 1891a), Laidlaw (1914a), Fraser (1919a, 1936) and Lieftinck (1953b, 1954) also worked on this genus. Lieftinck (1955a, 1971a), St. Quentin (1970), Prasad (1976a), Singh and Prasad (1976a) and Kumar and Prasad (1977a) published accounts on different species of this genus occurring in Indian region on recent times.

Diagnostic characters : Small to medium in size (usually abdomen 16.0-25.0 mm, hindwing 22.0-30.0 mm) ; green, metallic green yellow or brown marked with black ; the markings sometimes obscured by pruinescence ; vesicle rounded, low ; posterior lobe of prothorax moderately large, emerginate, subrectangular and provided with specialised tuft of hairs ; tibial claws with inner arms shorter than outer ; male genitalia with emerginate or depressed lamina with concave or deeply notched margin, small or large, moderately broad based hamules with short, inwardly directed distally curled hooks and narrow lobe ; female with borders of segment 8 of abdomen not dilated and broad, projecting vulver scales. Wings hyaline, sometimes tinted with yellow or brown at base ; usually 7-8 and 6-7 antenodal cross veins in fore- and hindwings respectively and 6-7 postnodal cross veins ; Pterostigma about 4-5 times as long as broad, not braced ;

discoidal cells roughly the shape of bilateral triangles and entire, that of forewing elongated in breadth of wing, situated far distal to the level of arc with costal margin about half the length of other margins, of hindwing elongated in length of wing, situated at or slightly distal to the level of arc with basal margin a little shorter than the outer margins ; arc situated between the 1st and 2nd antenodal cross veins ; discoidal field beginning with a row of 2 cells in forewing, with a row of single cell in hindwing ; hypertrigone entire ; subtrigone 3 celled ; Cu₂ and MA divergent at wing margin in forewing ; sectors of arc forming a common stalk ; only 1 cubital cross vein ; Rspl and Mfpl poorly formed and are mostly separated by a single row of cells from IR₃ and MA respectively ; anal loop only a little angulated, usually made of about 14 cells , upto 3 rows of postanal cells in forewing.

Distribution : India ; Nepal ; Bangladesh ; Sri Lanka ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; New Guinea ; Australia.

Brachydiplax sobrina (Rambur)
(Figs. 395 and 450-451)

Libellula sobrina Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 114.

Brachydiplax sobrina (Rambur) : Kirby, 1893, *J. Linn. Soc. Zool.*, 24 : 551. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 325.

Material studied : 1 ♂, Rongrengiri, 15.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂	22.0	29.0	8	8	6	7

Note : The single specimen studied was collected near a stream as it was perching on a twig of a small bush

Distribution : India : Assam, Himachal Pradesh, Karnataka, Kerala Maharashtra, Meghalaya, Orissa, Punjab, Uttar Pradesh, West Bengal
Outside India : Nepal ; Bangladesh ; Sri Lanka ; Burma ; Thailand ; Vietnam.

Genus Nannophya Rambur

Nannophya Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 27. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 321.

Nannodythemis Brauer. 1868, *Verh. zool. bot. Ges. Wien.*, 18 : 169, 726.

Fylla Kirby, 1889, *Trans. zool. Soc. Lond.*, 12 : 259

Type-species : *Nannophya Pygmaea* Rambur.

The genus has been used here sensu Ris (1910). Rambur (1842), Hagen (1849), Brauer (1868b,c), Selys (1878b, 1889), Karsch (1889c), Kirby (1889, 1890) Laidlaw (1931), Fraser (1921a, 1936) and Lifetinck (1954, 1962) also worked on this genus.

Diagnostic characters : Small in size (usually abdomen 9.0-16.0 mm hindwing 12.0-18.0 mm) ; red and yellow, marked with green or black; vesicle high, rounded or shallowly notched; posterior lobe of prothorax large, squarely emerginate and provided with specialised tuft of hairs; tibial claws with inner arms shorter than outer; male genitalia with arched, depressed lamina, moderately broad based hamules with broadly triangular and bluntly pointed outer hooks and a little projected, narrow lobe; 2nd segment of penis dilated apically with lobes converging, the median lobe short, subtriangular, the apical and lateral lobes narrower and longer; female with borders of segment 8 of abdomen not dilated and long vulver scales extending nearly to apex of segment 9 of abdomen. Wings hyaline, sometimes marked with yellow or amber at base; usually 5 and 4-5 antenodal cross vein in fore- and hindwings respectively and 4-6 postnodal cross veins in either wing; pterostigma about 3-4 times as long as broad, not braced; discoidal cells entire, that of forewing appearing as a quadrangle, situated well distal to the level of arc with distal margin angulated, of hindwing elongated in length of wing, roughly the shape of bilateral triangle, situated at or slightly distal to the level of arc with basal margin a little shorter than the other margins; arc situated between the 1st and 2nd antenodal cross veins; Cu₂ widely separated from the inner angle of the discoidal cells; discoidal field beginning with a row of single cell; hypertrigone and subtrigone entire; sectors of arc forming a common stalk; Cu₂ and MA diverging at wing margin in forewing; only 1 cubital cross vein or sometimes 2 in hindwing; Rspl, Mspl and anal loop not properly differentiated; upto 2 rows of postanal cells in forewing.

Distribution : India; China; Burma; Thailand; Vietnam; Malaysia; Indonesia; Australia.

***Nannophya pygmaea* Rambur**
(Figs. 394, 448-449 and 538)

Nannophya pygmaea Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 27. Fraser, 1936. *Fauna Brit. India, Odon*, 3 : 322.

Material studied : 2 exs, Barapani (1 ♂, 24.vii.1967, coll RKV; 1 ♂, 21.vi.1973, coll AKG); 8 ♂♂, Naya Bunglow, 26.vi.1978, coll SKC.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	Abdomen	hindwing	An	Pn	An	Pn
♂♂	11.0-12.0	13.5-15.0	5	4-5	4-5	4-5

Notes : The males studied vary from the description of the species provided by Fraser (1936) a little in size and nodal index.

This very small dragonfly species appears to be restricted to areas situated at a comparatively higher altitude in Meghalaya in northern Khasi hills.

Distribution : India : Assam, Meghalaya. Outside India : China ; Burma ; Thailand ; Vietman ; Malaysia ; Indonesia.

Genus *Acisoma* Rambur

Acisoma Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 28. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 329.

Type-species : *Acisoma panorpoides* Rambur

Rambur (1842) established this genus for 2 of his new species. The generic concept has further been enlightened and there has also been addition of a few more species as a result of contribution rendered chiefly by Hagen (1849), Bruaer (1868b, c), Kriby (1889, 1890), Karsch (1889a), Foerster (1906b), Ris (1909-1910) and Fraser (1919a, 1936). Different Indo-Malaysian species of this genus have been dealt with by Lieftinck (1954, 1955a, 1971a), Bhasin (1953), St. Quentin (1970), Kumar and Juneja (1976), Prasad (1976a), Singh and Prasad (1976a) and Lahiri (1977a, 1979).

Diagnostic characters : Small in size (usually abdomen 15.0-20.0 mm, hindwing 16.0-23.0 mm) ; black or brown marked with blue or green ; vesicle low, rounded above ; posterior lobe of prothorax large, emerginate as a collar and provided with specialised tuft of hairs ; tibial claw with inner arms shorter than outer ; abdomen markedly dilated on segments 1-6 and then markedly narrowed upto the end ; male genitalia small with arched depressed lamina, broad based projected hamules with strongly curved hooks and narrow lobes with margin subquadrate ; 2nd segment of penis swollen distally, with thin moderately long median lobes ; female with borders of segment 8 of abdomen not dilated, oval, projecting, vulver scale and tumid 8th ventral plate. Wings hyaline, sometimes marked with golden yellow or blackish brown at base ; usually 6-8½ and 5-6 antenodal cross

veins in fore- and hindwings respectively and 6-8 postnodal cross veins ; pterostigma about 3-4 times as long as broad, not braced ; disocidal cells roughly the shape of bilateral triangles and entire, that of forewing elongated in breadth of wing, situated well distal to the level of arc with costal margin sometimes angulated and less than half the length of other margins, of hindwing elongated in length of wing, situated at the level of arc with basal margin about half the length of other margins ; arc situated between the 1st and 2nd antenodal cross veins ; discoidal field commencing with a row of 2 cells ; hypertrigone entire ; subtrigone entire or 3-4 celled ; Cu₂ well separated from inner angle of disocidal cell in hindwing ; sectors of arc forming a common stalk ; only 1 cubital cross vein, Rspl and Mspl not well differentiated ; anal loop nearly straight, made of about 12-15 cells ; upto 3 rows of postanal cells in forewing.

Distribution : India ; Nepal ; China ; Sri Lanka ; Burma ; Thailand ; Malaysia ; Indonesia ; Japan ; Taiwan ; Philippines ; Africa ; Madagascar.

***Acisoma panorpoides panorpoides* Rambur**
(Figs. 400 and 456-457)

Acisoma panorpoides Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 28.

Acisoma panorpoides panorpoides Rambur : Ris, 1911, *Cat. Coll. Selys*, 12 : 456. Fraser 1936, *Fauna Brit. India, Odon.*, 3 : 330.

Material studied : 2 ♂♂, Chitmaring beel, 12.iv.1973, coll ARL ; 1 ♂, Rongrengiri, 21.iv.1973, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	18.0-20.0	21.0-22.0	6-7 (7½)	6-7	5-6	6-8

Note : In Meghalaya this species appears to be restricted only at a lower altitude and is commonly found near marshy areas.

Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Punjab, Tamil Nadu, Uttar Pradesh and 'Bengal' (exact locality unknown). Outside India : Nepal ; China ; Sri Lanka ; Thailand ; Malaysia ; Indonesia ; Japan ; Taiwan ; Philippines.

Genus **Brachythemis** Brauer

Brachythemis Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, **18** : 736. Fraser, 1936, *Fauna Brit. India. Odon.*, **3** : 363.

Cecergates Kirby, 1889. *Trans. zool. Soc. Lond.*, **12** : 306 (partim).

Zonothrasys Karsch, 1890, *Ent. Zeit.*, **1** : 297 (partim).

Termitophorba Foerster, 1906, *Jber. Nassau*, **69** : 305 (partim).

Type-species : *Libellula contaminata* Fabricius

The genus has been used here sensu Ris (1909, 1911). Brauer (1868a, b, c), Karsch (1889a), Kirby (1889, 1890), Selys (1891a), Laidaw (1914a, 1931), Fraser (1919b, 1936), Lieftinck (1954, 1962) and Pinhey (1962) also worked on this genus. Accounts on the type-species collected from different parts of Indian region have been published by Lieftinck (1948a, 1955a, 1971a), Bhasin (1953), Lahiri *et. al* (1969), St. Quentin (1970), Kumar (1972c, 1973b), Bose and Mitra (1975), Mitra and Sen (1975), Mitra (1976), Kumar and Juneja (1976), Singh and Prasad (1976a), Kumar and Prasad (1977a) and Lahiri (1979).

Diagnostic characters : Small to medium in size (usually abdomen 18.0-23.0 mm, hindwing 20.0-26.0 mm) ; black, brown or red, marked with yellow ; vesicle high, notched at apex ; posterior lobe of prothorax not erected as a collar and usually not provided with specialised tuft of hairs ; tibial claw with inner arms smaller than outer ; male genitalia with depressed, arched lamina, broad based hamules with strongly curled hooks and large, subquadrate or rounded, projected lobe ; 2nd segment of penis swollen distally with closely apposed median lobes of moderate length and width and somewhat similar but, longer apical lobes ; female with borders of segment 8 of abdomen not dilated, distally narrowed vulver scale extending to base of segment 9, with apex terminating in a pair of short cones and 9th ventral plate extending distally to cover the 10th segment with a pair of stumped subbasal ungulate processes and about 15 equally spaced marginal long hairs. Wings hyaline, sometimes partly coloured reddish yellow or blackish brown ; usually $6\frac{1}{2}$ - $7\frac{1}{2}$ and 5-6 antenodal cross veins in fore- and hindwings respectively and 5-6 postnodal cross veins ; pterostigma about 4-5 times as long as broad, not braced ; discoidal cells roughly the shape of bilateral triangles, that of forewing elongated in breadth of wing, entire or traversed once, situated well distal to the level of arc, with costal margin slightly more than half the length of other margins, of hindwing elongated in length of wing, entire, situated at the level of arc, with basal margin about half the length of other margins ; arc situated between the

1st and 2nd antenodal cross veins; discoidal field commencing with a row of 3 cells in forewing, of 2 cells in hindwing; hypertrigone entire; subtrigone 3 celled; Cu_2 and MA parallel at wing margin in forewing; sectors or arc forming a common stalk; only one cubital cross vein; Rs_{pl} and Ms_{pl} poorly formed and are mostly separated by a single row of cells from IR_s and MA respectively; anal loop only a little angulated, usually made of about 15-22 cells; upto 3 rows of postanal cells in forewing.

Distribution : India; Nepal; China; Sri Lanka; Burma; Thailand; Malaysia; Indonesia; Taiwan; Philippines; Iraq.

Brachythemis contaminata (Fabricius)

(Figs. 398, 439 and 470-471)

Lebellula contaminata Fabricius, 1793, *Entom Syst.*, 2 : 382.

Lebellula truncatula Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 95.

Brachythemis contaminata (Fabricius) : Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, 18 : 736. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 365.

Material studied : 1 ♂, Anogiri, 7.xi.1973, coll SB; 1 ♂, Chitmar-beel, 10.iv.1973, coll ARL; 1 ♂, Napak beel, 12.iv.1973, coll ARL; 1 ♂, Rongtham river bank, 9.iv.1973, coll ARL; 1 ♂, Rongrengiri, 18.iv.1973, coll ARL; 1 ♂, Barapani, 4.x.1968, coll RKV; 5 exs, Shillong (2 ♂♂, 11.xi.1974, coll KD; 2 ♂♂, 1 ♀, 13.xi.1974, coll ARL); 1 ♂, Jowai, 4.x.1972, coll ARL; 2 ♂♂, 1 ♀, Sonapurdi, 27-28, viii.1974, coll SRL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	21.0-23.0	22.5-23.0	7½	5-8	5	6-7
♀♀	18.0	24.0	7½	6	5	6

Notes : In Meghalaya this species was collected near lakes or slow running streams at variable altitude, but it appears to be a commoner insect at lower altitude.

Distribution : India : Virtually cosmopolitan. Outside India : Nepal; China; Bangladesh; Sri Lanak; Burma; Thailand; Malaysia; Indonesia; Japan; Taiwan; Philippines.

Genus *Crocothemis* Brauer

Crocothemis Brauer, 1868, *Verh. zool. Bot. Ges. Wien*, **18** : 367, 736. Fraser, 1936, *Fauna Brit, India, Odon.*, **3** : 343.

Bebilicia Kirby, 1900, *Ann. Mag. nat. Hist.* (7), **6** : 71 (partim).

Type-species : *Libellula erythraea*

The genus has been used here sensu Ris (1909, 1911, 1916). Brauer (1868a, b, c), Selys (1878b, 1883a, 1889, 1891a), Kirby (1889, 1890), Foerster (1906b), Laidlaw (1914a, 1931), Fraser (1919a, 1936), Lieftinck (1933, 1942, 1954), Watson (1969) and Pinhey (1962) also worked on this genus. Different species of the genus occurring in Indian region have been dealt with by Bhasin (1953), Lieftinck (1955a, 1971a), Lahiri *et. al.* (1970, 1972), St. Quentin (1970), Kumar (1972c), Bose and Mitra (1975), Ghosh *et. al.* (1975b), Kumar and Juneja (1976), Mitra (1976), Prasad (1976a), Singh and Prasad (1976a), Kumar and Prasad (1977a), and Lahiri (1977a, 1979).

Diagnostic characters : Medium in size (usually abdomen 20.0-35.0 mm, hindwing 26.0-38.0 mm) ; red or yellow marked with brown or black ; vesicle low, rounded ; posterior lobe of prothorax not erected as a collar and usually not provided with specialised tuft of hairs ; tibial claw with inner arms shorter than outer ; male genitalia with emereginte or depressed arched lamina, broad based, projected hamules evenly narrowed to an acute hook distally with a lateral ridge and lobe broadly rounded at outer margin ; 2nd segment of penis a little swollen distally, with rather short, narrow diverging median lobes, and longer apical lobes ; female with borders of segment 8 of abdomen not dilated, prominent, tongue shaped vulver scale projecting nearly at a right angle, and tumid 9th ventral plate with a pair of stumped subbasal ungulate processes and a few marginal hairs. Wings hyaline, sometimes marked with amber at base or enfumed with brown at apex ; usually $10\frac{1}{2}$ - $12\frac{1}{2}$ and 8-9 antenodal cross veins in fore- and hindwings respectively and 7-11 postnodal cross veins ; pterostigma about 5-6 times as long as broad, not braced ; discoidal cells roughly the shape of bilateral triangles ; that of forewing elongated in the breadth of wing, traversed by a cross vein and situated well distal to the level of arc with costal margin less than half the length of other margins, of hindwing elongated in length of wing, entire or traversed by a cross vein and situated at the level of arc with basal margin about half the length of other margins ; arc situated between the 1st and 2nd antenodal cross veins ; discoidal field beginning with a row of 3 cells in forewing, of 2 cells in hindwing ; hypertrigone entire ; subtrigone 3 celled ; Cu_2 and MA parallel at wing margin in forewing ; sectors of arc forming a common stalk ; only one cubital

cross veins ; Rspl and Mspl poorly formed and are separated by a single row of cells from IR₃ and MA respectively ; anal loop nearly straight, broadened subapically and usually made of 19-27 cells ; upto 4 rows of postanal cells in forewing.

Distribution : India ; Nepal ; China ; Bangladesh ; Sri Lanka ; Burma ; Thailand ; Malaysia ; Indonesia ; New Guinea ; Japan ; Taiwan ; Philippines ; Australia ; Iran ; Iraq ; Europe ; Africa ; Madagascar.

***Crocothemis servilia servilia* (Drury)**

(Figs. 399, 435, and 472-473)

Lebellula servilia Drury, 1770, 111. ex. Ins., 1 : 112.

Crocothemis servilia Drury) : Brauer, 1868, *Verh. zool. bot. Ges.. Wien.*, 18 : 737.

Crocothemis servilia servilia (Drury) : Ris, 1911 *Cat. Coll. Selys*, 13 : 533. Fraser, 1936, *Fauna Brit. India, Odon.* 3 : 345.

Material studied : 1 ♂, Chitmarging beel, 10.iv.1973, coll ARL ; 1 ♂, Remgiri, 5.ix.1973, coll SB ; 1 ♀, Rongtham river bank, 9.iv.1973, coll ARL ; 1 ♂, 1 ♀, Rongrengiri, 19-21.iv.1973, coll ARL ; 1 ♀, Tebangiri, 11.xi.1973, coll SB ; 20 exs, Barapani (1 ♂, 8.iv.1964, coll AKM ; 1 ♂, 8.xii.1964, coll AKM ; 1 ♂, 11.xii.1964, coll SB ; 3 ♀♀, 24.xi.1967, coll RKV ; 4 ♂♂, 1 ♀, 21.viii.1968, coll RKV ; 9 ♂♂, 4 ♀♀, 9.x.1968 coll SB ; 1 ♀, 17.ix.1969, coll NM ; 1 ♀, 19.xi.1972, coll AKG ; 1 ♂, 3.vii.1973, coll MD ; 1 ♀, 26.ix.1973, coll SKG) ; 1 ♂, Burnihat, 31.vii.1973, coll MD ; 1 ♂, Cherrapunjee, 20.xii.1965, coll BKT ; 1 ♀, Jakrim, 4.xii.1977, coll ARL ; 1 ♂, Laidlad, 24.viii.1973, coll MD ; 1 ♂, 1 ♀, Mairang, 2.xii.1977, coll KRR ; 1 ♂, 1 ♀, Mawblong, 22.ix.1972, coll AKG ; 2 exs, Mawpat (1 ♀, 30.x.1964, coll MRR ; 1 ♀, 18.iv.1968, coll RKV) ; 30 exs, Mawphlong (3 ♀♀, 17.ix.1964, coll SB ; 1 ♀, 24.x.1964, coll SB ; 2 ♂♂, 17.xi.1964, coll SB ; 1 ♀, 9.xii.1964, coll SB ; 2 ♀♀, 31.viii.1967, coll RKV ; 2 ♂♂, 3 ♀♀, 8.xi.1967, coll RKV ; 2 ♂♂, 6 ♀♀, 19.xi.1970, coll BBT ; 1 ♂, 1 ♀, 12.i.1973, coll AKG ; 1 ♀, 11.v.1973, coll AKG ; 2 ♂♂, 3 ♀♀, 21.xi.1973, coll AKG) ; 1 ♂, Mawrapat, 3.xii.1977, coll ARL ; 2 exs, Mawroh, coll MRR (1 ♂, 25.ix.1965, 1 ♀, 17.x.1963) ; 6 ♂♂, 2 ♀♀, Mawsyrnam, 4.x.1972, coll ARL ; 1 ♂, 4 Kms south of Mawsyrnam, 5.xii.1977, coll ARL ; 4 exs, Myllem (4 ♂♂, 1 ♀, 27.iv.1965, coll SB ; 2 ♂♂, 1 ♀, 25.vii.1968, coll RKV) ; 2 ♂♂, Nonghyllan, 11.xii.1977, coll ARL ; 2 ♀♀, Nongklan, 1 xii.1977, coll KRR ; 1 ♀, Nonghpoh, 15.x.1975, coll SB ; 9 exs, Old Barapani roadside (6 ♀♀, 9.xi.1970, coll SKC ; 3 ♂♂, 3.v.1975, coll MD) ; 3 exs, Pynursla (2 ♂♂,

29.viii.1972, coll AKG ; 1 ♀, 29.viii.1973, coll SKC) ; 175 exs, Shillong (1 ♀, 27.vii.1959, coll SNP ; 1 ♀, 27.vii.1960, coll BKT ; 1 ♀, 14.iii.1961, coll SNP ; 1 ♀, 26.vii.1961, coll SNP ; 1 ♂, 3.viii.1961, coll SNP ; 2 ♂♂, 1 ♀, 3.xi.1961, coll SNP ; 1 ♂, 4 ♀♀, 28.viii.1962, coll SNP ; 1 ♀, 25.ix.1962, coll SNP ; 1 ♂, 2 ♀♀, 25.x.1962, coll SNP ; 1 ♀, 6.vii.1963, coll VDS ; 3 ♀♀, 10.x.1963, coll SNP ; 1 ♂ 2 ♀♀, 5.vii.1965, coll SNP ; 2 ♂♂, 27.vii.1965, coll BKT ; 2 ♀♀, 15.ix.1965, coll BKT ; 1 ♂, 2.ix.1967, coll JKP ; 4 ♂♂, 8.ix.1967, coll SKC ; 1 ♂, 6.x.1967, coll SKC ; 2 ♂♂, 1 ♀, 15.xi.1967, coll BKT ; 1 ♀ 8.viii.1968, coll SNP ; 1 ♂, 2.x.1970, coll JKP, 1 ♀, 15.vi.1971, coll RSG ; 1 ♀, 10.ix.1971, coll RSG ; 1 ♂, 6.x.1971, coll RSG ; 3 ♂♂, 2 ♀♀, 19.x.1971, coll RSG ; 4 ♂♂, 10 ♀♀, 29.x.1971, coll RSG ; 1 ♂, 28.xi.1971, coll ARL ; 3 ♂♂, 1 ♀, 11.xii.1971, coll ARL ; 1 ♀, 29.iv.1972, coll RSG ; 1 ♂, 14.v.1972, coll KD ; 2 ♂♂, 4 ♀♀, 11.vi.1972, coll ARL ; 4 ♂♂, 2 ♀♀, 3.ix.1972, coll ARL ; 1 ♂, 1 ♀, 12.ix.1972, coll ARL ; 3 ♂♂, 4 ♀♀, 27-29.ix.1972, coll KD ; 2 ♂♂, 6 ♀♀, 23.x.1972, coll RSG ; 4 ♂♂, 3 ♀♀, 28.x.1972, coll RSG ; 3 ♂♂, 1 ♀, 3.xi.1972, coll RSG ; 3 ♂♂, 2 ♀♀, 7.xi.1972, coll RSG ; 1 ♀, 11.iii.1973, coll ARL ; 1 ♀, 27.iii.1973, coll KD ; 1 ♂, 1 ♀, 22.vi.1973, coll KD ; 1 ♀, 24.xi.1973, coll RSG ; 1 ♂, 11.v.1974, coll KD ; 1 ♂, 16.vii.1974, coll KD ; 1 ♂, 1 ♀, 6.x.1974, coll MSJ ; 1 ♀, 15.x.1974, coll MSJ ; 2 ♀♀, 29.x.1974, coll MSJ ; 1 ♂, 1.xi.1974, coll MSJ ; 1 ♀, 4.xi.1974, coll MSJ ; 2 ♂♂, 2 ♀♀, 6.xi.1974, coll RSG ; 2 ♂♂, 14.xi.1974, coll KD ; 1 ♀, 15.xi.1974, coll RSG ; 1 ♂, 3 ♀♀, 20.xi.1974, coll MSJ ; 3 ♂♂, 3 ♀♀, 21.xi.1974, coll RSG ; 1 ♂, 2 ♀♀, 2.xii.1974, coll RSG ; 1 ♂, 1 ♀, 18.xii.1974, coll MSJ ; 1 ♂, 1 ♀ 19.xii.1974, coll RSG ; 1 ♂, 21.xii.1974, coll RSG ; 1 ♂, 9.i.1975, coll RSG ; 1 ♀, 10.i.1975, coll MSJ ; 1 ♂, 22.viii.1975, coll MSJ ; 1 ♂, 1 ♀, 5.ix.1975, coll MSJ ; 1 ♂, 1 ♀, 9.ix.1975, coll MSJ ; 1 ♂, 18.ix.1975, coll MSJ ; 1 ♀, 23.ix.1975, coll MSJ ; 1 ♂, 25.ix.1975, coll MSJ ; 1 ♂, 3 ♀♀, 18.x.1975, coll RSG ; 1 ♂, 1 ♀, 28.x.1975, coll MSJ ; 1 ♂, 1 ♀, 31.x.1975, coll MSJ ; 1 ♂, 1 ♀, xi 1975, coll RSG ; 1 ♀, 4.xi.1975, coll MSJ) ; 9 exs, Upper Shillong (1 ♀, 31.x.1964, coll RSG ; 2 ♂♂, 1 ♀, 13.vi.1967 coll RKV ; 2 ♀♀, 1 xi.1973, coll MSJ ; 1 ♂, 2 ♀♀, 18.ix.1975, coll MSJ) ; 1 ♂, 2 ♀♀, Sonapahar, 29.xi.1977, coll KRR ; 3 ♂♂, Umlyngkat, 29.xi.1977, coll KRR ; 1 ♂, Umsamlem, (7.vii.1970, coll SKT ; 2 ♀♀ Umroi, 2.xi.1972, coll ARL ; 6 exs, Umsning (1 ♂, 7.xi.1963, coll VDS ; 1 ♀, 12.xii.1967, coll RKV ; 2 ♂♂, 28.vii.1969, coll BD ; 2 ♂♂, 10.ix.1969, coll NM) ; 10 exs, Umtham (1 ♂, 29.xi.1967, coll RKV ; 3 ♂♂, 6 ♀♀ 26.ix.1973, coll SKC) ; 3 exs, Umtynger (1 ♂, 9.x.1964 coll SB ; 2 ♂♂, 10.xi.1964, coll RPG) ; 14 ♂♂, 7 ♀♀, Garampani, 26-29.i.1975, coll

AKG ; 1 ♂, 1 ♀, Jowai, 3.viii.1972, coll ARL ; 2 ♂♂, Sonapurdi, 27. viii.1974, coll ARL ; 2 ♂♂, 2 ♀♀, Ratachara, 6-7.xii.1975, coll SKC ; 4 ♂♂, 3 ♀♀, Thadlaskein, 3.viii.1972, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	23.5-24.5	27.0-29.0	10½-11½	8-10	8-9	9-11
♀♀	24.0-25.0	29.0-30.0	10½-11½	7-10	9	8-9

Note : This species appears to be the most common dragonfly in Meghalaya and has been collected all over the state and in all seasons of the year. However, it was noticed to be more common near human habitations and during the monsoon months.

Distribution : India : Virtually cosmopolitan. Outside India : Nepal ; China ; Bangladesh ; Sri Lanka ; Burma ; Thailand ; Malaysia ; Indonesia ; Japan ; Taiwan ; Philippines ; Iran ; Iraq.

Genus *Diplacodes* Kirby

Diplacodes Kirby, 1889, *Trans. zool. Soc. Lond.*, 12 : 307. Fraser 1936, *Fauna Brit. India, Odon.*, 3 : 331

Type-species : *Lebellula lefebvrei* Rambur*

Kirby (1889) established this genus including a number of species earlier referred to the genera *Diplacina* Brauer and *Diplax* Charpentier. Later, several authorities worked on this genus of which the more important contributions came from Karsch (1889a), Kirby (1890), Foerster (1906b), Ris (1909, 1910), Laidlaw (1914a, 1931), Fraser (1919a, 1936), Lieftinck (1954, 1962, 1975) and Pinhey (1962, 1967). Different Indian species of the genus have also been dealt with by Lieftinck (1948a, 1955a, 1971a), Bhasin (1953), Asahina (1957), St. Quentin (1970), Lahiri *et. al.* (1969), Kumar and Juneja (1976), Mitra (1976), Prasad (1976a), Singh and Prasad (1976a), Kumar and Prasad (1977a) and Lahiri (1977a, 1979).

Diagnostic characters : Small to medium in size (usually abdomen 14.0-25.0 mm, hindwing 17.0-29.0 mm) ; coloured yellow, brown or red marked with black, the markings sometimes obscured by preuinescence ; vesicle high, rounded or shallowly notched ; posterior lobe of prothorax large, subrectangular, emerginate and provided with specialised tuft of

After Fraser (1936), Lieftinck (1954) and Davis (1981), but as opposed to Kirby's (1890) citation, viz. *Diplacodes tetra* (Rambur).

hairs ; tibial claw with inner arms shorter than outer ; male genitalia with arched, depressed or projecting lamina, broad based hamules with short, distal, inwardly curled hooks and broad or narrow, projecting lobe ; 2nd segment of penis moderately swollen distally, with both median and apical lobes short, narrow, and branched ; female with borders of segment 8 of abdomen not dilated, vulver scale variably projected, extending to base of segment 9 of abdomen, with rounded or shallowly notched margin and tumid 9th ventral plate having a pair of stumped subbasal ungulate processes. Wings hyaline, sometimes partly marked with yellow, black or blackish brown ; usually $5\frac{1}{2}$ - $9\frac{1}{2}$ and 5-6 antenodal and 5-7 and 4-6 postnodal cross veins in fore- and hindwings respectively ; pterostigma about 4-5 times as long as broad, not braced ; discoidal cells roughly the shape of bilateral triangles, that of forewing elongated in breadth of wing, entire or traversed by a cross vein and situated far distal to the level of arc with costal margin less than half the length of other margins ; of hindwing elongated in length of wing, entire, situated at the level of arc with basal margin about half the length of other margins ; arc situated between the 1st and 2nd antenodal cross veins ; discoidal field beginning with a row of 2-3 cells in forewing, of a single cell in hindwing ; hypertrigone entire, subtrigone entire or 2-3 celled in forewing ; Cu_2 widely displaced from the inner angle of the discoidal cell in hindwing ; Cu_2 and MA diverging at wing margin in forewing ; sectors of arc forming a common stalk ; M_{spl} not clearly differentiated ; R_{spl} poorly formed and separated by a single row of cells from IR_3 ; anal loop angulated a little, usually made of 11-14 cells ; upto 3 rows of postanal cells in forewing.

Distribution : India ; China ; Sri Lanka ; Andamans ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; New Guinea ; Japan ; Ryukyus ; Taiwan ; Philippines ; Australia ; Pacific Islands ; Iraq ; Saudi Arabia ; Turkey ; Mauritius ; Africa ; Madagascar ; Seychelles.

KEY TO THE SPECIES OF THE GENUS *DIPLACODES* KIRBY

Male

Wings hyaline apically.

.trivialis (Rambur)

Wings black apically.

.nebulosa (Fabricius)

Female

Vulver scale only slightly emerginate, extending upto one third along the length of abdominal segment 9 and with its apical margin broadly notched (Fig. 431).

... *.nebulosa* (Fabricius)

Vulver scale markedly emerginate, extending half way along the length of abdominal segment 9 and with apical margin broadly rounded (Fig. 432). .*trivialis* (Rambur)

***Diplacodes nebulosa* (Fabricius)**
(Figs. 401, 431 and 458-459)

Libellula nebulosa Fabricius, 1793, *Entom. syst.*, 2 : 379.

Diplax nebulosa (Fabricius) : Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, 18 : 72'

Diplacodes nebulosa (Fabricius) : Kirby, 1889, *Trans. zool Soc. Lond.*, 12 : 308. Fraser 1936, *Fauna Brit. India, Odon.*, 3 : 335.

Material studied : 1 ♂, Darugiri, 10.iv.1973, coll ARL ; 1 ♂, Rongtham river bank, 9.iv.1973, coll ARL ; 1 ♂, Rongrengiri, 18.iv.1973, coll ARL ; 1 ♂, Songsok, 14.iv.1973, coll ARL ; 1 ♂, 1 ♀, Wageasi, 8.iv.1973, coll ARL ; 1 ♀, Lailad, 24.viii.1973, coll MD ; 1 ♀, Shillong, 10.vii.1973, coll KR ; 5 ♂♂, 2 ♀♀, Sonapurdi, 26-28.viii.1974, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	18.0-19.0	20.0-21.0	7½-8½	5-6	6	5-6
♀♀	16.0	20.0	7½	5	6	6

Note : Specimens of both sexes under study vary from the description of the species provided by Fraser (1936) a little in size.

In Meghalaya this species appears to be more common at lower altitude in fields covered with tall grasses or mastered fields having slow running irrigation channels.

Distribution : India : Assam, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Tamil Nadu, Uttar Pradesh, West Bengal. Outside India : China ; Sri Lanka ; Burma ; Vietnam ; Malaysia ; Indonesia ; New Guinea ; Australia.

***Diplacodes trivialis* (Rabmur)**
(Figs. 402, 432 and 460-461)

Libellula trivialis Rambur, 1842, *Hist. nat. Ins, Nevrop.*, 115.

Diplax trivialis (Rambur) : Brauer, 1866, *Novara* : 104.

Trithemis trivialis (Rambur) : Kirby, 1889, *Trans. zool. Soc., Lond.*, 12 : 278.

Diplacodes trivialis (Rambur) : Karsch, 1891, *Ent. Nachr.*, 17 : 246. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 336.

Material studied : 9 exs, Barapani (1 ♂, 4.vii.1968, coll RKV ; 1 ♀, 21.viii.1968, coll RKV ; 1 ♂, 9.x.1968, coll SB ; 3 ♂♂, 26.vii.1969, coll BD ; 1 ♂, 1 ♀, 21.iv.1973, coll RSP ; 1 ♂, 21.vi.1973, coll AKG) ; 1 ♂, Burnihat, 31.vii.1973, coll MD ; 1 ♀, Cherrapunjee, 24.x.1967, coll RKV ; 1 ♂, Dawki, 18.v.1972, coll ARL ; 2 exs, Mawpat (1 ♂, 4.vii.1968, coll RKV ; 1 ♂, 4.x.1968, coll MKS) ; 1 ♀, Mawrynakreng, 4.x.1972, coll AKG ; 3 exs, Myllem (2 ♂♂, 25.vii.1968, coll RKV ; 1 ♀, 18.viii.1971, coll SKG) ; 1 ♀, Nongpoh, 25.viii.1972, coll AKG ; 1 ♂, Nongstoin, 28.iv.1970, coll SK ; 4 exs, Shillong (1 ♀, 24.x.1967, coll RKV ; 1 ♀, 20.ix.1972, coll KD ; 1 ♂, 8.iv.1973, coll KD ; 1 ♂, 25.vi.1975, coll MSJ) ; 1 ♂, Umroi, 2.xi.1972, coll ARL ; 1 ♂, Umsmalem, 31.vii.1973, coll MD ; 1 ♂, Umsning, 25.vii.1972, coll AKG ; 1 ♂, Umtham, 4.x.1968, coll BKT ; 1 ♂, Garampani, 29.i.1975, coll AKG ; 1 ♂, 1 ♀, Thadlaskein, 3.viii.1972, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	21.0-22.5	23.0	7½-8½	6	6	6
♀♀	20.5-21.0	22.0	5½-7½	5-6	5-6	5-6

Notes : This species appears to have wider distribution in Meghalaya than *D. nebulosa* (Fabricius) and is equally common in areas situated at both higher and lower altitude. These are commonly found in the open, on grassy lawns, foot paths etc, in the vicinity of water masses.

Distribution : India : Andaman Islands, Andhra Pradesh, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Tamil Nadu, Tripura, Uttar Pradesh, Outside India : China ; Sri Lanka ; Burma ; Thailand ; Vietman ; Malaysia ; Indonesia ; New Guinea ; Japan ; Ryudyus ; Philippines ; Australia ; Pacific Islands ; Iraq ; Seychelles.

Genus *Neurothemis* Brauer

Polyneura Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 26. (nom, praeoc).

Neurothemis Brauer, 1867, *Verh. zool. bot. Ges. Wien.*, 17 : 289. Fraser, 1936, *Fauna Brit. India., Odon.*, 3 : 350.

Untamo Kirby, 1889, *Trans. zool. Soc. Lond.*, 12 : 260.

Type-species : *Libellula fulvia* Drury

This genus under the name *Polyneura* was established by Rambur (1842) for a few species earlier referred to the genus *Libellula* Linnaeus. Brauer (1867a, b) proposed the name *Neurothemis* for *Polyneura* and his concept was accepted by all later workers. Subsequently the generic concept has further been elaborated and there has also been addition of quite a number of species as a result of contribution rendered chiefly by Brauer (1868a, b, c), Selys, (1878b, 1889, 1891a), Kirby (1889, 1890), Foerster (1898), Krueger (1903), and Ris (1909, 1911). Laidlaw (1914a, 1931), Fraser (1919a, 1936), Schmidt (1938) and Lieftinck (1954) have also worked on this genus. Lieftinck (1927, 1948a, 1955a, 1971a), Bhasin (1953), St. Quentin (1970), Ghosh *et. al* (1975a, b), Mitra and Sen (1975), Kumar and Juneja (1976), Prasad (1976a), Singh and Prasad (1976a), Kumar and Prasad (1977a) and Lahiri (1977b, 1979) published accounts of different species of the genus occurring in Indian region.

Diagnostic characters : Small to medium in size (usually abdomen 16.0-28.0 mm, hindwing 19.0-32.0 mm) ; black, red or brown, partly marked with yellow or green ; vesicle high, rounded or shallowly notched ; posterior lobe of prothorax a little emerginate, but not erected as a collar and usually not provided with specialised tuft of hairs ; tibial claw with inner arms shorter than outer ; male genitalia with a little emerginate arched lamina, broad hamules with strongly curled distal hooks and broad or narrow, projecting lobe ; 2nd segment of penis dilated distally, with narrow, closely apposed median lobes and longer acutely pointed and forcipate apical lobes ; female with borders of segment 8 of abdomen not dilated, moderately large, subacute projecting vulver scale and tumid 9th ventral plate extended over segment 10 of abdomen bearing a pair of stumped sub-basal ungulate processes. Wings sometimes with close secondary reticulation, hyaline, or partly or wholly coloured with orange, black or opalescent white ; usually $10\frac{1}{2}$ - $15\frac{1}{2}$ and 8-12 antenodal cross veins in fore- and hindwings respectively and 7-12 postnodal cross veins ; pterostigma about 4-5 times as long as broad, not braced ; discoidal cells roughly the shape of bilateral triangles and traversed by 1-3 cross veins, that of forewing elongated in breadth of wing, situated far distal to the level of arc with costal margin a little more than half the length of other margins, of hindwing elongated in the length of wing, situated at the level of arc with basal margin a little more than half the length of other margins ; arc situated at the 2nd or between 2nd and 3rd antenodal cross veins ; discoidal field beginning with a row of 3 cells in forewing, of 2 cells in hindwing ; hyper-

trigone and cubital space usually 3-6 celled ; Cu_2 and MA parallel or a little divergent at wing margin in forewing ; secotrs of arc forming a common stalk ; Rspl and Mspl poorly formed and are mostly seperated by a single fow or cells form IR_3 and MA respectively ; anal loop angulated a little, usually made of 18-33 cells ; upto 4 rows of postanal cells in forewing ; (in species with secondary reticulation, all parts of wing, with higher number of cells and cross veins).

Distribution : India ; Nepal ; Tibet ; China ; Bangladesh ; Sri Lanka ; Nicobar Islands ; Burma , Thailand ; Vietnam ; Malaysia ; Indonesia ; New Guinea ; Japan , Taiwan ; Philippines ; Australia ; Pacific Islands.

KEY TO THE SPECIES OF THE GENUS *NEUROTHEMIS* BRAUER (EITHER SEX)

1. Neuration open ; wings marked with golden yellow only at base. . *intermedia* group
Neuration very to moderately close ; wings marked otherwise. . 2
2. Wings marked with reddish brown which extends from base to nearly apex.
.. . *fulvia* (Drury)
Wings marked with black or blackish brown which variably extends from base to nodus. . *t. tullia* (Drury)

KEY TO THE SUBSPECIES OF *INTERMEDIA* GROUP

Male

Base of wings deep amber yellow upto a little beyond discoidal cell. . *i. atlanta* Ris
Base of wings pale golden yellow upto a little beyond discoidal cell.
... . *i. intermedia* (Rambur)

(Female of *N. i. atlanta* Ris was not available in the collection studied.
Therefore, no key is provided for the females of *intermedia* group.

***Neurothemis fulvia* (Drury)** (Figs, 404, 436 and 466-467)

Libellula fulvia Drury, 1773, *III, Exot. Ins.*, 2 : 84.

Libellula sophronia Drury, 1773, *III, Exot. Ins.*, 2 : 86.

Neurothemis fulvia (Drury) : Kirby, 1889, *Trans. zool. Soc. Lond.*, 12 : 271. Fraser, 1936, *Fauna Brit. India, Odon.*, 2 : 353.

Material studied : 1 ♂, Anogiri, 8.xi.1973, coll SB ; 1 ♂, Dainadubi, 15.iv.1971, coll RSP ; 1 ♂, 1 ♀, Dambu, 9.iv.1973, coll ARL ; 1 ♀, Napak beel, 12.iv.1973, coll AR: L 1 ♂, Rongrengiri, 19.iv.1973, coll ARL ; 2 exs, Songsok (1 ♂, 15.iv.1973, coll ARL ; 1 ♀, 18.xi.1973,

coll SB) ; 1 ♂, 1 ♀, Wageasi, 6-7.iv.1973, coll ARL ; 2 ♂♂, 1 ♀, Burnihat, 24.viii.1973, coll ARL ; 4 ♂♂, 1 ♀, Lailad, 24.viii.1973, coll ARL ; 2 exs, Nongpoh (1 ♂, 25.viii.1972, coll ARL ; 1 ♂, 19.ix.1973, coll SB) ; 2 exs, Shillong (1 ♀, 21.xi.1973, coll RSG ; 1 ♂, 4.ix.1975, coll KD) ; 4 exs, Umran (3 ♂♂, 12.ix.1967, coll RKV ; 1 ♀, 2.viii.1970, coll SK) ; 1 ♀, Umsning, 24.vii.1969, coll BD ; 1 ♂, 1 ♀, Sonapurdi, 27.viii.1974, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	24.5-26.5	30.0	30-32	17-19	21-26	20-22
♀♀	22.0-23.0	29.5-30.0	28-31	12-17	20-25	15-21

Note : In Meghalaya this species is usually found in submontane areas at lower altitude, in forests with thick undergrowth of bamboo and canes near small streams filled with muddy water.

Distribution : India : Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Tamil Nadu, Uttar Pradesh, West Bengal. Outside India : Nepal ; China ; Bangladesh ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia.

***Neurothemis intermedia atlanta* Ris**

(Figs. 405 and 462-463)

Neurothemis intermedia atlanta, Ris, 1916, *Cat. Coll. Selys*, 16 : 1168. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 358.

Material studied : 2 ♂♂, Sonapurdi, 27.viii.1974, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	21.0	19.0	8½-10	8	8	8

Notes : This subspecies appears to have a restricted distribution in Meghalaya. The specimens were collected near dense tropical forests at lower altitudes having mostly hot and humid climate.

Distribution : India : Assam, Kerala, Meghalaya, Sikkim, Tripura. Outside India : Nepal ; Burma ; Thailand.

***Neurothemis intermedia intermedia* (Rambur)**

(Figs. 406, 437 and 464-465)

Libullula intermedia Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 91.*Neurothemis intermedia* (Rambur) : Selys, 1889, *Ann. Mus. Civ. Genova*, 27 : 454.*Neurothemis intermedia intermedia* (Rambur) : Ris, 1911, *Cat. Coll. Selys.*, 13 : 563.Fraser, 1936. *Fauna Brit. India, Odon.*, 3 : 357.

Material studied : 1 ♀, Bagmara, 2.iii.1965, coll ASR ; 1 ♂, 1 ♀, Damra, 20.xi.1973, coll SB ; 1 ♂, 1 ♀, Songkhama, 15.xi.1973, coll SB ; 1 ♂, 1 ♀, Songsok, 18.xi.1973, coll SB ; 1 ♂, 1 ♀, 18 Kms north of Balat, 8.xii.1978, coll ARL ; 3 exs, Nongpoh (1 ♂, 1 ♀, 6.xi.1972, coll RSP ; 1 ♂, 15.x.1975, coll SB) ; 3 ♂♂, 4 ♀♀, Ranikor, 10.xii.1977, coll ARL ; 3 exs, Shillong (1 ♂, 3.xi.1961, coll SNP ; 1 ♂, 25.viii.1968, coll RKV ; 1 ♂, 25.xi.1972, coll RSG) ; 2 ♂♂, Umtham, 29.xi.1967, coll RKV ; 5 exs, Garampani, coll AKG (1 ♂, 26.i.1975, 4 ♀♀, 27.i.1975) ; 5 ♂♂, 3 ♀♀, Ratachara, 24.i.1975, coll AKG.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	22.0	25.0-26.0	10½-11½	8-9	8-10	8-9
♀♀	20.0-21.0	24.0-25.0	10½-12½	7-8	8-10	8-9

Notes : In Meghalaya this subspecies was noticed to have a wider distribution than *N. i. atlanta* Ris and equally common in areas at lower and higher altitude, although it was not collected from central Jaintia hills and southern Khasi hills. They were most commonly found in fields covered with tall grasses near streams.

Distribution : India : Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal. Outside India : Nepal ; Sri Lanka ; Burma.

***Neurothemis tullia tullia* (Drury)**

(Figs. 403, 430 and 468-469)

Libellula tullia Deury, 1773, *III. Exot. Ins.*, 2 : 85.*Neurothemis tullia* (Drury) : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 8.

Neurothemis tullia tullia (Drury) : Ris, 1911, *Cat. Coll. Selys.*, 13 : 551. Fraser., 1936, *Fauna Brit. India, Odon.*, 3 : 360.

Material studied : 2 ♂♂, Wageasi, 8.iv.1973, coll ARL ; 1 ♂, Nongpoh, 25.viii.1972, coll ARL ; 2 exs, Shillong (1 ♀, 21.xi.1973, coll RSG ; 1 ♂, 4.ix.1975, coll KD).

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	19.0-22.5	21.0-24.5	10½-12½	7-8	8-10	7-8
♀	18.0	22.0	11½	7	9	7

Notes : This species appears to have a scattered distribution in Meghalaya. These are commonly found in flower gardens and vegetable fields.

Distribution : India : Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Punjab, Tamil Nadu, Tripura, Sikkim, Uttar Pradesh, West Bengal. Outside India : Nepal ; Tibet ; China ; Sri Lanka ; Burma ; Thailand ; Vietnam ; Malaysia.

Genus *Sympetrum* Newman

Sympetrum Newman, 1833, *Ent. Mag.*, 1 : 511. Fraser, 1936, *Fauna Brit. India., Odon.*, 3 : 370.

Diplax Charpentier, 1840, *Lib. Eur.*, : 12.

Type-species : *Libellula vulgata* Linnaeus

Newman (1833) established this genus incorporating 2 species. Kirby (1889) greatly elaborated the generic concept and suppressed under it the genus *Diplax* Charpentier 1840. All later workers accepted Kirby's opinion. Amongst others Kirby (1890), Fraser (1919a, 1936, 1949a), Borer (1945), Lieftinck (1954, 1962) and Pinhey (1962) also worked on this genus. Different species of the genus from Indian region have also been dealt with by Bhasin (1953). Lieftinck (1955a, 1971a), St. Quentin (1970), Kumar (1973b), Bose and Mitra (1975), Singh and Prasad (1976a), Prasad and Kumar (1977a) and Lahiri (1979).

Diagnostic characters : Small to medium in size (usually abdomen 18.0-35.0 mm, hindwing 20.0-40.0 mm) ; coloured black, brown or red marked with green and yellow ; vesicle small, shallowly notched ; posterior lobe of prothorax large, emerginate as a collar and provided with specialised tuft of hairs ; tibial claw with inner arms smaller than outer ; male genitalia with arched, emerginate lamina and variably developed lobe,

hamules and hooks of the later ; 2nd segment of penis slightly dilated distally with well developed sub-parallel median lobes, bearing a median apical process and shorter apical lobes ; female with borders of segment 8 of abdomen not dilated ; vulver scale variably projected and notched at apex, minute, moderately large or even extending beyond apex of abdomen ; 9th ventral plate tumid, extended over 10th abdominal segment, sometimes keeled, and bearing a pair of stumped, sub-basal ungulate processes. Wings hyaline, sometimes partly marked with yellow, brown or black ; usually $6\frac{1}{2}$ - $11\frac{1}{2}$ and 5-6 antenodal cross veins in fore- and hindwings respectively and 6-11 postnodal cross veins ; pterostigma about 4-5 times as long broad, not braced ; discoidal cells roughly the shape of bilateral triangles, that of forewing elongated in breadth of wing, traversed once, situated far distal to the level of arc with costal margin a little more than half the length of other margins, of hindwing elongated in length of wing, entire or rarely traversed once, situated at the level of arc with basal margin a little more than half the length of other margins ; arc situated between the 1st and 2nd antenodal cross veins ; discoidal field beginning with a row of 3 cells in forewing, of 2-3 cells in hindwing ; hypertrigone entire ; subtrigone 3 celled ; only 1 cubital cross vein, rarely 2 in hindwing ; Cu_2 and MA strongly converging at wing margin in forewing ; sectors of arc forming a common stalk ; R_{spl} and M_{spl} poorly formed and are mostly separated by a single row of cells from IR_s and MA respectively ; anal loop angulated a little, usually made of 19-26 cells ; upto 4 rows of postanal cells in forewing.

Distribution : Virtually cosmopolitan all over Africa, America, Europe and Asian countries.

KEY TO THE SPECIES OF THE GENUS *SYMPETRUM* NEWMAN (EITHER SEX)

Synthorax bright yellow laterally and with a broad black stripe on postero-lateral suture ; wings amber yellow at extreme base. *.hypomelas* (Selys)

Synthorax reddish or dull yellow laterally and with posterolateral suture marked finely with black ; bases of wings pale amber yellow upto about level of cubital cross vein. *.orientale* (Selys)

Sympetrum hypomelas (Selys) (Figs. 29-30, 396 and 434)

Diplax hypomelas Selys, 1884, *Ann. Soc. Ent. Belg.*, 28 : 37.

Sympetrum hypomelas (Selys) : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 16. Fraser, 1936, *Fauna Brit. India, Odon*, 3 : 373.

Material studied : 4 exs, Pynursla (3 ♂♂, 29.viii.1972, coll ARL ; 1 ♂, 29.viii.1973, coll SKC) ; 1 ♀, Shillong, 15.viii.1980, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	28.0	34.0	10½-11½	10-11	8	11
♀	26.5	34.5	8½	7-8	6	8-9

Notes : The males studied vary from the description of the species provided by Fraser (1936) a little in size and nodal index.

In Meghalaya this species was noticed to be restricted only to central and southern Khasi hills. At Pynursla, these were hovering over a temporary water pool near a small village in the valley.

Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh Sikkim, Uttar Pradesh, West Bengal. Outside India : Nepal ; Tibet ; China ; Burma.

***Sympetrum orientale* (Selys)**
(Figs. 397, 433 and 452-453)

Diplax orientale Selys, 1883, *Ann. Soc. Ent. Belg.*, 27 : 140.

Sympetrum orientale (Selys) : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 16. Fraser, 1936, *Fauna Brit. India, Odon*, 3 : 375.

Material studied : 2 ♂♂, Dympep, 24.x.1967, coll RKV ; 8 exs, Mawphlong (1 ♂, 8.xi.1967, coll RKV ; 1 ♀, 27.x.1970 coll GMY ; 4 ♂♂, 1 ♀, 14.viii.1973, coll SB ; 1 ♂ 21.xi.1973, coll AKG) ; 2 ♂♂, 2 ♀♀, Pynursla, 29.viii.1972, coll ARL ; 8 exs, Shillong (1 ♀, 21.viii.1967, coll RKV ; 2 ♂♂, 1 ♀, 5.xi.1968, coll RKV ; 1 ♂, 1.viii.1976, coll KD ; 2 ♂♂, 1 ♀, 6.x.1977, coll RSG) ; 9 exs, Upper Shillong (1 ♂, 4 ♀♀, 4.viii.1965, coll BKT ; 1 ♂, 1 ♀, 10.viii.1967, coll RKV ; 2 ♂♂, 20.vii.1971, coll RSP) ; 3 ♀♀, Weilo, 14.viii.1973, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	25.0-26.0	26.0-28.0	7½-8½(8)	8-9	6-7	7-9
♀♀	23.0-25.0	27.0-27.5	8½	8-9	8-7	7-9

Notes : This species appears to be more common in Meghalaya than *S. hypomelas* (Selys). They were collected mostly near streams from bushes covered with tall grass.

Distribution : India : Meghalaya. ? Outside India : China (vide Ris 1911).

Genus *Trithemis* Brauer

Trithemis Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, **18** : 176. Fraser, 1936, *Fauna Brit. India, Odon.*, **3** : 381.

Type-species : *Libellula aurora* Burmeister

Brauer (1868a, b, c) established this genus for a few new species and some others earlier referred to the genus *Libellula* Linnaeus. The generic concept has further been elaborated and there has been addition of some more species, as a result of contributions rendered chiefly by Selys (1878b, 1883a, 1889, 1891a), Karsch (1889a), Kirby (1889, 1890), Foerster (1906b) and Ris (1909-1912). Laidlaw (1914a), Fraser (1920a, 1936), Fraser and Dover (1922), Lieftinck (1954) and Pinhey (1962) also worked on this genus. Accounts on different species of the genus occurring in Indian region have been published by Navas (1930), Lieftinck (1948, 1955a, 1971a), Bhasin (1953), Asahina (1965), St. Quentin (1970), Kumar (1972a, c, 1973b), Sahni (1972), Bose and Mitra (1975), Kumar and Juneja (1976), Prasad (1976), Singh and Prasad (1976a), Kumar and Prasad (1977a) and Lahiri (1977a, b, 1979).

Diagnostic characters : Small to medium in size (usually abdomen 19.0-32.0 mm, hindwing 24.0-36.0 mm) ; coloured black or reddish marked with yellow, green, metallic blue or violet, sometimes partly pruinose ; vesicle depressed ; posterior lobe of prothorax not erected as a collar and usually not provided with specialized tuft of hairs ; tibial claw with inner arms much smaller than outer ; male genitalia with emerginate or depressed arched lamina, broad based small to very large hamules with distal strongly curled hooks and variably developed lobe ; 2nd segment of penis broadened distally, short, narrow, apposed or subparallel median lobes and similar but broader apical lobes ; female with borders of segment of 8 abdomen not dilated, vulver scale obsolescent and tumid, sub-oval 9th ventral plate extending over base of segment 10 of abdomen with a pair of stumped, sub-basal unguate processes. Wings hyaline, sometimes enfumed with brown at apex and usually marked with yellow, brown or black at base for variable extent with reddish or black neuration ; usually with $7\frac{1}{2}$ - $18\frac{1}{2}$ and 6-14 antenodal cross veins in fore- and hindwings respectively

Distribution : India ; Nepal ; Tibet ; China ; Pakistan ; Sri Lanka ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; New Guinea ; Taiwan ; Philippines ; Pacific Islands ; Syria ; Turkey ; Mauritius ; Africa ; Madagascar.

1. Legs very long, hind femora extending to apex of segment 2 of abdomen ; pterostigma bicolorous. *.pallidinervis* (Kirby)
Legs not unusually long, hind femora extending only upto the end of synthorax ; pterostigma unicolorous. 2
2. Base of hindwing with a small reddish brown spot ; neuration crimson. *.aurora* (Burmeister)
Base of hindwing with a small dark brown spot ; neuration black *festiva* (Rambur)

Material studied : 1 ♀, Chitmaring beel, 10.iv.1973, coll ARL ; 2 ♂♂, Napak beel, 10.iv.1973, coll ARL ; 1 ♂, Songsok, 16.iv.1973, coll ARL ; 27 exs, Barapani (1 ♂, 31.v.1967, coll BKT ; 11 ♂♂, 24.vi.1967 coll RKV ; 4 ♂♂, 26.vi.1967, coll RKV ; 1 ♀, 9.x.1968, coll SB ; 1 ♂, 17.xi.1969, coll NM ; 3 ♂♂, 21.vi.1973, coll AKG ; 4 ♂♂, 1 ♀, 14.viii. 1973, coll SB ; 1 ♂, 21.ix.1973, coll AKG) ; 2 ♂♂, Jakrim, 4.xii.1977,

coll ARL ; 1 ♂, Lailad, 24.viii.1973, coll ARL ; 2 exs, Mawpat (1 ♂, 13.viii.1967, coll RKV ; 1 ♂, 3.x.1970, coll GMY) ; 2 exs, Mawphlong (1 ♀, 7.v.1969, coll BD ; 1 ♂, 4.xi.1972, coll AKG) ; 8 exs, Old Barapani road side (1 ♂, 6.iv.1967, coll RKV ; 1 ♂, 4.vii.1968, coll RKV ; 4 ♂♂, 21.viii.1968, coll RKV ; 1 ♂, 28.vi.1970, coll SK ; 1 ♂, 6.xi.1973, coll AKG) ; 1 ♂, Pynursla, 29.viii.1972, coll ARL ; 2 ♀♀, Puksora, 7.xiii.1977, coll ARL ; 16 exs, Shillong (2 ♂♂, 18.ix.1962, coll RKV ; 4 ♂♂, 16.viii.1967, coll RKV ; 1 ♂, 5.ix.1967, coll SKC ; 3 ♂♂, 18.ix.1967, coll SKC ; 3 ♂♂, 9.ix.1972, coll ARL ; 1 ♂, 11.v.1974, coll KD ; 1 ♀, 20.vii.1974, coll MSJ ; 1 ♀, 3.vii.1975, coll MSJ) ; 5 ♂♂, Upper Shillong, 29.xi.1977, coll KRR ; 3 exs, Umran coll RKV (2 ♀♀, 18.v.1967 ; 1 ♂, 12.ix.1967) ; 4 exs Umsning (1 ♂, 22.x.1968, coll MRR ; 1 ♂, 1 ♀, 5. viii.1971, coll GMY ; 1 ♂, 25.vii.1972, coll AKG) ; 6 exs, Umtham, (1 ♂, 25.iv.1967, coll RKV ; 1 ♂, 1 ♀, 29.xi.1967, coll RKV ; 2 ♂♂, 1 ♀, 22.vii.1969, coll BD) ; 3 ♂♂, Jowai 3.viii.1972, coll ARL ; 14 exs, Thadlaskein (2 ♂♂, 16.vi.1970, coll SB ; 4 ♂♂, 4 ♀♀, 3.viii.1972, coll ARL ; 3 ♂♂, 1 ♀, 4.x.1972, coll ARL).

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	26.5-27.5	28.5-31.0	12½-13½	9-11	9-10	9-12
♀♀	22.5-24.5	27-0-31.0	12½-15½	7-10	9-12	8-11

Notes : This is a widely distributed species all over Meghalaya. They appear to prefer montane streams with exposed boulders, but are also seen near lakes.

Distribution : India : Virtually cosmopolitan. Outside India : Nepal ; Tibet ; Pakistan ; Sri Lanka ; Burma ; Vietnam ; Malaysia ; Indonesia ; Taiwan ; Philippines.

Trithemis festiva (Rambur)
(Figs. 408, 427 and 488-489)

Libellula festiva Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 92.

Trithemis festiva (Rambur) : Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, **18** : 736. Fraser, 1936, *Fauna Brit. India, Odon.*, **3** : 387.

Material studied : 1 ♂, Songsok, 16.iv.1973, coll ARL ; 2 ♂♂, Wageasi, 5,8.iv.1973, coll ARL ; 4 exs, Barapani (2 ♂♂, 24.vi.1967, coll RKV ; 1 ♂, 21.viii.1968, coll RKV ; 1 ♂, 17.ix.1969, coll NM) ; 3 ♂♂,

Mawblong, 22.ix.1972, coll AKG ; 2 exs, Mawpat (1 ♂, 18.iv.1968, coll RKV ; 1 ♂, 3.x.1970, coll GMY) ; 1 ♂, Mawphlong, 13.iv.1967, coll RKV ; 1 ♂, Nongklan, 1.xii.1977, coll KRR ; 1 ♂, Nongpoh, 19.ix.1973, coll SB ; 7 exs, Pynursla (4 ♂♂, 1 ♀, 25.viii.1972, coll ARL ; 2 ♂♂, 29.viii.1973, coll SKC) ; 1 ♂, Satmawdon, 5.xii.1977, coll ARL ; 19 exs, Shillong (1 ♂, 2.viii.1968, coll SNP ; 1 ♂, 26.ix.1962, coll SNP ; 1 ♂, 3.xi.1972, coll ARL ; 1 ♂, 27.iii.1973, coll MSJ ; 1 ♂, 25.viii.1973, coll MSJ ; 1 ♂, 14.xi.1974, coll KD ; 1 ♂, 8.xii.1974, coll MSJ ; 3 ♂♂, 19.vi.1975, coll MSJ ; 3 ♂♂, 1 ♀, 23.vi.1975, coll MSJ ; 2 ♂♂, 5.ix.1975, coll MSJ ; 1 ♀, 5.x.1975, coll ARL ; 1 ♀, 21.vi.1976, coll ARL ; 1 ♂, 1.viii.1976, coll KD) ; 1 ♂, Upper Shillong, 19.xi.1970, coll SKT ; 1 ♂, Umran, 12.ix.1967, coll RKV ; 3 exs, Umsning (1 ♂, 22.x.1968, coll MRR ; 1 ♂, 5.iii.1971, coll GMY ; 1 ♂, 5.viii.1971, coll GMY) ; 1 ♂, Umtham, 24.iv.1967, coll RKV ; 1 ♀, Ratachara, 29.i.1975, coll AKG ; 1 ♂, Thadlaskein, 3.iii.1972, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	23.0-26.0	27.0	10½-11½	7-9	8	8-10
♀♀	22.0-25.5	27.5-30.5	9½-11½	6-8	7	7-8

Notes : Distribution in Meghalaya and habitat of this species are very similar to those of *T. aurora* (Burmeister), but they are rarely found near lakes. Specimens are often noticed perching upon exposed boulders in mid-streams.

Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal. Outside India : Nepal ; Pakistan ; Sri Lanka ; Burma ; Malaysia ; Indonesia ; Taiwan ; Loo Vhoo Islands ; Philippines ; New Guinea ; Turkey ; ? Africa.

(*Note :* The species although recorded from Africa by Lieftinck (1953), it was not so, by Pinhey (1962). Hence an ? has been put against Africa).

***Trithemis pallidinervis* (Kirby)**

(Fig.s. 409, 428 and 490-491)

Sympetrum pallidinervis Kirby, 1889, *Trans. zool. Soc. Lond.*, 12 : 327.

Trithemis pallidinervis (Kirby) : Morton, 1907, *Trans. ent. Soc. Lond.*, : 304. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 389.

Material studied : 1 ♀, Darugiri, 10.iv.1973, coll ARL ; 1 ♂, 1 ♀, Rongtham river bank, 9,11.iv.1973, coll ARL ; 1 ♂, 10 Kms east of Rongram, 23.iv.1973, coll ARL ; 2 ♂♂, Songsok, 14-15.iv.1973, coll ARL ; 1 ♂, 2 ♀♀, Wageasi, 6-7.iv.1973, coll ARL ; 2 ♂♂, 3 ♀♀, Cherrapunjee, 20.vii.1973, coll AKG ; 1 ♂, Mawblong, 22.ix.1972, coll AKG ; 1 ♂, Myllem, 25.vii.1965, coll RKV ; 6 exs, Pynursla (3 ♀♀, 29.viii.1972, coll ARL ; 2 ♂♂, 1 ♀, 29.viii.1973, coll SKC) ; 8 ♂♂ 3 ♀♀, Sonapurdi, 26-27.viii. 1974, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	29.0-31.0	32.0-33.0	$7\frac{1}{2}$ - $8\frac{1}{2}$	8-9	6	9
♀♀	26.0-27.0	32.0-33.0	$8\frac{1}{2}$	8	6	8-10

Notes : Males studied vary from the description of the species provided by Fraser (1936) in having labium variably marked with black and entirely black labrum.

In Meghalaya this species was often collected near streams or rivers and it appears to be more common in southern part of the state.

Distribution : India : Andhra Pradesh, Assam, Bihar, Gujarat, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland Orissa, Punjab, Uttar Pradesh, West Bengal. Outside India : Tibet ; Burma ; Malaysia ; Indonesia ; Taiwan ; Philippines.

Genus *Zygonyx* Hagen

Zygonyx Hagen, 1867, *Verh. zool. bot. Ges. Wien.*, 17 : 62. Lieftinck, 1954, *Truebia*, 22 Suppl., : 158.

Zygonyx Selys-Hagen : Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 391.

Type-species : *Zygonyx iris* Selys *

Hagen (1867a) published a very short account of the genus *Zygonyx* and he was followed by Brauer (1968b, c). Kirby (1889) established the genus *Pseudomacromia* for a new species. Further contribution on either or both genera came from Selys (1868, 1891b), Karsch (1889, 1891b), Kirby (1890), Foerster (1906b), Ris (1908, 1909, 1912), and Fraser (1919b, 1924a). Fraser (1926f) suppressed the genus *Pseudomacromia* under

* After Kirby (1890), Fraser (1936) and Davis (1981), but as opposed to Lieftinck's (1984) citation viz. *Zygonyx ida* Selys.

Zygonyx and his opinion was accepted by all later workers. Laidlaw (1924a), Fraser (1931, 1936), Lieftinck (1953a, 1954, 1955a, 1971a), Bhasin (1953) and Pinhey (1962, 1964) also worked on this genus.

Diagnostic characters : Large in size (usually abdomen 36.0-50.0 mm, hindwing 45.0-60.0 mm) ; black or ferruginous, marked with white, green, yellow, steely blue or metallic green, sometimes partly pruinose ; vesicle high, rounded or grooved ; posterior lobe of prothorax not erected as a collar and usually not provided with specialised tuft of hairs ; tibial claw with arms subequal ; male genitalia with hood shaped, emerginate, lamina, usually bearing a specialised tuft of hairs apically, large to very large, projecting hamules with a broad base, and robust, strongly curved hooks and variably developed lobe ; 2nd segment of penis swollen distally, with short, narrow, subparallel median lobe and broader, longer, forcipate apical lobe ; female with short triangular valver scale and timid 9th ventral plate extending to base of segment 10 of abdomen ; abdomen sometimes with terminal segments inflated. Wings hyaline, tinted with yellow, suffused with brown, marked with amber at base or with black spots and bands all over ; usually $13\frac{1}{2}$ - $19\frac{1}{2}$ and 8-13 antenodal cross veins in fore- and hindwings and 6-14 postnodal cross veins ; pterostigma usually about 4-5 times as long as broad, not braced ; discoidal cells roughly the shape of bilateral triangles and entire or traversed by 1-3 cross veins, that of forewing elongated in breadth of wing, situated far distal to the level of arc, with costal margin less than half the length of other margins ; of hindwing elongated in length of wing, situated at or slightly proximal to the level of arc, with basal margin about half the length of other margins ; arc usually situated between the 1st and 2nd antenodal cross veins or opposite to the 2nd ; discoidal field beginning with a row of 3-4 cells ; 1-3 cubital cross veins in forewing, 1-2 in hindwing ; hypertrigone entire ; subtrigone 1-5, usually 3 celled ; Cu_2 and MA parallel or convergent at wing margin in forewing ; sectors of arc forming a common stalk ; R_{spl} and M_{spl} poorly formed and are mostly separated by a single row of cells from IR_2 and MA respectively ; anal loop strongly angulated, usually made of 25-50 cells ; upto 6 rows of postanal cells in forewing.

Distribution India ; China ; Sri Lanka ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; Philippines ; Israel ; Europe ; Africa ; Madagascar ; Seychelles.

***Zygonyx iris intermedia* subsp. nov.**
(Figs. 413 and 504-505)

Material studied Holotype ♂, Barapani, 26.vii.1969, coll BD, Z.S.I. Registration No. 3920/H₁₃ Paratype ♂, Nongpoh, 4.viii. 1972, coll SKC ; Z.S.I. Registration No. 3921/H₁₃

Measurements (in mm) and Nodal index.

Length of		Forewing		Hindwing	
abdomen	hindwing	An	Pn	An	Pn
♂♂ 36.0-39.5	39.5-46.5	(14) 14½-16½	8-12	10-12	10-12

Description : Male : *Zygonyx iris intermedia* subsp. nov. comes very close to *Z. i. mildredae* Fraser, but differs from the same in being larger in size, nodal index and in the following : (i) occiput without bright yellow mark at its center ; (ii) abdominal segments 1 and 2 unmarked with fine mid-dorsal carinal yellow line ; (iii) the middorsal carinal line of segment 7 of abdomen expanded to form a sagittate shaped marking.

Note : *Zygonyx iris intermedia* subsp. nov. has been described above by citing its difference with its nearest ally, *Z. i. mildredae* Fraser which is "characterised by the absence of the mid-dorsal spot on segment 7 of both sexes" (Fraser 1936).

This is a rare subspecies and has only twice been collected in northern Khasi hills at comparatively higher altitude.

Distribution : India : Meghalaya.

Genus *Onychothemis* Brauer

Onychothemis Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, 18 : 365. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 402.

Type-species : *Onychothemis abnormis* Brauer.

Brauer (1968a,b,c) established this genus giving a brief account. Later, the generic concept has been further elucidated and there has also been addition of a few more species as a result of contribution rendered chiefly by Karsch (1889), Kirby (1889, 1890, 1905), Ris (1909, 1911, 1912), Fraser (1919b, 1924a, 1936), Laidlaw (1924a, 1930b) and Lieftinck (1953a, 1954, 1955a, 1971a).

Diagnostic characters : -Medium in size (usually abdomen 28.0-38.0 mm, hindwing 37.0-46.0 mm) ; black or metallic blue, marked with yellow, green or red ; vesicle high, rounded ; posterior lobe of prothorax

large, emerginate as a collar and provided with specialised tuft of hairs ; tibial claw not bifid ; male genitalia with hood shaped, emerginate lamina, broad based projecting hamules with short strongly curved, robust hooks and short lobe bearing an accessory lobe at apex ; 2nd segment of penis dilated distally, with internal lobes produced into a pair of long flagella, and subparallel, short and subungulate median and apical lobes ; in females, borders of segment 8 of abdomen not dilated, vulver scale indistinct. Wings hyaline or variably enfumed with brown ; usually $12\frac{1}{2}$ - $17\frac{1}{2}$ and -9-11 antenodal cross veins and 8-13 and 10-12 postnodal cross veins in fore- and hindwings respectively ; Pterostigma about 6-7 times as long as broad, not braced ; discoidal cells roughly the shape bilateral triangles, that of forewing elongated in breadth of wing, traversed by a cross vein, situated far distal to the level of arc with costal margin a little less than half the length of other margins ; of hindwing elongated in length of wing, entire, situated at or slightly proximal to the level of arc with basal margin about half the length of other margins ; arc situated between the 1st and 2nd antenodal cross veins ; discoidal field beginning with a row of 3 cells in forewing, of 2-3 cells in hindwing ; hypertrigone entire ; subtrigone 3-4 celled ; 1 cubital cross vein ; Cu_2 and MA diverging a little at wing margin in forewing ; sectors of arc forming a common stalk ; R_{spl} and M_{spl} poorly formed and are mostly separated by a single row of cells from IR_3 and MA respectively ; R_s and IR_s markedly undulated ; anal loop strongly angulated, usually made of 22-26 cells ; upto 5 rows of postanal cells in forewing.

Distribution : India ; Sri Lanka ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; Philippines.

***Onychothemis testacea* (S. L.) Laidlaw**
(Figs. 417 and 492-493)

Onychothemis testacea Laidlaw, 1902, Proc. zool. Soc. Lond., 78 : 189.

Material studied : 1 ♂, Shillong, 26.viii.1971, coll RSG.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂	34.0	40.0	$14\frac{1}{2}$ - $15\frac{1}{2}$	10-11	9-10	10-11

Description : Male : black with metallic lusture on dorsum of head and synthorax, marked with yellow as follows : sides of mid-lobe and bases of lateral lobes of labium, anterior margin of anteclypeus, base of postcly-

peus narrowly, frons anteriorly and a large spot on either side of occiput connected by a median line ; eyes dark brown. Prothorax with anterior margin and dorsum of the posterior lobe yellow. Synthorax with following yellow markings : a fine mid-dorsal carinal line bifurcating along ante-alar sinus, an S-shaped humeral stripe made of an upper and a lower sub-rounded spots and a narrow elongated curved saccation in between, a narrow stripe of anterolateral suture, another similar stripe on metepimeron, which however is narrowed at either end and falling a little short of lower margin of synthorax and a small rounded upper spot on the 2nd lateral suture. Wings hyaline extreme apices enfumed with brown ; membrane blackish brown ; neuration black ; pterostigma elongated, covering about 2 cells, dark brown, lighter on proximal one fourth. Abdomen black, marked with yellow as follows : segment 2 with a mid dorsal spot, finely interrupted along the jugal suture and a ventrolateral spot on either side ; segments 3-7 with large dorso-apical spots falling short of apical border except on segment 5 ; segments 5-7 with ventro-lateral apical spots, segments 8 and 9 with very small ventro-lateral basal spots. Anal appendages black, superiors finely denticulate near base beneath. Genitalia black, as shown in Fig. 417. Penis is in Fig. 492-493.

Notes : The single male specimen under study comes very close to *O. t. ceylonica* Ris, but differs from the description of that subspecies provided by Fraser (1936) in details of body markings. However, sub-specific determination has not been possible in view of absence of good material.

It appears to be a rare insect, being restricted to central Khasi hills in Meghalaya.

Genus *Rhyothemis* Hagen

Rhyothemis Hagen, 1867, *Stett. Ent. Ziet.*, 28 : 232. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 419.

Type-species : *Libellula phyllis* Sulzer.

Hagen (1867b) established this genus giving a brief account. Later the generic concept has further been elaborated and there has also been addition of some more species as a result of contributions rendered chiefly by Selys (1878b, 1883a, 1889, 1891a), Brauer (1868b, c), Karsch (1889), Kirby (1889, 1890), Kruger (1902), Foerster (1906) and Ris (1909, 1911, 1913). Laidlaw (1902, 1914a), Martin (1904), Fraser (1920a, 1924a, 1931, 1936), Schmidt (1938), Lieftinck (1953b, 1954, 1975) and Watson (1969) also worked on this genus. Lieftinck (1948a, 1971), Bhasin (1953), St. Quen-

tin (1970) and Prasad (1976a) dealt with different species of the genus occurring in Indian region.

Diagnostic characters : Small to medium in size (usually abdomen 15.0-27.0 mm, hindwing 21.0-38.0 mm) ; Black, metallic blue or green marked with brown or yellow ; vesicle high, rounded ; posterior lobe of prothorax not erected as a collar and usually not provided with specialised tuft of hairs ; tibial claw with inner arms much smaller than outer ; male genitalia with broadly arched, depressed lamina, moderately broad based hamules with strongly curved hook and narrow lobe ; 2nd segment of penis swollen distally with narrow, subequal and subparallel median and apical lobes ; female with borders of segment 8 of abdomen not dilated, indistinct vulver scale and tumid 9th ventral plate extending to base of segment 10 with a pair of stumped sub basal ungulate processes and a row of long marginal hairs Wings hyaline, variably marked with black, golden yellow or steely blue black ; usually $7\frac{1}{2}$ - $11\frac{1}{2}$ and 5-12 antenodal and 7-13 and 9-15 postnodal cross veins in fore- and hindwings respectively ; pterostigma about 3-4 times as long as broad, not braced ; discoidal cells roughly the shape of bilateral triangles, that of forewing elongated in breadth of wing, traversed by one or more cross veins, situated far distal to the level of arc with costal margin about half the length of other margins ; of hindwing entire, situated at the level of arc with basal margin about half the length of other margins ; arc situated between the 1st and 2nd or opposite to the 2nd antenodal cross vein ; discoidal field beginning with a row of 3-5 cells ; hypertrigone usually traversed by 1-2 cross veins in forewing, entire in hindwing ; subtrigone made of 11 or more cells, but ill defined ; 1 cubital cross vein ; Cu_2 and MA parallel or convergent at wing margin in forewing ; sectors of arc entirely separated in forewing, forming a short stalk in hindwing ; R_{spl} and M_{spl} poorly formed and are mostly separated by a single row of cells from IR_s and MA respectively ; anal loop moderately angulated, made of 32-50 or more cells ; upto 4 rows of postanal cells in forewing.

Distribution : India ; Nepal ; Tibet ; China ; Bangladesh ; Sri Lanka ; Burma ; Thailand ; Vietnam ; Malaysia ; Indonesia ; New Guinea ; Japan ; Taiwan ; Philippines ; Australia ; Pacific Islands ; Syria ; Mauritius ; Africa ; Madagascar ; Seychelles.

***Rhyothemis variegata variegata* (Linnaeus)**

(Figs. 410, 440 and 500- 501)

Libellula variegata Linnaeus, 1763, *Amoenitates Acad.*, 6 : 412.

Rhyothemis variegata (Linnaeus) : Hagen, 1867, *Stett. Ent. Ziet.*, 28 : 232.

Rhyothemis variegata variegata (Linnaeus) : Ris, 1913, *Cat. Coll. Selys.*, 15 : 935. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 423.

Selys, 15 : 935. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 423.

Material studied : 1 ♂, 2 ♀♀, Balfagram, 24-25.iii.1976, coll SB ; 1 ♂, 1 ♀, Barapani, 17.viii.1968, coll RKV ; 1 ♀, Burnihat, 31. vii. 1973, coll MD ; 1 ♂, Cherrapunjee, 20.vii.1973, coll AKG ; 1 ♂, Dawki, 19.v.1971, coll SB ; 1 ♂, Mawblong, 22.ix.1972, coll AKG ; 1 ♀, Nongklan, 25.viii.1972, coll ARL ; 1 ♂, Umran, 12.ix.1967, coll RKV ; 1 ♀, Sonapurdi, 26.viii.1974, coll ARL

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	22.5	33.0-35.0	8½-9½	9-11	5-6	11
♀♀	21.5-22.5	33.0	(8)9½-10½	7-10	7	9-10

Notes : This species appears to have a scattered distribution in Meghalaya. They are sometimes noticed swarming 30'-40' above ground, but settling on nearby bushes when it is about to rain.

Distribution : India : Assam, Himachal Pradesh, Karnataka ; Kerala, Madhaya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Tamil Nadu, West Bengal. Outside India ; Nepal ; Tibet ; Bangladesh ; Burma ; ? also China [vide Lieftinck (1971)].

Genus *Tholymis* Hagen

Tholymis Hagen, 1867, *Ent. Ztg.* 28 : 221. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 410

Type-species : *Libellula tillarga* Fabricius.

Hagen (1867b) established this genus for a new species and also including *Libellula pallida* Bauvier in it. The generic concept was further elaborated as a result of contributions rendered chiefly by Brauer (1868b,c), Hagen (1875), Selys (1878b, 1891a), Kirby (1889, 1890), Foerster (1906b) and Ris (1909, 1913). Laidlaw (1924a, 1931), Borer (1945), Fraser (1920c, 1924, 1931, 1936), Lieftinck (1954, 1962), and Pinhey (1962) also worked on the genus and its species from different countries. The type-species collected from different parts of India and adjacent countries has been dealt with by Lieftinck (1948a, 1955a, 1971a), Bhasin (1953), Baijal *et.al.* (1955), Kumar (1972c, 1973b), Mitra and Lahiri (1974), Kumar and Prasad (1977a) and Lahiri (1977b).

Diagnostic characters : Medium in size (usually abdomen 28.0-35.0 mm, hindwing 31.0-39.0 mm) ; reddish, marked with yellow or green ; vesicle flat or shallowly rounded ; tibial claw with inner arms shorter than outer ; male genitalia with short, projecting, arched and hairy lamina, narrow hamules and wide projecting lobe ; 2nd segment of penis swollen distally with short, narrow, converging apical lobe female with borders of segment 8 of abdomen not dilated, deeply cleft, hart shaped, projecting vulver scale and narrow 9th ventral plate extending to apex of segment 10 of abdomen. Wings hyaline, marked with golden brown at base in forewing, upto nearly nodus in hindwing, where in males sometimes there is a opalescent white distal band ; usually $9\frac{1}{2}$ - $11\frac{1}{2}$ and 7 antenodal cross veins in fore- and hindwings respectively and 7-10 postnodal cross veins ; pterostigma about 4-5 times as long as broad, not braced ; discoidal cells roughly the shape of bilateral triangles, the same in forewing elongated in breadth of wing, traversed by a cross veins, situated far distal to the level of arc with costal margin less than half the length of other margins ; in hindwing elongated in length of wings, entire, situated slightly proximal to the level of arc with basal margin about half the length of other margins ; arc situated between the 1st and 2nd antenodal cross veins ; discoidal field beginning with a row of 3 cells in forewing, of 2 cells in hindwing ; hypertrigone entire ; subtrigone 3-4 celled ; 1 cubital cross vein ; Cu_2 and MA divergent at wing margin in forewing ; sectors of arc forming a common stalk ; Rs_{pl} and Ms_{pl} poorly formed and are mostly separated by a single row of cells from IR_s and MA respectively ; anal loop angulated a little, open at apex with borders meeting the wing margin and usually made of 23-25 cells ; upto 4 rows of postanal cells in forewing.

Distribution : India ; Sri Lanka ; Burma ; Thailand ; Malaysia ; Indonesia ; Taiwan ; Philippines ; Australia ; Pacific Islands ; Mauritius ; Africa ; Madagascar ; North America ; South America.

***Tholymis tillarga* (Fabricius)**

(Figs. 415, 429 and 506-507)

Libellula tillarga Fabricius, 1798, *Suppl. Ent. Syst.*, : 285.

Tholymis tillarga (Fabricius) : Kirby, 1890, *Syn. Cat. Neur. Odon.*, : 1. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 411.

Material studied : 1 ♂, Rongtham river bank, 9.iv.1973, coll ARL ; 1 ♀, Rongrengiri, 22.iv.1973, coll ARL ; 1 ♂, Burnihat, 31.vii.1973, coll MD ; 1 ♂, Lailad, 24.viii.1973, coll ARL ; 2 ♀ ♀, Ranikor, 10.xii.1977,

coll ARL ; 1 ♂, Shella, 22.ix.1972, coll ARL ; 2 exs., Shillong (1 ♂, 5.viii.1968, coll RKV ; 1 ♀, 25.vi.1975, coll KD) ; 1 ♂, Ratachara, 24.i.1975, coll AKG.

Measurements (in mm) and Nodal index

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	30.5-35.0	32.0-33.0	10½-11½	8-9	7	9-10
♀♀	29.0	35.0	9½-10½	7	7	8-9

Notes : This species appears to have a stray distribution in Meghalaya, but was noticed to be more common at lower altitude. These are usually found before dusk, swiftly petrolling over stagnant water mass or slow running streams. Sometimes specimens were beaten up from bushes adjacent to such water mass during day time.

Distribution : India : Assam, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal. Outside India : As for genus but unknown from America.

Genus *Hydrobasileus* Kirby

Hydrobasileus Kirby, 1889, *Trans. zool. Soc. Lond.*, 12 : 266, Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 428.

Type-species : *Hydrobasileus vittatus* Kirby.

Kirby (1889) established this genus for a new species. Further contribution on this genus came from Karsch (1889a), Ris (1909, 1913), Fraser (1920b, 1924a, 1931, 1936), Laildaw (1924a), Navas (1933), Lieftinck (1954, 1955a, 1971a) and Baijal *et. al.* (1955)

Diagnostic characters : Medium in size (usually abdomen 28.0-34.0 mm, hindwing 38.0-48.0 mm) ; coloured black or reddish brown, marked with green ; vesicle hing, notched ; posterior lobe of prothorax not erected as a collar and usually not provided with specialised tuft of hairs ; tibial claw with inner arms smaller than outer ; male genitalia with arched lamina, hamules with indistinct base produced into acutely pointed projecting hooks, and moderately broad, obtusely rounded lobe ; 2nd segment of penis swollen distally, with short, subtriangular median and narrow diverging apical lobes ; female with borders of segment 8 of abdomen not dilated,

variably projecting vulver scale deeply cleft into a pair of divergent ungu-
late processes extending beyond segment 9 of abdomen and tumid 9th
ventral plate with a pair of subbasal stumped unguate processes. Wings
hyaline, sometimes variably marked with yellow or brown ; usually $12\frac{1}{2}$ -
 $18\frac{1}{2}$ and 9-12 antenodal cross veins in fore-and hindwings respectively
and 8-12 postnodal cross veins ; pterostigma about 5-6 times as long as
broad, not braced ; discoidal cells roughly the shape of bilateral triangles,
the same in forewing elongated in breadth of wing, traversed by 1-2 cross
veins, situated far distal to the level of arc with costal margin less than
half the length of other margins ; in hindwing elongated in length of wing,
entire or traversed once, situated at the level of arc with basal margin less
than half the length of other margins ; arc situated between the 1st and 2nd
antenodal cross veins ; discoidal field beginning with a row of 3-4 cells ;
hypertrigone entire ; subtrigone 3-8 celled ; 1 cubital cross vein ; Cu_2 and
MA parallel at wing margin in forewing ; sectors of arc forming a common
stalk ; R_s markedly undulated ; R_{spl} and M_{spl} rather poorly defined
and are mostly separated by a single row of cells from IR_s and MA
respectively ; anal loop angulated, usually made of 21-37 cells ; upto
3 rows of postanal cells in forewing.

Distribution : India ; Sri Lanka ; Burma ; Thailand ; Vietnam ;
Malaysia ; Indonesia ; New Guinea ; Taiwan ; Philippines ; Australia.

Hydrobasileus croceus (Brauer)

(Figs. 411 and 494-495)

Tramea croceus Brauer, 1867, *Verh. zool. bot. Ges. Wien.*, 17 : 813.

Hydrobasileus croceus (Brauer) : Karsch, 1890, *Berlin. Ent. Zeit.* 33 : 351. Fraser,
1936, *Fauna Brit. India, Odon.*, 3 : 429.

Material studied : 1 ♂, Umtham, 29.xi.1967, Coll RKV

Measurements (in mm) and Nodal index

	Length of		forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂	29.5	38.5	$14\frac{1}{2}$ - $15\frac{1}{2}$	9	9-10	10-11

Notes : The male studied varies from the description of the species-
provided by Fraser (1936) in having shorter hindwing and more extensive
black markings on abdomen.

The species, seldom noticed near human habitation, appears to inhabit forested areas.

Distribution : India : Assam, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Rajasthan. Outside India : Sri Lanka ; Burma ; Vietnam ; Malaysia ; Indonesia ; Taiwan ; Philippines.

Genus *Pantala* Hagen

Pantala Hagen, 1861, *Dyn. Neur. Amer.*, : 141. Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 413.

Type-species : *Libellula flavescens* Fabricius

Hagen (1861) established this genus for 2 species which were earlier referred to the genus *Libellula* Linnaeus. Later, the generic concept has further been elaborated as a result of contributions rendered chiefly by Brauer (1868b, c), Hagen (1875), McLachlan (1877), Selys (1878b, 1883a, 1889, 1891a), Kirby (1889, 1890), Calvert (1895) and Ris (1909, 1913, 1916). Fraser (1920b, 1921b, 1924a, 1931, 1936), Fraser and Dover (1922), Lieftinck (1954, 1962, 1975), Schmidt (1938), Borer (1945), Pinhey (1962) and Watson (1969) also worked on this genus. Lieftinck (1948a, 1955a, 1971a), Bhasin (1953), Sing (1955), Gorodkov (1961), St. Quentin (1970), Kumar (1972c, 1973b), Mitra (1973, 1976), Mitra and Sen (1975), Prasad (1976a), Singh and Prasad (1976a), Kumar and Prasad (1977a) and Lahiri (1979) published accounts on the type species collected from different parts of India and adjacent countries.

Diagnostic characters : Medium in size (usually abdomen 29.0-35.0 mm, hindwing 37.0-43.0 mm) ; yellow or reddish brown with restricted black markings ; vesicle moderately high, rounded ; posterior lobe of prothorax not erected as a collar and usually not provided with specialised tuft of hairs ; tibial claw with inner arms much smaller than outer ; male genitalia with projecting, deeply fissured lamina, small but broad based hamules with short, curled hooks and shorter, projecting and rounded lobe ; 2nd segment of penis swollen distally, with short, ungulate and converging median lobe and longer, converging, distally dilated apical lobes ; female with segment 8 of abdomen not dilated, vulver scale inconspicuous and tumid 9th ventral plate extending to base of segment 10 of abdomen. Wings hyaline, sometimes suffused with brown and marked at base with brown or golden yellow ; usually $12\frac{1}{2}$ - $15\frac{1}{2}$ and 7-8 antenodal and 6-8 and 8-10 postnodal cross veins in fore- and hindwings respectively ; pterostigma smaller in hindwing, about 3-5 times as long as broad, not braced ;

discoidal cells roughly the shape of bilateral triangles, that of forewing elongated in the breadth of wing, traversed by a cross vein, situated far distal to the level of arc with costal margin about one third the length of other margins ; of hindwing elongated in length of wing, entire, situated at the level of arc with basal margin a little more than half the length of other margins ; arc situated between 1st and 2nd antenodal cross veins ; discoidal field beginning with a row of 3-4 cells in forewing, of 2-3 cells in hindwing ; hypertrigone entire ; subtrigone ill defined ; sectors of arc forming a common stalk ; R_s markedly undulated ; R_{spl} and M_{spl} rather poorly defined and are mostly separated by a single row of cells from IR_s and MA respectively ; anal loop only a little angulated, usually made of 22-28 cells ; upto 4 rows of postanal cells in forewing.

Distribution : Cosmopoliton.

***Pantala flavescens* (Fabricius)**

(Figs. 412, 425, 496-497 and 539)

Libellula flavescens Fabricius, 1798, *Suppl. Ent. Syst.*, 285.

Pantala flavescens (Fabricius) : Hagen, 1860, *Syn. Neur. N. Amer.*, : 142. Fraser, 1936, *Fauna Brit. India, Odon.*, : 3 : 414.

Material studied : 1 ♂, 1 ♀ Anogiri, 7.xi.1973, coll SB ; 2 ♂♂, 2 ♀♀, Balfagram 23-24.vii.1976, coll SB ; 1 ♀, Damra, 20.xi.1973, coll SB ; 1 ♀, Degrangiri, 10.xi.1973, coll SB ; 1 ♂, Rongtham river bank, 9.iv.1973, coll ARL ; 1 ♀, Tebangiri, 11.xi.1973, coll SB ; 4 exs, Barapani (1 ♀, 31.v.1967, coll BKT ; 1 ♂, 2 ♀♀, 21.viii.1968, coll RKV) ; 6 exs, Cherrapunjee, (1 ♀ 20.vii.1965, coll BKT ; 2 ♂♂, 8.v.1968, coll RKV ; 1 ♀, 21.viii.1968, coll RKV ; 2 ♂♂, 20.vii.1973, coll AKG) ; 1 ♂, Mawphlong, 23.iv.1970, coll GMY ; 1 ♀, Mawryngkreng, 4.x.1972, coll ARL ; 1 ♀, Mawsynram, 10.x.1972, coll AKG ; 1 ♂, Nongpoh, 25.viii.1972, coll ARL ; 4 ♂♂, 2 ♀♀, Pynursla, 29.viii.1972, coll ARL ; 2 ♂♂, 1 ♀, Puksoara, 9.xii.1977, coll ARL ; 4 exs, Shillong (1 ♀, 26.ix.1962, coll SNP ; 1 ♀, 19.xi.1970, coll SKT ; 1 ♂, 3.ix.1972, coll ARL ; 1 ♀, 9.x.1974, coll MSJ) ; 1 ♂, Umroi, 12.ix.1967, coll RKV ; 5 exs, Umsning (1 ♂, 27.iii.1968, coll RKV ; 1 ♂, 22.x.1968, coll MRR ; 1 ♀, 10.ix.1969, coll NM ; 2 ♂♂, 5.iii.1971, coll GMY) ; 3 ♂♂, 1 ♀, Sonapurdi, 26-27.iii.1974 coll ARL.

Measurements (in mm)and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂ ♂	31.0-32.0	37.5-39.0	12½	7-8	7-8	8-10
♀ ♀	33.0-35.0	39.5-41.0	12½-15½	6-8	7-8	7-8

Notes : Specimens of both sexes studied vary from the description of the species provided by Fraser (1936) in having two small upper black spots on synthorax one each on humeral and posterolateral suture.

This appears to be a widely distributed species in Meghalaya. These are commonly found in large swarms 30'-40' above ground but settling on bushes and trees just before it is going to rain.

Distribution : Cosmopolttan.

Genus **Urothemis** Brauer

Urothemis Brauer, 1868, *Verh. zool. bot. Ges. Wien.*, 18 : 175. Fraser, 1936, *Fauna Brit India, Odon.*, 3 : 441.

Type-species : *Urothemis bisignata* Brauer

Brauer (1868a,b,c,) established this genus for one of his new species and also included in it 2 other species earlier referred to the genus *Libellula* Linneaus. The generic concept has since then been elucidated as a result of contribution rendered chiefly by Selys (1889, 1890), Ris (1908, 1909 1913) and Foerster (1906b). Fraser (1920c, 1924a, 1931, 1936), Laidlaw (1924a), Lieftinck (1971a, 1954, 1962) and Pinhey (1962) also worked on this genus. The only known Indian species has in recent past been dealt with by Bhasin (1953) and Prasad (1976b).

Diagnostic characters : Medium in size (usually abdomen 25.0-31.0 mm, hindwing 34.0-38.0 mm) ; coloured black or red, marked with blue, green and metallic blue black ; vesicle high, broad ; posterior lobe of prothorax not erected as a collar and usually not bearing specialised tuft of hairs ; tibial claw with inner arms much shorter than outer ; male genitalia with arched lamina, markedly projecting, nearly straight hamules with base only little dilated and moderately wide lobe rounded at outer margin ; 2nd segment of penis broadened apically, with short median lobes ; in females, borders of segment 8 of abdomen not dilated ; vulver scale deeply cleft into two spatulate lobes extending to base of segment 10 and tongue like 9th ventral plate overlapping segment 10 of abdomen. Wings hyaline, sometimes marked with yellow, brown or black near base ; usually 7 and 5 antenodal cross veins in fore- and hindwings respectively and 6-8 postnodal cross veins ; pterostigma about 5 times as long as broad, not braced ; discoidal cell entire and roughly the shape of bilateral triangles, that of forewing elongated in length of wing, situated well distal to the level of arc, with costal margin a little more than half the length of other margins, of hindwing elongated in length of wing, situated at the level of arc, with costal margin a little longer than the distal margin and more than double the length of basal margin ; arc situated between the 1st and 2nd antenodal cross veins ; discoidal field commencing with a row of 2 cells ; hypertrigone entire ; subtrigone 3 celled ; Cu_2 and MA parallel or slightly converging at wing margin in forewing ; sectors of arc separated at origin ; 1 cubital cross vein ; R_{spl} and M_{spl} poorly formed and are mostly separated by a single row of cells from IR_s and MA respectively ; anal loop stocking shaped, made of 12-17 cells ; upto 4 rows of postanal cells in forewing.

Distribution : India ; Tibet, China ; Bangladesh, Sri Lanka, Burma Thailand, Vietnam, Malaysia, Indonesia, New Guinea, Philippines, Australia, Africa, Madagascar.

Urothemis signata signata (Rambur)
(Figs. 386 and 508-509)

Libellula signata Rambur, 1842, *Hist. nat. Ins. Nevrop.*, : 117.

Urothemis signata signata (Rambur) : Ris, 1913, *Cat. Coll. Selys*, 16 : 1023.

Fraser, 1936, *Fauna Brit. India, Odon.*, 3 : 442.

Material studied : 1 ♂, Barapani, 21.vi.1973, coll AKG ; 1 ♂, Sonapurdi, 27.viii.1974, coll ARL.

Measurements (in mm) and Nodal index.

	Length of		Forewing		Hindwing	
	abdomen	hindwing	An	Pn	An	Pn
♂♂	31.0	37.5	7	8	5	8

Notes : The males studied vary from the description of the species provided by Fraser (1936) in having longer abdomen and basal spot of hindwing broken into a cubital and an anal spot.

This species appears to have a scattered distribution in Meghalaya.

Distribution : India : Assam, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal. Outside India : Tibet ; China ; Bangladesh ; Sri Lanka ; Burma ; Vietnam.

DISCUSSION

A. Richness of the state and prepondarence of the different families :

The Odonate fauna state (147) is represented by approximately one third of the (of a total of nearly 460) species and subspecies known so far from India and is approximately 2.9% of that known from the entire world [estimated at 5,000 by Corbet (1974)]. Considering the total area of the state under consideration (approximately only 0.68% of total area of the Indian union), it can be said that the state has a rich Odonate fauna.

This is perhaps due to varied bio-physical condition, as discussed earlier, existing in the state. Such difference has resulted in the formation of diverse ecological niches.

A break up of the total number of species and subspecies found in the state at the family level reveals following percentage composition :

(i) Amphipterygidae-1 (approximately 0.7%) ; (ii) Chlorocyphidae-9 (approximately 6.1%) ; (iii) Euphaeidae-7 (approximately 4.8%) ; (iv) Calopterygidae-8 (approximately 4.4%) ; (v) Chlorolestidae-2 (approximately 1.4%) ; (vi) Lestidae-5 (approximately 3.4%) ; (vii) Protoneuridae-3 (approximately 2.0%) ; (viii) Platycnemididae-12 (approximately 8.2%) ; (ix) Coenagrionidae-17 (approximately 11.6%) ; (x) Gomphidae-20 (approximately 13.0%) ; (xi) Aeshnidae-same as Coenagrionidae ; (xii) Cordulegasteridae-4 (approximately 2.7%) ; (xiii) Corduliidae-6 (approximately 4.1%) ; (xiv) Libellulidae-36 (approximately 24.5%).

From the above it is noticed that, the family Libellulidae is represented by maximum number of species, followed by Gomphidae, Coenagrionidae and Aeshnidae ; nearly 60.9% of the species and sub-species is represented by these 4 families. Contrastingly enough, 4 other families e.g. Amphipterygidae, Chlorolestidae, Protoneuridae and Cordulegasteridae comprise approximately 6.8% of the total number of species and sub-species found in the state of Meghalaya. Remaining species and subspecies (nearly 32.3% of the total) are represented by the rest of the 6 families.

Again out of the two suborders Zygoptera and Anisoptera, the latter (approximately 56.2%) is more preponderent over the former (approximately 43.8%).

A break up of the number of genera under each of the 14 families stated above, shows the following number and percentage composition : (i) Amphipterygidae and Chlorolestidae-1 each (approximately 1.3%) ; (ii) Chlorocyphidae, Protoneuridae and Cordulegasteridae-2 each (approximately 2.6%) ; (iii) Euphaeidae and Lestidae-3 each (approximately 3.9%) ; (iv) Platycnemididae and Coduliidae-4 each (approximately 5.2%) ; (v) Calopterygidae-6 (approximately 7.8%) ; (vi) Coenagrionidae-7 (approximately 9.1%) ; (vii) Aeshnidae-8 (approximately 10.4%) ; (viii) Gomphidae-13 (approximately 16.9%) ; (ix) Libellulidae-12 (approximately 27.3%).

Of the 14 families Libellulidae is the most significantly represented family. It is followed, in the order, by the families Gomphidae, Aeshnidae and Coenagrionidae and when considered together, these four families are noticed to comprise 49 (approximately 63.6%) genera known from the state ; remaining genera, i.e. 28 being represented by the rest of 10 families.

Prevalence of the different families, when considered with regard to composition of families in respect of species and subspecies on one hand and genera on the other, appears basically same.

Analysis of generic composition of 2 suborders, viz. Zygoptera and Anisoptera, indicates that, as in species-subspecies level, the latter (approximately 62.4%) is more predominant over the former (approximately 37.6%).

Odonate fauna of India comprising of about 460 species and subspecies under 142 genera and 17 families, when considered as a whole, show that, the suborder Anisoptera (comprising of about 63.3% of the total genera and 57.1% of the total species) is more prevalent than the suborder Zygop-

tera (leaving aside the only species and genus belonging to suborder Anisozygoptera). Four families, viz. Libellulidae, Gomphidae, Coenagrionidae and Aeshnidae considered most prevalent, together hold about 264 species and subspecies (approximately 57.4% of the total) under 88 genera (approximately 61.9% of the total) least number of general (one each) and species (six) of Indian Odonates are hold by four other families viz. Chlorolestidae, Megapodagriidae, Amphipterygidae and Epiophlebididae. Thus prevalence of different suborders and families in respect of genera and species composition, in the Odonate fauna of state of Meghalaya and that of Indian union appear to be basically similar.

B. Faunal affinities :

Analysis of the Odonate fauna occurring in the state of Meghalaya reveal that about 97.4% of the genera (75) and 64.6% of the species and subspecies (95) are common to rest of eastern India and countries adjacent to India, i.e. Bangladesh and Nepal. Commonness of the faunal component with other parts of India and that of the world in general, follow in decreasing order as follows : (i) Burma, Thailand, Vietnam [67 genera (approximately 87.0%) and 79 species and subspecies (approximately 53.7%)]; (ii) Indonesia and Malaysia [57 genera (approximately 74.0%) ; and 44 species and subspecies (approximately 29.9%)]; (iii) China, Taiwan, Japan and its adjoining islands [61 genera (approximately 79.1%) and 38 species and subspecies (approximately 25.9%)]; (iv) Peninsular (Southern) India [46 genera (approximately 59.8%) and 44 species and subspecies (approximately 29.9%)]; (v) North West India and Pakistan [44 genera (approximately 57.1%) and 57 species and subspecies (approximately 38.8%)]; (vi) Sri Lanka [42 genera (approximately 54.5%) and 29 species and subspecies (nearly 19.7%)]; (vii) Australia, New Zealand and the Pacific Islands [31 general (approximately 40.3%) and 12 species and subspecies (approximately 8.2%)]; (viii) Africa and Madagascar [30 genera (approximately 38.9%) and 5 species and subspecies (approximately 3.5%)]; (ix) Europe [15 genera (approximately 19.5%) and only 3 species (approximately 2.0%)]; (x) North America [14 genera (approximately 18.2%) and only 1 species (approximately 0.7%)]; (xi) South America [9 genera (approximately 11.8%) and only one species (approximately 0.7%)].

It can be noticed that the state shows closest affinity with Indochinese and least so with Neotropical elements in respect of Odonate fauna. Fraser (1933) also made similar observation since he wrote 'In the north-eastern provinces—Bengal, Assam and Bihar—the Malaysian affinities become pronounced and increases further towards lower Burma, which is purely Malaysian'

C. Endemism :

One genus (approximately 1.3%) and 33 species and subspecies (approximately 21.8%) are endemic to the state of Meghalaya. This shows that the state is quite rich in endemism at the species-sub-species level, but nearly negligibly so, at the generic level. However, figures, of familiewise distribution of the endemic species and subspecies indicate that endemism is not uniform in all the families. e.g. (i) Corduliidae-3 out of 6 species (50.0%) ; (ii) Platycnemididae-7 out of 12 species (approximately 58.3%) ; (iii) Chlorolestidae-1 out of 2 species (50.0%) ; (iv) Euphaeidae-3 out of 7 species (approximately 42.9%) ; (v) Lestidae-3 out of 5 species (approximately 60.0%) ; (vi) Gomphidae-8 out of 19 species (approximately 42.1%) (vii) Cordulegasteridae-1 out of 4 species (25.0%) ; (viii) Aeshnidae-4 out of 21 species (approximately 19.0%) ; (ix) Calopterygidae-1 out of 8 species (approximately 12.8%) ; (x) Libellulidae-2 out of 36 species (approximately 5.2%). No endemism is exhibited in the families Amphipterygidae, Chlorocyphidae, Protoneuridae and Coenagrionidae.

D. Distribution pattern of species and subspecies within the state :

Some of the species and subspecies are very widely distributed all over the state e.g. *Aciagrion tillyardi* Laidlaw (family Coenagrionidae), *Orthetrum sabina* (Drury), *Crocothemis s. servilia* (Drury) (family Libellulidae) etc., but many species and subspecies have localised distribution in the state. Such distribution seems to be related to the prevalent variable bio-physical condition of the different parts of the state under consideration.

Based on the prevailing bio-physical condition, the state can conveniently be subdivided into 5 major distinct zones, each with some characteristic faunal component, as follows :

(1) Foothills (upto 600 m) : It forms the periphery of entire state but extends over more area in the Garo hills. This zone is characterized by tropical luxuriant evergreen forest, hot and humid climate and low (less than 200 cm/annum) rainfall. Collection localities of Sl. Nos. 1-28, 30, 32, 35, 51, 57-61, 74 and 76-78 fall under this zone.

71 species and subspecies (approximately 48.9%) are represented in this zone. Of these, 21 (approximately 14.3%) are limited to this zone only.

(2) Northern slope of Khasi hills (600-1100 m) ; In this zone, vegetation is mainly subtropical, rainfall slightly more than in the foothills (200-300 cm/annum). The climate is less hot and humid here. Collection localities of Sl. Nos. 53, 67 and 69-71 fall under this zone.

In this zone 46 species and subspecies (approximately 31.3%) ; are found. Only two of these species are restricted to this zone.

(3) Central hilly region of Garo and Khasi hills (1100-2000 m) ; This zone covers most of the central area of Garo and Khasi hills. Temperate luxurious vegetation, cold climate and rainfall of about 300-400cm/annum are characteristics of this zone. Tura, Garo hills and collection localities of Sl. Nos. 29, 40-43, 45, 46, 55, 62-63 and 69 fall under this zone.

99 species and subspecies (approximately 67.4%) occur in this zone and 31 of these (approximately 21.1%) are limited to this zone.

(4) Southern slope of Khasi hills (1500-2000 m) : It is characterised by scanty vegetation due to erosion of soil caused by heavy rainfall (500-1549 cm/annum, maximum recorded rainfall in the world) and cold climate. Collection localities of Sl. Nos. 31, 33, 34, 36-39, 44, 47-49, 52, 54, 64, 65, 67, 73 and 74 fall under this zone.

46 species and subspecies (approximately 31.5%) are found here. Six of these (approximately 4.9%) are limited only to this zone.

(5) Central upland of Jaintia hills (600-1500 m) ; This zone is comprised of nearly flat valleys with scanty vegetation, much of natural forest being removed by terrace cultivation. Rainfall (300-700 cm/annum) is less than in southern slope of Khasi hills and climate is warmer than in the two preceding zones. Collection localities 76 and 89 fall under this zone.

Only 17 species and subspecies (approximately 11.6%) occur in this zone. All of these are also known from one or more of the other zones named above.

Thus it is noticed that central hilly region of Garo and Khasi hills is most rich from the viewpoint of occurrence of Odonate fauna. This is followed, in decreasing order, by foothills, southern slope of Khasi hills, northern slope of Khasi hills and central upland of Jaintia hills. It is also noteworthy that, excepting central upland of Jaintia hills, some of the species and subspecies in each of the other zones are very much restricted to a particular zone. This fact is well marked in the foothills and the central hilly region of Garo and Khasi hills.

Central upland of Jaintia hills, where natural forest has been depleted to a great extent on account of extensive terrace cultivation, has the least number of species and subspecies. This suggests a direct co-relation

between available forests and faunal component in a particular area. Need of vegetation to provide necessary shelter to immature adults has been pointed out by Corbet (1980) and Parr (1973). However, such correlation might also be due to limitation of desired breeding ground caused by deforestation as has been suggested by Lieftinck, (1968) in connection with Malaysian fauna.

Richness of faunal component of the central zone of Garo and Khasi hills in comparison to that of southern slope of Khasi hills, can be accounted for by the aforementioned reasons. Preference for a higher rainfall area by the species may also play a role in limiting the distribution of some species which are known only from either one of these zones in the state. e.g. *Rhinocypha immaculata* Selys (known only from southern slope of Khasi hills) or nearly all species of a genus e.g. *Bayadera* Selys (that of *B. kali* Cowley being uncertain) which are endemic in central zone of Khasi hills).

As indicated above, a number of species and subspecies occurring in the state are known either from foothills (altitude 600 m or less) or from zones with higher altitude (over 1100 m). Altitudinal influence, in limiting the distribution of many Odonate species and subspecies, is possibly brought about through a change in either temperature or atmospheric pressure or both. Apparently many Odonate species and subspecies are able to thrive only within a limited range of atmospheric pressure and temperature.

Northern slope of Khasi hills can be said to have a moderately rich fauna. Its general biophysical factors appear to be suitable for many species and subspecies excepting perhaps those which are specifically sensitive to their ability to withstand only a limited range of altitude and rainfall.

In summing up, it may be stated that a few factors apparently appear to act as barriers, limiting the distribution of species and subspecies. These are (i) extent of available vegetation; (ii) amount of rainfall and (iii) altitude. It may be noted that, these factors in general are effective only at species subspecies level, but in certain cases, also tend to hold good at generic level as well. This is exemplified by the genera *Bayadera* Selys and *Paragomphus* Cowley, besides others, where all the members are exclusively known from, the central zone of Khasi hills and northern foothills respectively, in the state.

It is obvious that, the species which are very widely spread all over the state are very highly adaptive and are able to tolerate a wide range of bio-physical factors.

While analysing zonal faunal components, 8 species have been kept out of consideration, since their actual distribution within the state is uncertain from available records. These are *Bayadera kali* Cowely, *Aciagrion approximaans* (Selys), *Oligoeaschna Khasiana* Lieftinck, *Anax guttatus* (Burmeister), *Gynacantha khasiaca* McLachlan, *Aeshna petalura* Martin, *Chlorogomphus fraseri* St. Quentin and *Somatochlora daviesi* Lieftinck, all being recorded from Khasi hills.

From the nature of collection available at hand, (the same having not been at regular intervals in every season throughout the years) it is not possible to present a data regarding seasonal fluctuation of population of different species and subspecies. Also, actual time of collection for a number of species reported earlier from the state, remains uncertain from the available information. However, the data available shows that, most of the species have been collected during the period of March—November ; 23 species and subspecies (approximately 15.5%) were collected during the period December-February as well ; but only for 6 of them, some collections could be made between the middle of December—middle of February. Those few, truly overwintering species and subspecies are *Aciagrion tillyardi* Laidlaw, *Palpopleura s. sexmaculata* (Fabricius), *Crocothemis s. servilia* (Drury), *Diplacodes trivialis* (Rambur), *Neurothemis i. intermedia* (Rambur) and *Trithemis festiva* (Rambur). Maximum number of species and subspecies [91 (approximately 61.5%)] were collected during the month of June, July and August which was followed by the collections made during the months of March-May [34 (approximately 57.1%)] and between September-November [58 (approximately 39.5%)]. A few species not appearing till the month of August, take to wing only from September onwards. These are, *Rhinocypha immaculata* Selys, *Echo margirita m.* Selys, *Vestalaria smaragdina* (Selys), *Coelicia didyma* Selys, *Anax* sp. A, *Hemicordulia asiatica* Selys and *Hydrobasileus croceus* (Brauer). In general, most species and subspecies appear from March onwards and many of them continue to be on wing during the next 4-6 months. Availability of desired optimum temperature and opportunity for breeding resulting from the ensuring rainfall possibly lead to a rapid enhancement of population from March onwards.

S U M M A R Y

1.0 Odonate fauna of the state of Meghalaya in Eastern India has been studied in a comprehensive manner for the first time.

2.0 A total of 147 species and subsepcies belonging to 77 genera under 14 families known till date from the state have been listed including 49 which are now records from Meghalaya.

3.0 Collection data, distriubtion, measurements of body parts and notes of taxonomic importance have been provided for all the 112 species and subspecies studied during the present work together with adequate illustrations of different body parts of taxonomic importance.

4.0 All the 68 genera studied have been treated in detail on the basis of material available and literature, while supergeneric catagories have been briefly dealt with.

5.0 Six species and one subspecies turned out to be new to science ; these are : *Magalestes raychoudhurii* sp. nov. (Family Chlorolestidae), *Orolestes durga* sp. nov. and *Lestes garoensis* sp. nov. (Family Lestidae). *Calicnemia mukherjeei* sp. nov. (Family Platycnemididae), *Nihonogomphus indicus* sp. nov. and *Onychogomphus meghalayanus* sp. nov. (Family Gomphidae) and *Zygonyx iris intermedia* subsp. nov. (Family Libellulidae). Three species, one each belonging to the genera *Anotogaster* Selys, (Family Cordulegasteridae), *Anax* Leach and *Gynacantha* Rambur (Family Aeshnidae), whose specific identity could not be exactly determined due to lack of males, have been described in detail. Four species, namely, *Coeliccia raseri* Laidlaw, *Aciqgrion tillyardi* Laidlaw, *Argiocnemis obscura* Laidlaw and *Paragomphus echinoccipitalis* (Fraser) have also been completely re-described in view of their existing inadequate description. The male of *P. echinoccipitalis* (Fraser) and females of *Elattoneura compioni* (Fraser) and *Anisogomphus caudalis* Fraser, have been described for the first time. *Rhinocypha perforata* subsp. *beatifica* Fraser has been elevated to the rank of a species. *Cariagrion fallax* Ris and *C. olivaceum* Laidlaw have been both treated only as a monotypic species since in both case characters used for subspecific ranking of population appeared to overlap in specimen studied. *O. echinoccipitalis* Fraser and *C. biguttata* (Fraser) have been removed from the genera *Onychogomphus* Selys and *Cephalaeschna* Selys, to *Paragomphus* Cowley and *Periaeschna* Martin, respectively, while *O. duaricus* Fraser has been treated as a subspecies of *O. saundersi* Selys.

6.0 Rnuning keys for the material studied have been provided in the text together with important synonyms and original references for all the genera and species.

7.0 Finally an attempt has been made to correlate the distribution pattern of various Odonate species and subspecies known from Meghalaya with

different physical and environmental factors prevalent in the state and to analyse the faunal component from zoogeographical point of view.

ACKNOWLEDGEMENTS

The author is thankful to the Director, Zoological Survey of India, Calcutta for providing an opportunity to carry out the present work. Former Professor and Head of the department of Zoology of the Calcutta University (Late) Dr. D. N. Roychoudhury is remembered with a deep sense of gratitude, not only for his encouragement to undertake this work, but also for his constant guidance till the time of his untimely death in May, 1981. The author is also most sincerely thankful to Dr. A. K. Ghosh, Deputy Director, Zoological Survey of India, for helping him with all necessary opportunity as the Officer-in-Charge of the Eastern Regional station of the Survey at Shillong and for providing valuable guidance in completing the present work after the sudden demise of Late Professor Roychoudhury. Late Dr. Lieftinck of Netherlands, the most notable Odonatologist of the present decade is reckoned with kind regards for many of his invaluable suggestions and for his considered opinion on the identity of most of the species dealt with in the present study. Various helpful suggestions and loan of literature coming from Mrs. L.K. Gloyd, Division of Insects, Museum of Zoology, University of Michigan, Ann Arbor, U.S.A., Dr. S. Asahina, The National Institute of Health, Tokyo, Japan, Dr. E. C. G. Pinhey, former Curator, National Museum, Rhodesia, Dr. P. S. Corbet, Professor, Zoology department, Canterbury University, New Zealand, Dr. P. Aguesse, Faculty of Science, Biology department, Rabat, Maroc and Dr. St. Quentin, Vienna, Austria, are all acknowledged with sincere thanks. Finally, with sincere thanks is acknowledged the manifold friendly helps of Dr. S. Biswas, Mr. T. R. Mitra and Mr. S.S. Roy.

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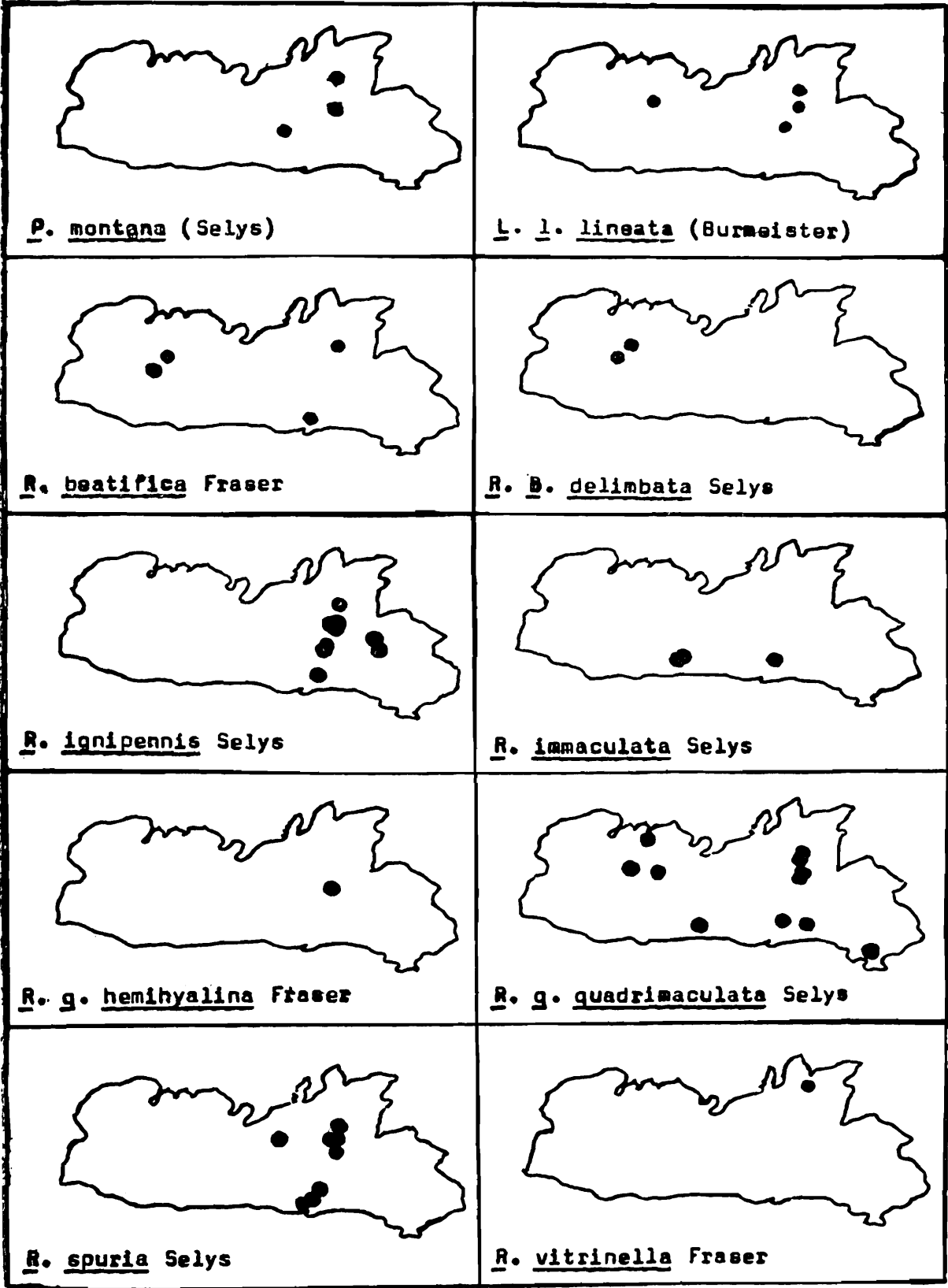
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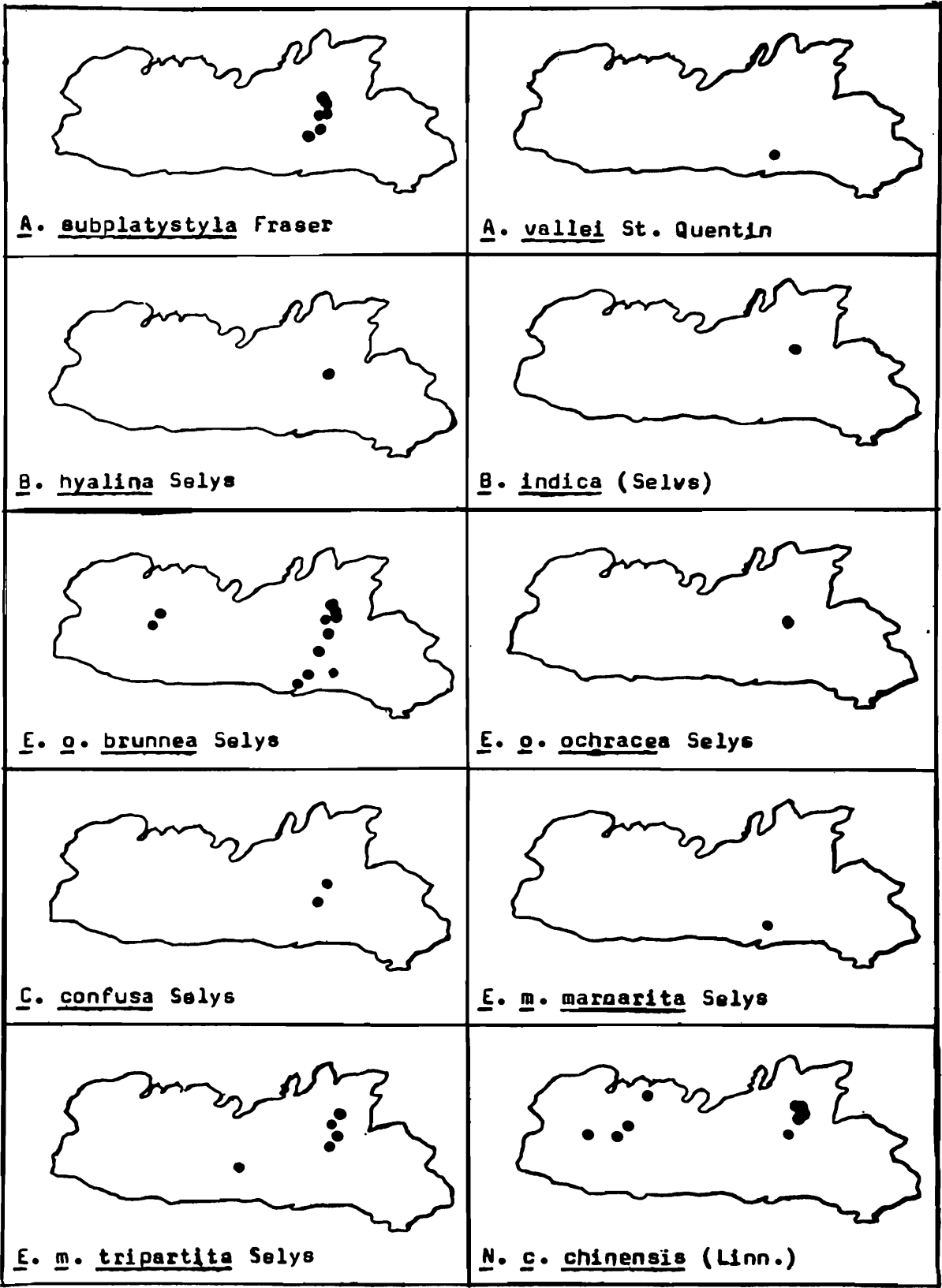
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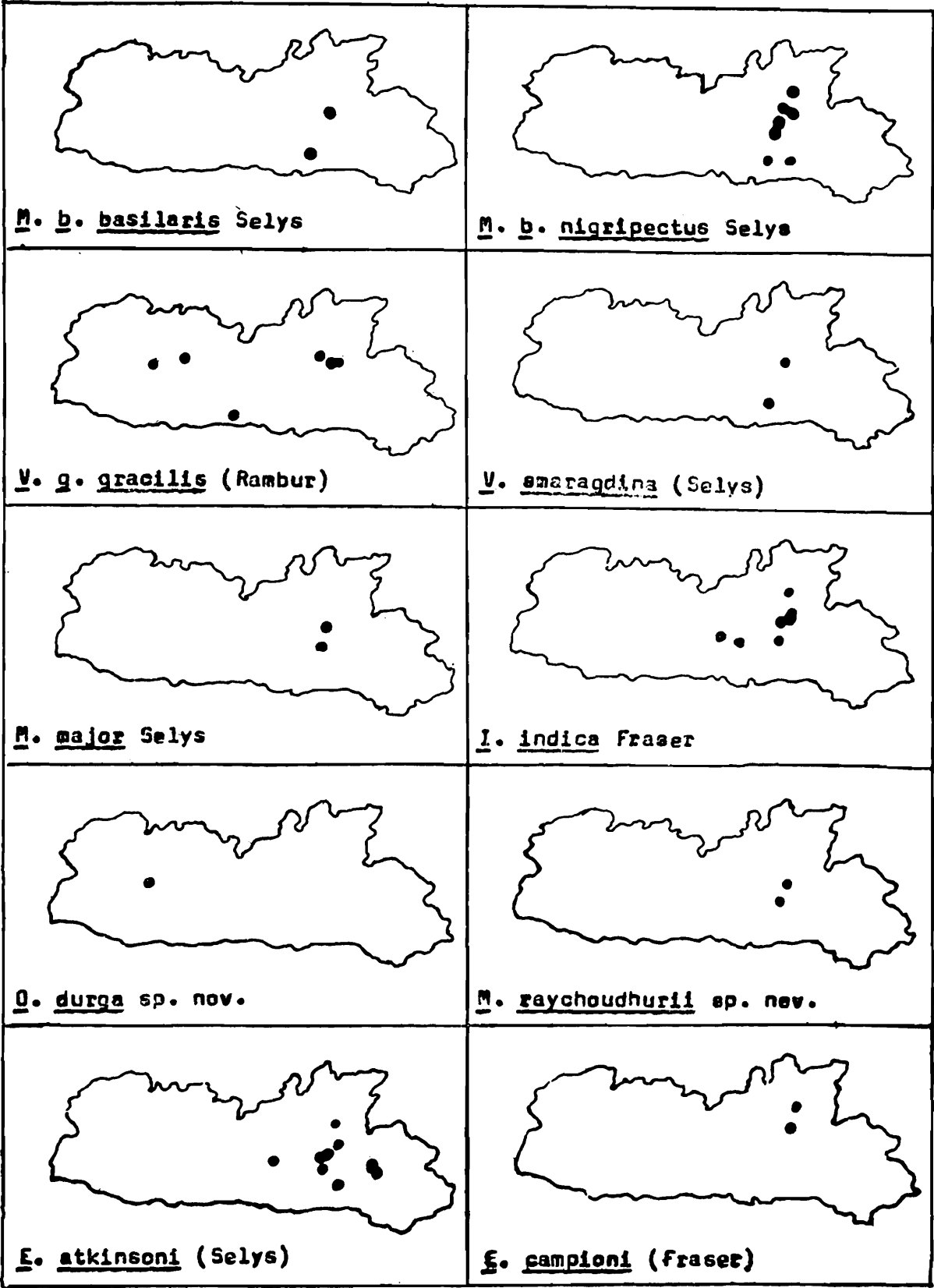
**DISTRIBUTION MAPS
OF ODONATE FAUNA
OF MEGHALAYA**



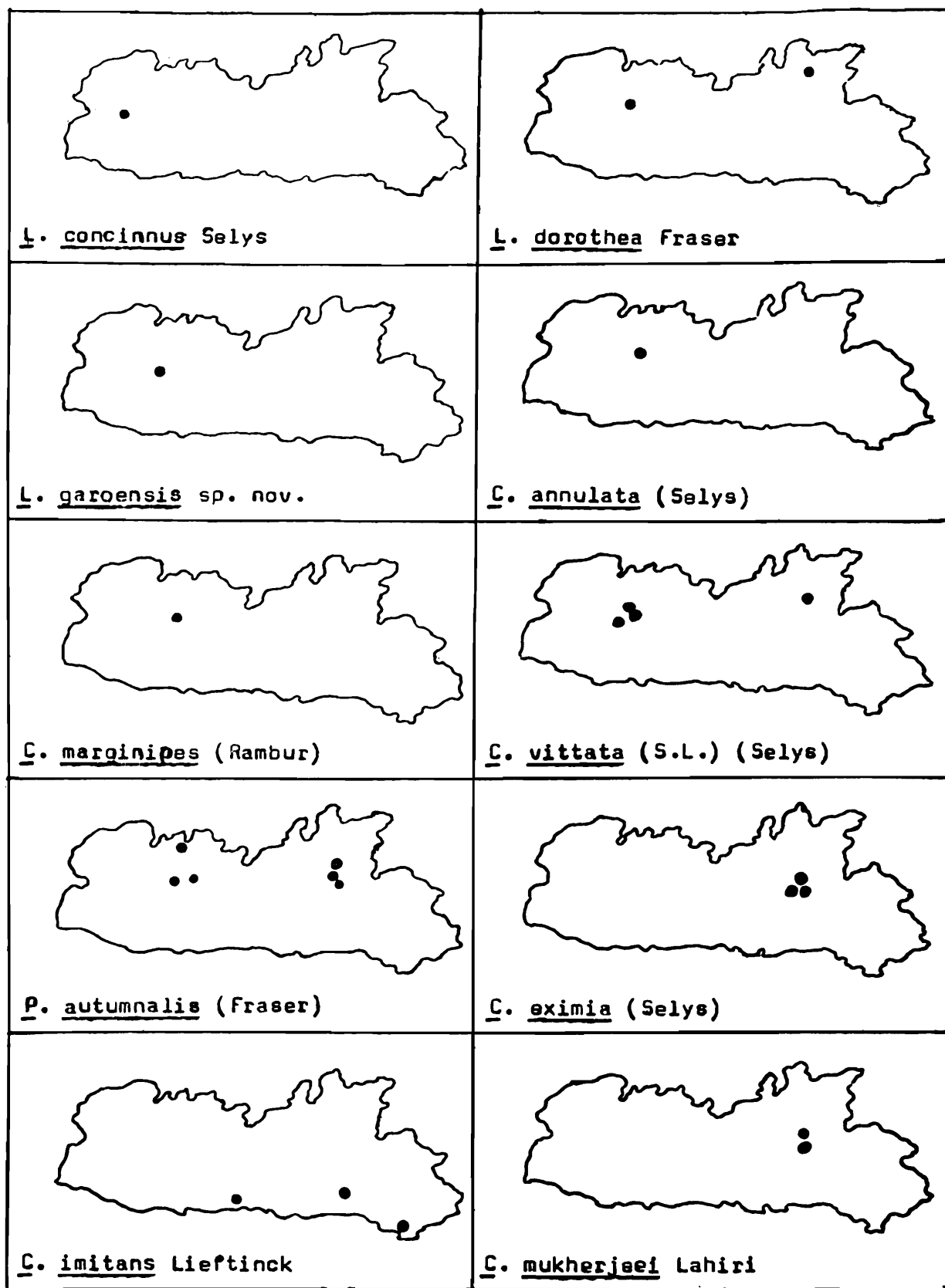
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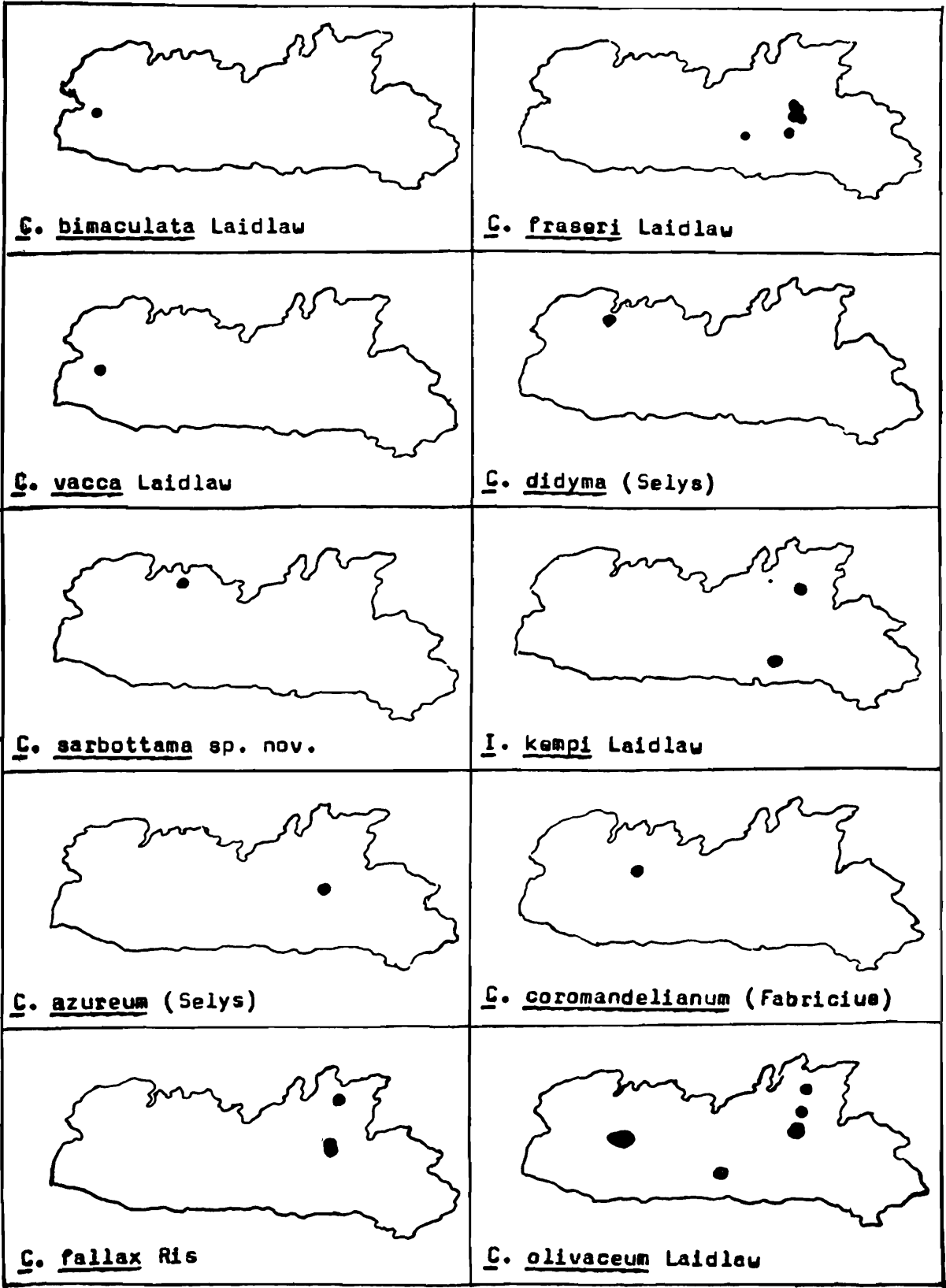
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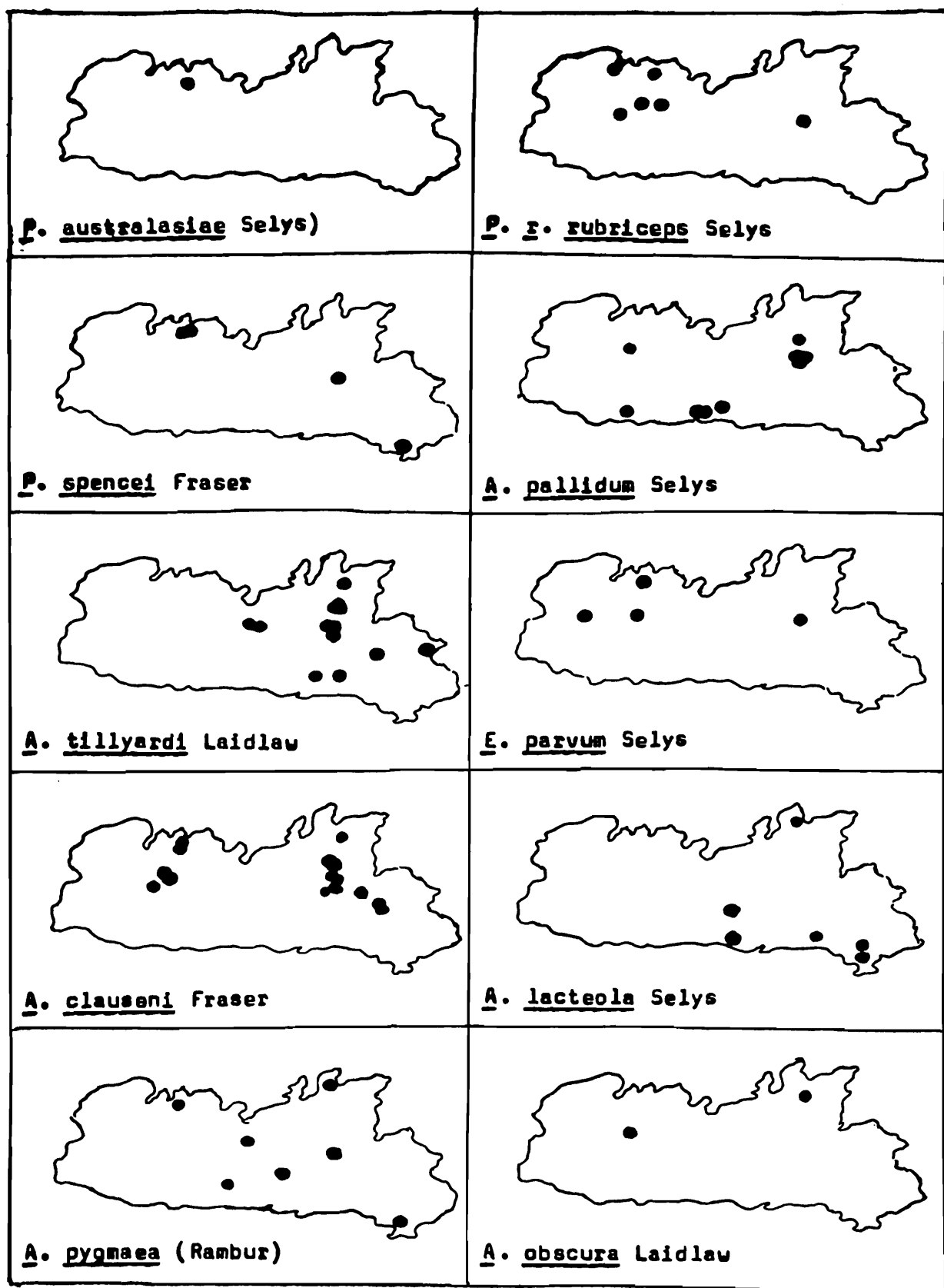
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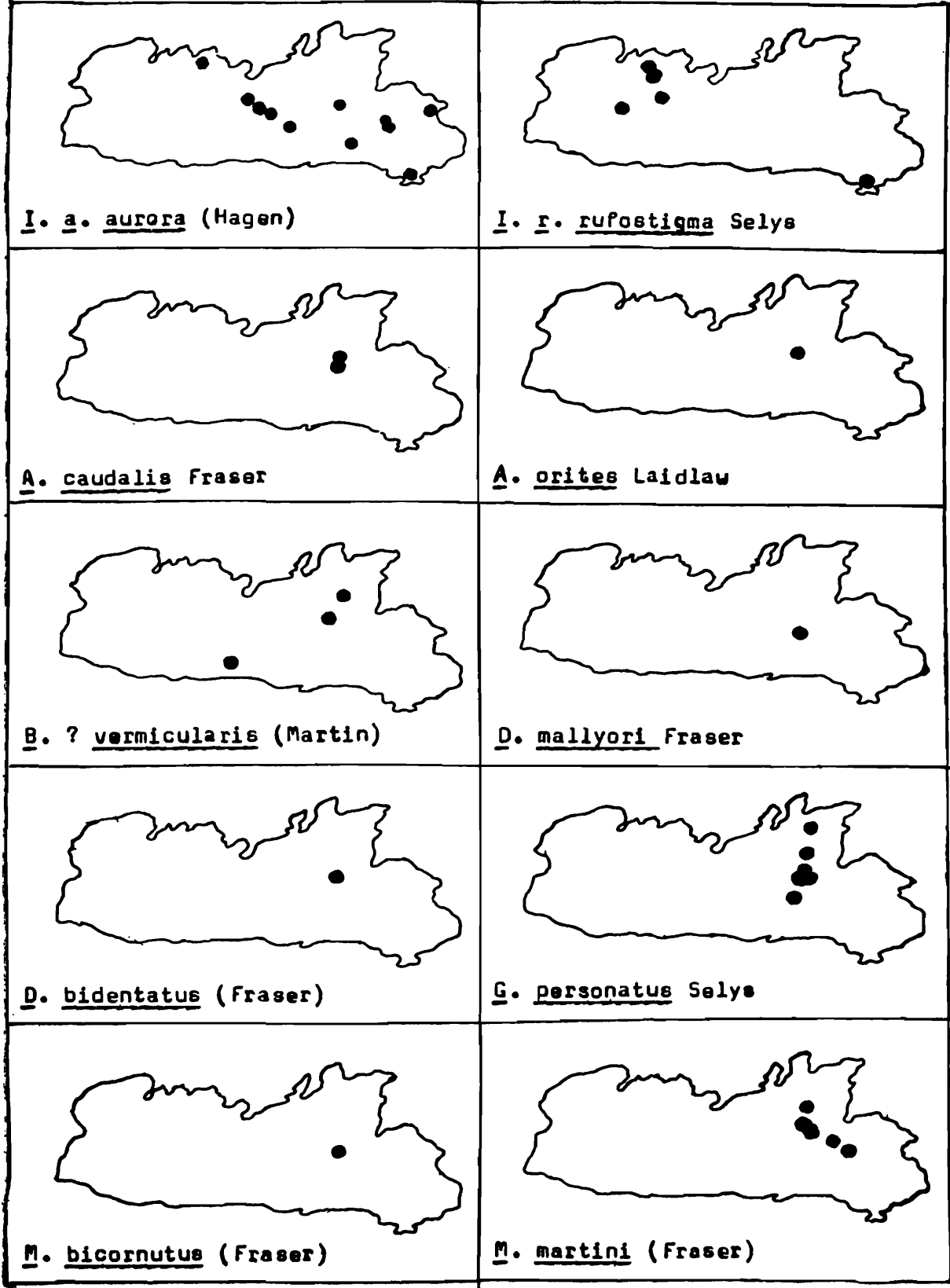
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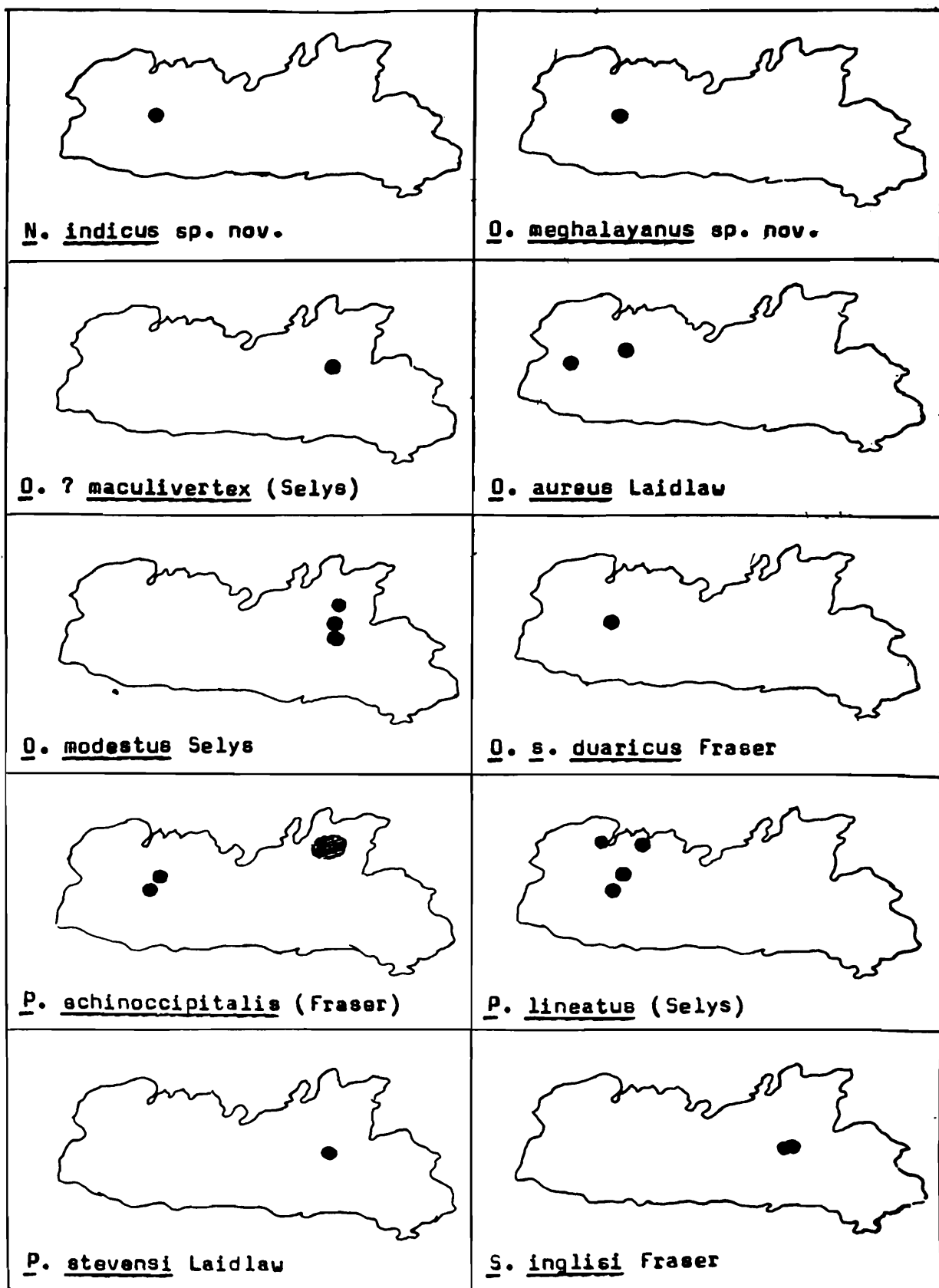
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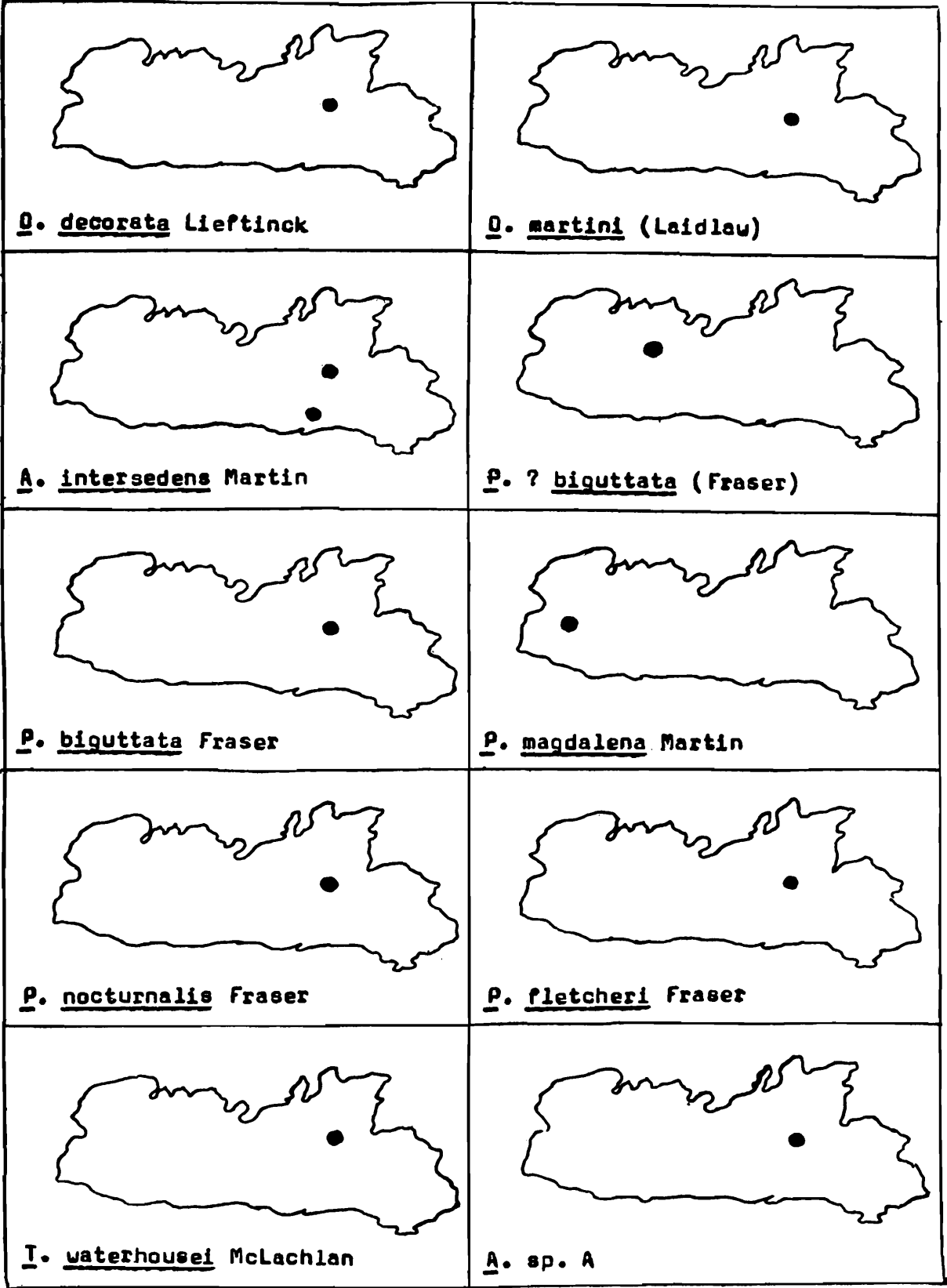
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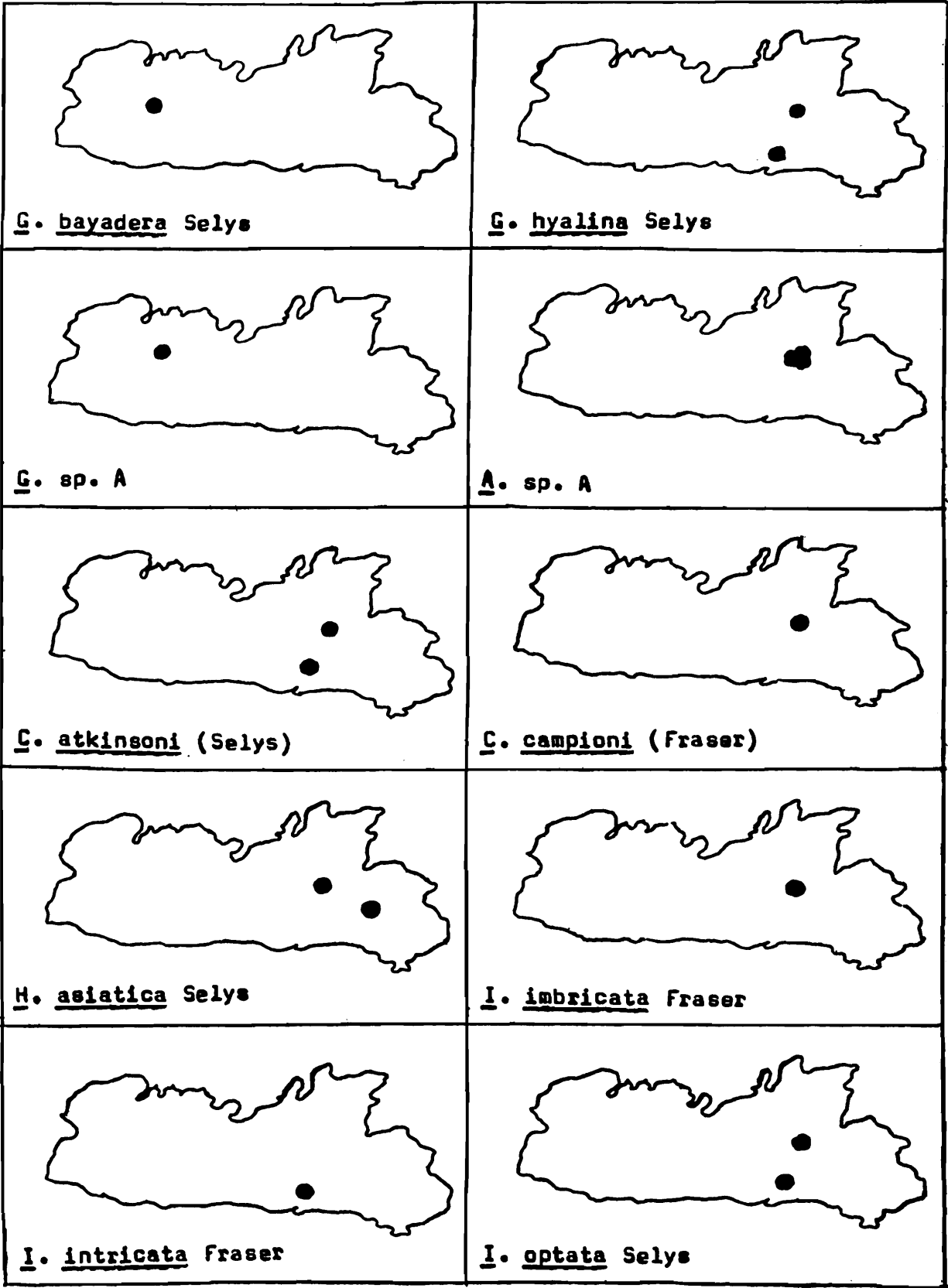
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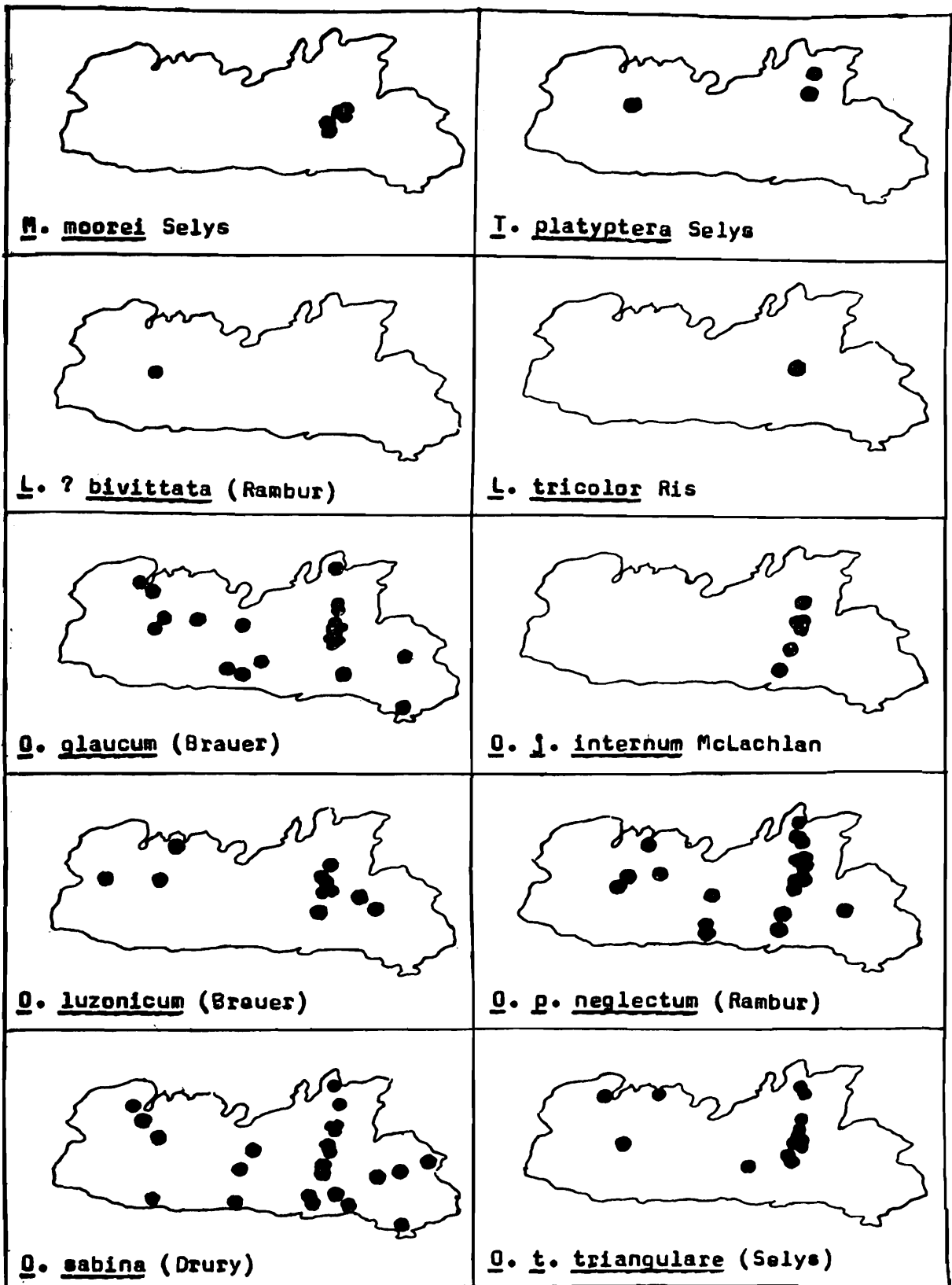
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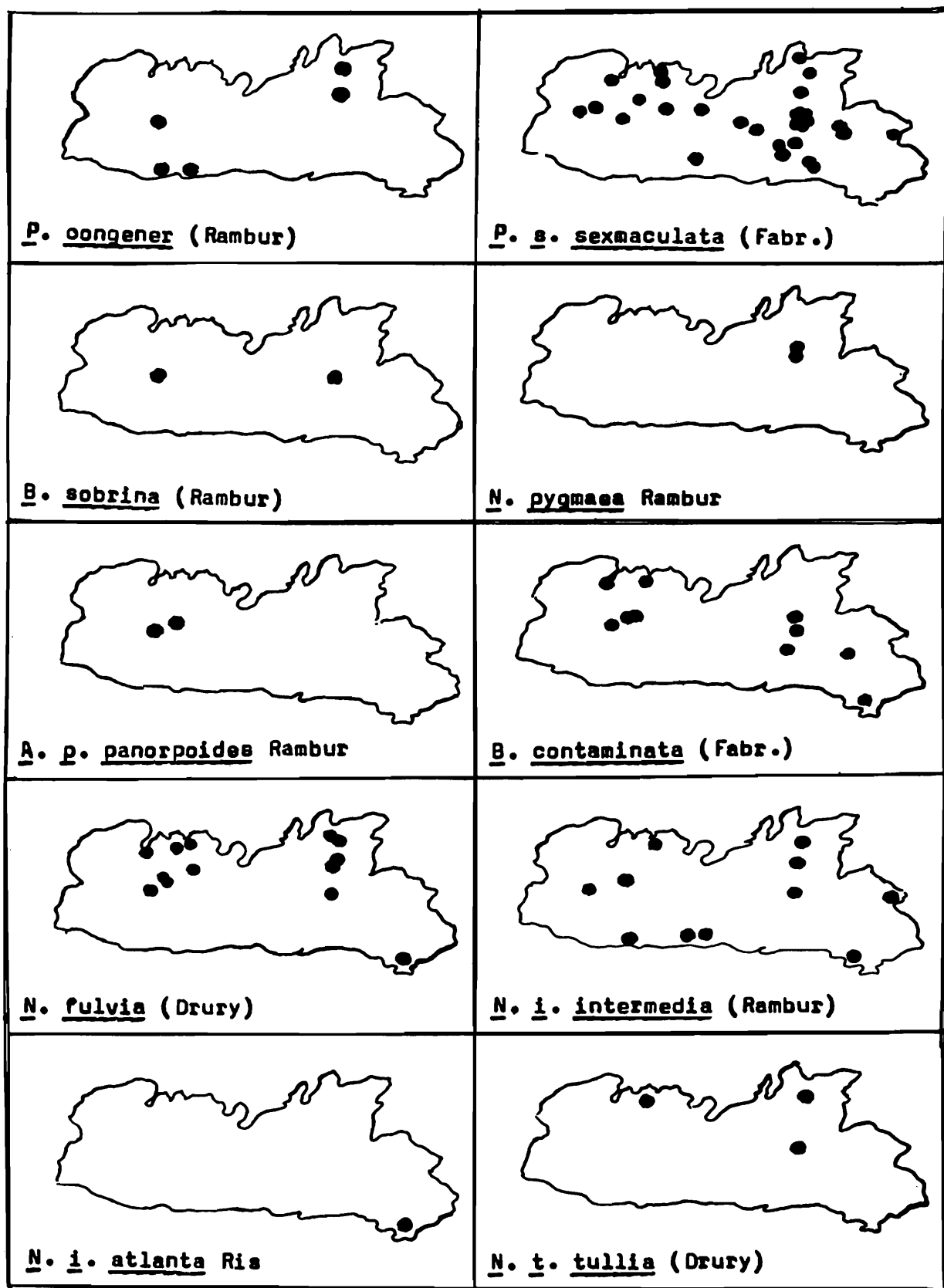
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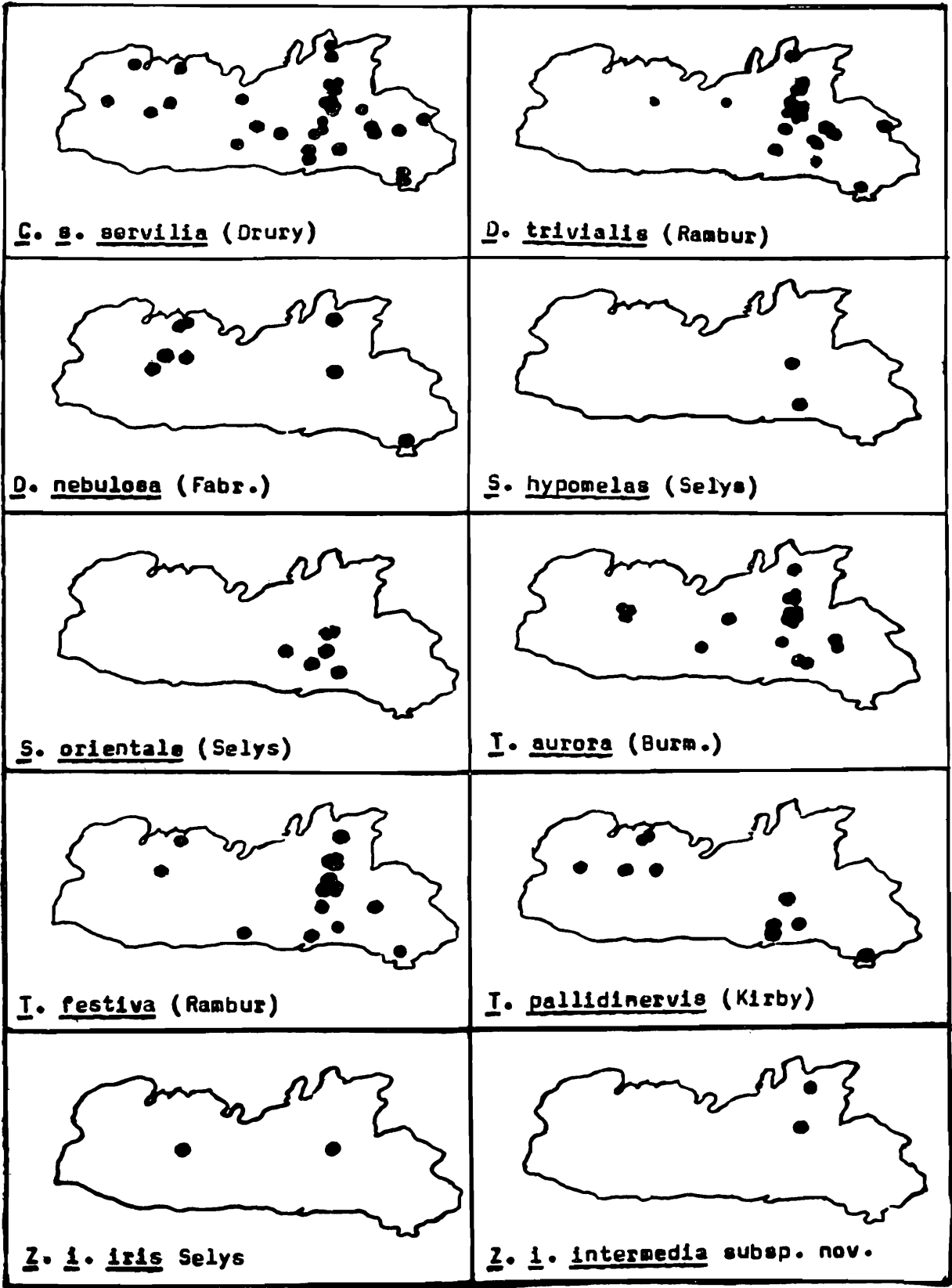
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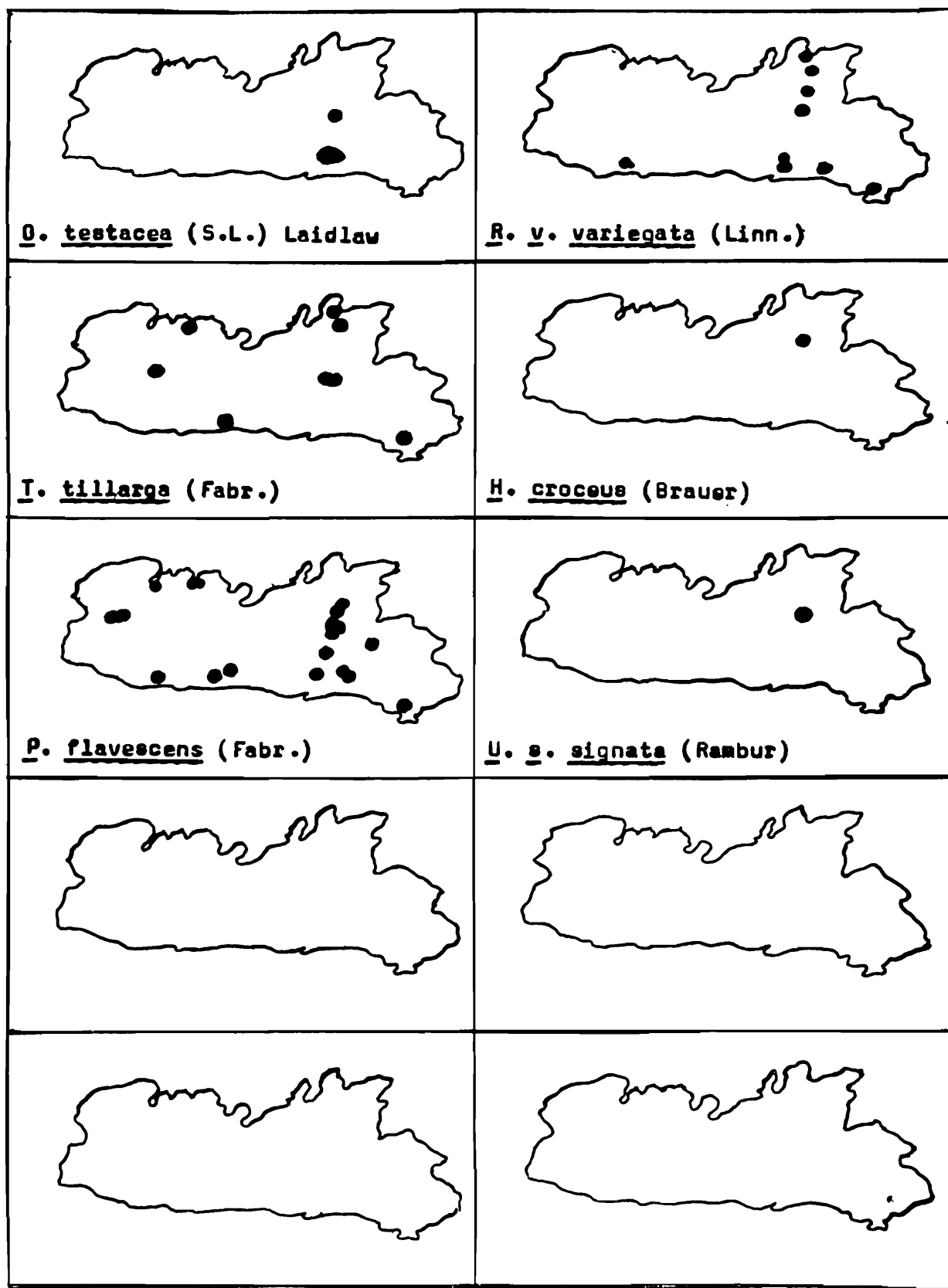
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Map—12



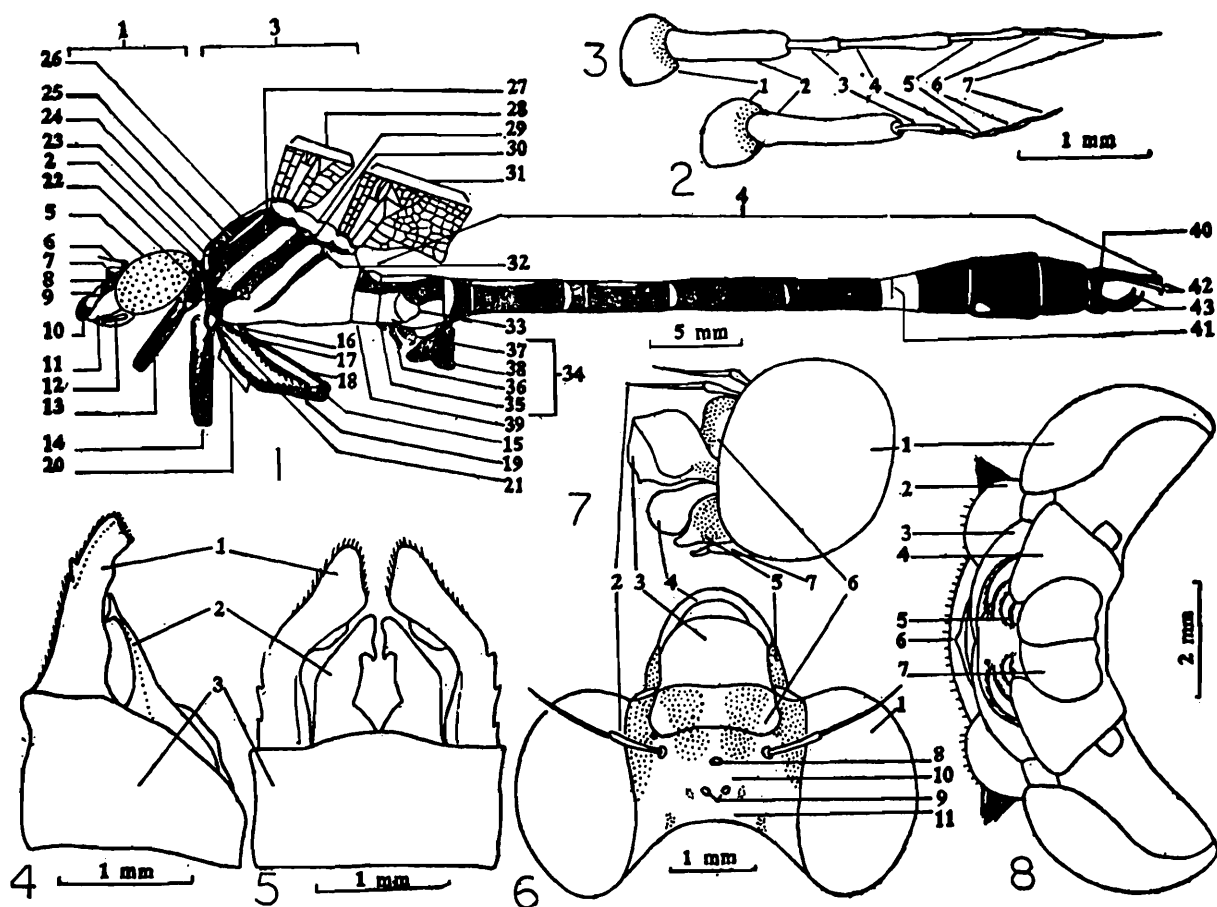
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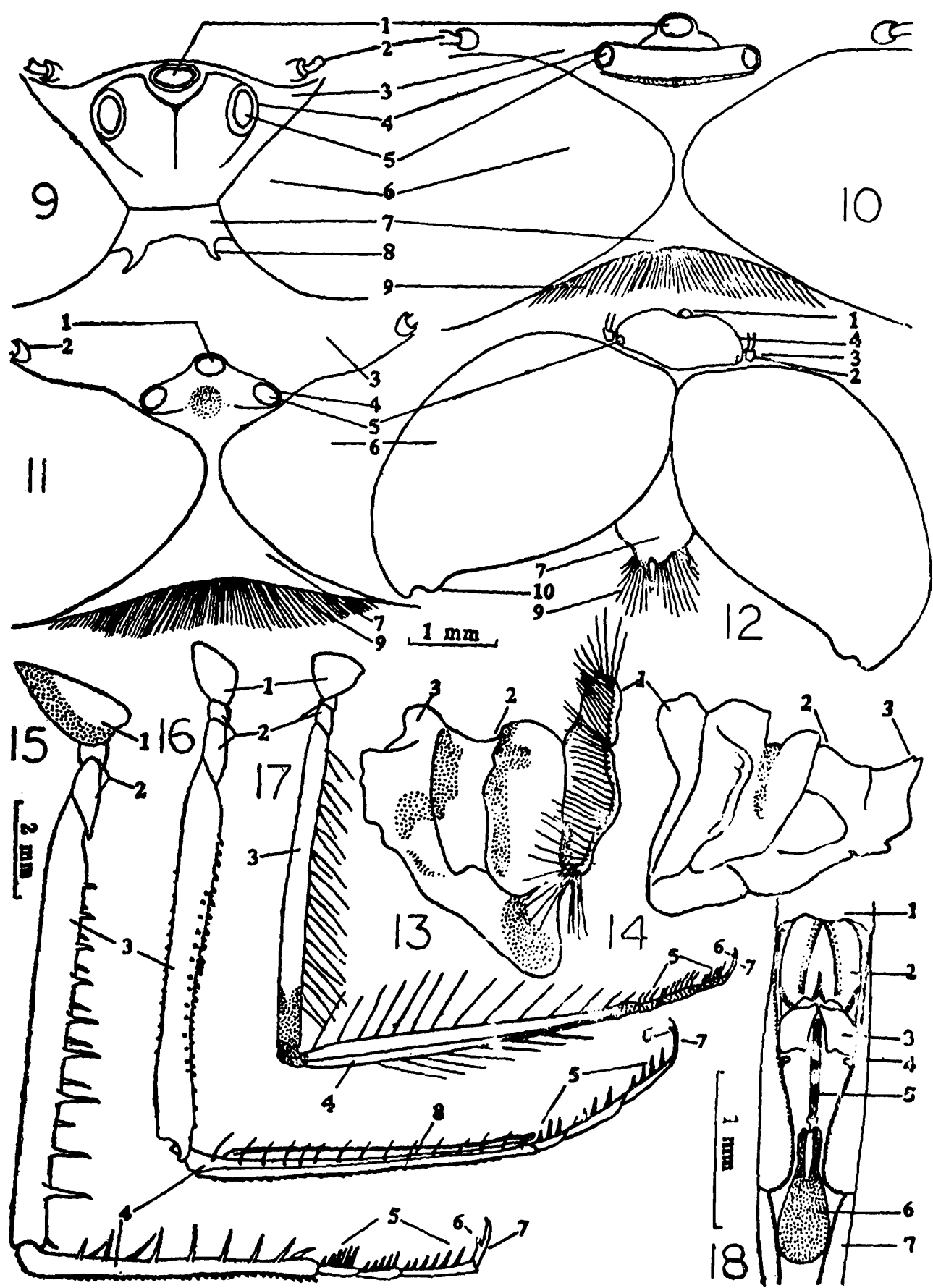
Map—14

F I G U R E S

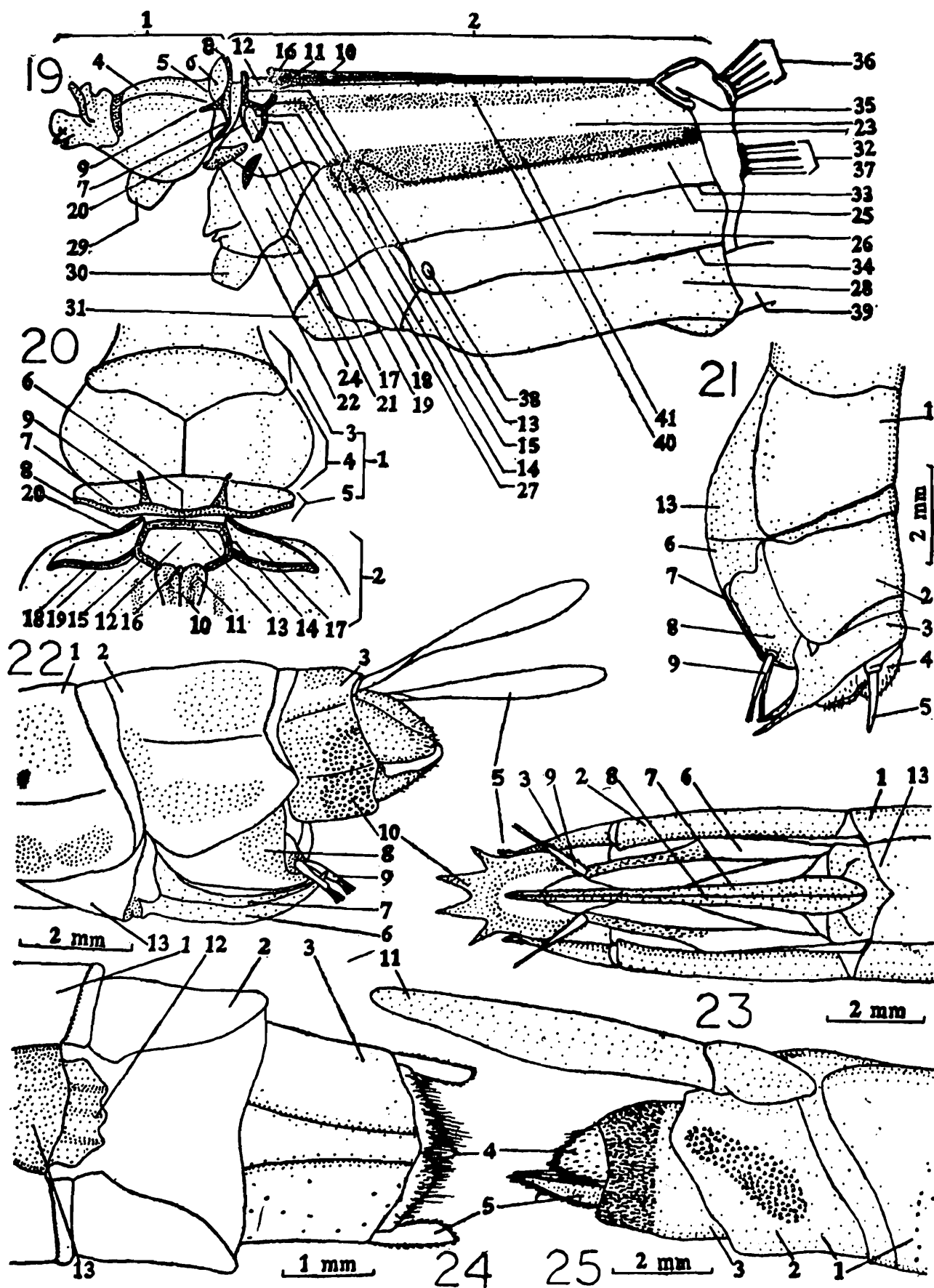
- Fig. 1. External morphology of a dragonfly, *Nihonogomphus indicus* sp. nov., male (lateral view, showing only clipped right wings and legs of left side) ; [1, head ; 2, prothorax ; 3 synthorax ; 4, abdomen ; 5, eye ; 6, antenna ; 7, frons ; 8, postclypeus ; 9, anteclypeus ; 10, labrum ; 11, mandible (*base*) ; 12, labium ; 13, foreleg ; 14, middle leg ; 15, hindleg ; 16, coxae ; 17, trochanter ; 18, femur ; 19, tibia ; 20, tarsi ; 21, tibial claw ; 22, spiracle ; 23, mesothoracic collar ; 24, mid-dorsal carina ; 25, antehumeral stripe ; 26, antealar sinus ; 27, humeral suture ; 28, right forewing ; 29, tergum ; 30, first lateral suture ; 31, right hindwing ; 32, second lateral suture ; 33, oreillets ; 34, accessory male genitalia ; 35, lamina ; 36, anterior haumle ; 37, posterior hamule ; 38, vesicula spermalis ; 39, first abdominal segment ; 40, tenth abominal segment ; 41, jugal suture ; 42, superior anal appendages ; 43, branches of inferior anal appendages].
- Figs. 2-3. Antenna of two dragonflies ; Fig. 2, *Chlorogomphus atkinsoni* (Selys), male ; Fig. 3, *Anotogaster* sp. A., female ; (1-7, antennal segments first to seventh).
- Figs. 4-5. Male anal appendages (lateral and dorsal view respectively) of a damselfly, *Caliphaea confusa* Selys ; (1 superior anal appendage ; 2 inferior anal appendage ; 3, tenth abdominal segment).
- Figs. 6-7. Head (lateral and dorsal view respectively) of a dmaselfly, *Rhinocypha immaculata* Selys, female ; (1 eyes ; 2, antenna ; 3, epistome ; 4, labrum ; 5, bases of mandibles ; 6, frons ; 7, labium ; 8, anterior ocellus ; 9, posterior ocelli ; 10, vertex ; 11, occiput).
- Fig. 8. Head (ventral view) of a dragonfly, *Chlorogomphus atkinsoni* Selys, male ; (1, eyes ; 2, postclypeus ; 3, bases of mandibles ; 4, lateral lobes of labium ; 5, labial palpi ; 6, labrum ; 7, middle lobe of labium).



- Figs. 9-12 Head of dragonflies (dorsal view of rear part) : Fig. 9. *Nihonogomphus indicus* sp. nov., female ; Fig. 10. *Anotogaster* sp. A, female ; Fig. 11. *Chlorogomphus atkinsoni* (Selys), male ; Fig. 12. *Hemicordulia asiatica* Selys, male ; (1, anterior ocelus ; 2, antenna (base) ; 3, vertex ; 4, vesicle ; 5, lateral ocelli ; 6, eyes ; 7, occiput ; 8, spines on posterior margin of occiput ; 9, hairs on posterior margin of occiput ; 10, sinuous projection on posterior margin of occiput).
- Figs. 13-14 Prothorax (lateral view) of Libelluloid male dragonflies ; Fig. 13. *Orthetrum sabina* (Drury) ; Fig. 14. *Crocothemis s. servilia* (Drury) ; (1, anterior lobe ; 2, middle lobe ; 3, posterior lobe). (Figs. 9-14 in same scale)
- Figs. 15-17 Hindlegs of dragon and damselflies ; Fig. 15. *Anisogomphus caudalis*, Fraser, female ; Fig. 16. *Hemicordulia asiatica* Selys, male ; Fig. 17. *Copera annulata* (Selys), male ; (1, coxa ; 2, trochanter ; 3, femur ; 4, tibia ; 5, tarsus ; 6, inner arm of claw (hook) ; 7, claw ; 8, keel on tibiae).
- Fig. 18. Male external genitalia (ventral view) of a damselfly, *Argiocnemis obscura* Laidlaw ; (1, first abdominal segment ; 2, lamina ; 3, anterior hamule ; 4, posterior hamule ; 5, penis ; 6, vesicula spermalis ; 7, third abdominal segment).



- Fig. 19. Thorax (lateral view) of a demselfly, Fig. 20. Anterior part of the same in dorsal view ; (both hypothetical and not to scale) ; (1 prothorax ; 2, synthorax ; 3, 4 and 5, anterior, middle and posterior lobe respectively of prothorax ; 6, 7, 8 and 9, midlobe, lateral lobe, inferior lip and stylet of posterior lobe of prothorax ; 10, middorsal carina ; 12, mesothoracic acrotergite ; 13, 14 and 15, anterior, lateral and posterior carina respectively of frame ; 16, pit ; 17, mesostigmal lamina (plate) ; 18, posterior ridge of mesostigmal lamina ; 19, depression behind mesostigmal plate for locking the male anal (caudal) appendage ; 20, mesothoracic stigma ; 21, epaulette ; 22, pre-episternum ; 23, mesepisternum ; 24, mesinfraepisternum ; 25, mesopimeron ; 26, metepisternum ; 27, metinfra-episternum ; 28, metepimeron ; 29, 30 and 31, fore, middle and hindlegs respectively ; 32, 33 and 34, humeral, 1st and 2nd lateral suture respectively ; 35, antearlar sinus ; 36 and 37, fore- and hindwings respectively ; 38, mesothoracic spiracle ; 39, abdomen ; 40, antennumeral stripe ; 41, humeral stripe).
- Figs. 21-25 Apical abdominal segments of dragonflies showing female genitalia ; Fig. 21, *Periaeschna ? biguttata* (Fraser), in left lateral view ; Fig. 22, *Anax*. sp. A, in left lateral view ; Fig. 23, *Tetracanthagyna waterhuosei* McLachlan, in ventral view ; Fig. 24. *Chlorogomphus atkinsoni* (Selys), in ventral view ; Fig. 25, *Anotogaster* sp. A, in left lateral view ; (1, 2 and 3, abdominal segments 8, 9 and 10, respectively ; 4, epiproct ; 5, anal appendage ; 6, ventral or first valvulae ; 7, inner or second valvulae ; 8, lateral or third valvulae ; 10, dentigerous plate ; 11, pseudoovipositor ; 12, vulver scale ; 13, sternite of 8th abdominal segment).



- Fig. 26. Male accessory genitalia of *Chlorogomphus atkinsoni* (Selys) ; (1, 2 and 3 abdominal segments 1st, 2nd and 3rd respectively ; 4, oreillet ; 5, lamina ; 6, bosses on lamina ; 7 and 8, anterior and posterior haumles respectively ; 9, penis ; 10, vesicula spermalis).
- Figs. 27-28. Male anal appendages of *Chlorogomphus atkinsoni* (Selys) in dorsal and right lateral view respectively ; (1, 10th abdominal segment ; 2, and 3, superior and inferior anal appendages respectively ; 4, paraproct).
- Figs. 29-30. Penis of a dragonfly, *Sympetrum hypomelas* (Selys) ; Fig. 29. In left lateral view, Fig. 30. Apex more magnified in dorsal view ; (1, vesicula spermalis ; 2, proximal or 1st segment ; 3, apical or 2nd segment ; 4, apical lobe ; 5, median lobe ; 6, lateral lobe ; 7, internal lobe ; 8, median process).
- Figs. 31-32. Penis of a demselfly, *Caliphaea confusa* Selys ; Fig. 31. In right lateral view ; Fig. 32. Apex more magnified in dorsal view ; (1, first segment or shaft ; 2 and 3, internal and terminal fold respectively, of second segment ; 4, lateral apical process ; 5 and 6, internal and external branches respectively of lateral apical process).

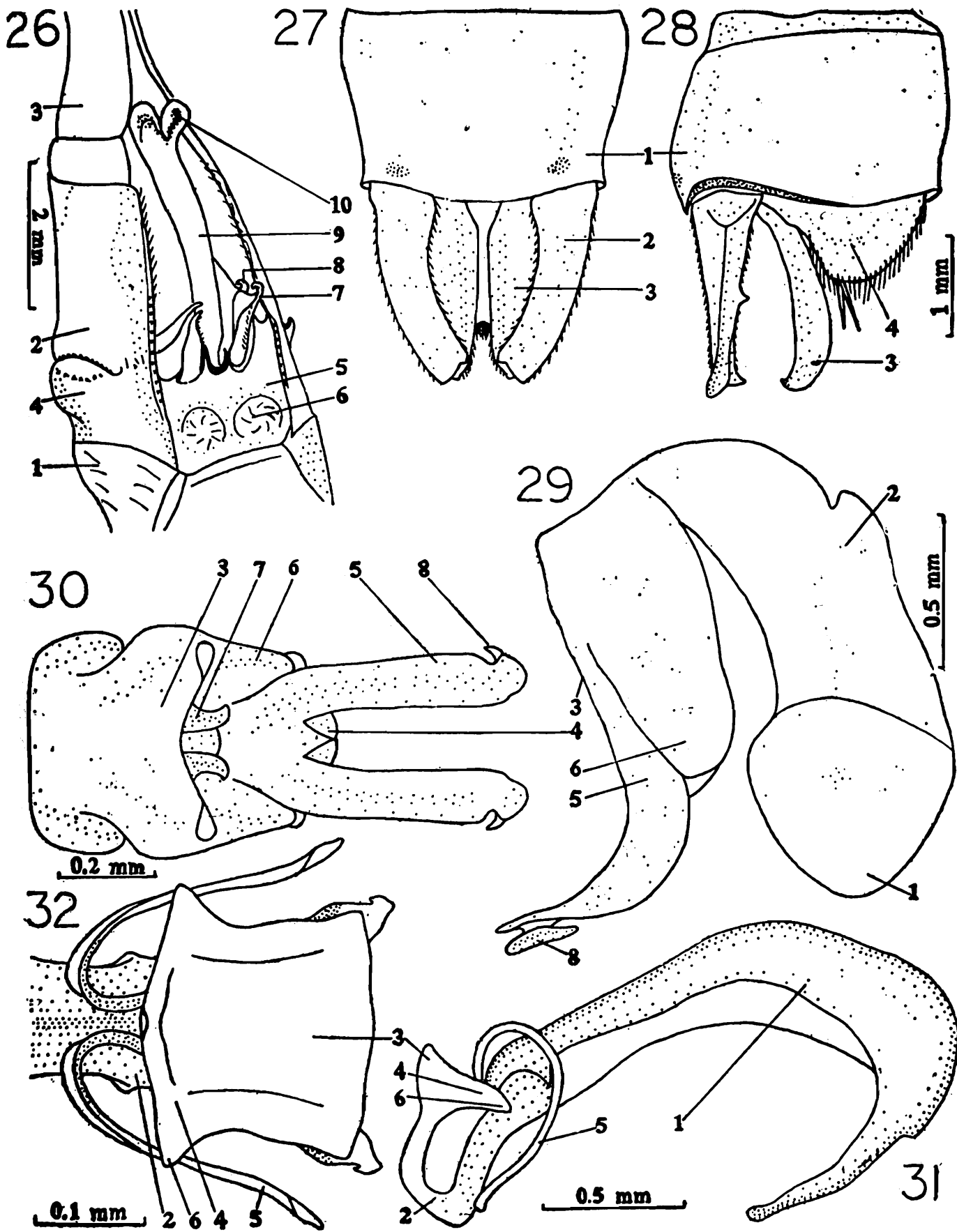
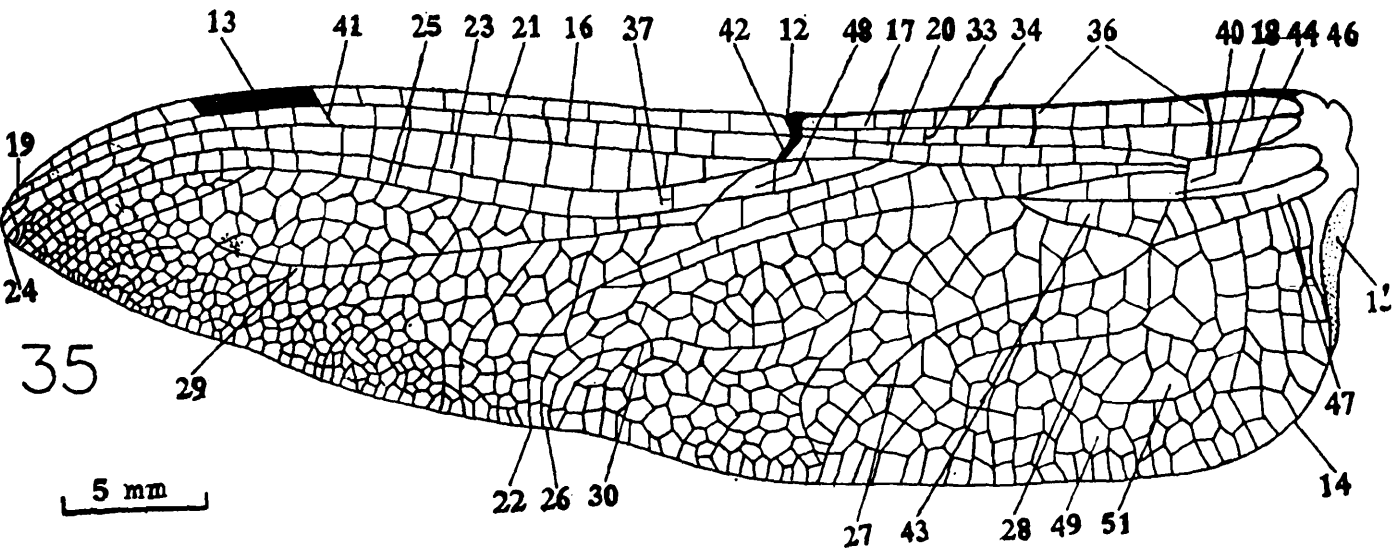
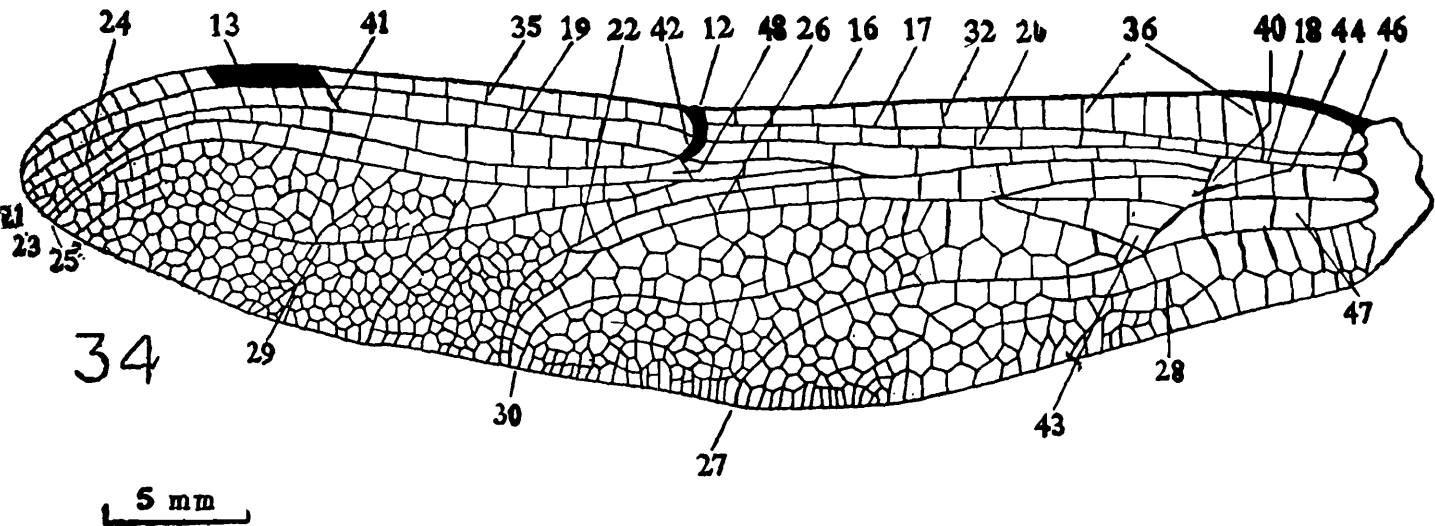
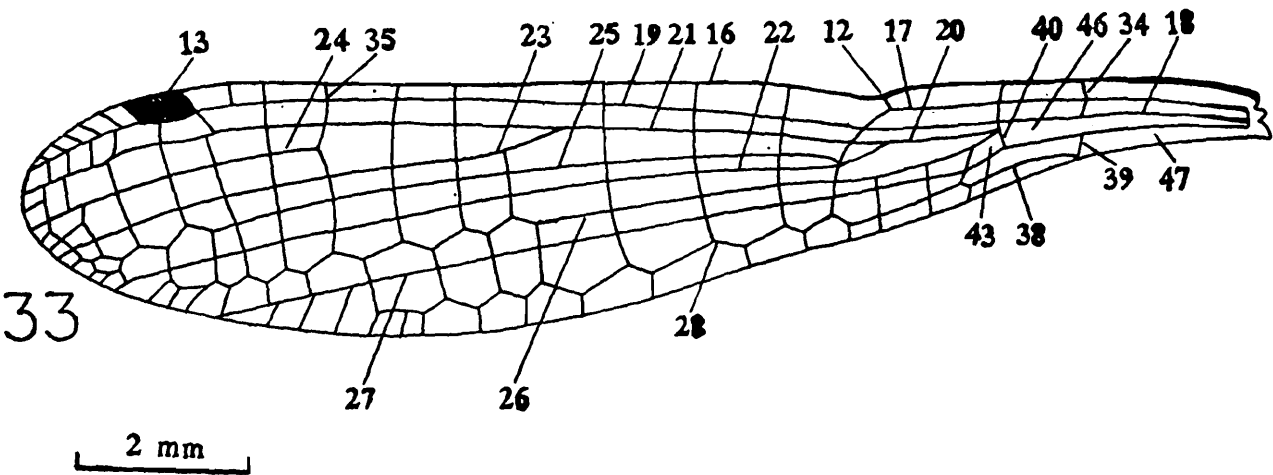


Fig. 33. Left hindwing of a damselfly, *Pseudagrion spencei* Fraser, male.

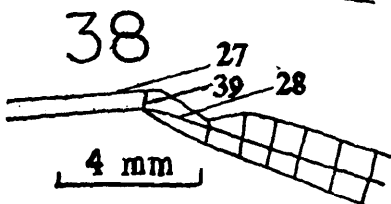
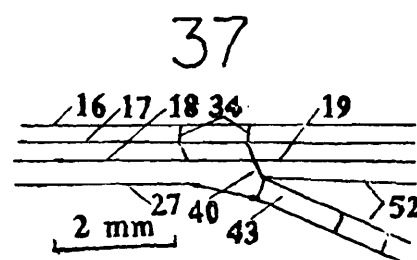
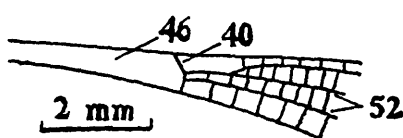
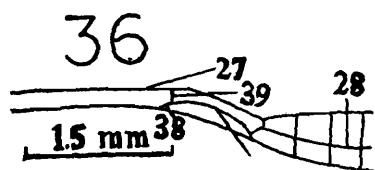
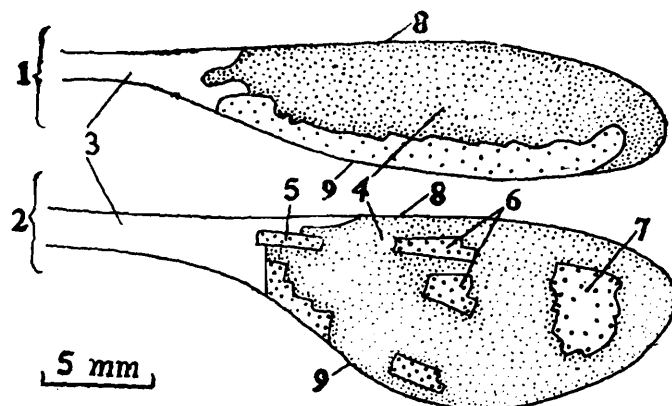
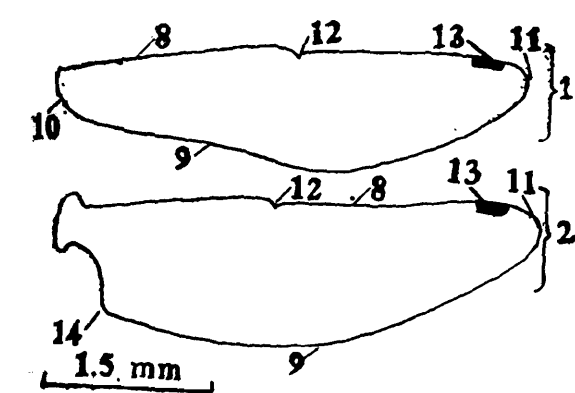
Figs. 34 & 35. Left fore- and hindwing of a dragonfly *Anax* sp. A, female.

(1, forewing ; 2, hindwing ; 3 and 4, hyaline and opaque areas of wing respectively ; 5, 6 and 7, basal, median and apical bands respectively of vitreous areas of wings ; 8, 9, 10 and 11, anterior, inner, basal and distal margins respectively of wings ; 12, nodus ; 13, pterostigma ; 14, tornus ; 15, membrane ; 16, C ; 17, Sc ; 18, R+M ; 19, R₁ ; 20, Rs ; 21, R₂ ; 22, R₄₊₅ ; 23, R₃ ; 24, 1R₂ ; 25, 1R₃ ; 26, MA ; 27, Cu₂ ; 28, IA ; 29, Rspl ; 30, Mspl ; 31, Aspl ; 32, and 33, costal and subcostal cross veins respectively ; 34, An ; 35, ; Pn ; 36, primary An ; 37, O ; 38, Ab ; 39, Ac ; 40, Arc ; 41, Br ; 42, Sn ; 43, Dc ; 44, Ht ; 45, St ; 46, median space ; 47, Cubital space ; 48, Bg ; 49, anal area ; 50, At ; 51, Al ; 52, Sectors of Arc ; 53, discoidal field).



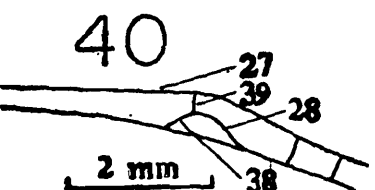
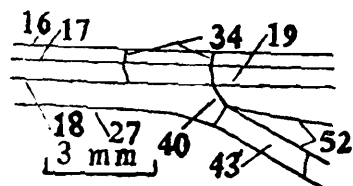
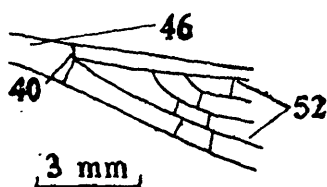
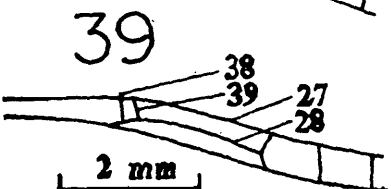
- Figs. 36-37 Outline of fore- and hindwings of right side ; Fig. 36. A dragonfly, *Austroaeschna intersedens* Martin, male ; Fig. 37, A damselfly, *Rhinocypha q. quadrimaculata* Selys, male.
- Figs. 38-43. Inner side, near base, of right hindwings of damselfly showing origins of Ab and IA ; Fig. 38, *Megalestes raychoudhunii* sp. nov. : Fig. 39, *Orolestes durga* sp. nov. : Fig. 40, *Elatoneura atkinsoni* Selys ; Fig. 41. *Prodasineura autumnalis* (Fraser) ; Fig. 42, *Vestalis g. gracilis* (Rambur) ; Fig. 43, *Philoganga montana* (Selys).
- Figs. 44-47 Base of hindwings near arc showing origin of sectors of arc ; Fig. 44. *Rhinocypha q. quadrimaculata* Selys ; Figs. 45, *Libellago l. lineata* (Burmeister) ; Fig. 46. *Lyriothemis* ? *bivittata* (Rambur) ; Fig. 47. *Urothemis s. signata* (Rambur).
- Figs. 48-51. Base of hindwing of damselflies showing Dc and its relation to arc ; Fig. 48, *Prodasineura autumnalis* (Fraser) ; Fig. 49, *Copera marginipes* (Rambur) ; Fig. 50. *Ceriagrion coromandelianum* (Fabricius) ; Fig. 51. *Argiocnemis obscura* Laidlaw.

(Lettering as in Figs., 33—35).



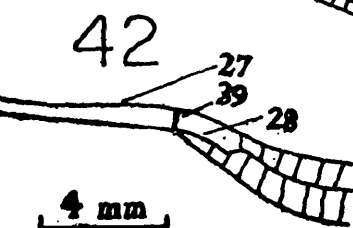
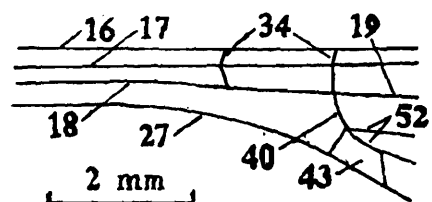
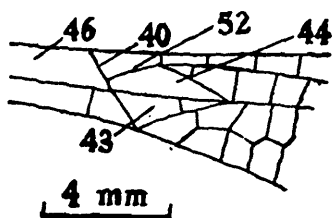
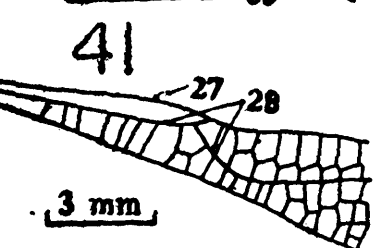
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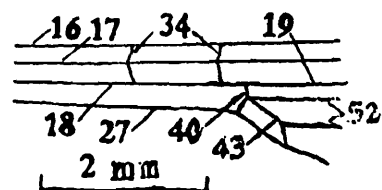
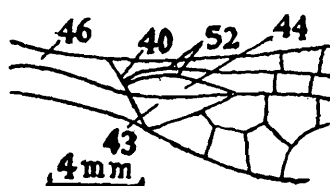
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Figs. 52-53 Base of hindwings of dragonflies showing Dc and its relations to arc; Fig. 52. *Tetrathemis platyptera* Selys ; Fig. 53. *Nannophya pygmaea* Rambur.

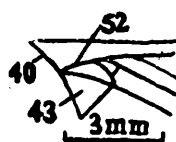
Figs. 54-55. Dc and basal part of discoidal field of hindwing of dragonflies ; Fig. 54. *Acisoma p. panorpoides* Rambur ; Fig. 55. *Orthetrum t. triangulare* (Selys)

Figs. 56-57. Distal part of IA showing its relation to inner wing margin in forewings of dragonflies ; Fig. 56. *Onychogomphus modestus* Selys ; Fig. 57. *Paragomphus lineatus* (Selys).

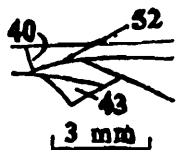
Figs. 58-61. Inner side, near base of hindwings of dragonflies showing anal area in relation to St and Dc ; Figs. 58-59. *Paragomphus lineatus* (Selys), male and female respectively ; Figs. 60-61. *Nihonogomphus indicus* sp. nov., male and female respectively.

Figs. 62-63. Inner side near base of hindwings of dragonflies showing Al and its relation to Dc and rest of anal area ; Fig. 62. *Tholymis tillarga* (Fabricius) ; Fig. 63. *Acisoma p. panorpoides* Rambur.

(Lettering as in Figs. 33-35)



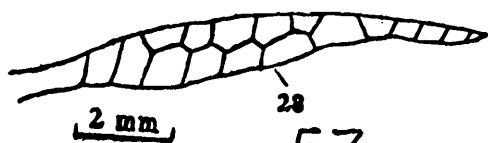
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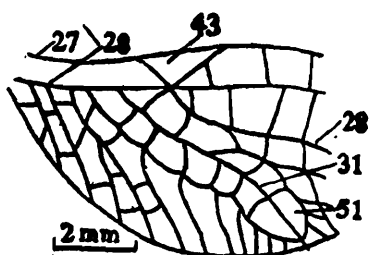
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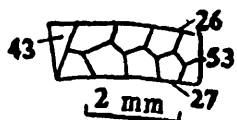
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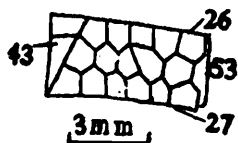
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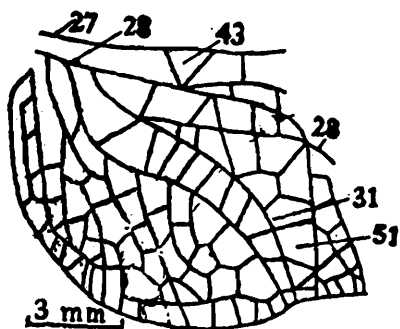
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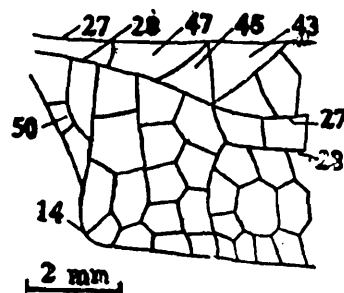
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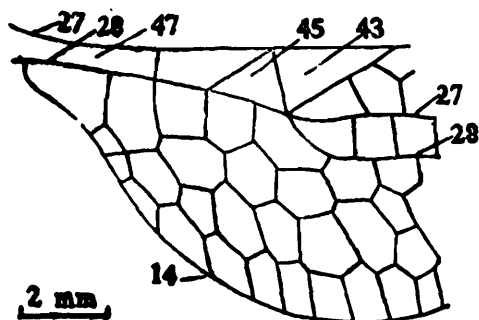
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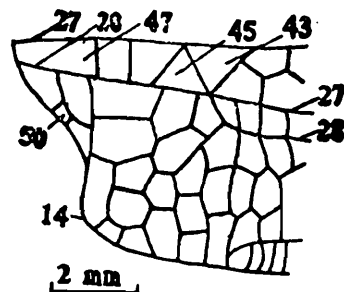
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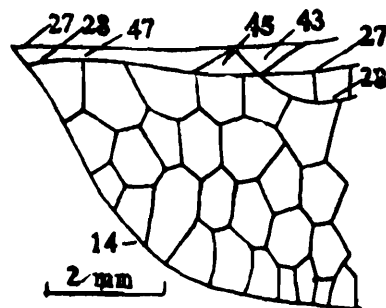
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59

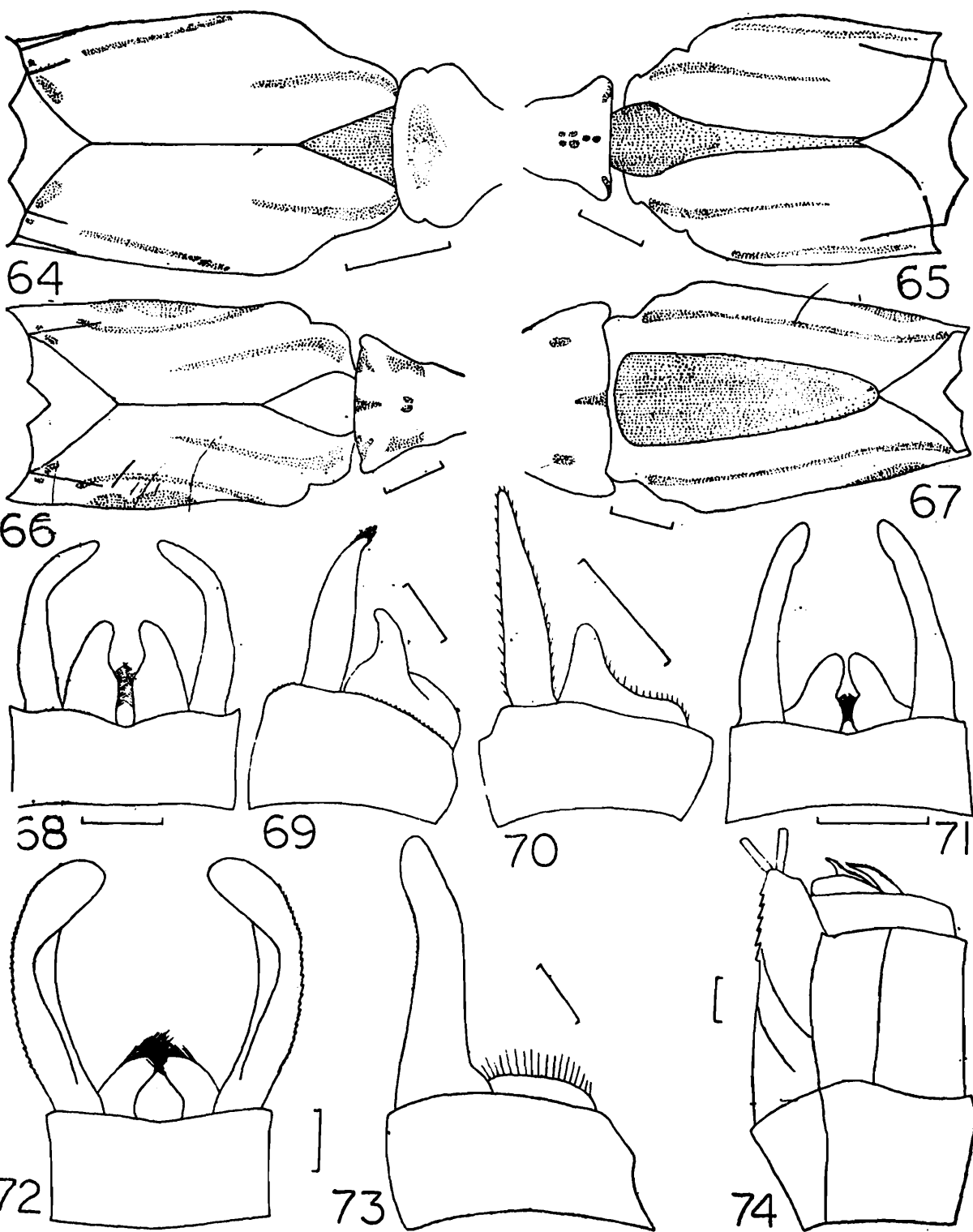


60



61

- Figs. 64-67. Thorax of male *Rhinocypha* spp., in dorsal views, showing varying extent of development of mesothoracic triangle ; Fig. 64. *R. vitrinella* Fraser ; Fig. 65. *R. q. quadrimaculata* Selys ; Fig. 66. *R. igniepnis* Selys ; Fig. 67. *R. immaculata* Selys.
- Figs. 68-69. Male 10th abdominal segment and anal appendages of *Rhinocypha beatifica* Fraser, in dorsal and left lateral view.
- Figs. 70-71. Male 10th abdominal segment and anal appendages of *Libellago l. lineata* (Bermeister), in left lateral and dorsal view.
- Figs. 72-74. *Philoganga montana* (Selys) ; Figs. 72-73. Male 10th abdominal segment and anal appendages in dorsal and left lateral view ; Fig. 74. End segments of abdomen including anal appendages showing female genitalia.
- (Scale=1.0 mm for Figs. 64-67 and 74 ; 0.5 mm for Figs. 68-73).



Scale = 1mm & 0.5mm (68 To 73)

Figs. 75-82. Male 10th abdominal segment and anal appendages of damselflies

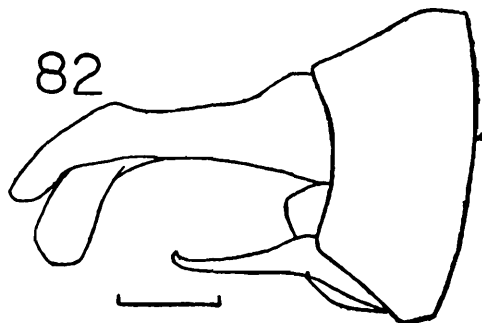
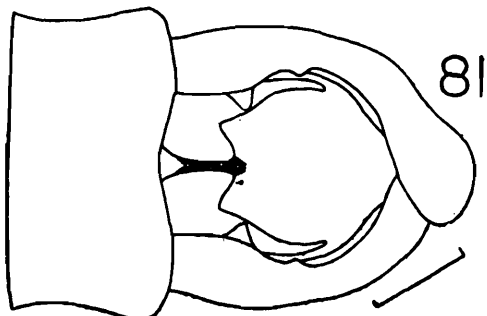
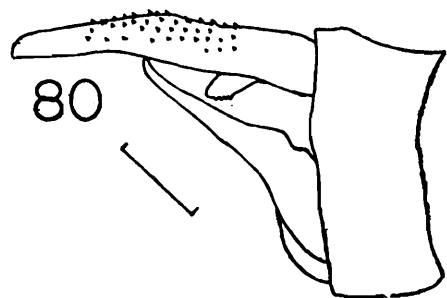
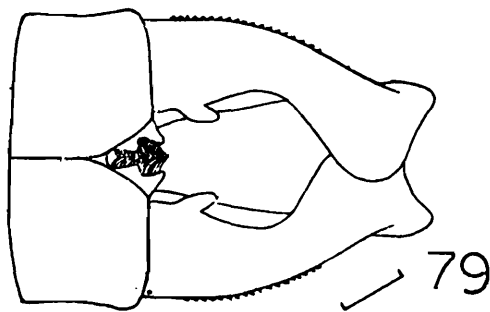
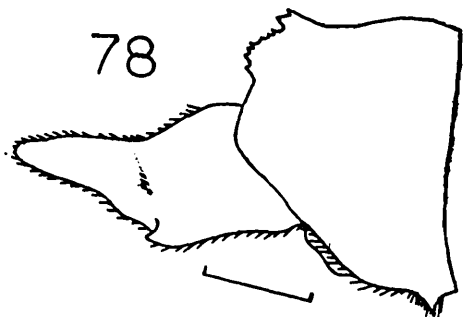
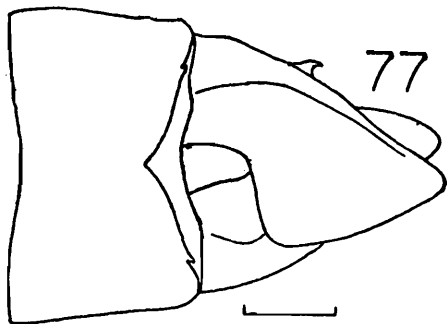
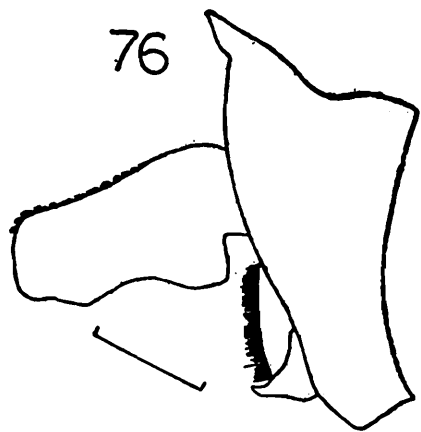
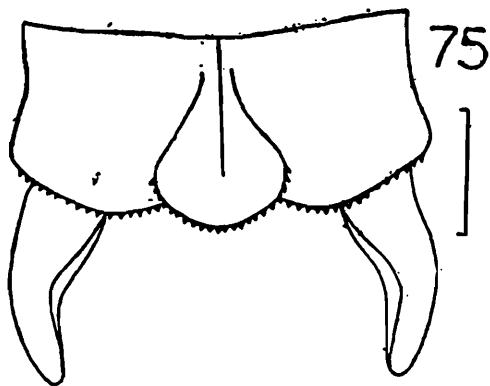
Figs. 75-76. *Euphaea ochracea brunnea* Selys, in dorsal and right lateral view.

Figs. 77-78. *Anisopleura subplatystyla* Fraser, in dorsal and right lateral view.

Figs. 79-80. *Bayadera indica* (Selys), in dorsal and right lateral view.

Figs. 81-82. *Bayadera hyalina* Selys, in dorsal and right lateral view.

(Scale=0.5mm)



Scale = 0.5 mm

Figs. 83-90. Male 10th abdominal segment and anal appendages of damselflies.

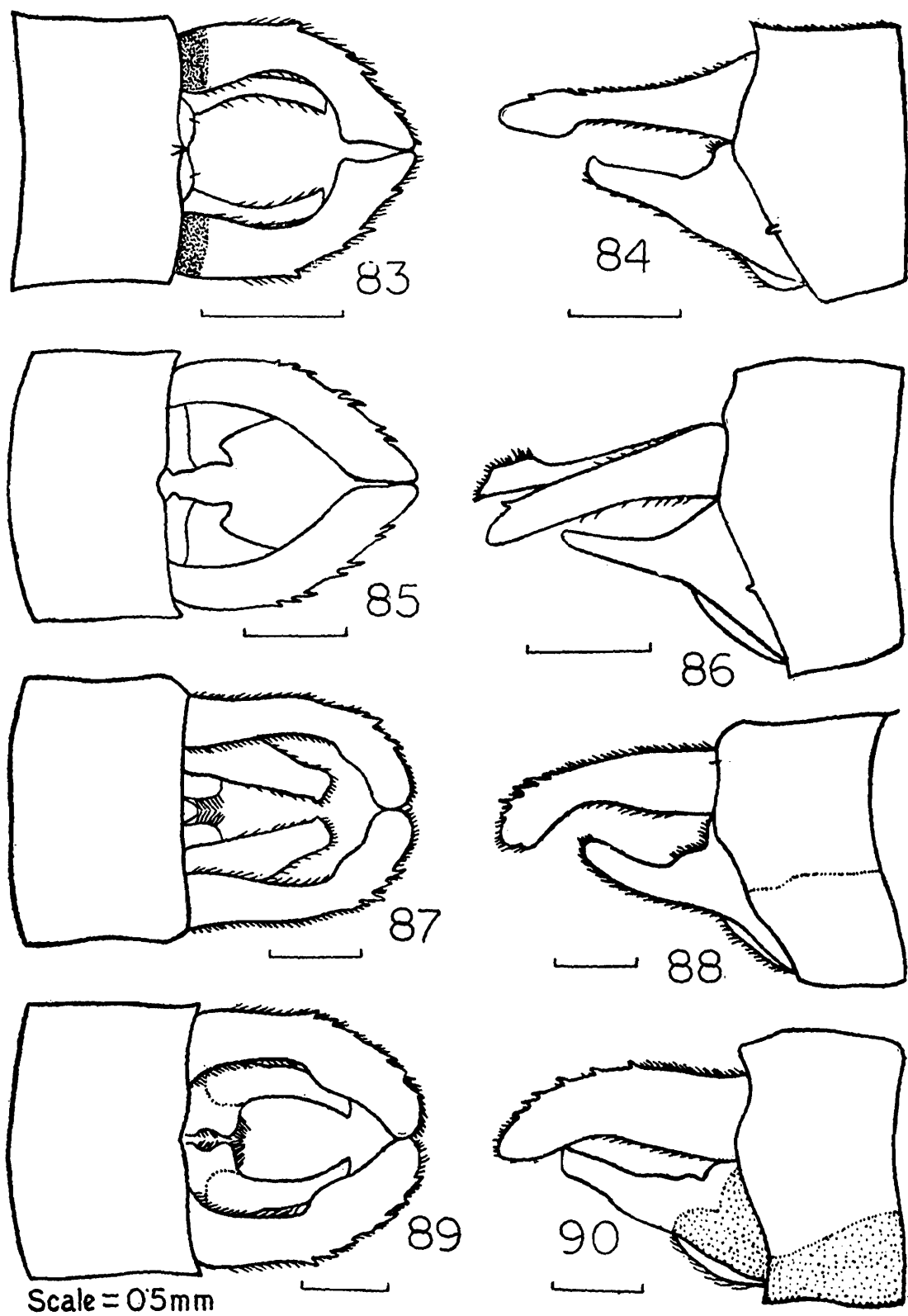
Figs. 83-84. *Vestalis g. gracilis* (Rambur), in dorsal and right lateral view.

Figs. 85-86. *Echo margarita tripartita* Selys, in dorsal and right lateral view.

Figs. 87-88. *Matrona basilaris nigripectus* Selys, in dorsal and right lateral view.

Figs. 89-90. *Neurobasis c. chinensis* (Linnaeus), in dorsal and right lateral view.

(Scale = 0.5mm)



Figs. 91-102. Penis of damselflies in lateral view and their apex more magnified in dorsal views. repsectively.

Figs. 91-92. *Libellago l. lineata* (Bermeister).

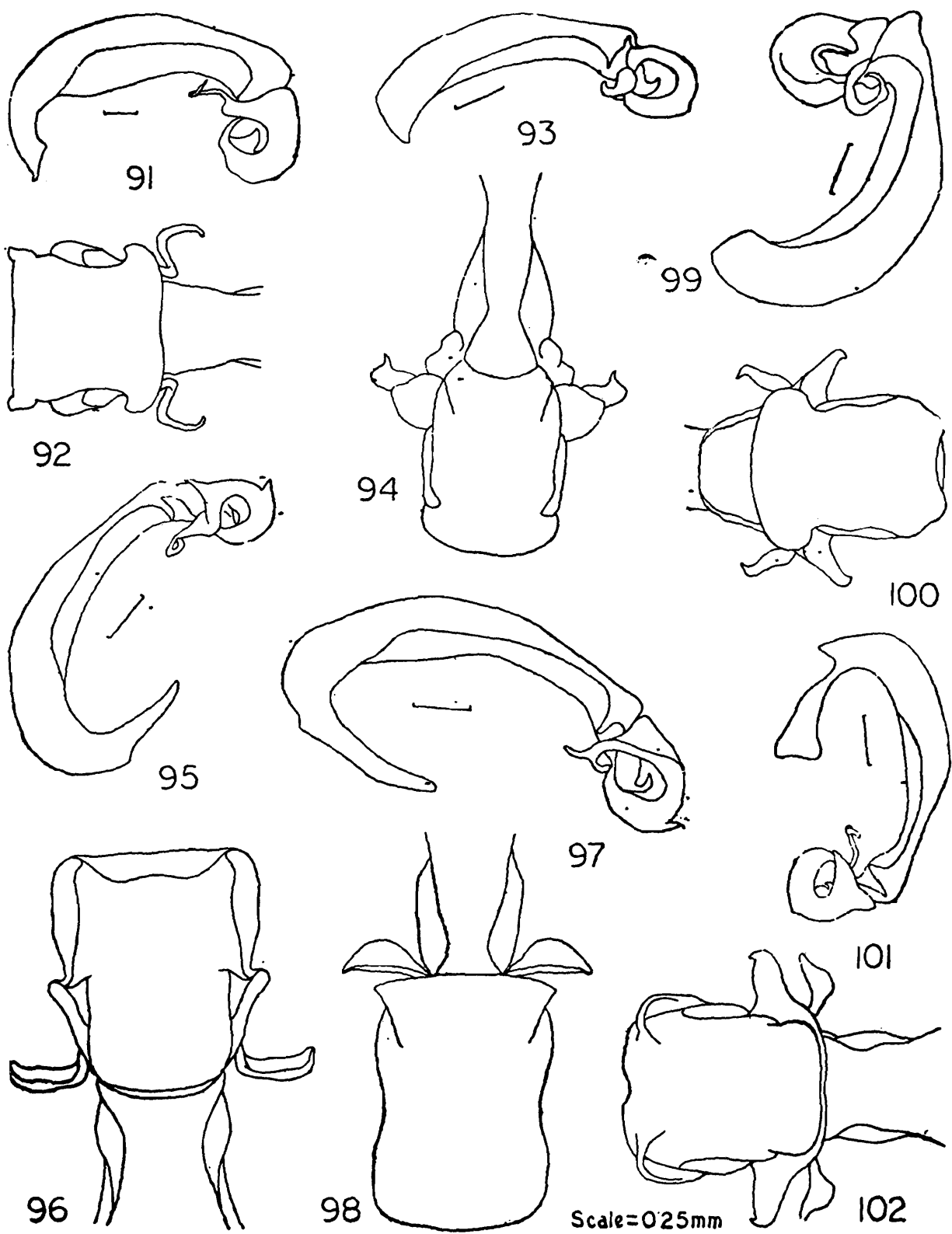
Figs. 93-94. *Rhinocypha biforata delimbata* Selys.

Figs. 95-96. *Rhinocypha ignipennis* Selys.

Figs. 97-98. *Rhinocypha immaculata* Selys.

Figs. 99-102. *Rhinocypha beatifica* Fraser. (Figs. 99-100 from Songsok ; Figs. 101-102 from Shella).

(Scale=0.25mm)



Figs. 103-114. Penis of damselflies in lateral views and their apex more magnified in dorsal views respectively.

Figs. 103-104. *Rhinocypha quadrimaculata* Selys

Figs. 105-106. *Rhinocypha spuria* Selys.

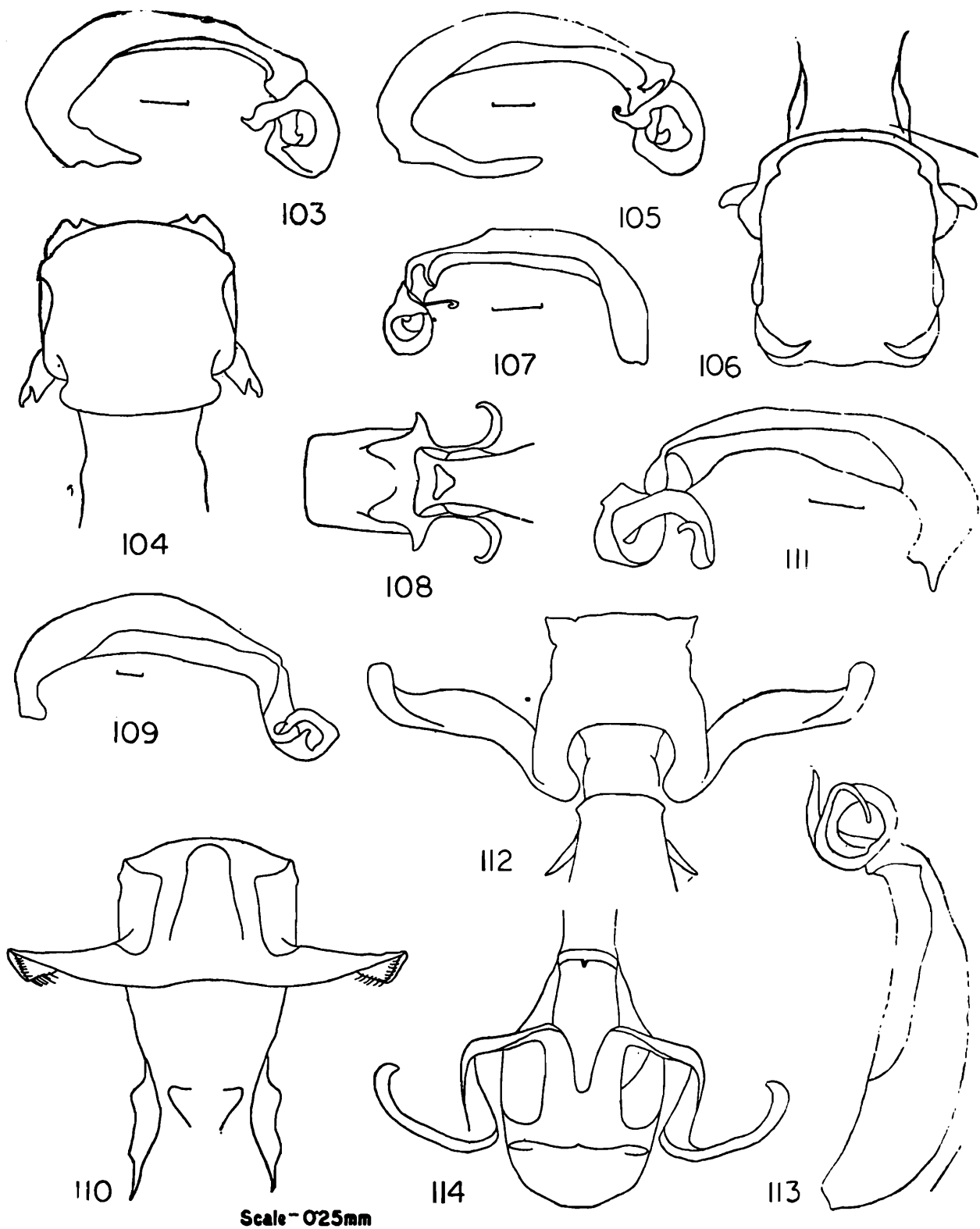
Figs. 107-108. *Rhinocypha vitrinella* Farser.

Figs. 109-110. *Philoganga montana* (Selys)

Figs. 111-112. *Euphaea ochracea brunnea* Selys

Figs. 113-114. *Anisopleura subplatystyla* Fraser

(Scale=0.25mm)



Figs. 115-126. Penis of damselflies in lateral views and their apex more magnified in dorsal views respectively.

Figs. 115-116. *Bayadera indica* (Selys).

Figs. 117-118. *Bayadera hyalina* Selys.

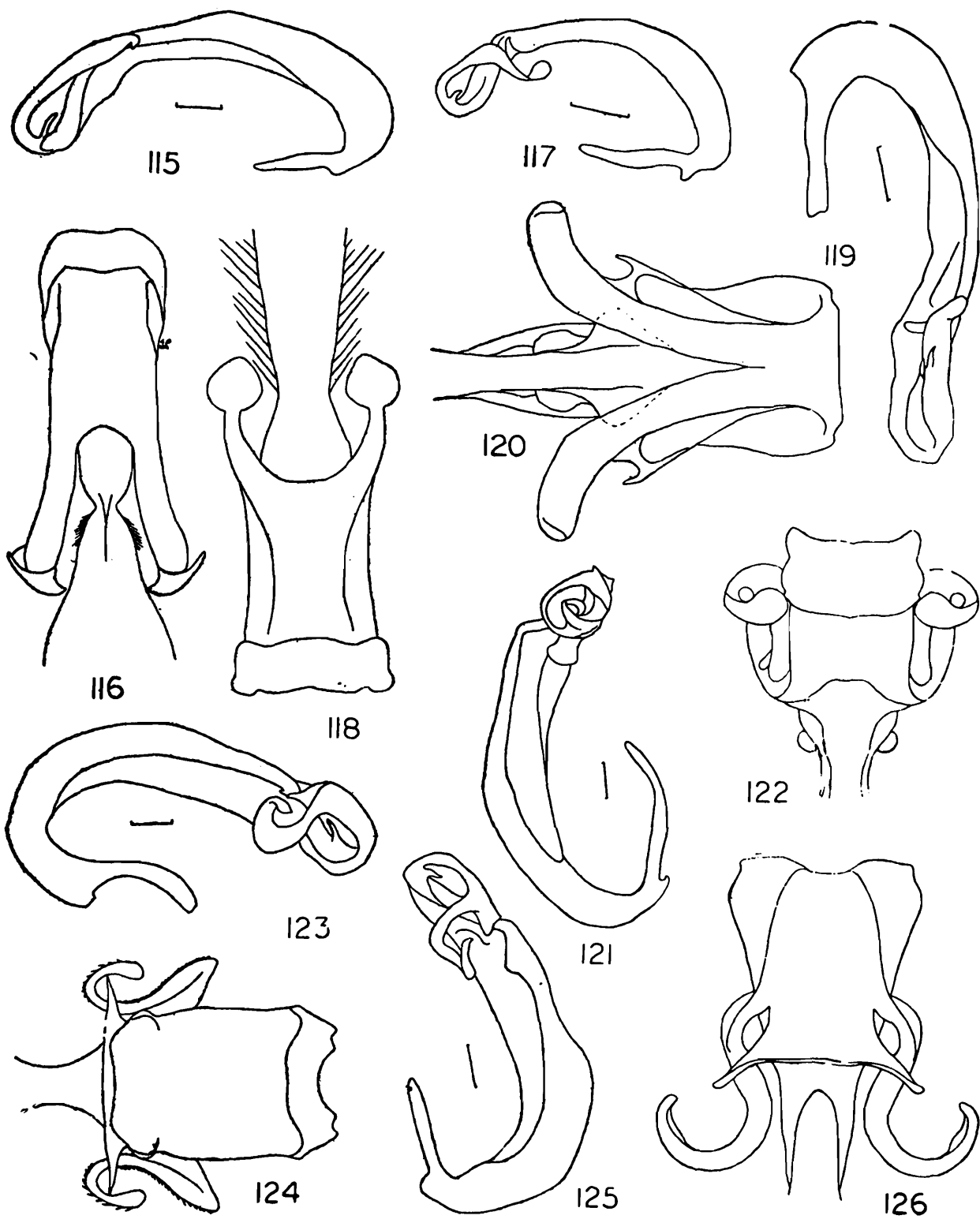
Figs. 119-120. *Vestalis g. gracilis* (Rambur)

Figs. 121-122. *Echo margarita tripartita* Selys

Figs. 123-124. *Matrona basilaris nigripectus* Selys

Figs. 125-126. *Neurobasis c. chinensis* Linneaus.

(Scale=0.35mm)



Scale = 0.25mm

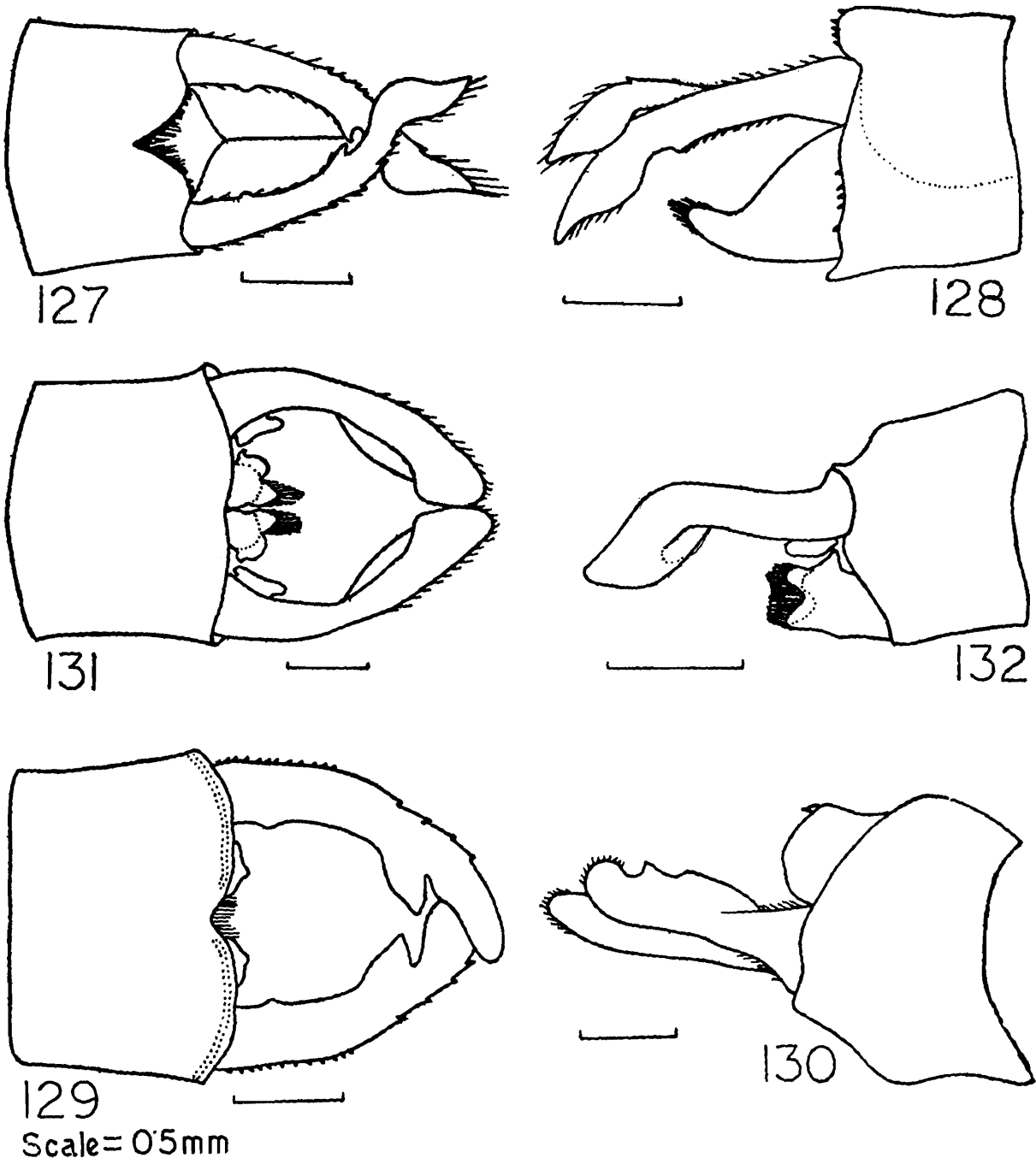
Figs. 127-132. Male 10th abdominal segment and anal appendages of damselflies.

Figs. 127-128. *Indolestes indica* Fraser, in dorsal and right lateral view.

Figs. 129-130. *Orolestes durga* sp. nov., in dorsal and left lateral view.

Figs. 131-132. *Megalestes raychaudhuri* sp. nov., in dorsal and right lateral view.

(Scale=0.5mm)



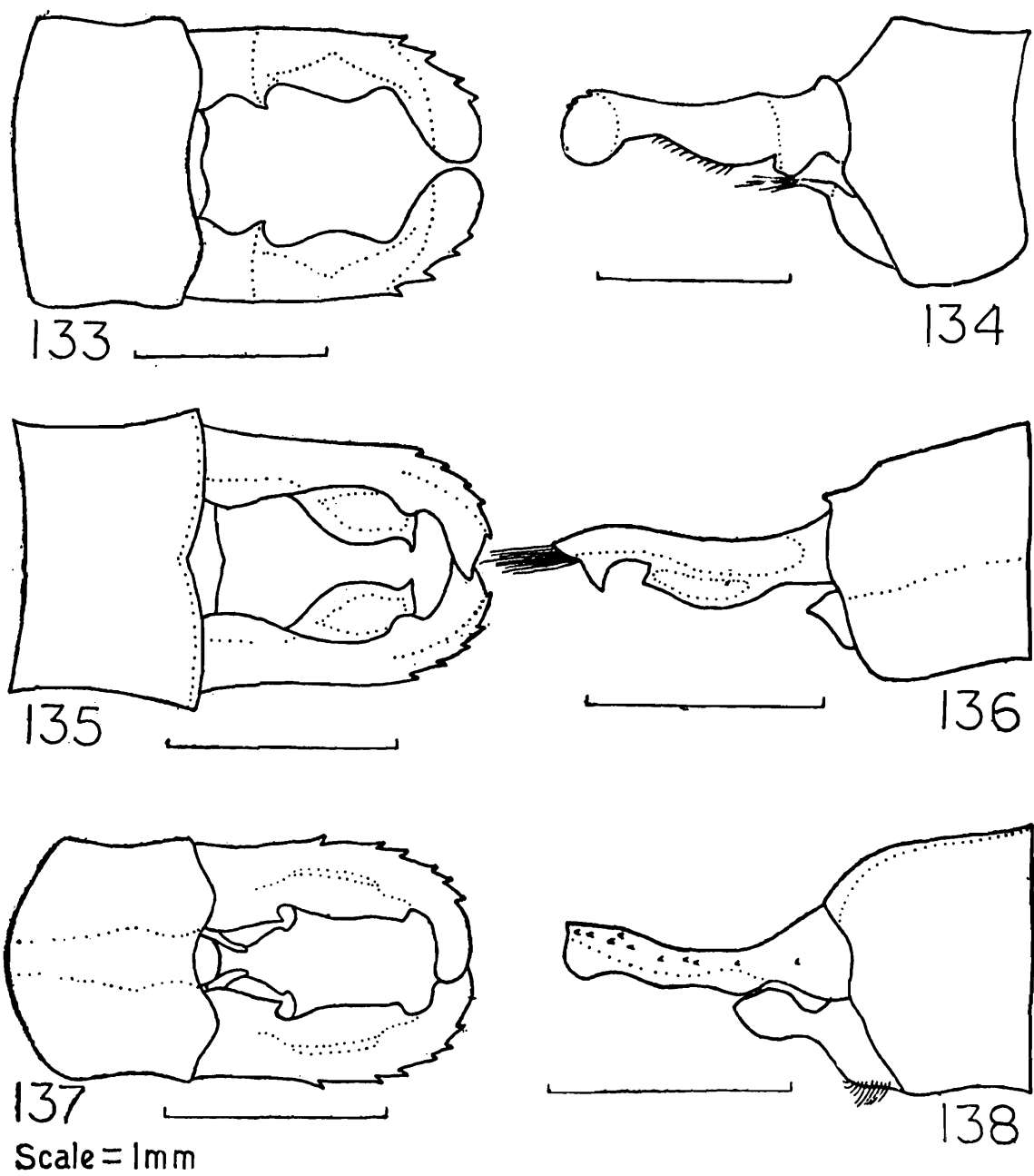
Figs. 133-138. Male 10th abdominal segment and anal appendages of damselflies.

Figs. 133-134. *Lestes dorothea* Fraser, in dorsal and right lateral view.

Figs. 135-136. *Lestes garoensis* sp. nov., in dorsal and right lateral view.

Figs. 137-138. *Lestes concinnus* Selys, in dorsal and right lateral view.

(Scale=1.0mm)



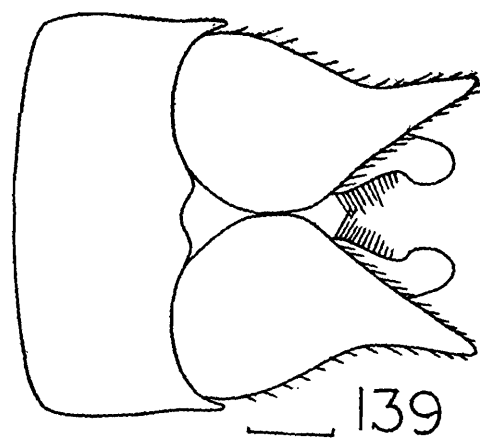
Figs. 139-144. Male 10th abdominal segment and anal appendages of damselflies.

Figs. 139-140. *Prodasineura autumnalis* (Fraser), in dorsal and right lateral view.

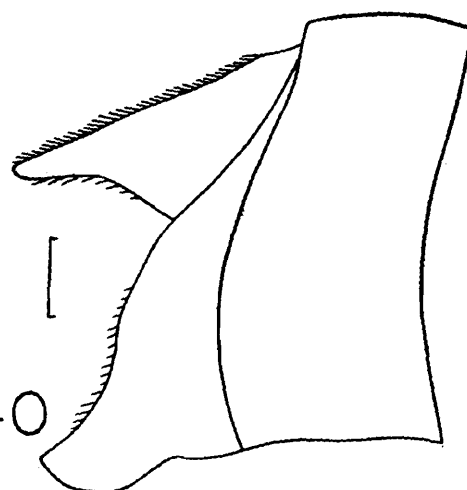
Figs. 141-142. *Elattoneura campioni* (Fraser), in dorsal and right lateral view.

Figs. 143-144. *Elattoneura atkinsoni* (Selys), in dorsal and left lateral view.

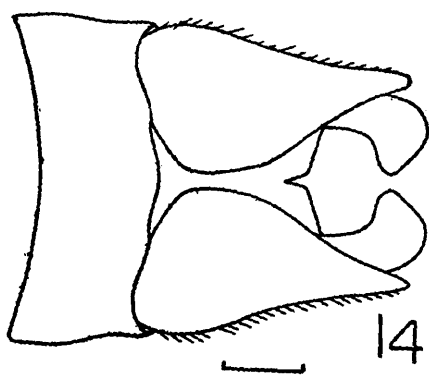
(Scale=0.2mm)



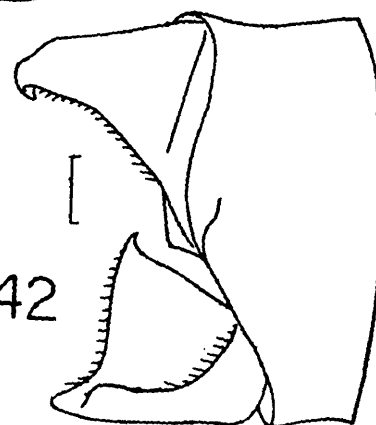
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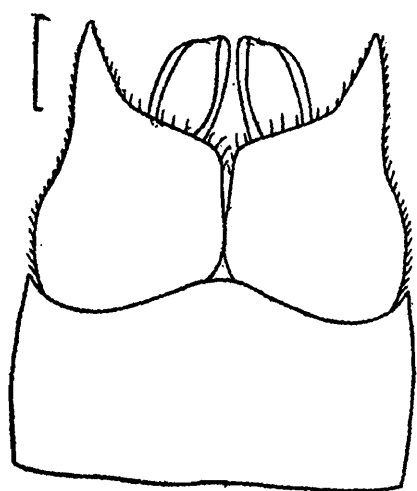
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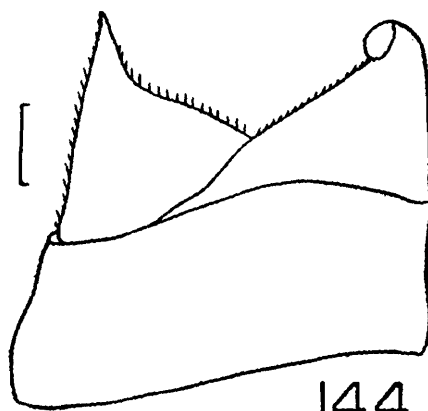
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142



143



144

Scale = 0.2mm

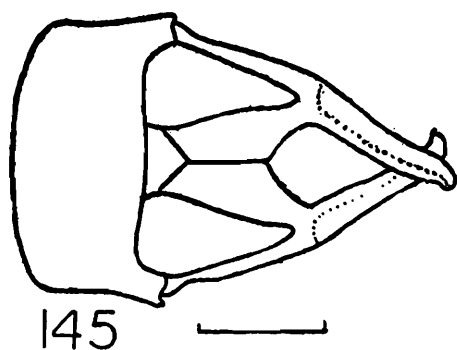
Figs. 145-150. Male 10th abdominal asgment and anal appendages of damselflies.

Figs. 145-146 *Copera annulata* (Selys), in dorsal and left lateral view.

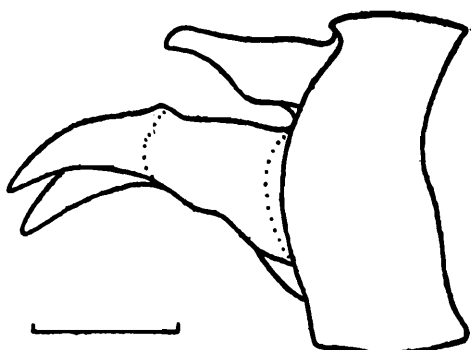
Figs. 147-148. *Copera marginipes* (Rambur), in dorsal and left lateral view.

Figs. 149-150. *Copera vittata* (S.L.) (Selys), in dorsal and left lateral view.

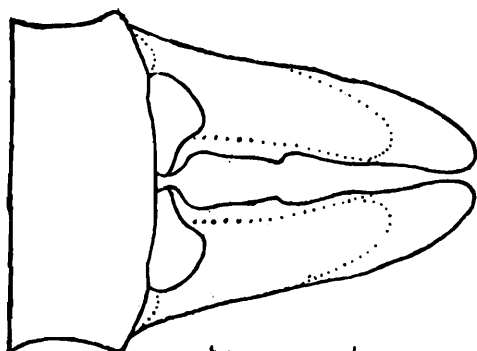
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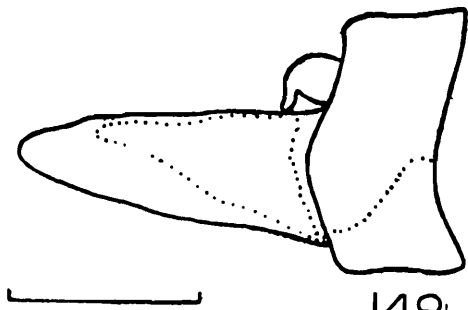
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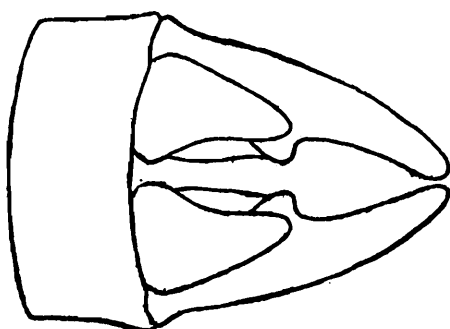
146



147

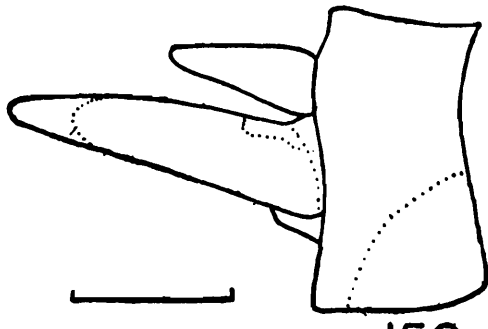


148



149

Scale = 0.5mm



150

Figs. 151-158. Male 10th badominal segment and anal appendages of damselflies.

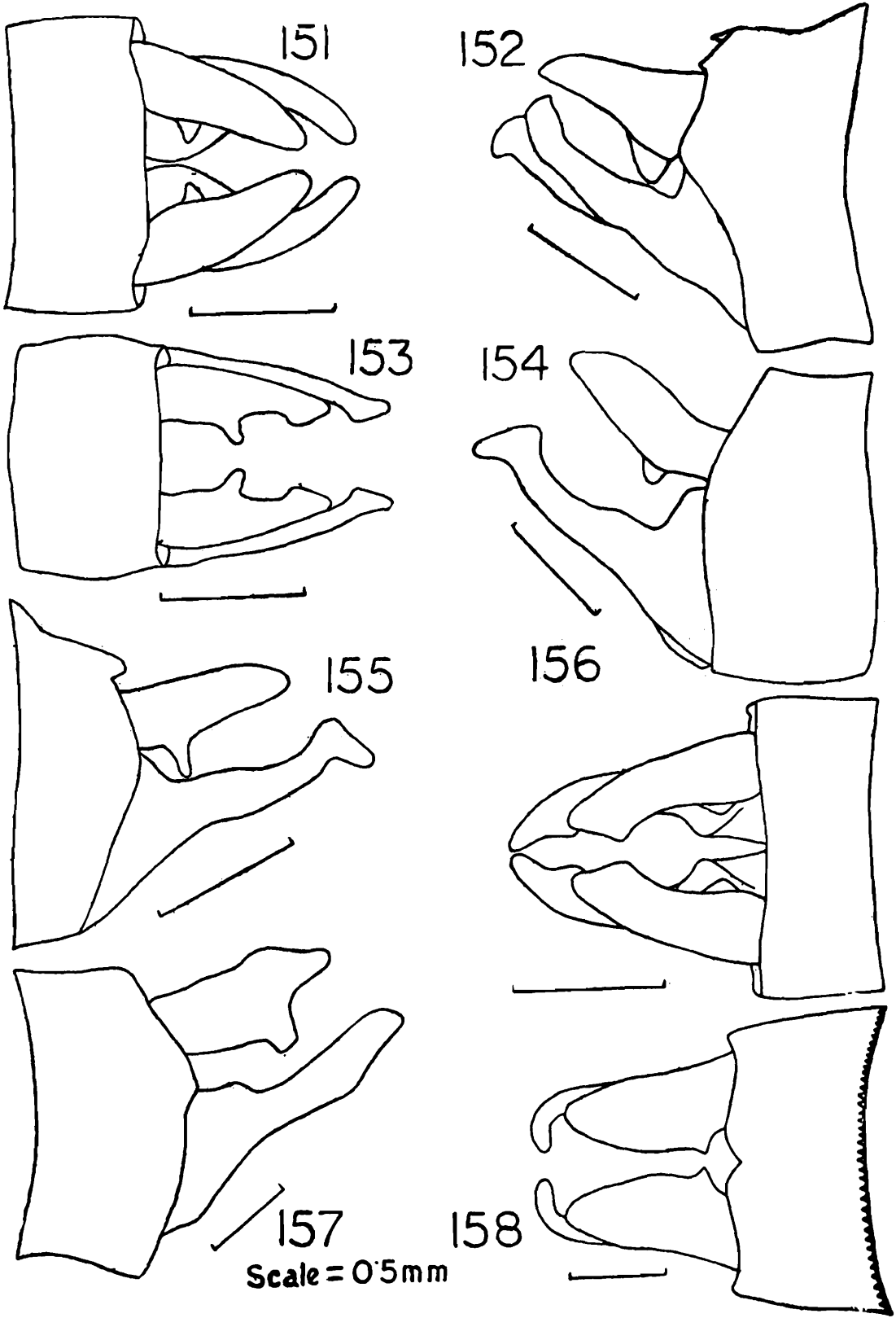
Figs. 151-152. *Calicnemia eximia* (Selys), in dorsal and left lateral view.

Figs. 153-154. *Calicnemia imitans* Lieftinck, in dorsal and left lateral view.

Figs. 155-156. *Calicnemia mukherjeei* Lahiri, in right lateral and dorsal view.

Figs. 157-158. *Indocnemis kempfi* Laidlaw, in right lateral and dorsal view.

(Scale=0.5mm)



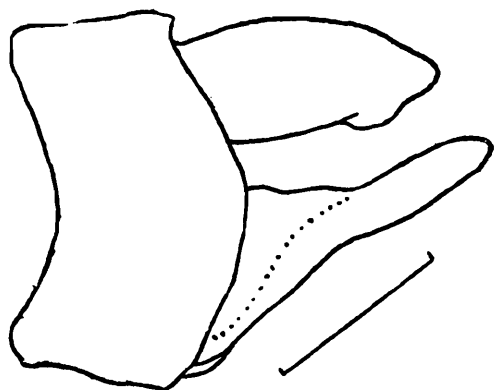
Figs. 159-164. Male 10th abdominal segment and anal appendages of damselflies.

Figs. 159-160. *Coelliccia fraseri* Laidlaw, in left lateral and dorsal view.

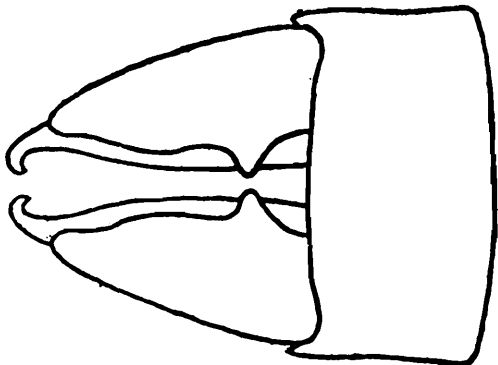
Figs. 161-162. *Coelliccia sarbottama* sp. nov., in right lateral and dorsal view.

Figs. 163-164. *Coelliccia didyma* (Selys), in left lateral and dorsal view.

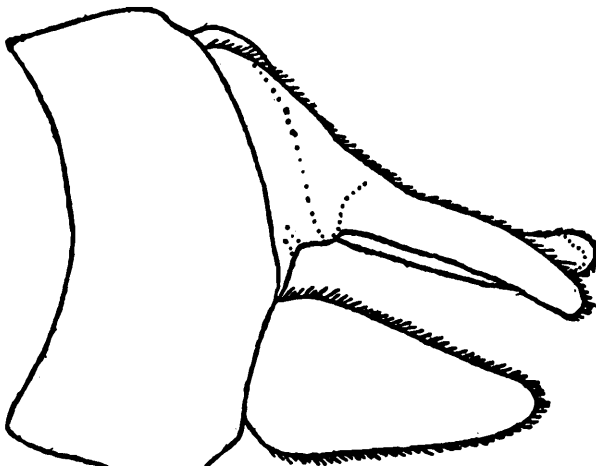
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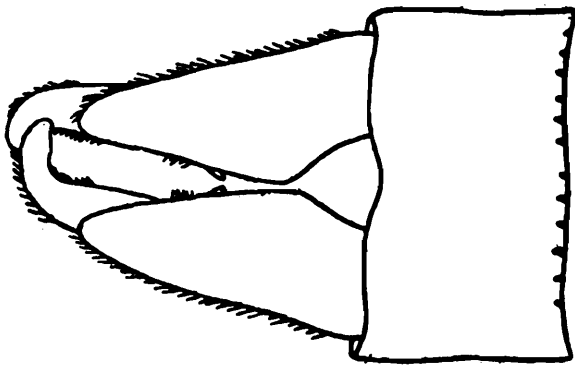
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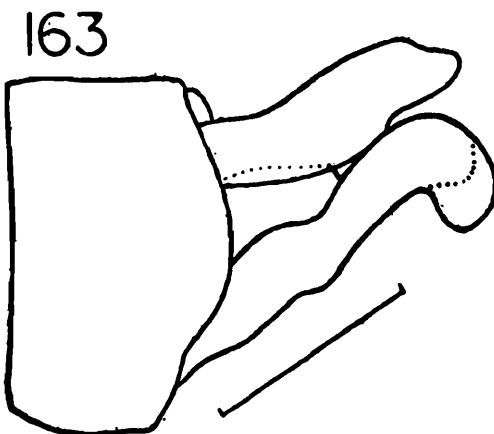
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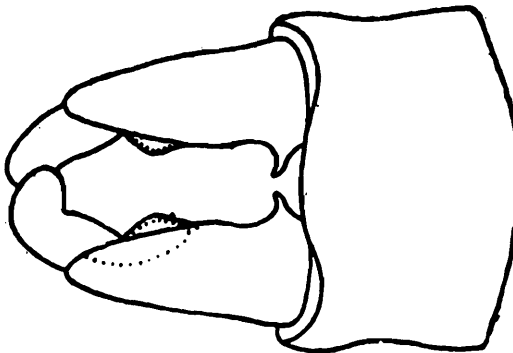
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162



163



164

Scale = 0.5mm

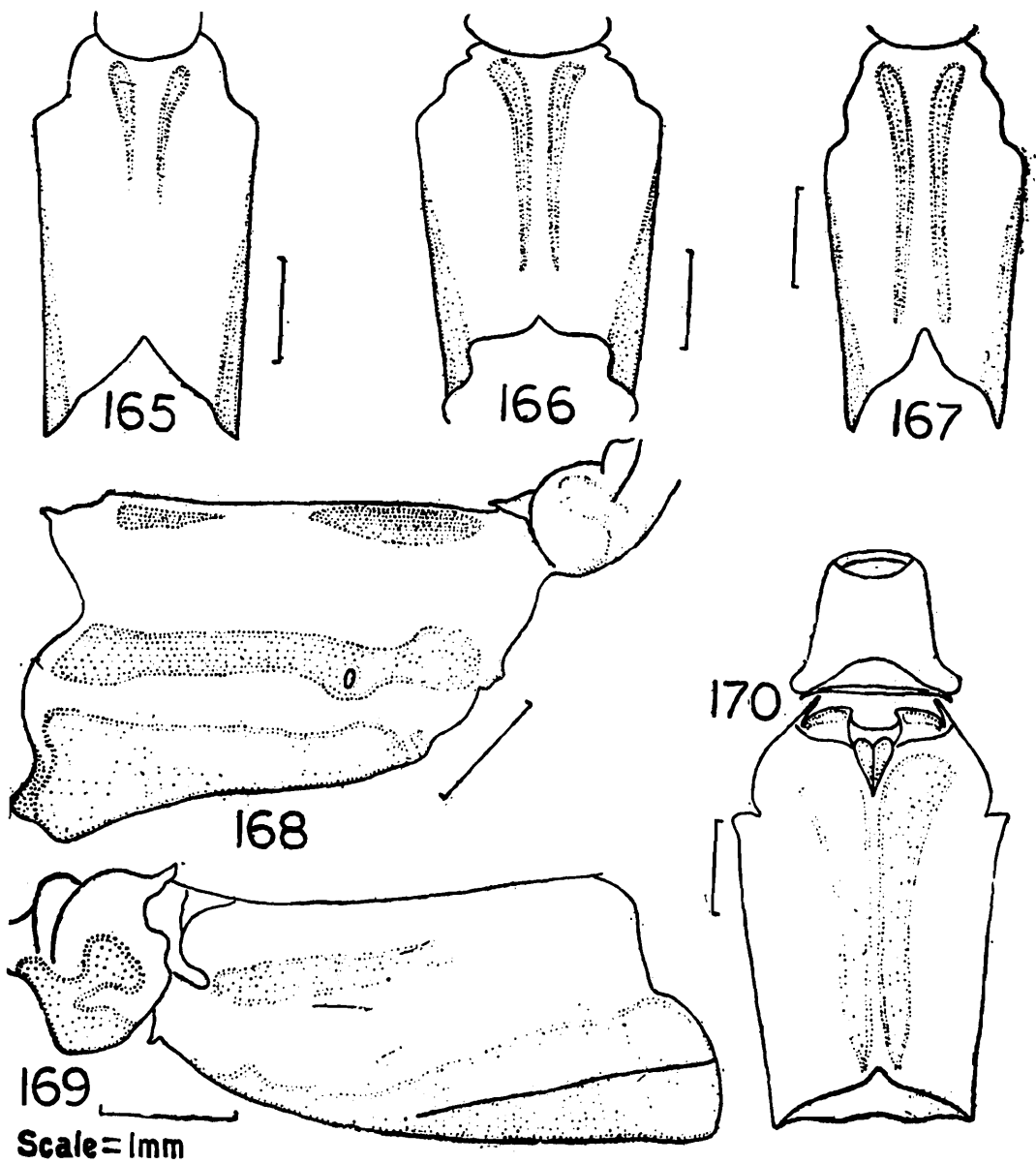
Figs. 165-170. Thoracic markings of damselflies, showing varying extent of development of antehumeral stripes.

Figs. 165-167. *Coeliccia fraseri* Laidlaw, males, in dorsal views.

Figs. 168-169. *Coeliccia didyma* (Selys), in lateral views ; Fig 168, male, from right side ; Figs. 169, female, from left side.

Figs. 170. *Coeliccia sarbottama* sp. nov., male, in dorsal view.

(Scale=1.0mm)



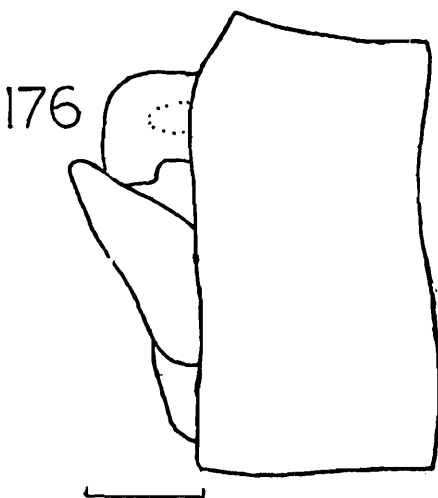
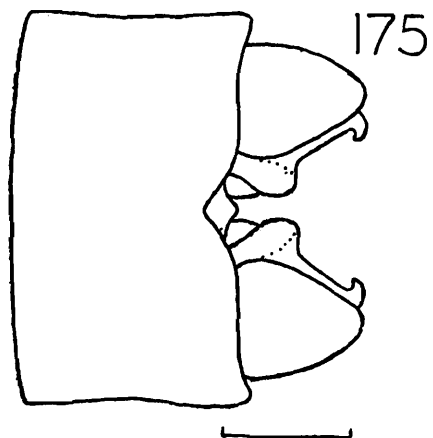
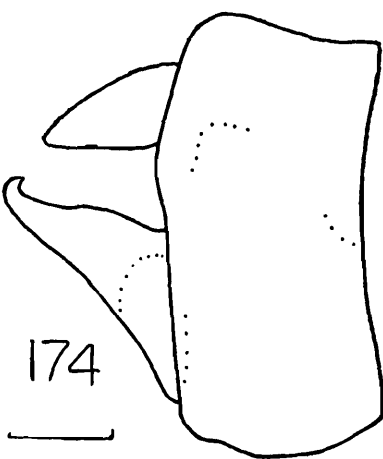
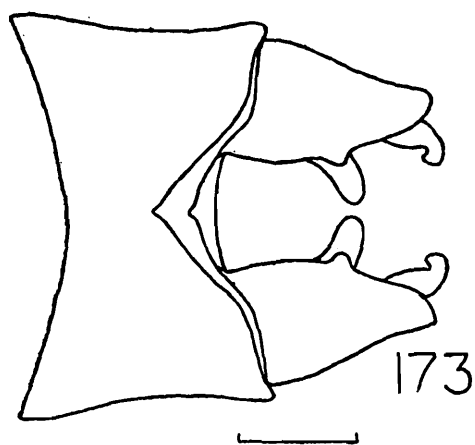
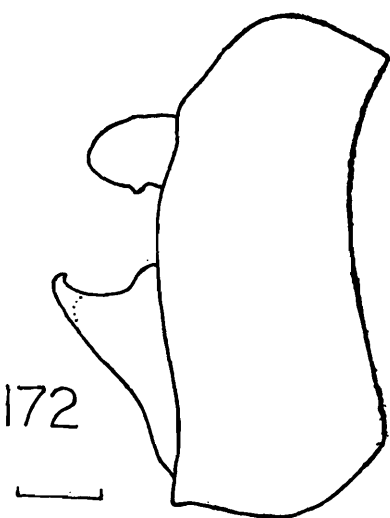
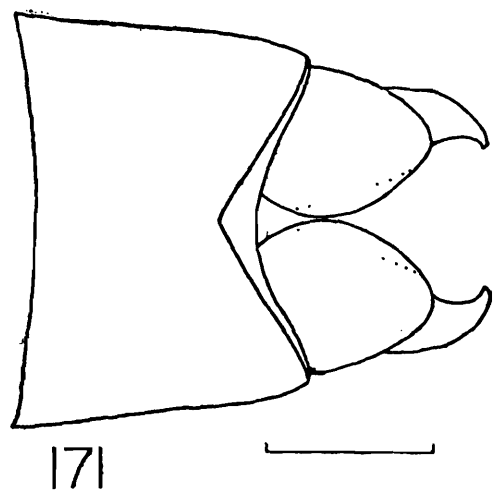
Figs. 171-176. Male 10th abdominal segment and anal appendages of damselflies.

Figs. 171-172. *Ceriagrion coromandelianum* (Fabricius), in dorsal and right lateral view.

Figs. 173-174. *Ceriagrion falax* Ris, in dorsal and right lateral view.

Figs. 175-176. *Ceriagrion olivaceum* Laidlaw, in dorsal and right lateral view.

(Scale=0.3mm)



Scale = 0.3mm

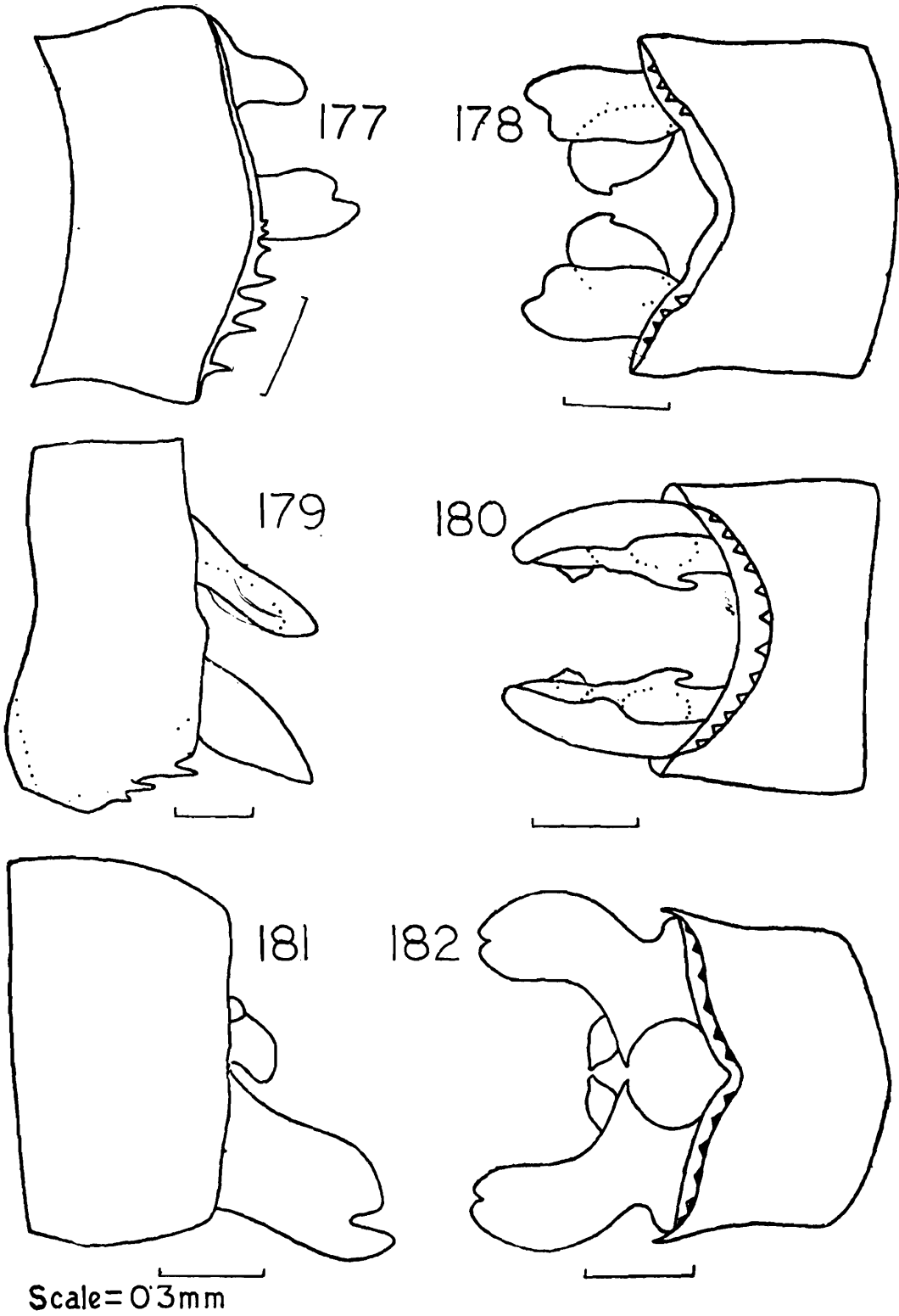
Figs. 177-182. Male 10th abdominal segment and anal appendages of damselflies.

Figs. 177-178. *Pseudagrion australasiae* Selys, in right lateral and dorsal view.

Figs. 179-180. *Pseudagrion r. rubriceps* Selys, in right lateral and dorsal view.

Figs. 181-182. *Pseudagrion spencei* Fraser, in right lateral and dorsal view.

(Scale=0.3mm)



Figs. 183-192. Male 10th abdominal segment and anal appendages of damselflies.

Figs. 183-184. *Enallagma parvum*, Selys, in dorsal and right lateral view.

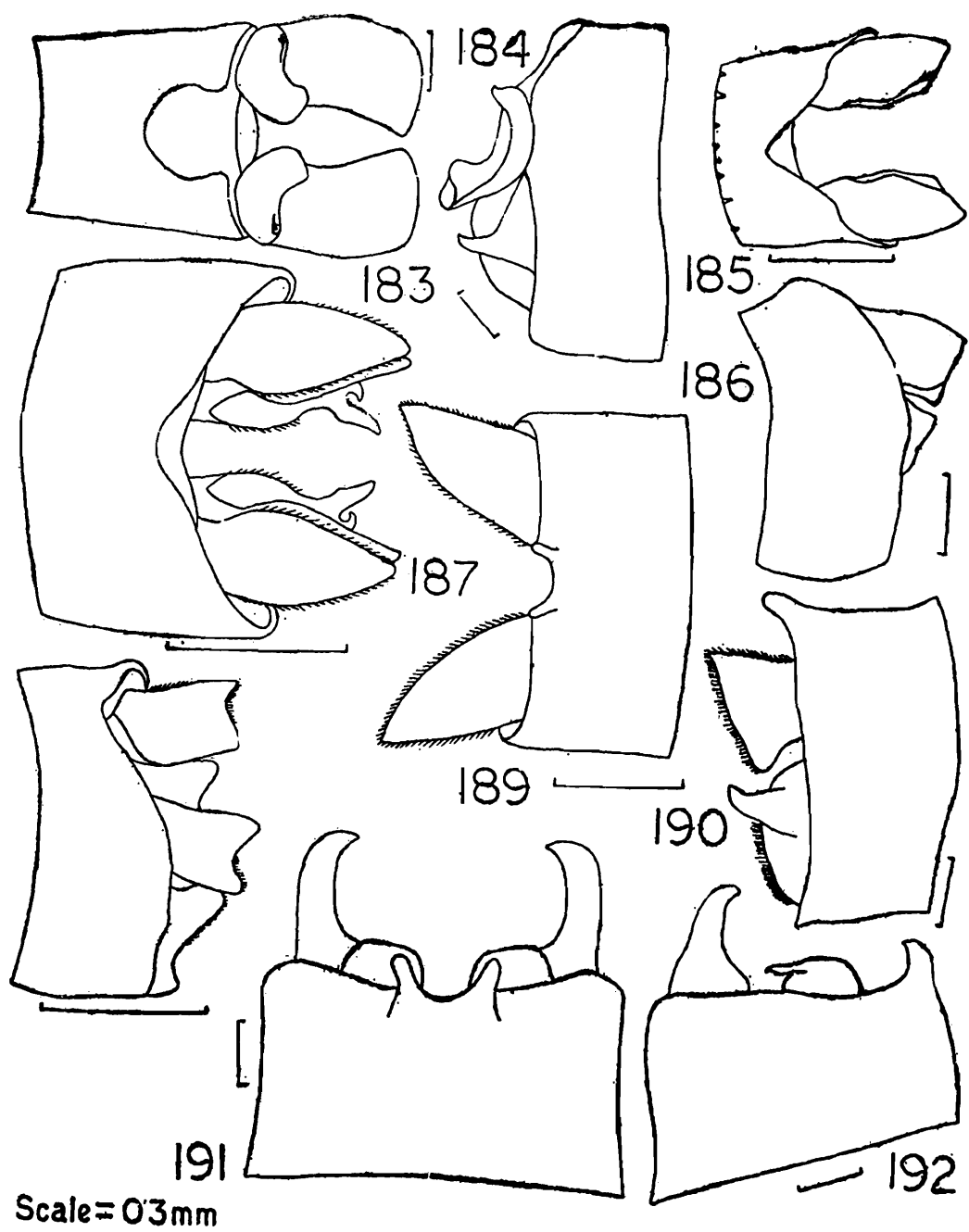
Figs. 185-186. *Acigrion pallidum* Selys, in dorsal and left lateral view.

Figs. 187-188. *Aciagrion tillyardi* Laidlaw, in dorsal and dorsolateral view from right side.

Figs. 189-190. *Ischnura a aurora* (Hagen), in dorsal and right lateral view.

Figs. 191-192. *Ischnura r. rufostigma* Selys, in dorsal and right lateral view.

(Scale=0.3mm)



Figs. 193-201. Male 10th abdominal segment and anal appendages of damselflies.

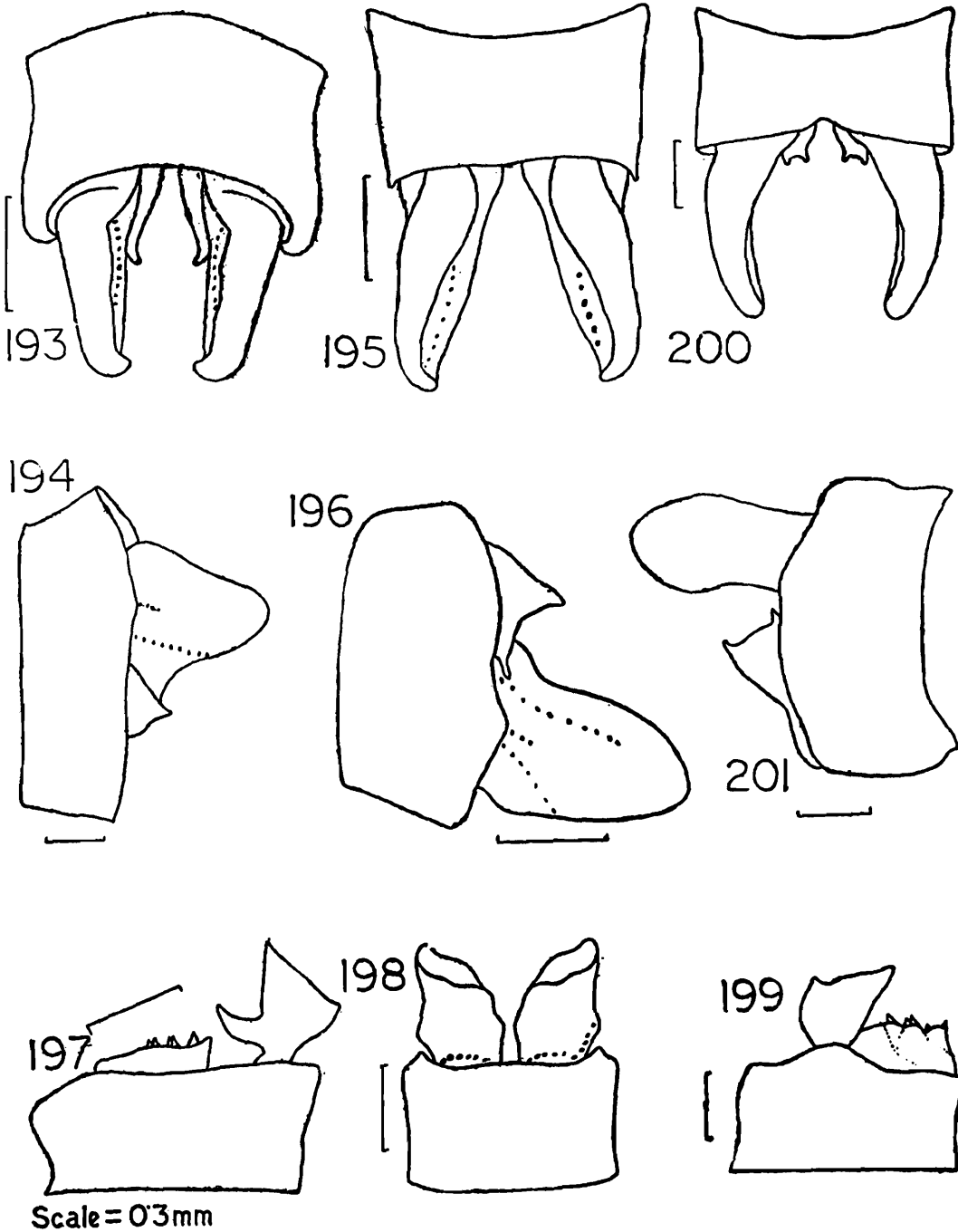
Figs. 193-194. *Agriocnemis lacteola* Selys, in dorsal and left lateral view.

Figs. 195-196. *Agriocnemis clauseni* Fraser, in dorsal and right lateral view.

Figs. 197-199. *Agriocnemis pygmaea* (Rambur), in left lateral, dorsal and ventrolateral view from left side.

Figs. 200-201. *Argiocnemis obscura* Laidlaw, in dorsal and right lateral view.

(Scale=0.3mm)



Figs. 202-212. Posterior lobe of prothorax and anterior part of synthorax of damselflies in dorsal views.

Figs. 202. *Pradasineura autumnalis* (Fraser), Female.

Figs. 203. *Elattoneura compioni* (Fraser), female.

Figs. 204. *Elattoneura atkinsoni* (Selys), female.

Fig. 205. *Copera marginipes* (Rabmur), male.

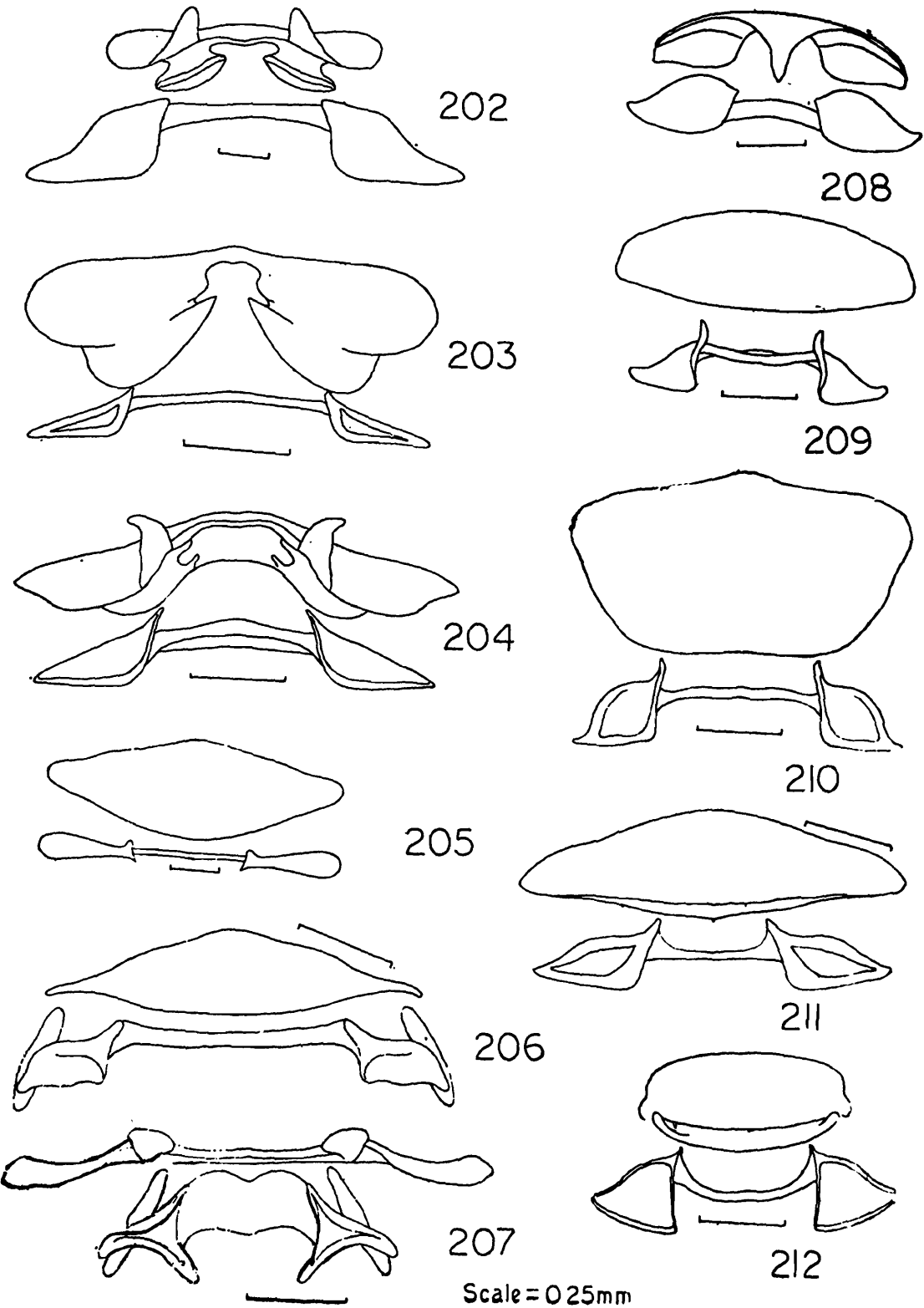
Figs. 206-207. *Copera vittata* (S.L.) (Selys), male and female respectively.

Figs. 208-209. *Coelliccia didyma* (Selys), female and male respectively.

Figs. 210 and 212. *Coelliccia fraseri* Laidlaw, male and female respectively.

Figs. 211. *Coelliccia sarbottama* sp. nov., male.

(Scale=0.25mm)



Figs. 213-221. Posterior lobe of prothorax and anterior part of synthorax of damselflies in dorsal views.

Figs. 213-214. *Ceriagrion fallax* Ris, male and female respectively.

Fig. 215. *Pseudagrion spencei* Fraser, male.

Fig. 216. *Pseudagrion r. rubriceps* Selys, female.

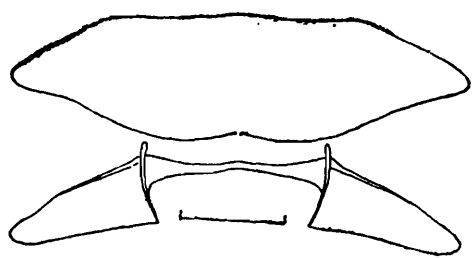
Fig. 217. *Pseudagrion australasiae* Selys, male.

Fig. 218. *Ischnura r. rufostigma* Selys, male.

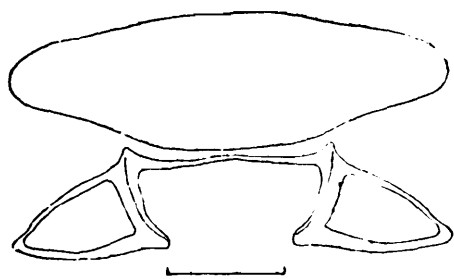
Fig. 219. *Ischnura a. aurora* (Hagen), female.

Figs. 220-221. *Argiocnemis obscura* Laidlaw, female and male respectively.

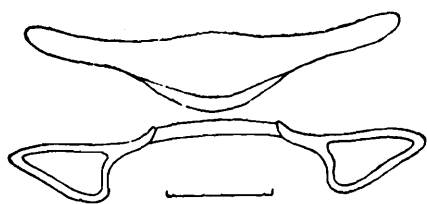
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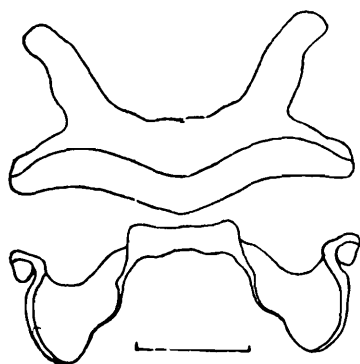
213



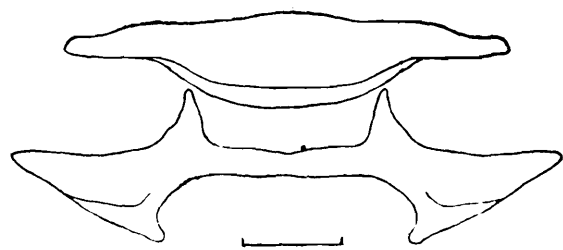
214



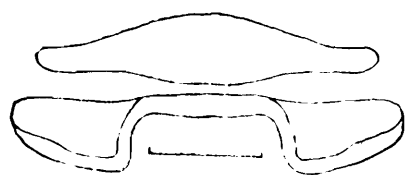
215



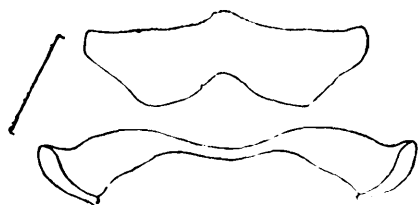
216



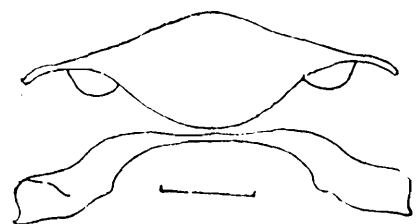
217



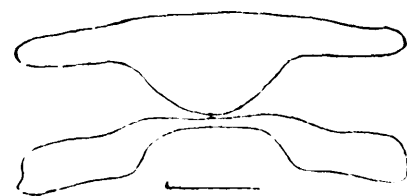
218



219



220



221

Scale = 0.25mm

Figs. 222-231. Posterior lobe of prothorax and anterior part of synthorax of damselflies in dorsal views.

Figs. 222-223. *Agriocnemis clauseni* Fraser, male and female respectively.

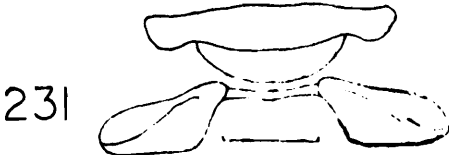
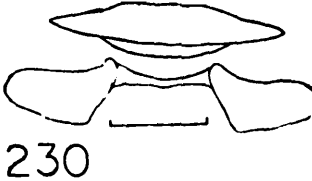
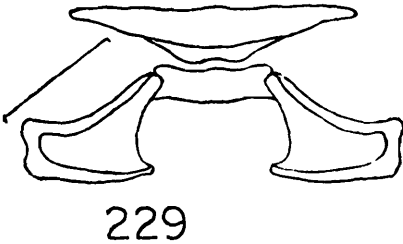
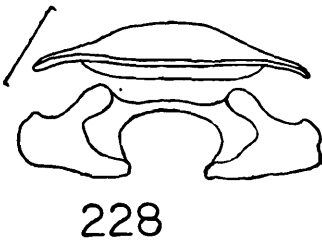
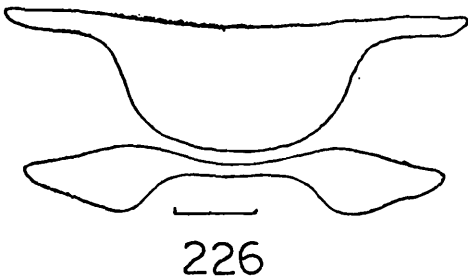
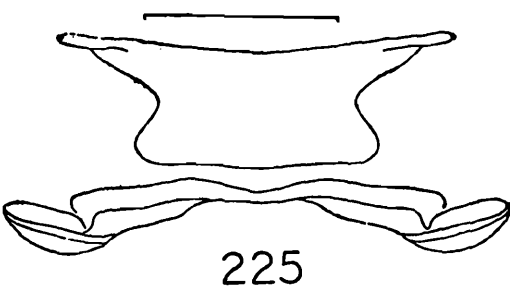
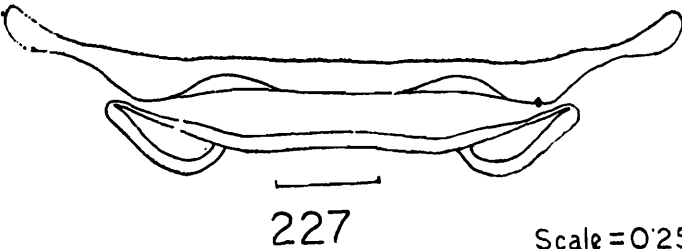
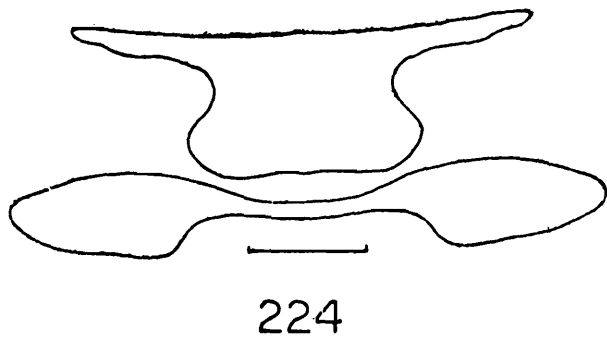
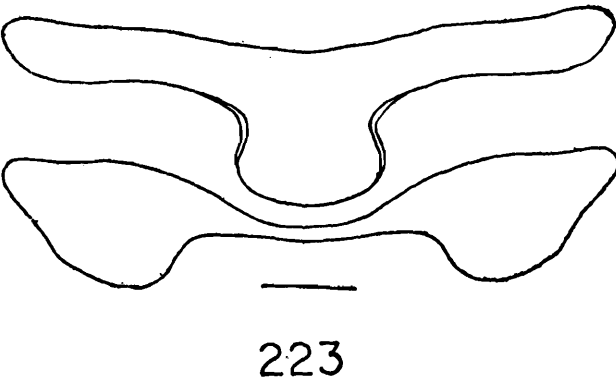
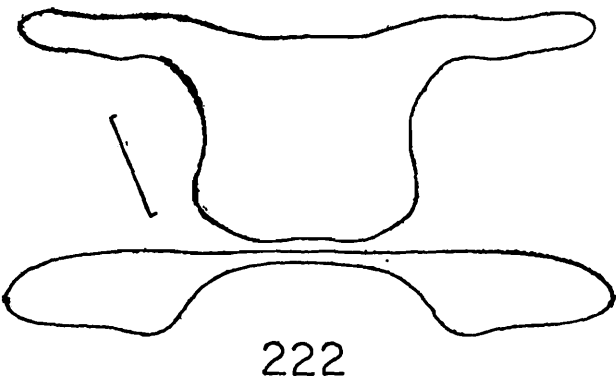
Figs. 224-225. *Agriocnemis lacteola* Selys, male and female respectively.

Figs. 226-227. *Agriocnemis pygmaea* (Rambur), male and female respectively.

Figs. 228-229. *Aciagrion pallidum* Selys, male and female respectively.

Figs. 230-231. *Aciagrion tillyardi* Laidlaw, male and female respectively.

(Scale=0.25mm)



Scale = 0.25mm

Figs. 232-241. Penis of damselflies in lateral views and their apex, more magnified, in dorsal views respectively.

Figs. 232-233. *Prodasineura autumnalis* (Fraser).

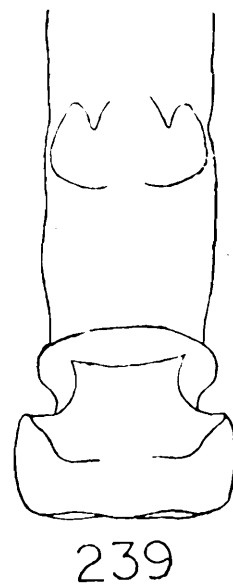
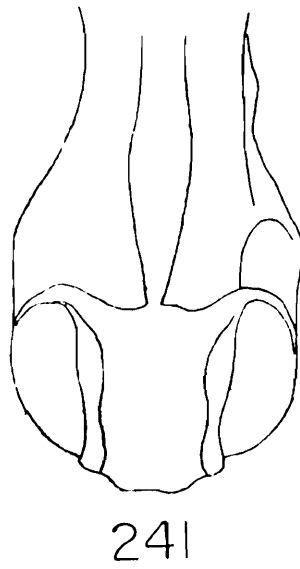
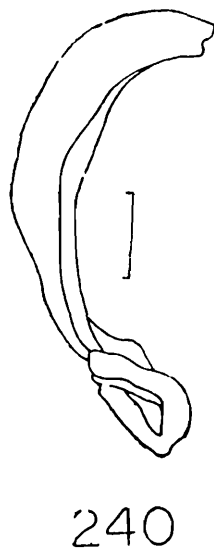
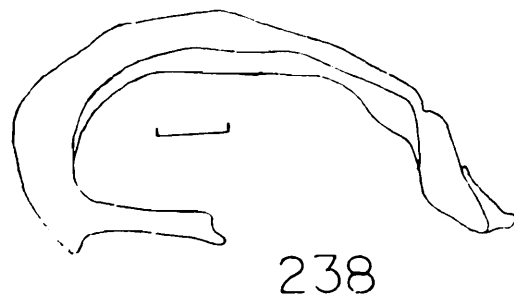
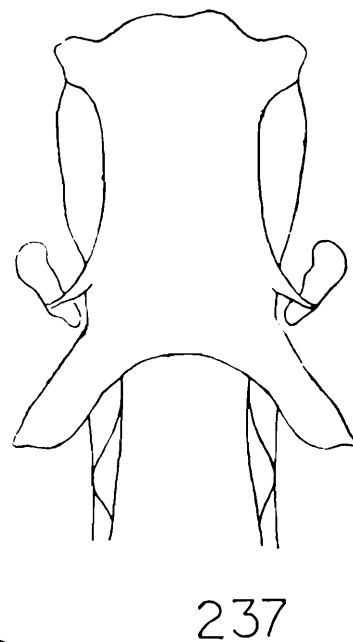
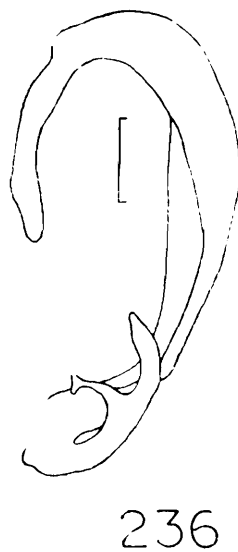
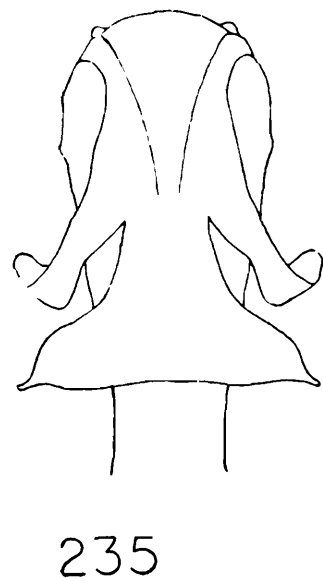
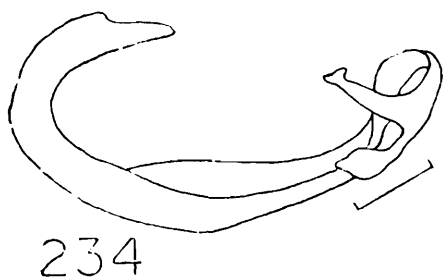
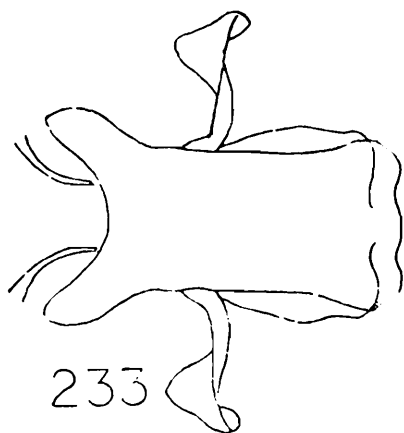
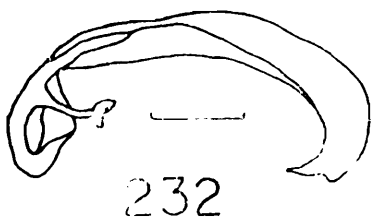
Figs. 234-235. *Elattoneura cmapioni* (Fraser).

Figs. 236-237. *Elattoneura atkinsoni* (Selys).

Figs. 238-239. *Copera annulata* (Selys)

Figs. 240-241. *Copera marginipes* (Rambur).

(Scale=0.25mm)



Scale = 0.25mm

Figs. 242-251. Penis of damselflies in lateral views and their apex more magnified in dorsal views respectively.

Figs. 242-243. *Copera vittata* (S.L.) (Selys).

Figs. 244-245. *Calicnemia eximia* (Selys).

Figs. 246-247. *Calicnemia imitans* Lieftinck

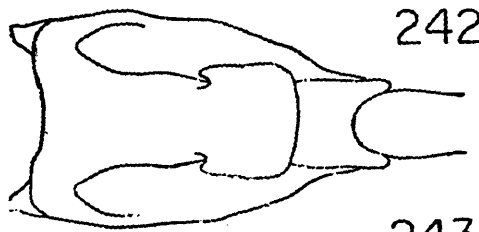
Figs. 248-249. *Calicnemia mukherjeei* Lahiri.

Figs. 250-251. *Indocnemis kempi* Laidlaw.

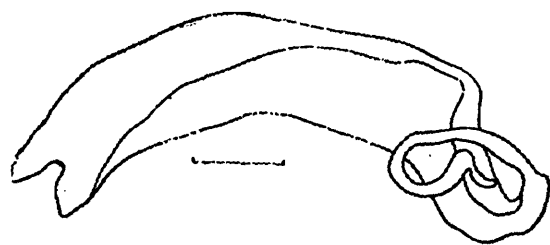
(Scale=0.25mm)



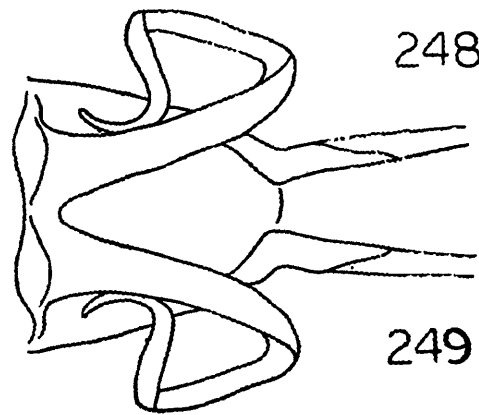
242



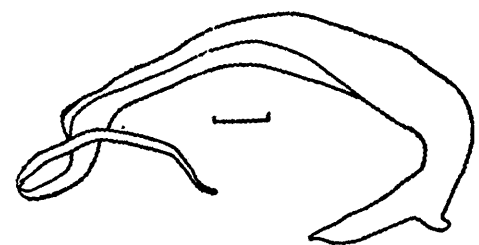
243



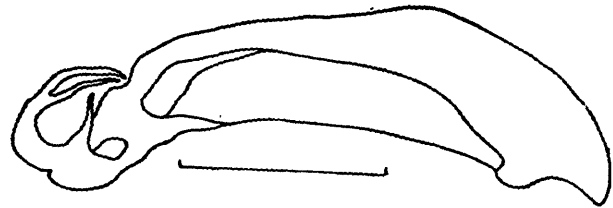
248



249



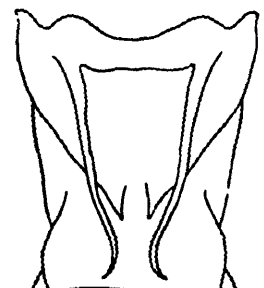
250



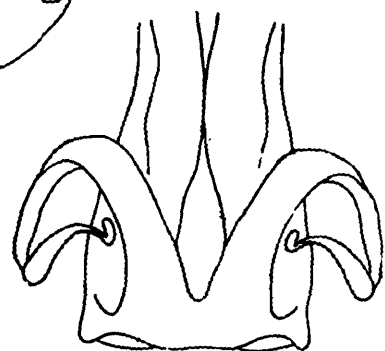
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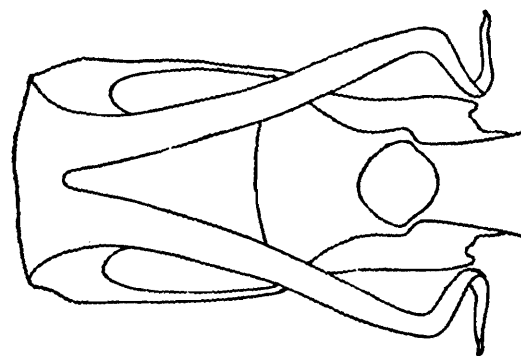
246



245



247



251

Scale=0.25mm

Figs. 252-263. Panis of damselflies in lateral views and their apex more magnified dorsal views respectively.

Figs. 252-253. *Coelicia fraseri* Laidlaw.

Figs. 254-255. *Coelicia sarbottama* sp. nov.

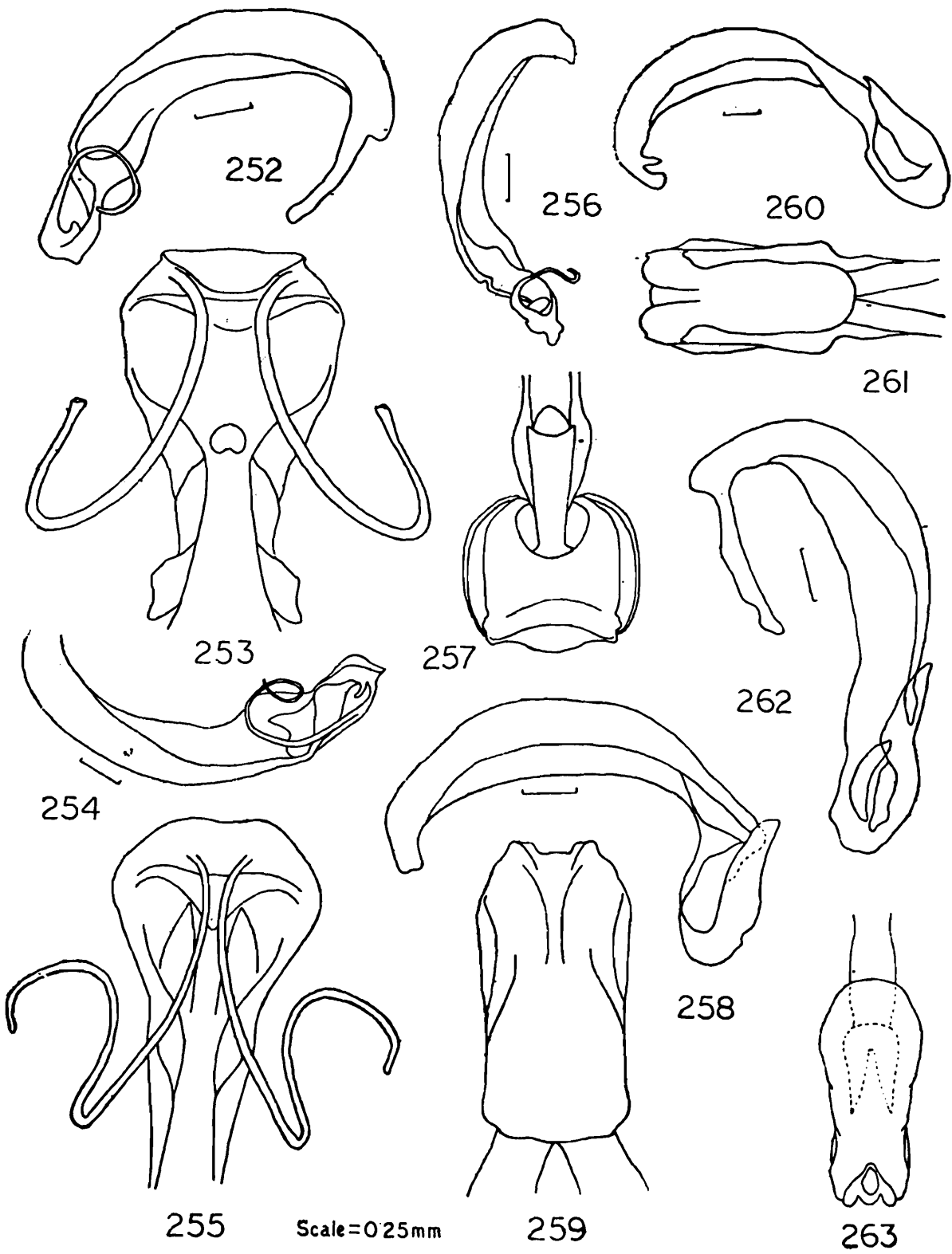
Figs. 256-257. *Coelicia didyma* (Selys)

Figs. 258-259. *Ceriagrion coromandelianum* (Fabricius).

Figs. 260-261. *Ceriagrion fallax* Ris.

Figs. 262-263. *Ceriagrion olivaceum* Laidlaw.

(Scale=0.25mm)



Figs. 264-275. Penis of damselflies in lateral views and their apex more magnified in dorsal views respectively.

Figs. 264-265. *Pseudagrion australasiae* Selys

Figs. 266-267. *Pseudagrion r. rubriceps* Selys.

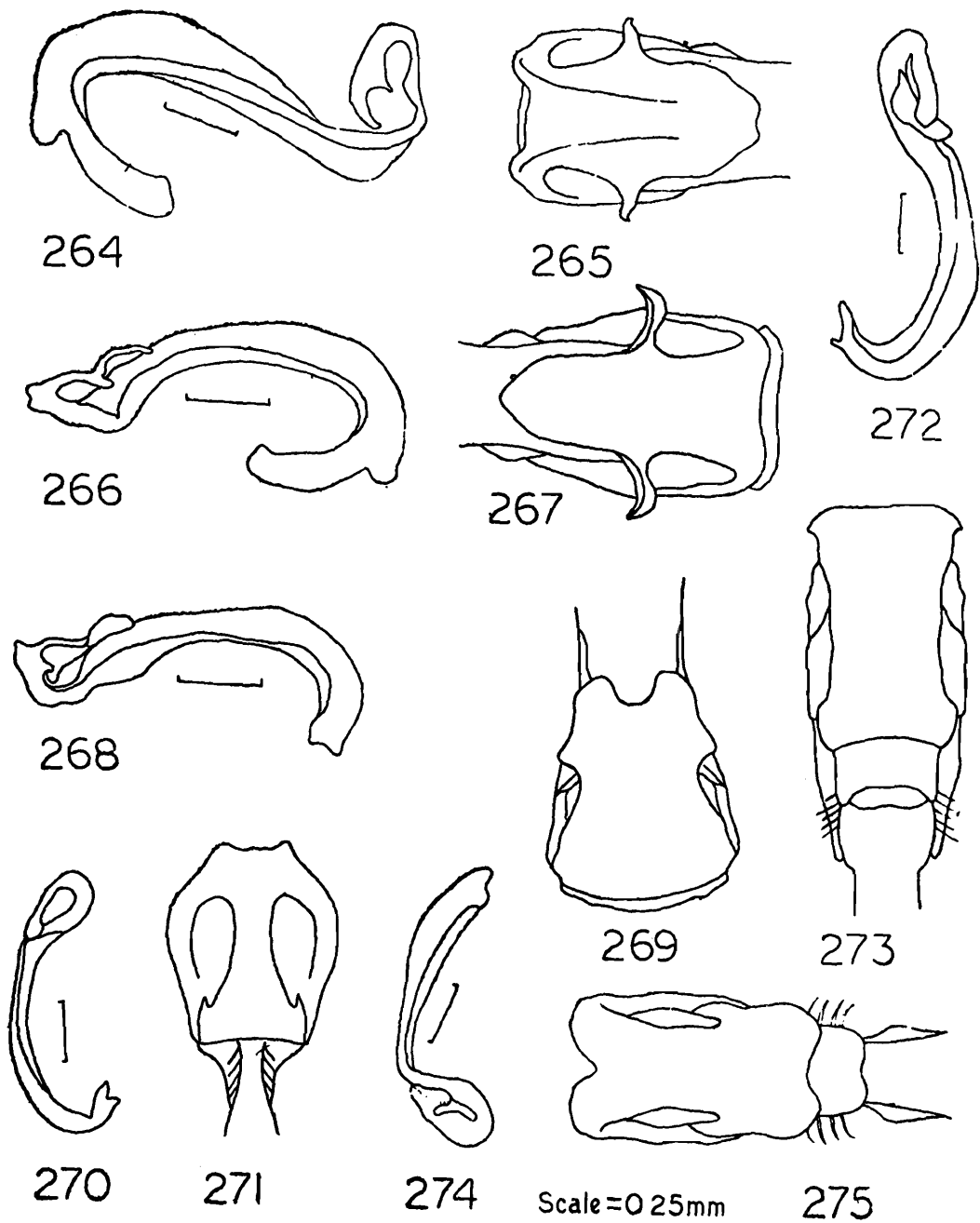
Figs. 268-269. *Pseudagrion spencei* Fraser.

Figs. 270-271. *Enallagma parvum* Selys.

Figs. 272-273. *Aciagrion pallidum* Selys.

Figs. 274-275. *Aciagrion tillyardi* Laidlaw.

(Scale=0.25mm)



Figs. 276-287. Penis of damselflies in lateral views and their apex more magnified in dorsal views respectively.

Figs. 276-277. *Ischnura r. rufostigma* Selys.

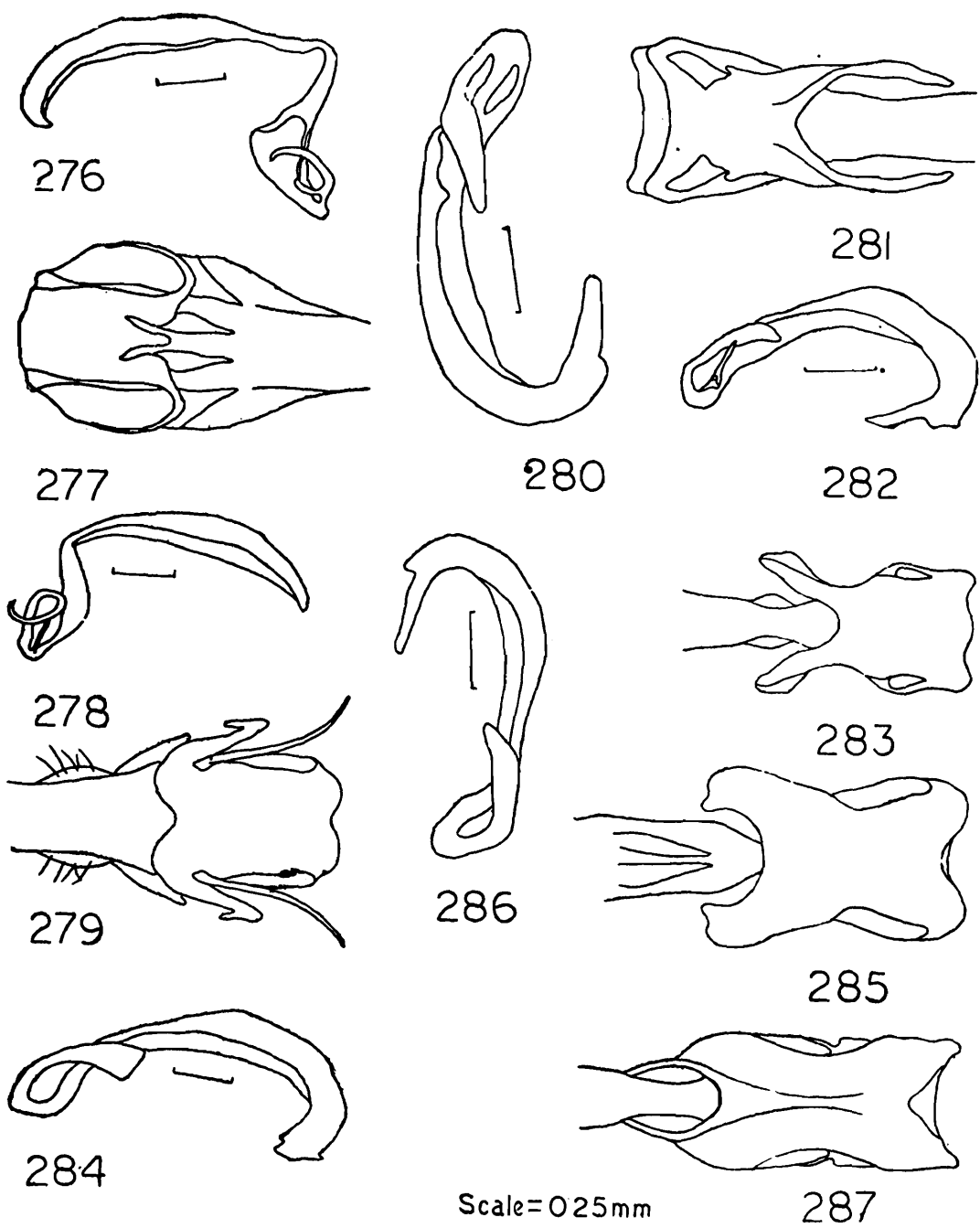
Figs. 278-279. *Ischnura a. aurora* (Hagen).

Figs. 280-281. *Argiocnemis clauseni* Fraser.

Figs. 282-283. *Argiocnemis lacteola* Selys.

Figs. 284-285. *Argiocnemis pygmaea* (Rambur).

Figs. 286-287. *Argiocnemis obscura* Laidlaw.



Figs. 288-299. Penis of damselflies in lateral views and their apex more magnified in dorsal views respectively.

Figs. 288-289. *Lestes dorothea* Fraser.

Figs. 290-291. *Lestes garoensis* sp. nov.

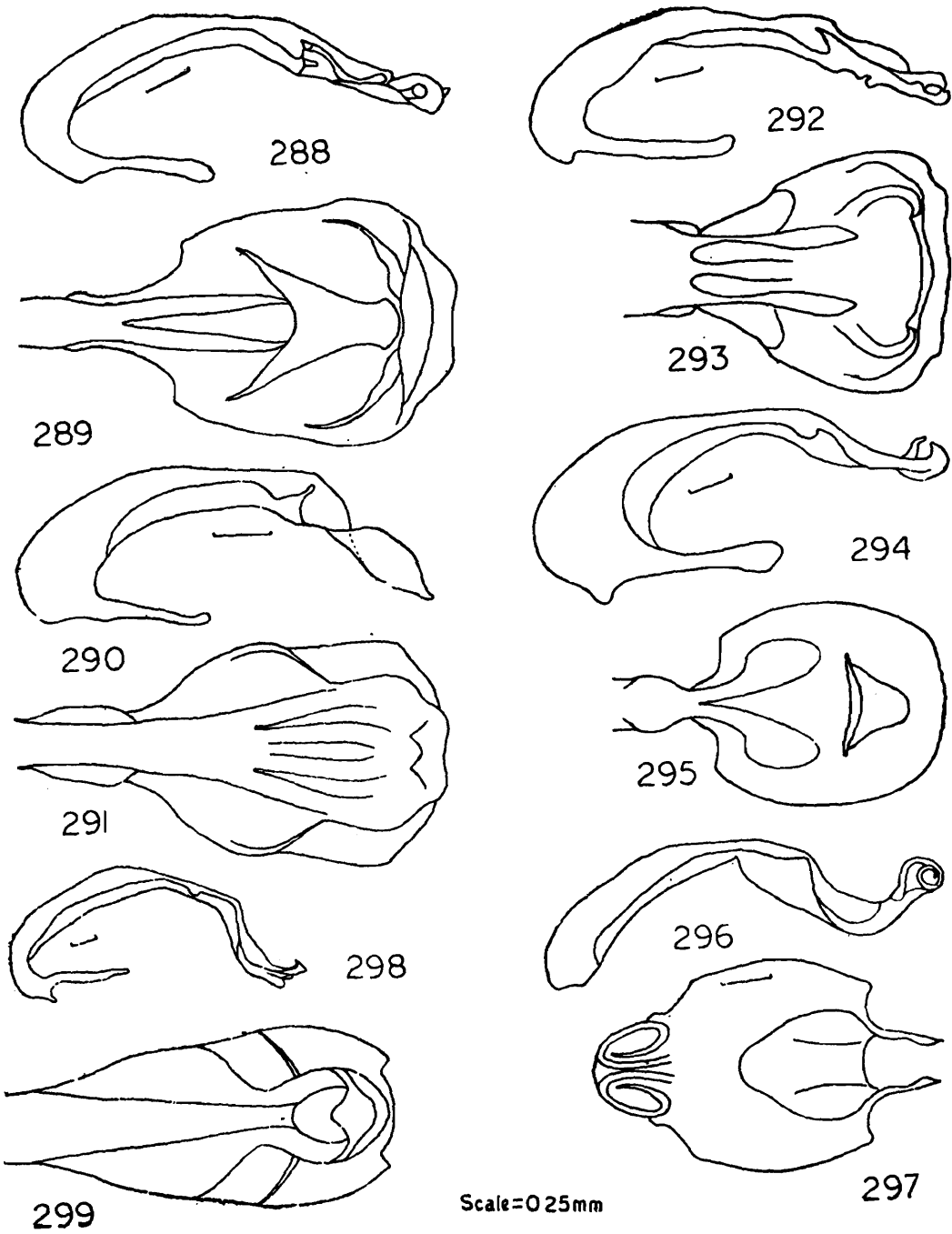
Figs. 292-293. *Lestes concinnus* Selys.

Figs. 294-295. *Orolestes durga* sp. nov.

Figs. 296-297. *Indolestes indica* Fraser.

Figs. 298-299. *Megalestes raychoudhuria* sp. nov.

(Scale=0.25mm)



Figs. 300-307. Male 10th abdominal segment and anal appendages of dragonflies.

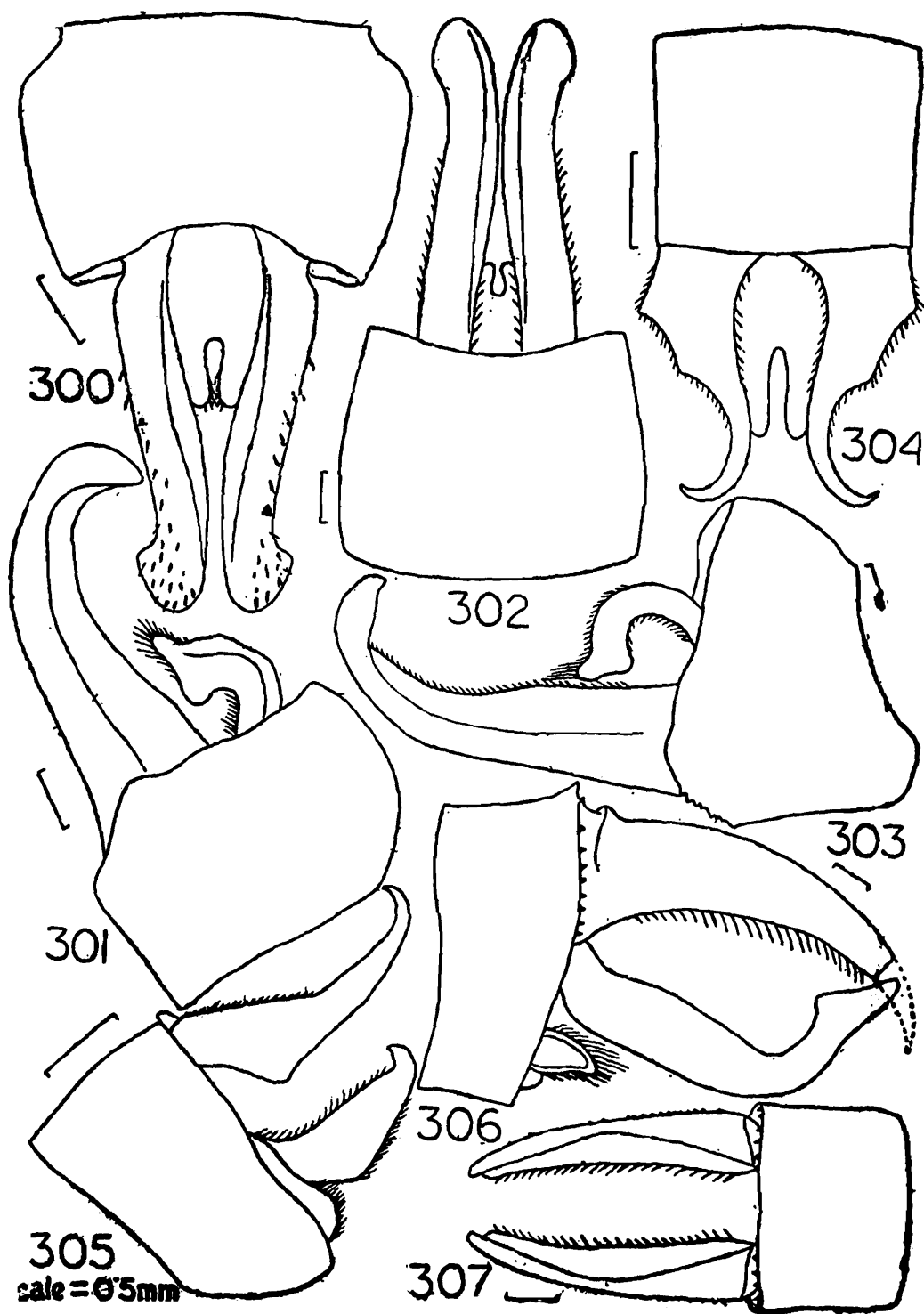
Figs. 300-301. *Paragomphus echinoccipitalis* (Fraser), in dorsal and left lateral view.

Figs. 302-303. *Paragomphus lineatus* (Selys), in dorsal and left lateral view.

Figs. 304-305. *Stylogomphus inglisi* Fraser, in dorsal and left lateral view.

Figs. 306-307. *Onychogomphus aureus* Laidlaw, in left lateral view.

(Scale=0.5mm)



Figs. 308-315. Male 10th abdominal segment and anal appendages of dragonflies.

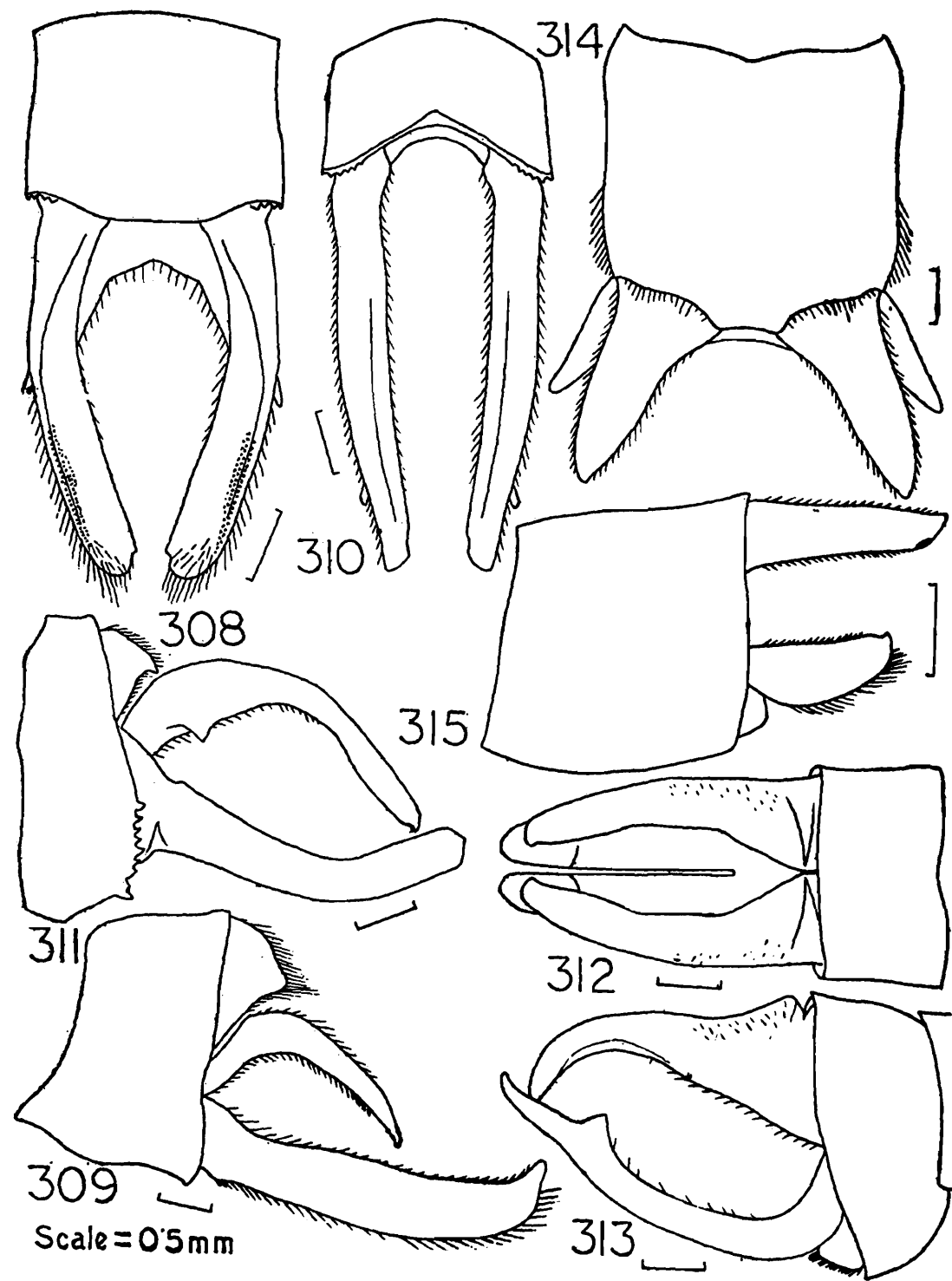
Figs. 308-309. *Nihonogomphus indicus* sp. nov., in dorsal and left lateral view.

Figs. 310-311. *Onychogomphus saundersi duaricus* Fraser, in dorsal and left lateral view.

Figs. 312-313. *Onychogomphus modestus* Selys, in dorsal and left lateral view.

Figs. 314-315, *Merogomphus martini* (Fraser), indorsal and left lateral view.

(Scale=0.5mm)



Figs. 316-323. Male external genitalia of dragonflies in lateral views.

Fig. 316. *Nihonogomphus indicus* sp. nov., from right side.

Figs. 317. *Onychogomphus saundersi duaricus* Fraser, from right side.

Fig. 318. *Onychogomphus modestus* Selys, from left side.

Fig. 319. *Onychogomphus aureus* Laidlaw, from right side.

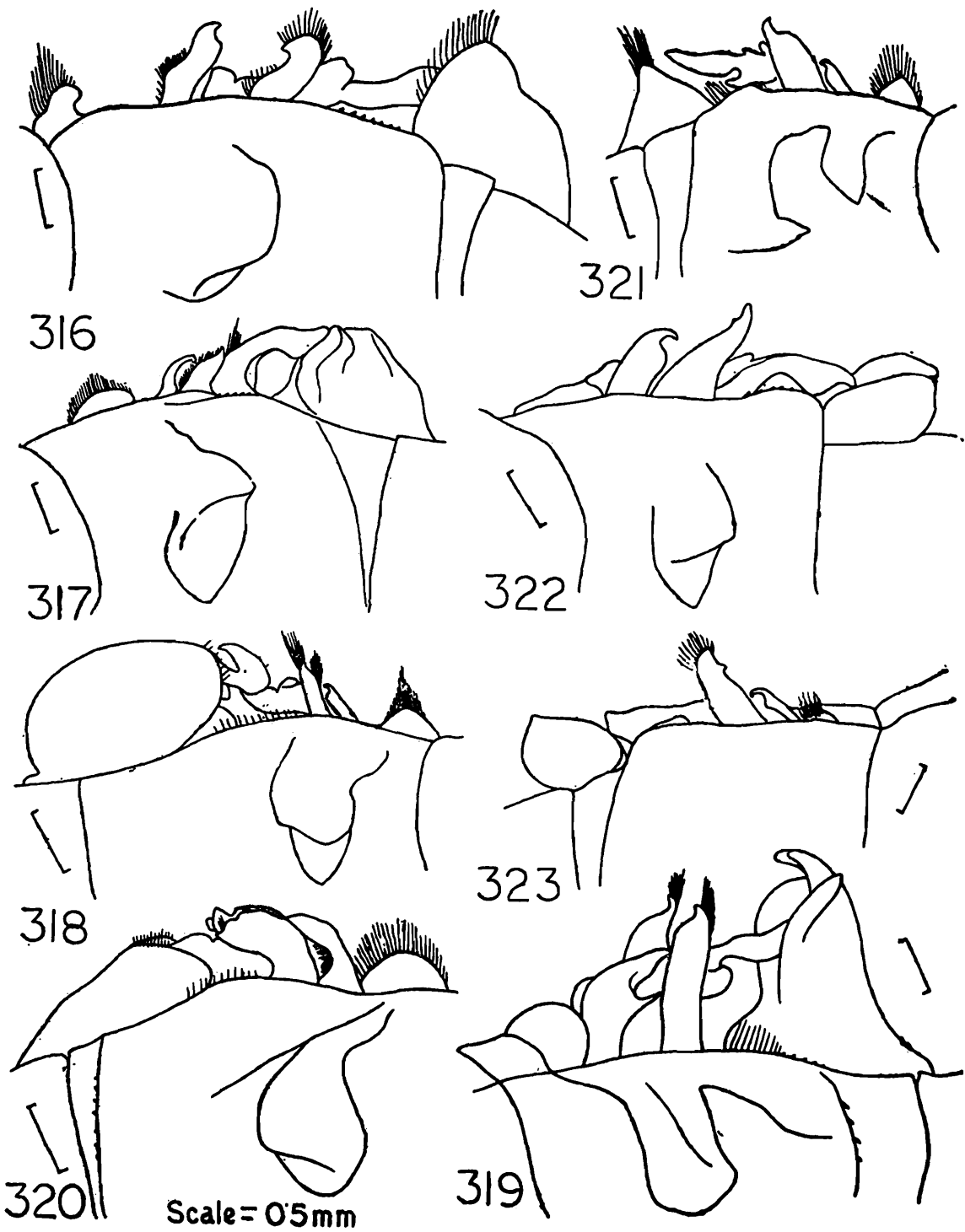
Fig. 320. *Stylogomphus inglisi* Fraser, from left side.

Fig. 321. *Merogomphus martini* (Fraser), from left side.

Fig. 322. *Paragomphus lineatus* (Selys), from right side.

Fig. 323. *Paragomphus echinoccipitalis* (Fraser), from left side.

(Scale=0.5mm)



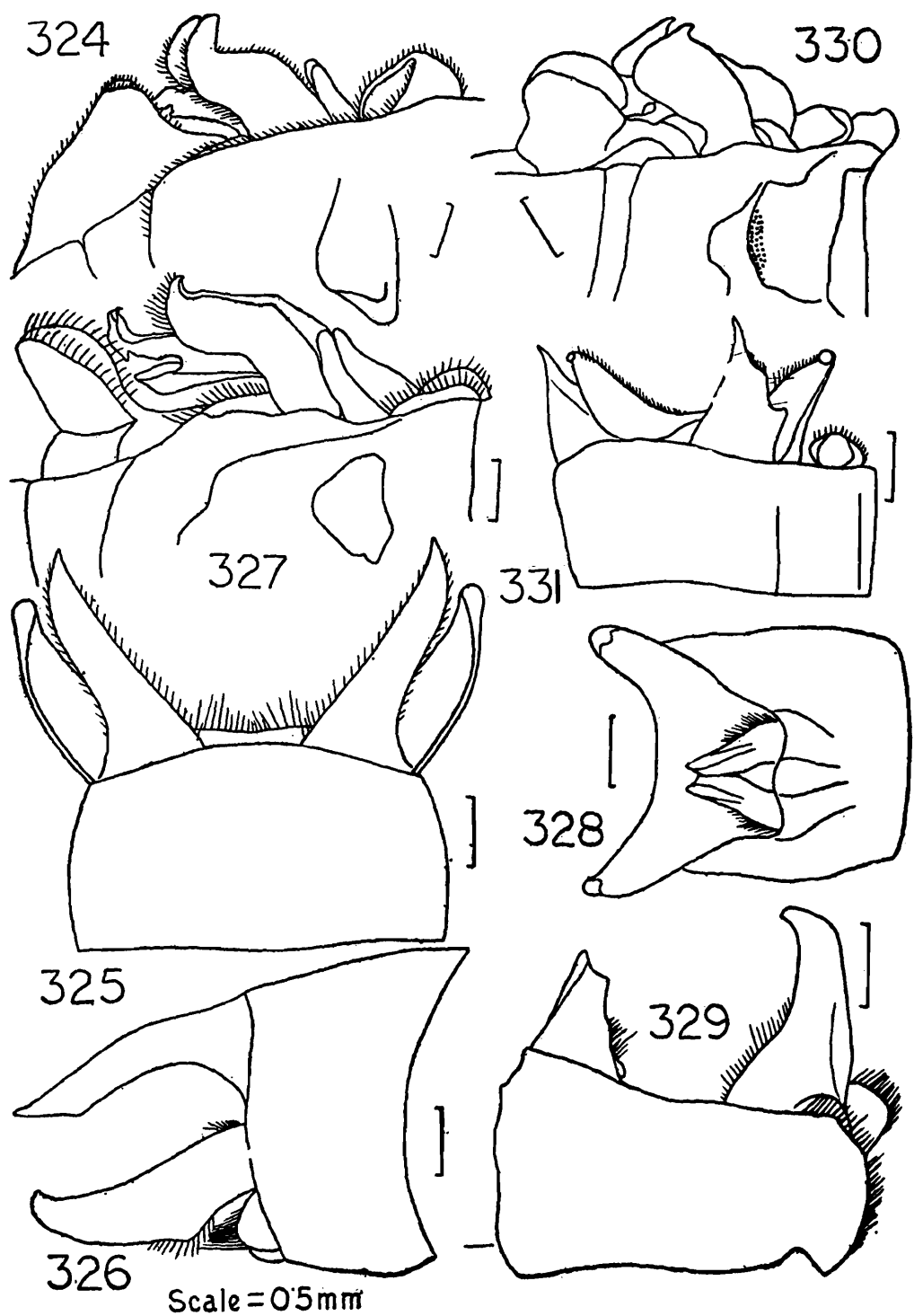
Figs. 324-331. Male external genitalia, 10th abdominal segment and anal appendages of dragonflies.

Figs. 324-326. *Gomphus personatus* Selys ; Fig. 324. External genitalia, in left lateral view ; Figs. 325-326. 10th abdominal segment and anal appendages in dorsal and right lateral view.

Figs. 327-329. *Anisogomphus caudalis* Fraser ; Fig. 327. External genitalia, in left lateral view ; Figs. 328-329. 10th abdominal segment and anal appendages, in dorsal and left lateral view.

Figs. 330-331. *Burmagomphus ? vermicularis* (Martin) ; Fig. 330. External genitalia, in left lateral view ; Fig. 331. 10th abdominal segment and anal appendages in dorsolateral view from left side.

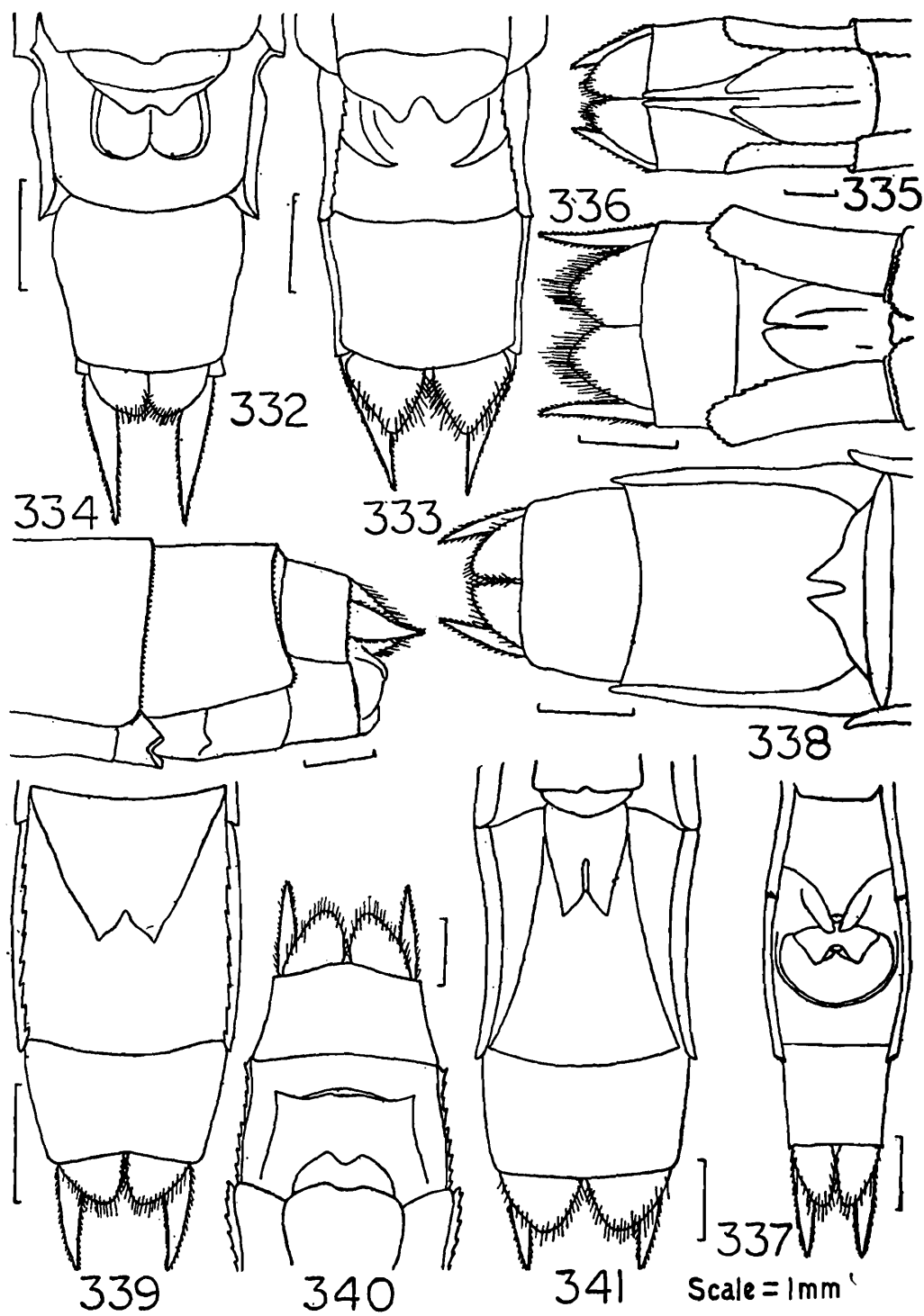
(Scale=0.5mm)



Figs. 332-341. End segments of abdomen of female dragonflies including anal appendages showing vulver scale and associated organs.

- Fig. 332. *Paragomphus echinoccipitalis* (Fraser), in ventral view.
Fig. 333. *Paragomphus lineatus* (Selys), in ventral view.
Fig. 334. *Anisogomphus caudalis* Fraser, in left lateral view.
Fig. 335. *Onychogomphus* ? *maculivertex* (Selys), in ventral view.
Fig. 336. *Onychogomphus aureus* Laidlaw, in ventral view.
Fig. 337. *Nihonogomphus indicus* sp. nov., in ventral view.
Fig. 338. *Burmagomphus* ? *vermicularis* (Martin), in ventral view.
Fig. 339. *Merogomphus martini* (Fraser), in ventral view.
Fig. 340. *Perissogomphus stevensi* Laidlaw, in ventral view.
Fig. 341. *Gomphus personatus* Selys, in ventral view.

(Scale=1.0mm)



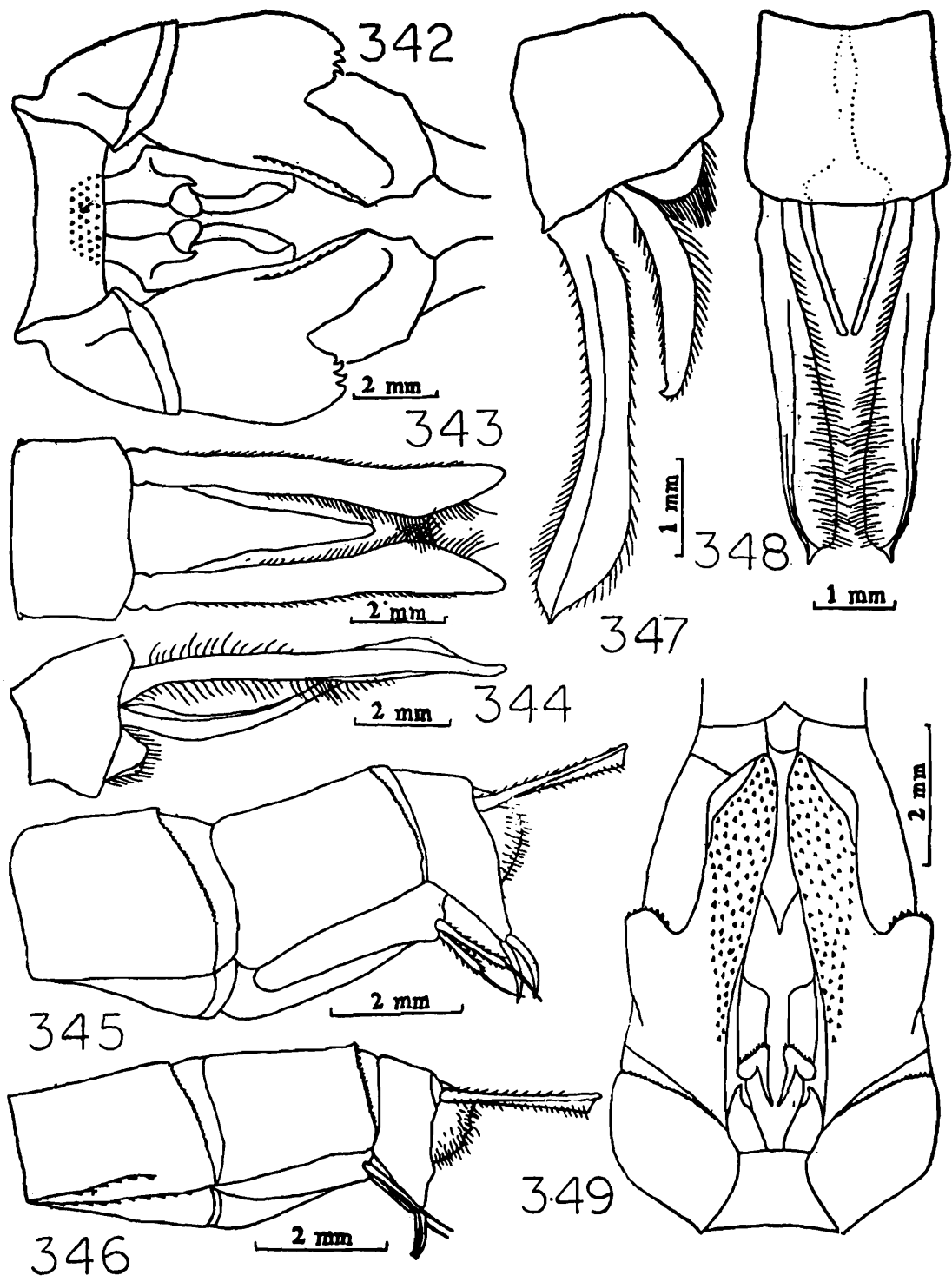
Figs. 342-349. Genitalia and anal appendages of dragonflies.

Figs. 342-344. *Gynacantha khasiaca* McLachlan, male ; Fig. 342. External genitalia, in ventral view ; Figs. 343 and 344. 10th abdominal segment and anal appendages, in dorsal and right lateral view.

Figs. 345-346. End segments of abdomen of *Gynacantha* sp., females, from right side, showing genitalia and anal appendages (fructured off at apex) ; Fig. 345. *G. sp. A* ; Fig. 346. *G. bayadera* Selys.

Figs. 347-349. *Austroaeschna intersedens* Martin, male ; Figs. 347-348. 10th abdominal segment and anal appendages, in left lateral and dorsal view ; Fig. 349. External genitalia, in ventral view.

(Scale=1.0mm)



Figs. 350-363. Penis of dragonflies in lateral views and their apex, more magnified in dorsal views respectively.

Figs. 350-351. *Paragomphus echinoccipitalis* (Fraser)

Figs. 352-353. *Paragomphus lineatus* (Selys)

Figs. 354-355. *Stylogomphus inglisi* Fraser.

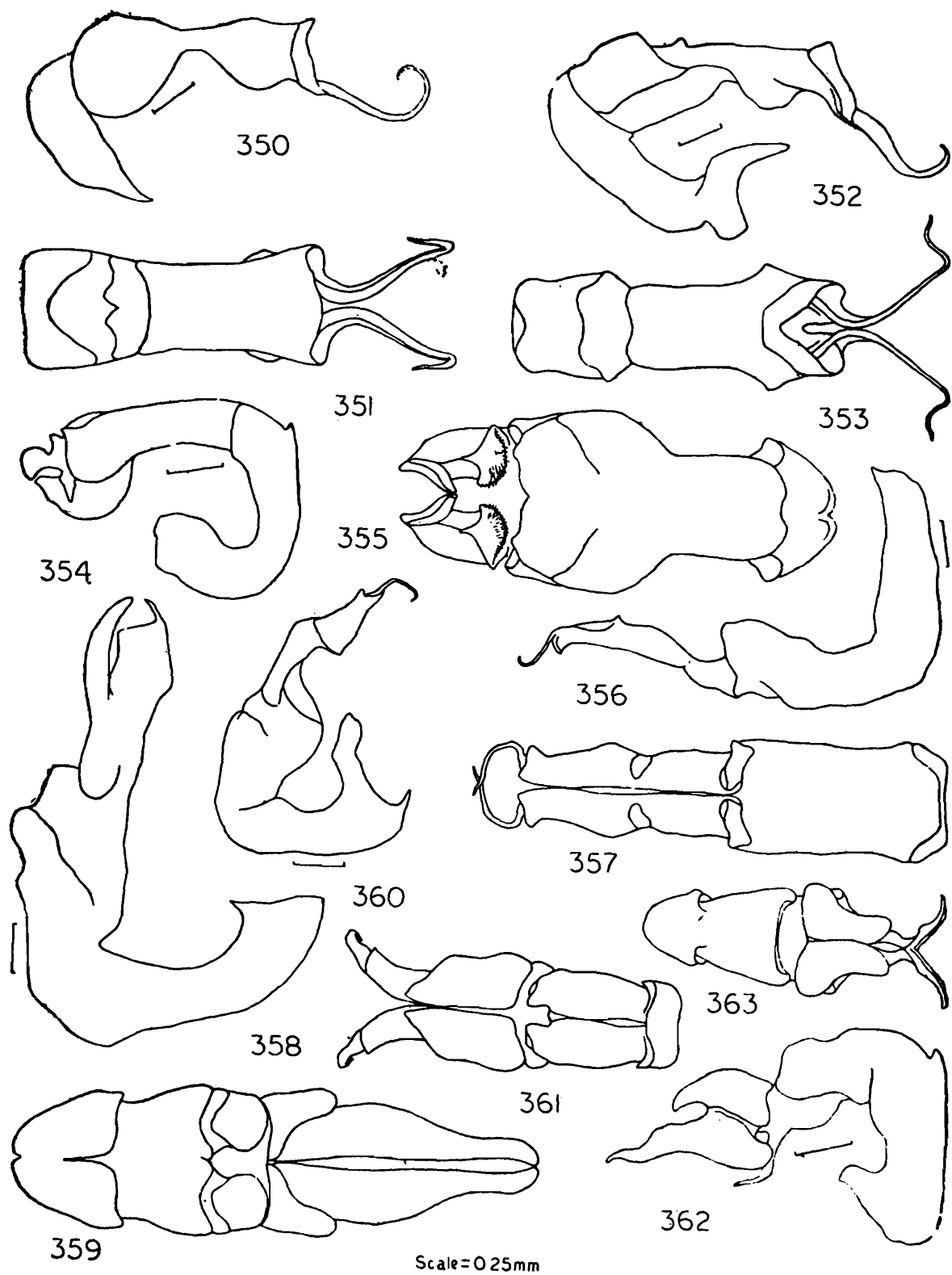
Figs. 356-357. *Onychogomphus aureus* Laidlaw.

Figs. 358-359. *Nihonogomphus indicus* sp. nov.

Figs. 360-361. *Onychogomphus saundersi duaricus* Fraser.

Figs. 362-363. *Onychogomphus modestus* Selys.

(Scale=0.25mm)



Figs. 364-375. Penis of dragonflies in lateral views and their apex more magnified in dorsal views respectively.

Figs. 364-365. *Merogomphus martini* (Fraser).

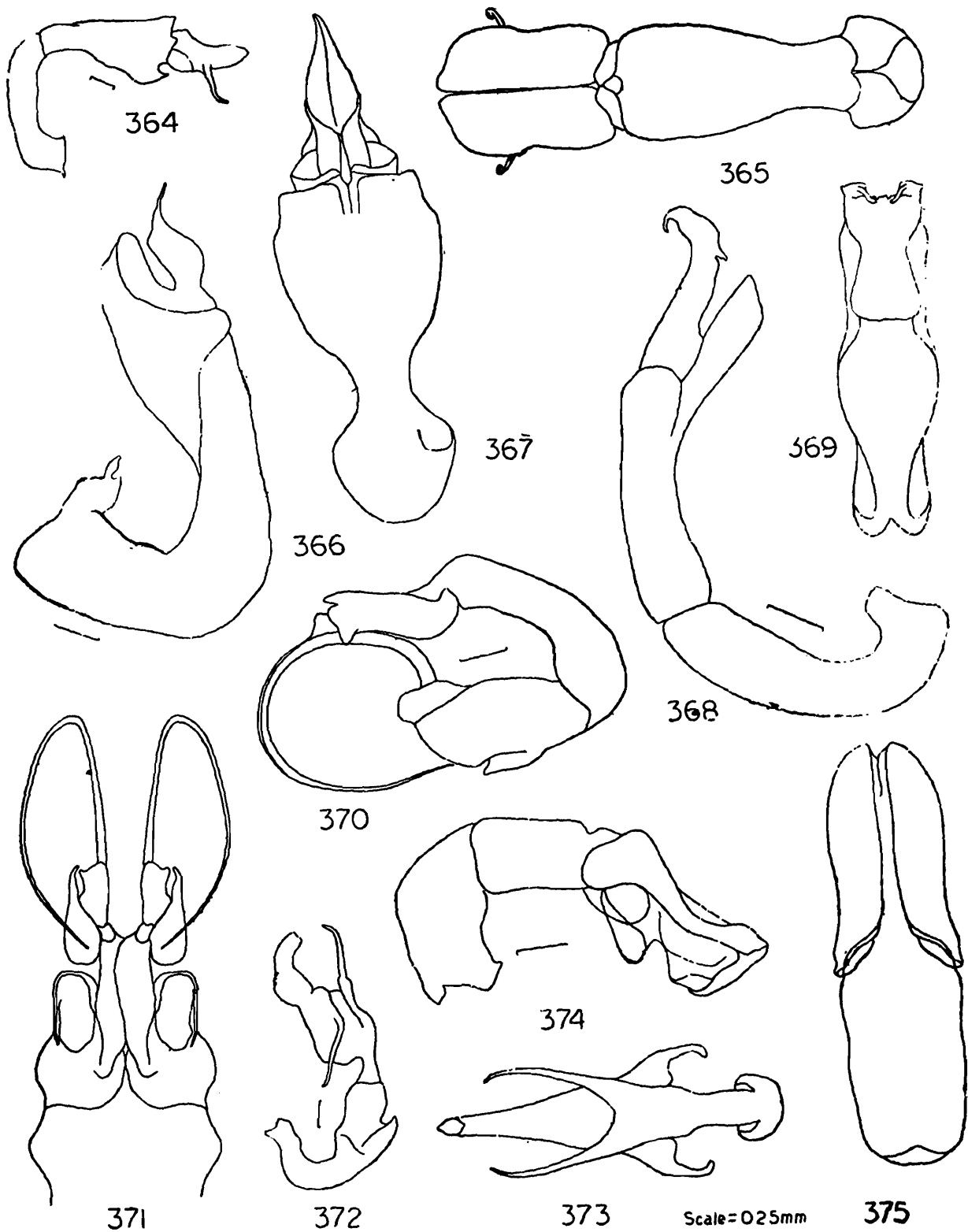
Figs. 366-367. *Gomphus personatus* Selys.

Figs. 368-369. *Anisogomphus caudalis* Fraser.

Figs. 370-371. *Burmagomphus ? vermicularis* (Martin).

Figs. 372-373. *Austroaeschna intersedens* Martin.

Figs. 374-375. *Chlorogomphus atkinsoni* (Selys).



Figs. 376-386. Genitalia and anal appendages of dragonflies.

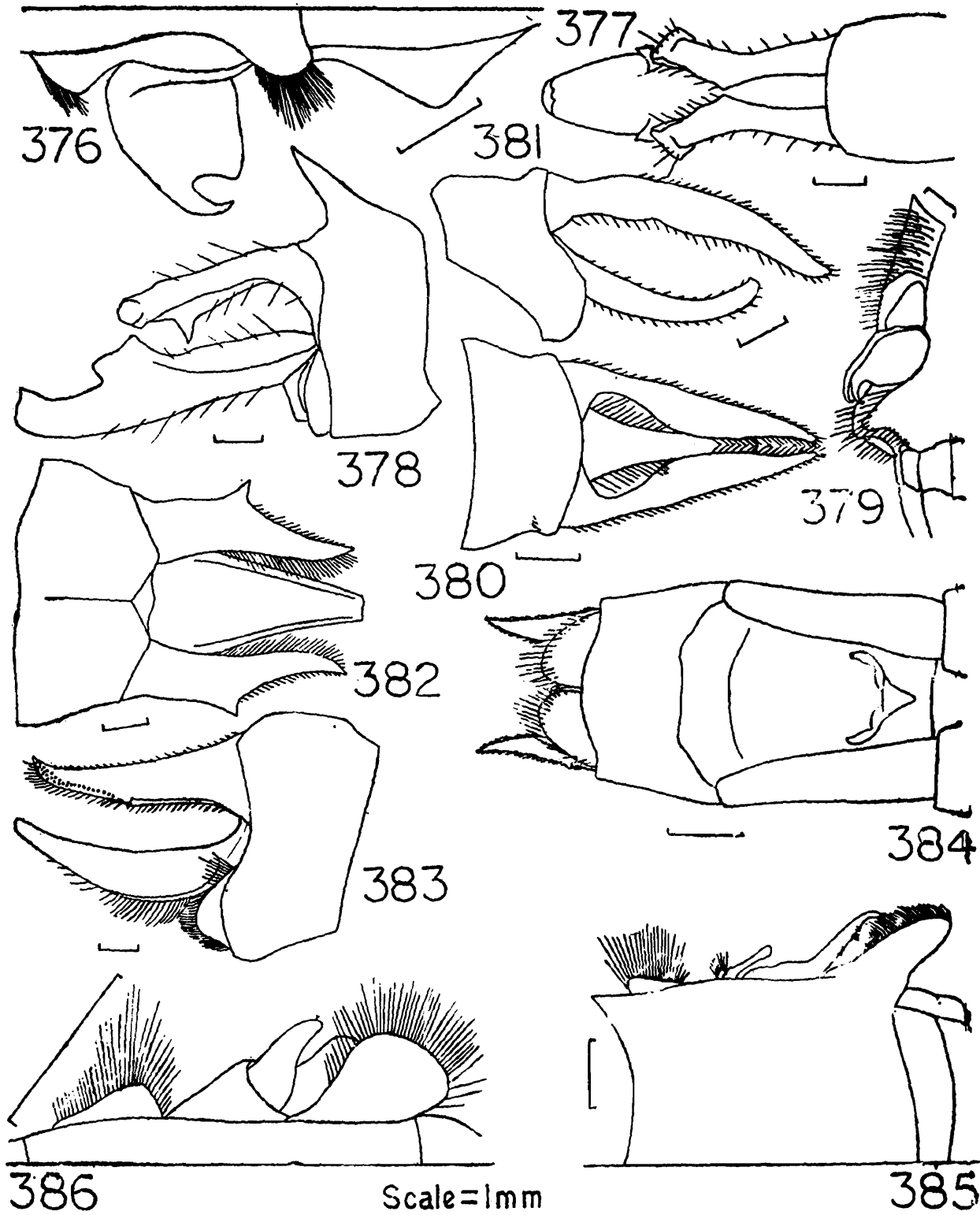
Figs. 376-378. *Idionyx optata* Selys, male ; Fig. 376. External a genitalia, in left lateral view ; Figs. 377-378. Anal appendages, in dorsal and right lateral view.

Figs. 379-381. *Hemicordulia asiatica* Selys, male ; Fig. 379. External genitalia, in left lateral view ; Figs. 380-381. Anal appendages, in dorsal and left lateral view.

Figs. 382-385. *Macromia moorei* Selys. Figs. 382-383. Male anal appendages, in dorsal and left lateral view ; Fig. 384. End segments of abdomen including anal appendages showing female genitalia ; Fig. 385. Male external genitalia, in right lateral view.

(Scale=0.25 mm)

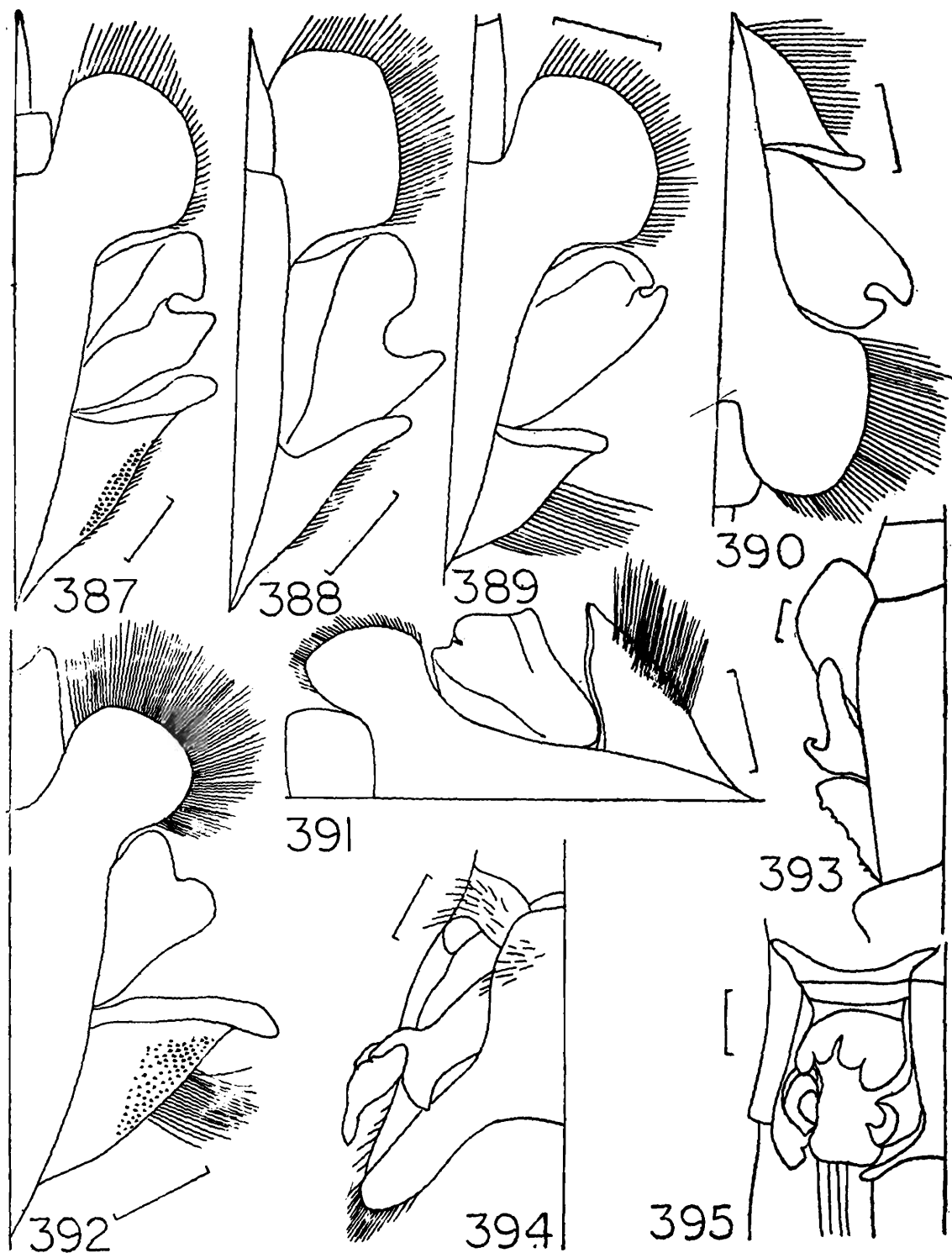
Fig. 386. *Urothemis s. signata* (Rambur), male external genitalia in right lateral view.
(Scale=1.0mm.)



Figs. 387-395. Male external genitalia of dragonflies.

- Fig. 387. *Orthetrum luzonicum* (Brauer), in left lateral view.
Fig. 388. *Orthetrum geaucum* (Brauer), in left lateral view.
Fig. 389. *Orthetrum t. triangulare* (Selys), in left lateral view.
Fig. 390. *Orthetrum pruinsum neglectum* (Rambur), in right lateral view.
Fig. 391. *Orthetrum sabina* (Drury), in left lateral view.
Fig. 392. *Orthetrum japonicum internum* McLachlan, in left lateral view.
Fig. 393. *Potamarcha congener* (Rambur), in right lateral view.
Fig. 394. *Nannophya pygmaea* Rambur, in left lateral view.
Fig. 395. *Brachydiplax sobrina* (Rambur), in left lateral view.

(Scale=2.0mm for Fig. 394, 0.5mm for the rest)

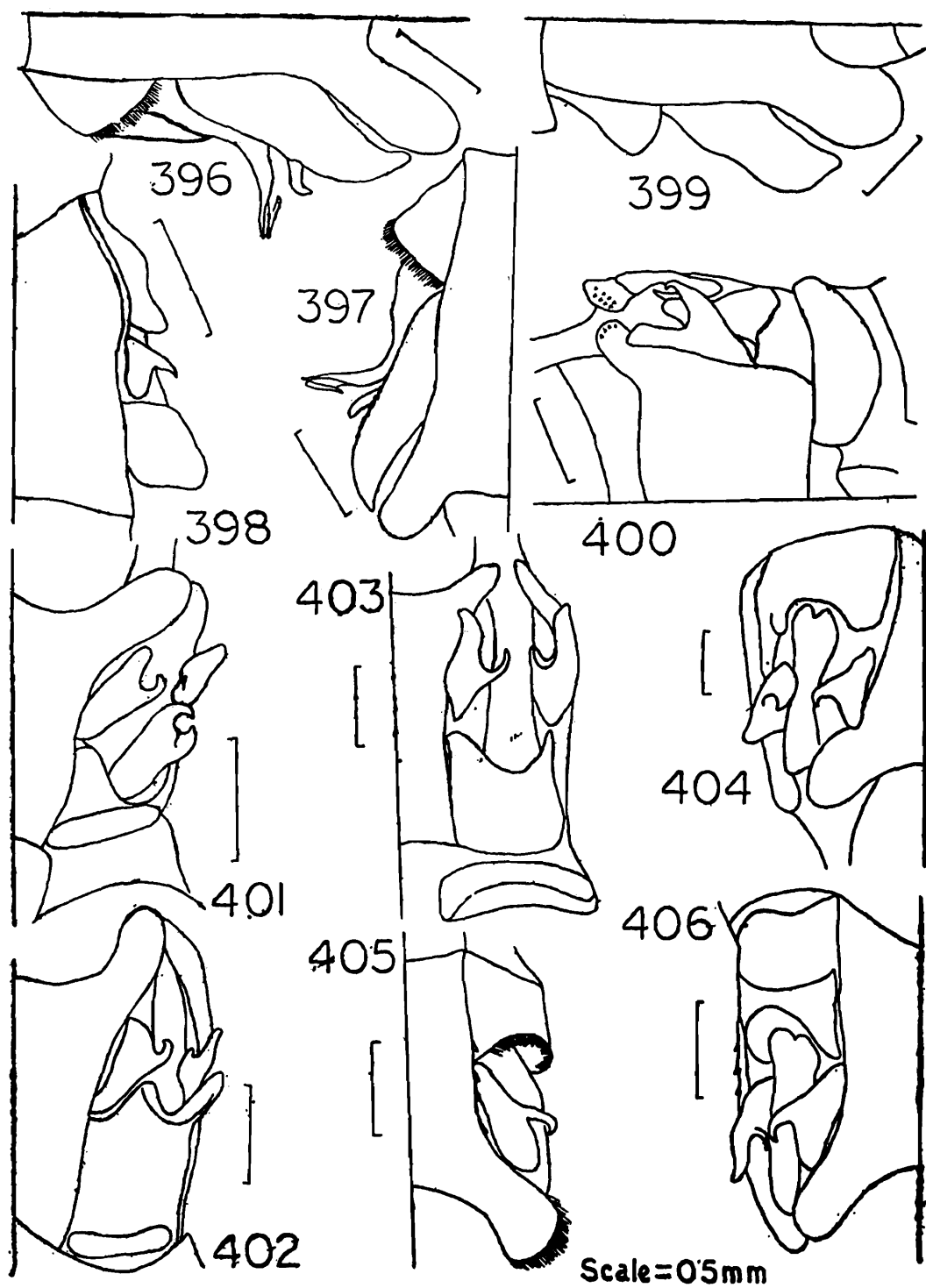


Scale = 0.5 mm & 2 mm (394)

Figs. 396-406. Male external genitalia of dragonflies.

- Fig. 396. *Sympetrum hypomelas* (Selys), in left lateral view.
- Fig. 397. *Sympetrum orientale* (Selys), in left lateral view.
- Fig. 398. *Brachythemis contaminata* (Fabricius), in right lateral view.
- Fig. 399. *Crocothemis s. servilia* (Drury), in left lateral view.
- Fig. 400. *Acisoma p. panorpoides* Rambur, in left lateral view.
- Fig. 401. *Diplacodes nebulosa* (Fabricius), in left lateral view.
- Fig. 402. *Diplacodes trivialis* (Rambur), in left lateral view.
- Fig. 403. *Neurothemis t. tullia* (Drury), in left lateral view.
- Fig. 404. *Neurothemis fulvia* (Drury), in left lateral view.
- Fig. 405. *Neurothemis intermedia atlanta* Ris, in right lateral view.
- Fig. 406. *Neurothemis i. intermedia* (Rambur), in left lateral view.

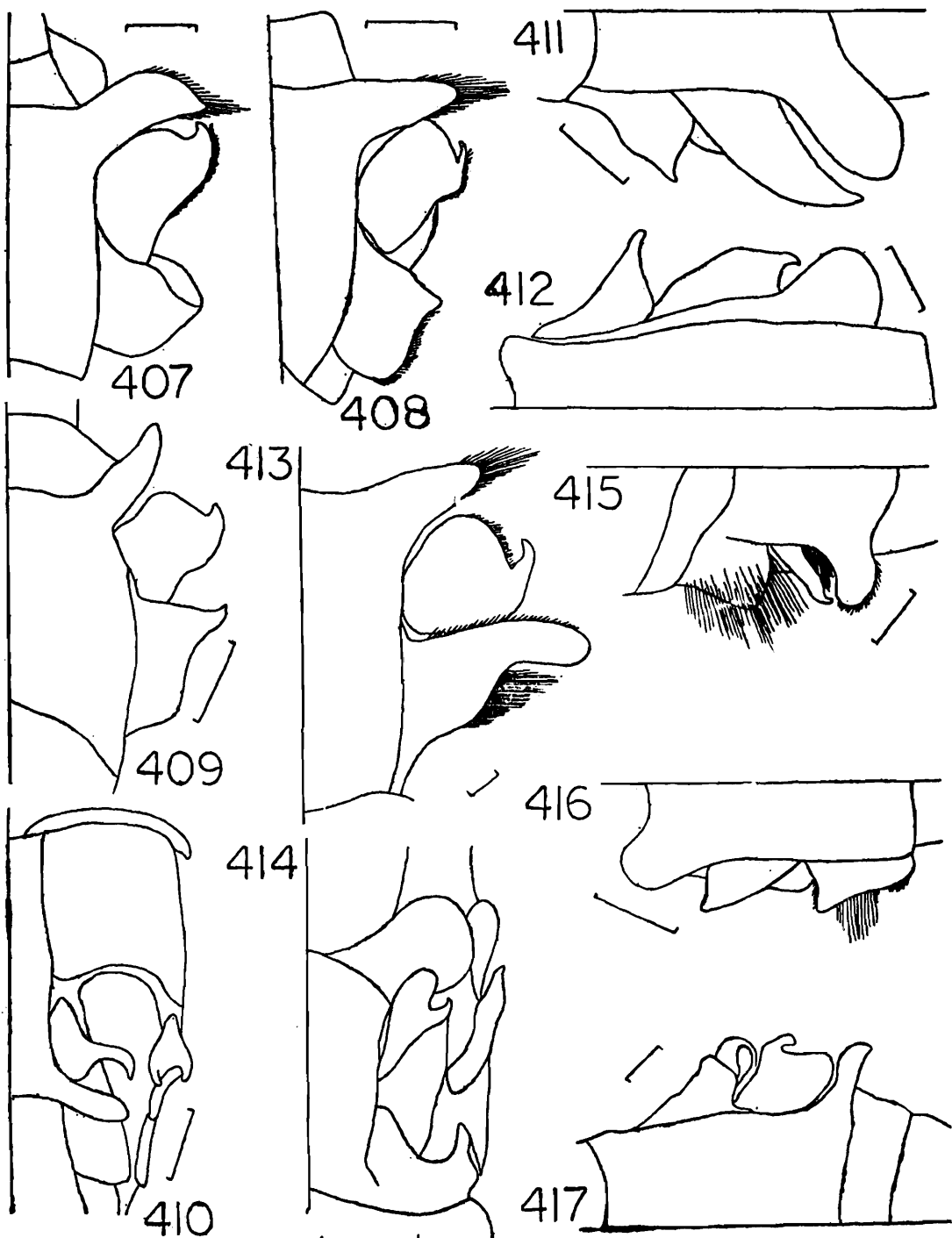
(Scale=0.5mm)



Figs. 407-417. Male external genitalia of dragonflies.

- Fig. 407. *Trithemis aurora* (Burmeister), in left lateral view.
Fig. 408. *Trithemis festiva* (Rambur), in left lateral view.
Fig. 409. *Trithemis pallidinervis* (Kriby), in left lateral view.
Fig. 410. *Rhyothemis v. variegata* (Linnaeus), in right lateral view.
Fig. 411. *Hydrobasileus croceus* (Brauer), in left lateral view.
Fig. 412. *Pantala flavescens* (Fabricius), in right lateral view.
Fig. 413. *Zygonyx iris intermedia* subsp. nov., in left lateral view.
Fig. 414. *Palpopleura s. sexmaculata* (Fabricius), in left lateral view.
Fig. 415. *Tholymis tillarga* (Fabricius), in right lateral view.
Fig. 416. *Tetrathemis platyptera* Selys, in right lateral view.
Fig. 417. *Onychothemis testacea* (S.L.) Laidlaw, in right lateral view.

(Scale=0.5mm)

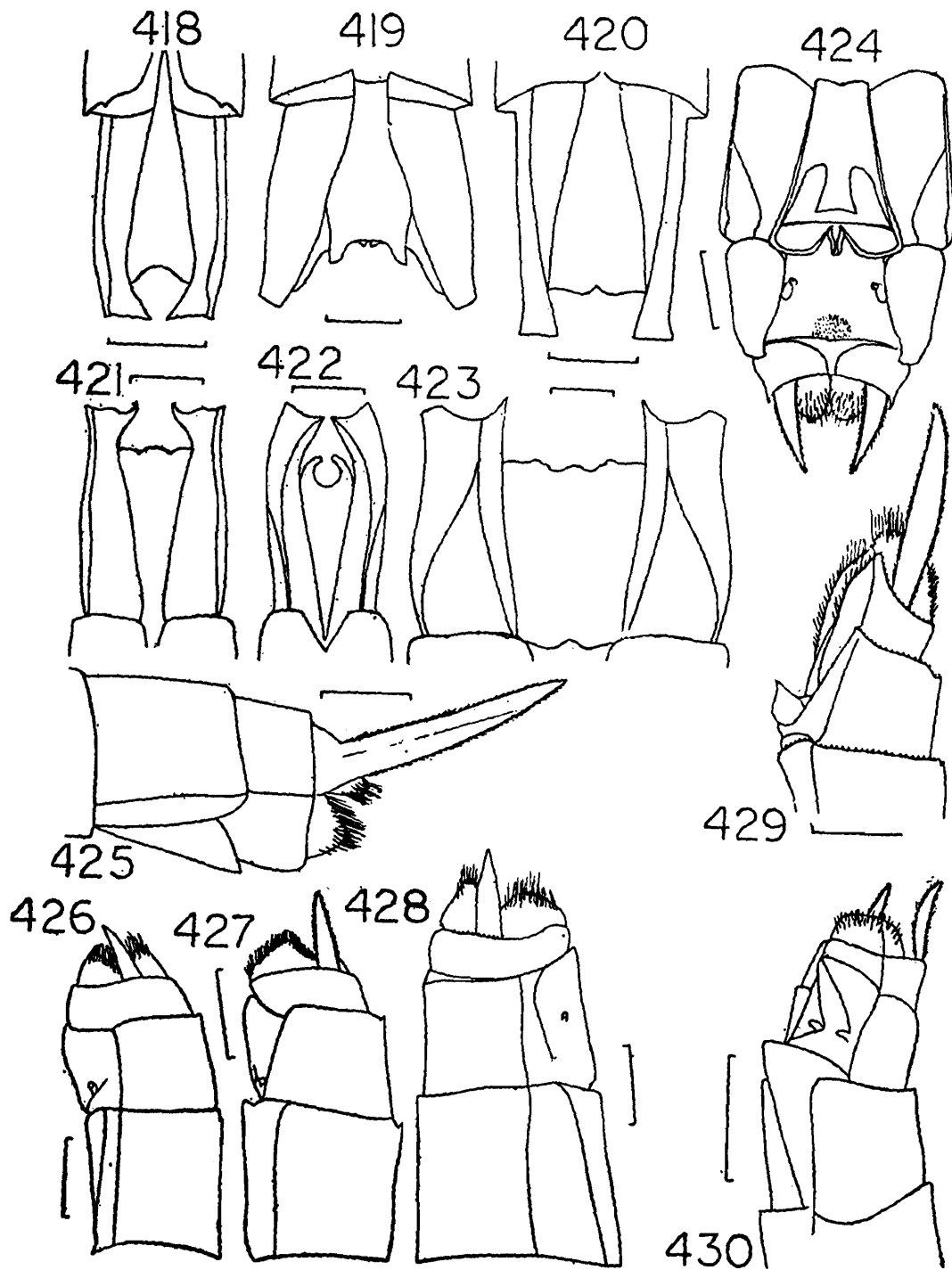


Scale = 0.5 mm

Figs. 418-423. Ventral view of 8th abdominal segment of female *Orthetrum* spp., showing tip of vulver aperture ; Fig. 418. *O. glaucum* (Brauer) ; Fig. 419. *O. japonicum internum* McLachlan ; Fig. 420. *O. luzonicum* (Brauer) ; Fig. 421. *O. pruinsum neglectum* (Rambur) ; Fig. 422. *O. sabina* (Drury) ; Fig. 423. *O. t. triangulare* (Selys).

Figs. 424-430. End segments of abdomen including anal appendages showing female genitalia ; Fig. 424. *Lyriothemis* ? *bivittata* (Rambur), in ventral view ; Fig. 425. *Pantala flavescens* (Fabricius), in left lateral view ; Fig. 426. *Trithemis aurora* (Burmeister), in right lateral view ; Fig. 427. *Trithemis festiva* (Rambur), in right lateral view ; Fig. 428. *Trithemis pallidinervis* (Kirby), in left lateral view ; Fig. 429. *Tholymis tillarga* (Fabricius), in right lateral view ; Fig. 430. *Palpopleura s. sexmaculata* (Fabricius), in left lateral view.

(Scale=1.0mm)



Scale = 1mm

Figs. 431-441. End segments of abdomen including anal appendages showing female genitalia.

Fig. 431. *Diplacodes nebulosa* (Fabricius), in right lateral view.

Fig. 432. *Diplacodes trivialis* (Rambur), in right lateral view.

Fig. 433. *Sympetrum orientale* (Selys), in left lateral view.

Fig. 434. *Sympetrum hypomelas* (Selys), in right lateral view.

Fig. 435. *Crocothemis s. servilia* (Drury), in right lateral view.

Fig. 436. *Neurothemis fulvia* (Drury), in right lateral view.

Fig. 437. *Neurothemis i. intermedia* (Rambur), in left lateral view.

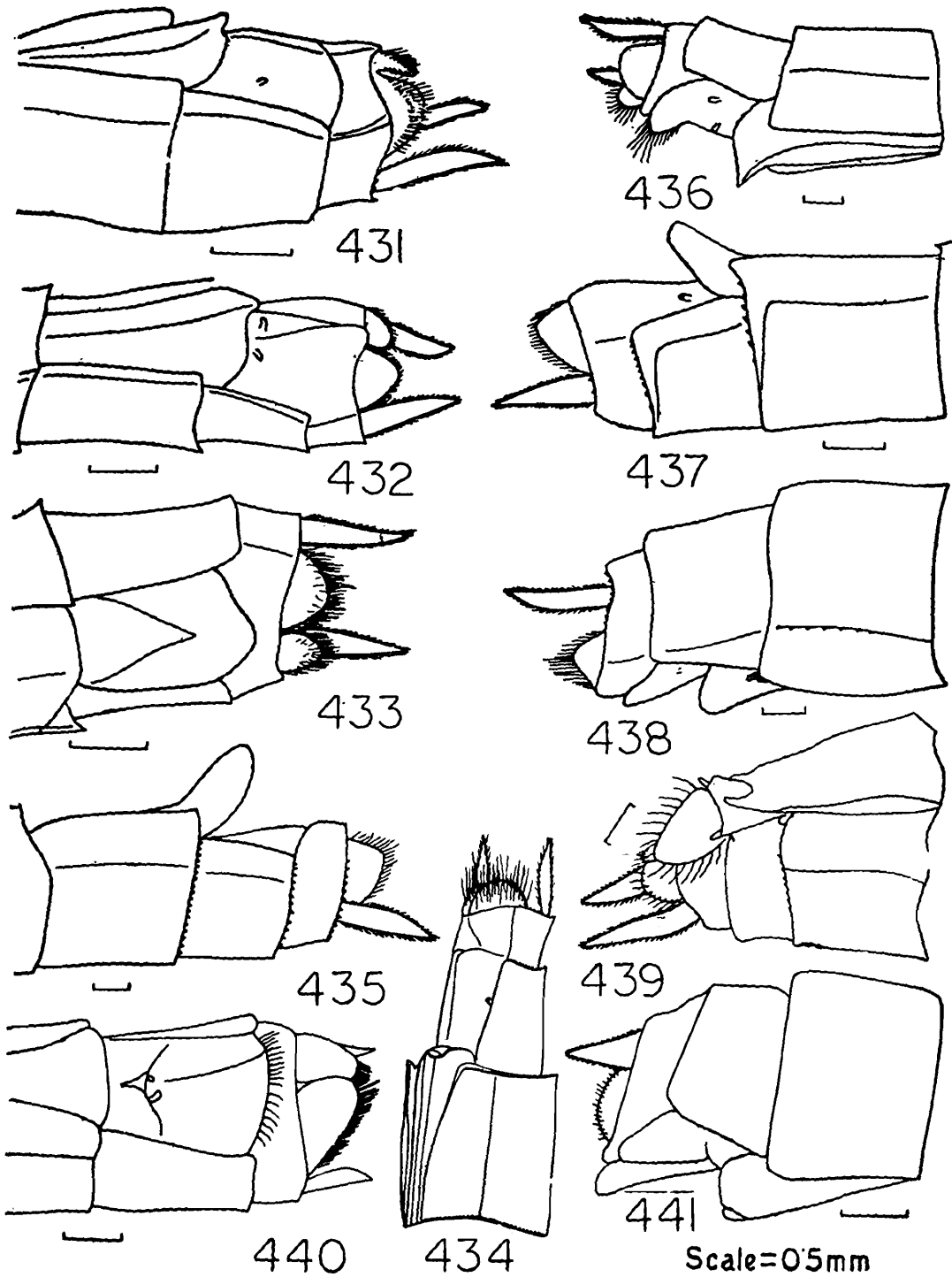
Fig. 438. *Neurothemis t. tullia* (Drury), in right lateral view.

Fig. 439. *Brachythemis contaminata* (Fabricius), in left lateral view.

Fig. 440. *Rhyothemis v. variegata* (Linnaeus), in right lateral view.

Fig. 441. *Tetrathemis platyptera* Selys, in right lateral view.

(Scale=0.5mm)



Figs. 442-453. Penis of dragonflies in lateral views and their apex, more magnified in dorsal views respectively.

Fig. 442-443. *Hemicordulia asiatica* Selys.

Fig. 444-445. *Macromia moorei* Selys.

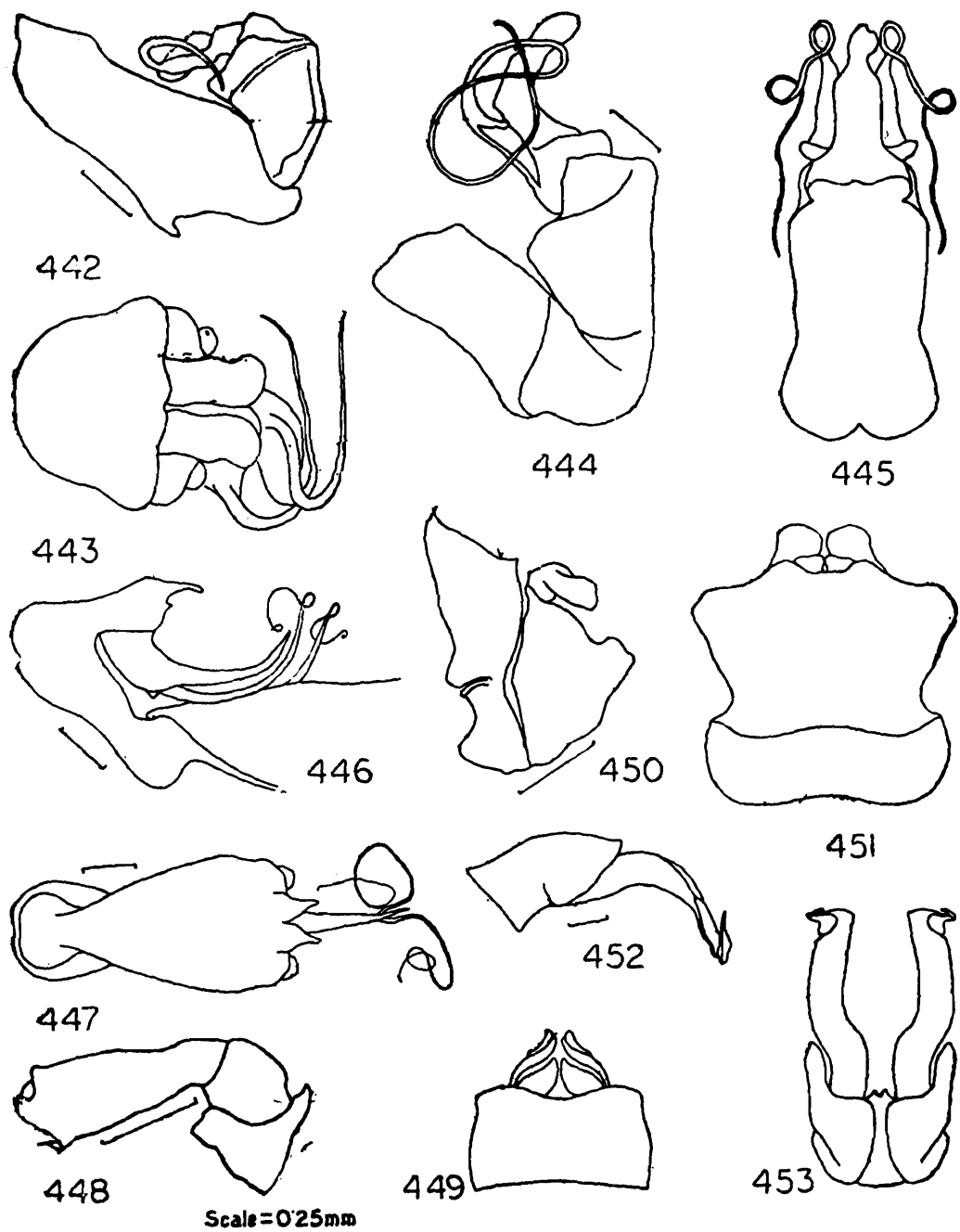
Figs. 446-447. *Idionyx optata* Selys.

Figs. 448-449. *Nannophya pygmaea* Rambur.

Figs. 450-451. *Brachydiplax sobrina* (Rambur).

Figs. 452-453. *Sympetrum orientale* (Selys).

(Scale=0.25mm)



Figs. 454-463. Penis of dragonflies in lateral views and their apex, more magnified in dorsal views prespectively.

Figs. 454-455. *Potamarcha congener* (Rambur).

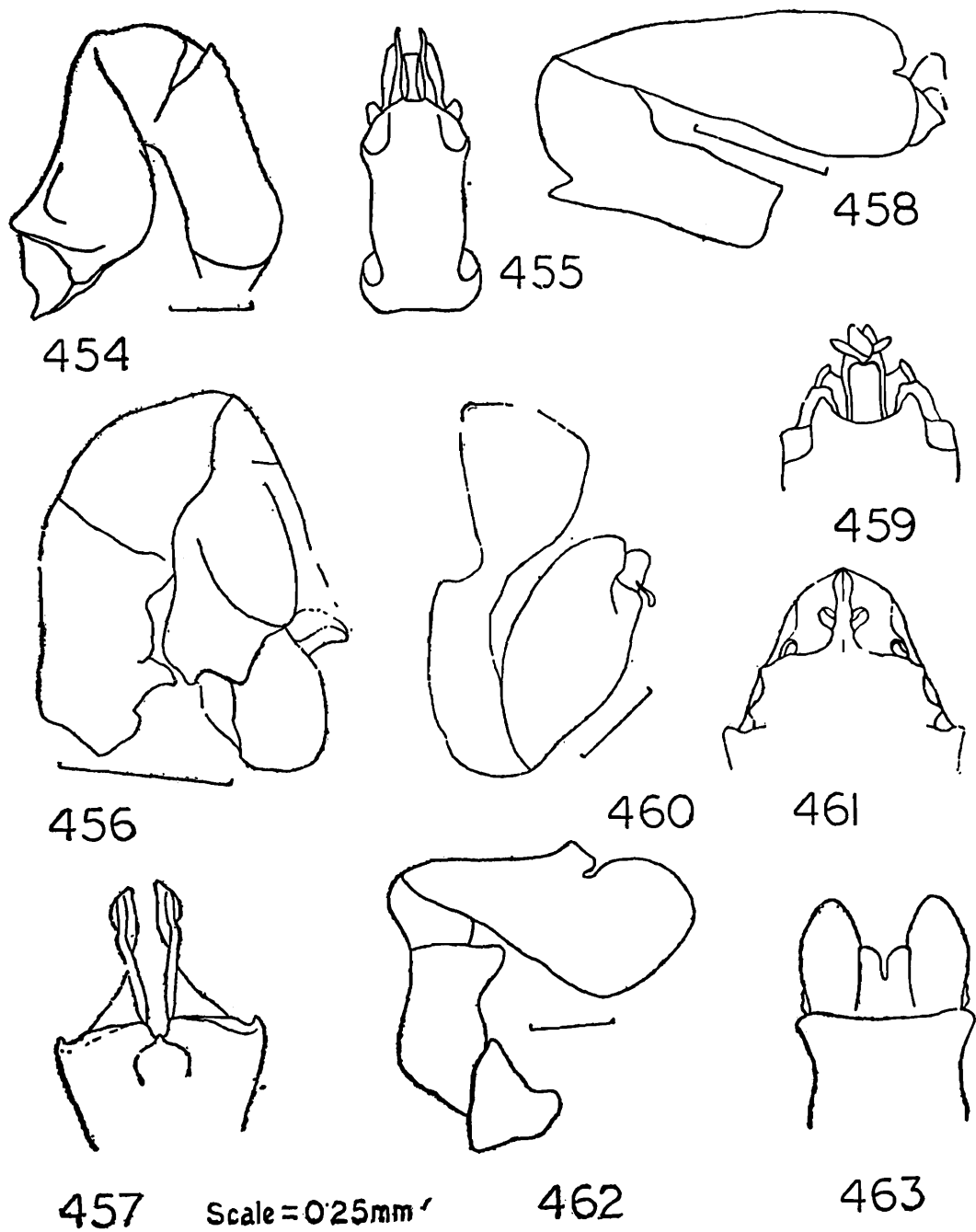
Figs. 456-457. *Acisoma p. panorpoides* Rambur.

Figs. 458-459. *Diplacodes nebulosa* (Fabricius).

Figs. 460-561. *Diplacodes trivialis* (Rambur).

Figs. 462-463. *Neurothemis inrermedia atlanta* Ris.

(Scale=0.25mm)



Figs. 464-473. Penis of dragonflies in lateral views and their apex, more magnified in dorsal views respectively.

Figs. 464-465. *Neurothemis i. intermedia* (Rambur).

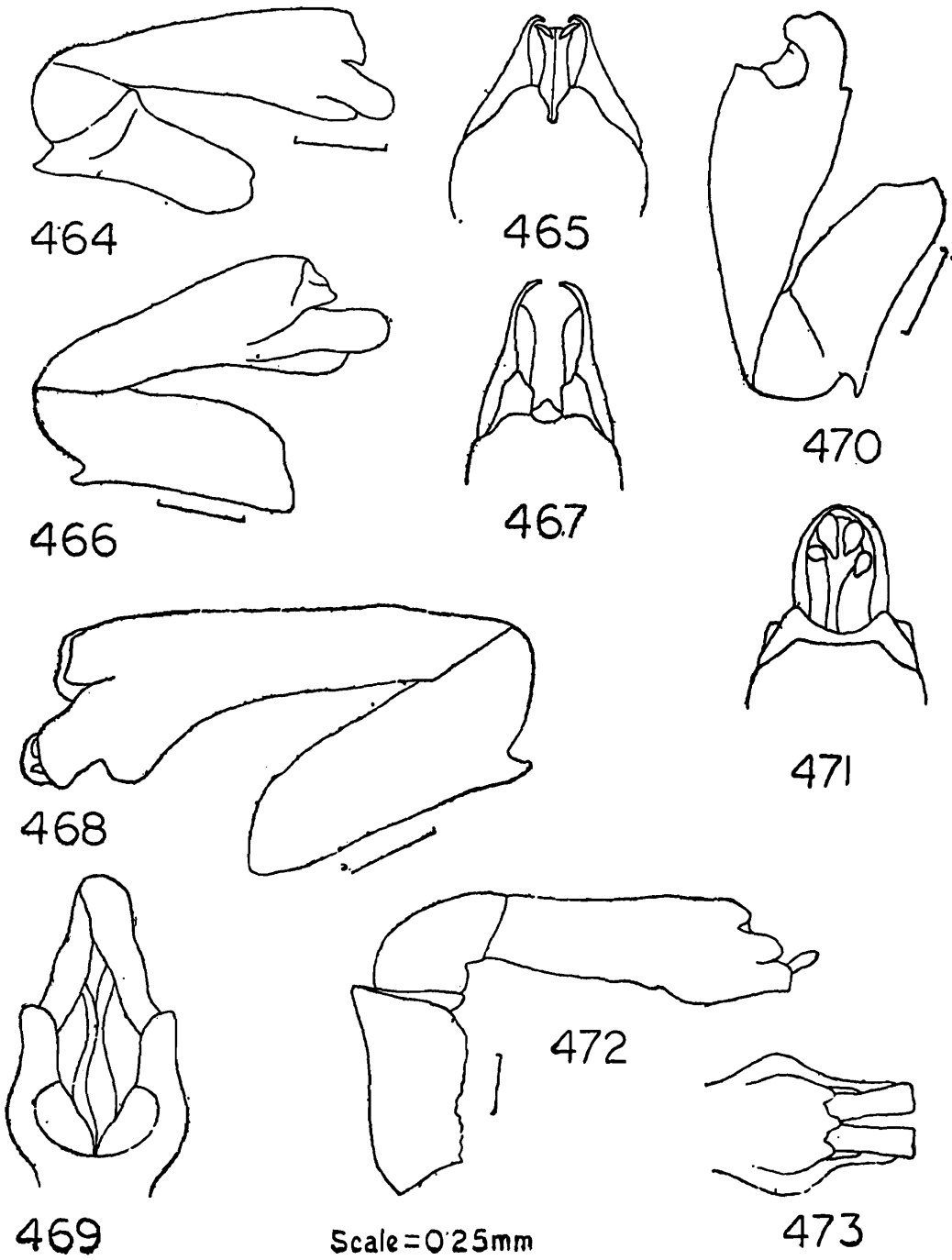
Figs. 466-467. *Neurothemis fulvia* (Drury).

Figs. 468-469. *Neurothemis t. tullia* (Drury).

Figs. 470-471. *Brachythemis contaminata* (Fabricius).

Figs. 472-473. *Crocothemis s. sylvia* (Drury).

(Scale=0.25mm)



Figs. 474-485. Penis of dragonflies in lateral views and their apex, more manifested in dorsal views respectively.

Figs. 474-475. *Orthetrum glaucum* (Brauer).

Figs. 476-477. *Orthetrum japonicum internum* Mc Lachlan

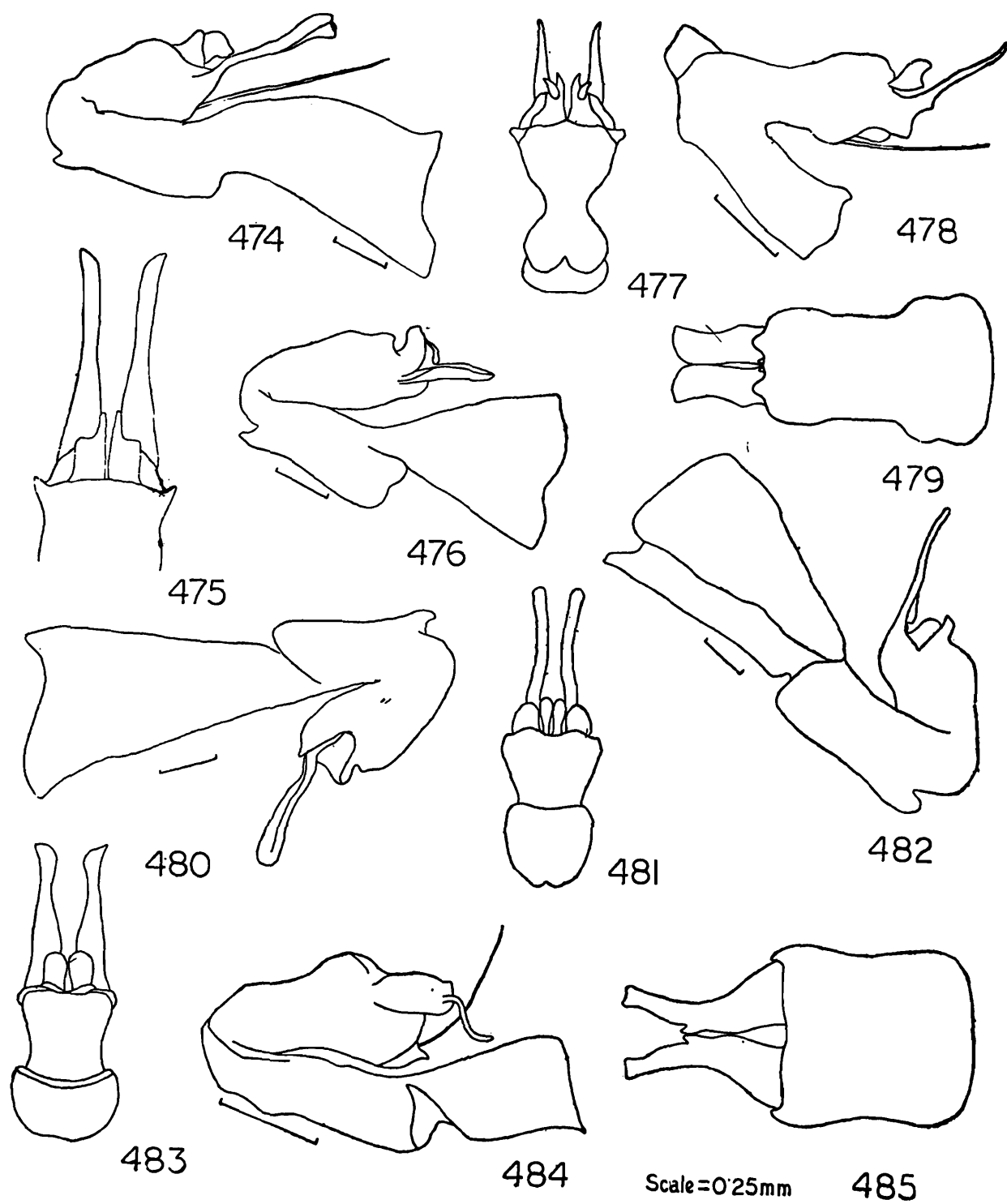
Figs. 478-479. *Orthetrum luzonicum* (Brauer).

Figs. 480-481. *Orthetrum pruinsum neglectum* (Rambur).

Figs. 482-483. *Orthetrum t. triangulare* (Selys).

Figs. 484-485. *Orthetrum sabina* (Drury).

(Scale=0.25mm)



Figs. 486-497. Penis of dragonflies in lateral views and their apex, more magnified, in dorsal views respectively.

Figs. 486-487. *Trithemis aurora* (Burmeister).

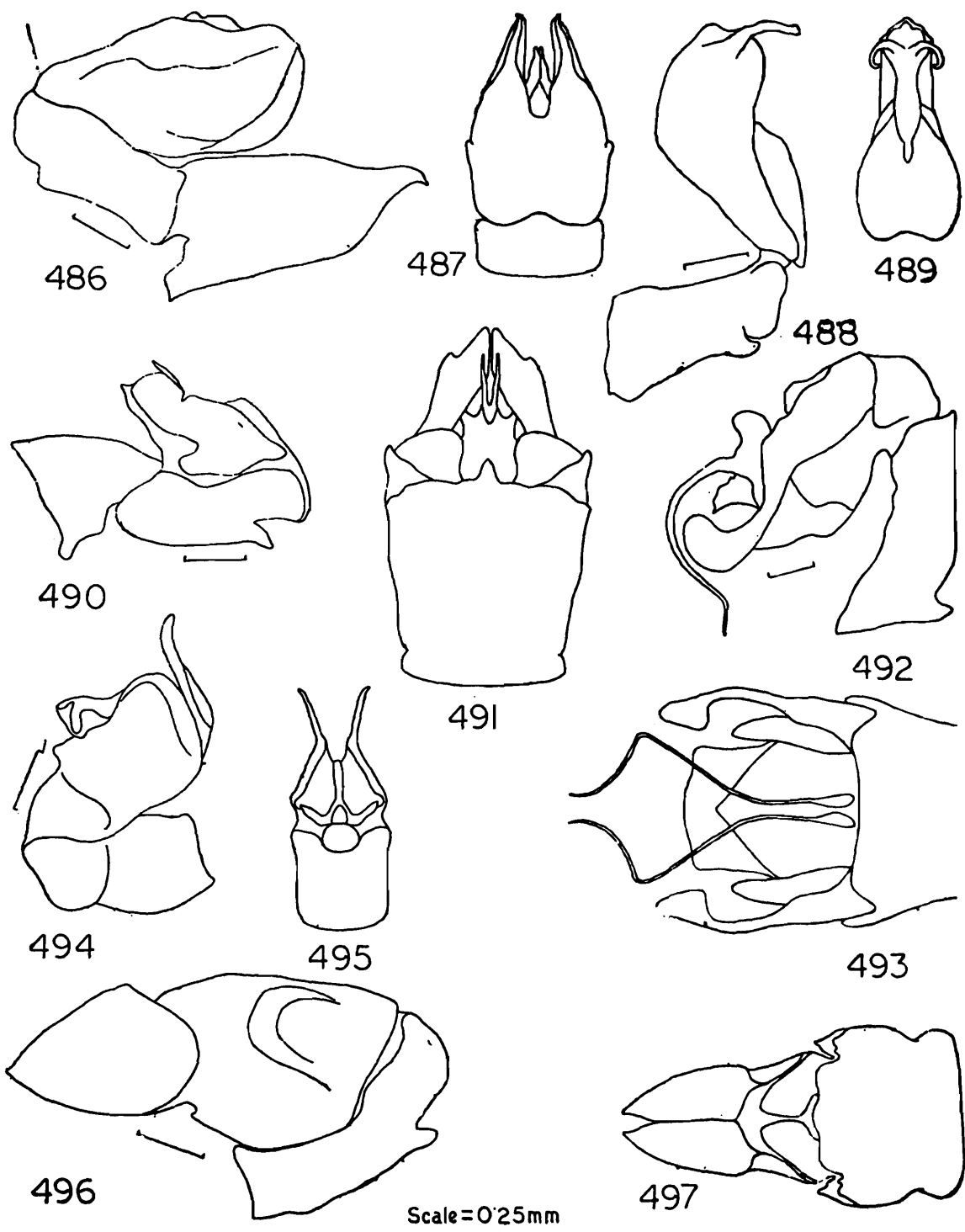
Figs. 488-489. *Trithemis festiva* (Rambur).

Figs. 490-491. *Trithemis pallidinervis* (Kirby).

Figs. 492-493. *Onychothemis testacea* (S.L.) Laidlaw.

Figs. 494-495. *Pantala flavescens* (Fabricius).

(Scale=0.26mm)



Figs. 498-509. Penis of dragonflies in lateral views and their apex, more magnified, in dorsal views respectively.

Figs. 498-499. *Palpopleura s. sexmaculata* (Fabricius).

Figs. 500-501. *Rhyothemis v. variegata* (Linnaeus).

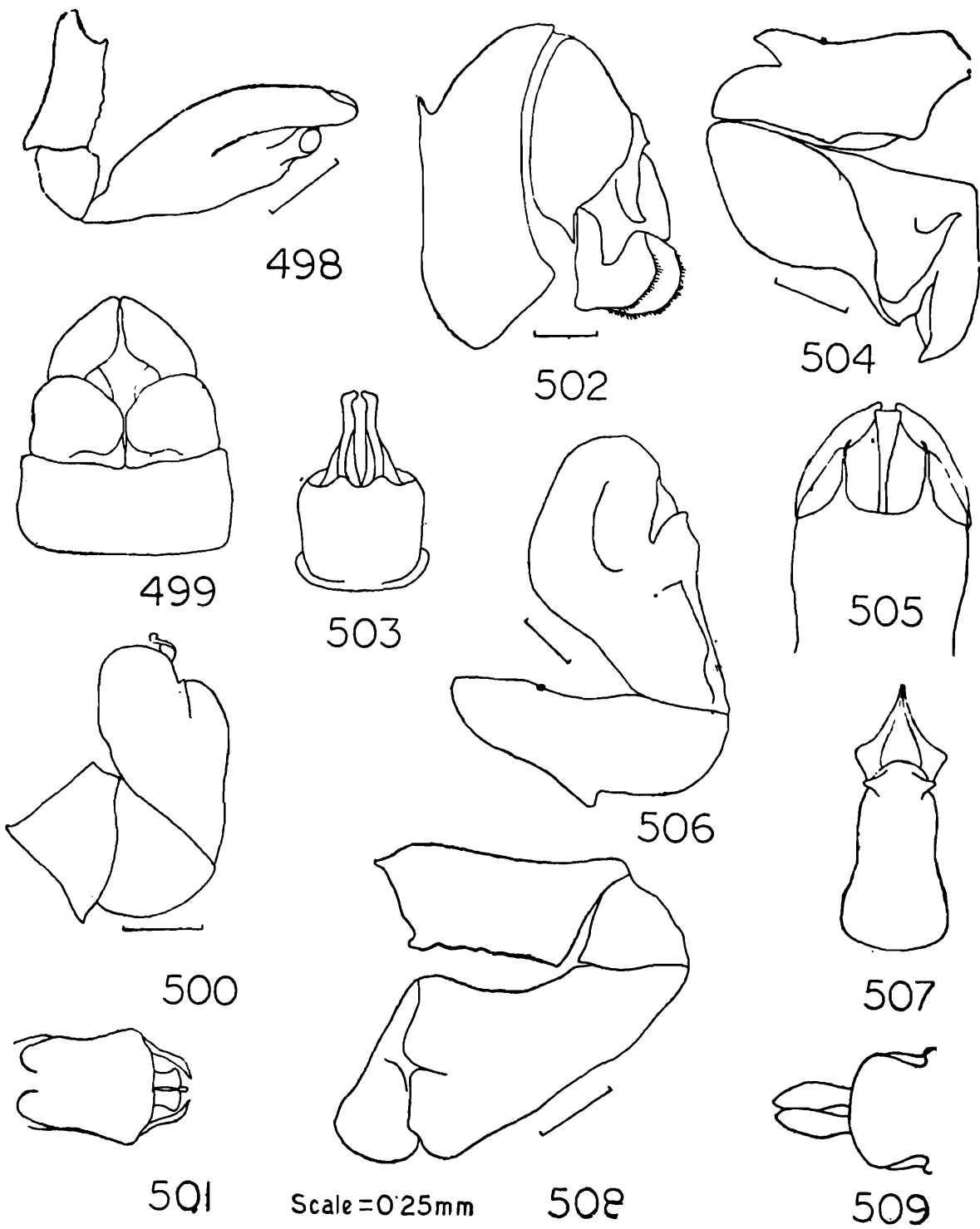
Figs. 502-503. *Tetrathemis platyptera* Selys.

Figs. 504-505. *Zygonyx iris intermedia* subsp. nov.

Figs. 506-507. *Tholymis tillarga* (Fabricius).

Fig. 508-509. *Urothemis s. signata* (Rambur)

(Scale=0.25 mm)



Figs. 510-515. Photographs of fore—and hindwings of male damselflies.

Fig. 510. *Rhinocypha beatifica* Fraser.

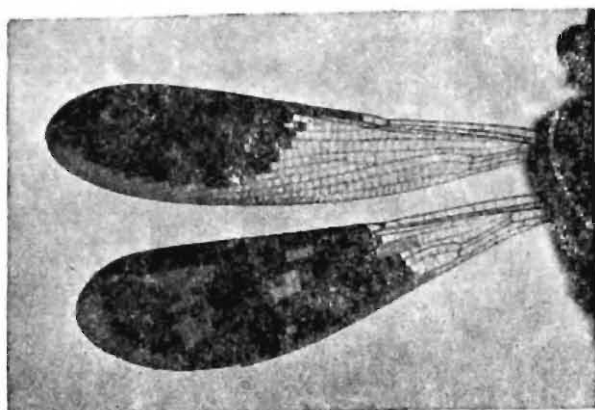
Fig. 511. *Rhinocypha biforata delimbata* Selys.

Fig. 512. *Rhinocypha ignipennis* Selys.

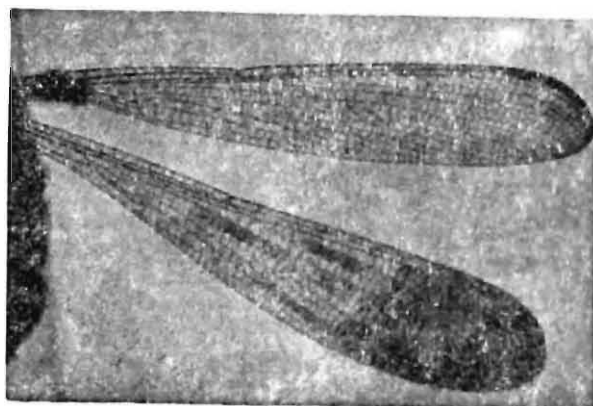
Fig. 513. *Rhinocypha q. quadrimaculata* Selys.

Fig. 514. *Rhinovypha spuria* Selys.

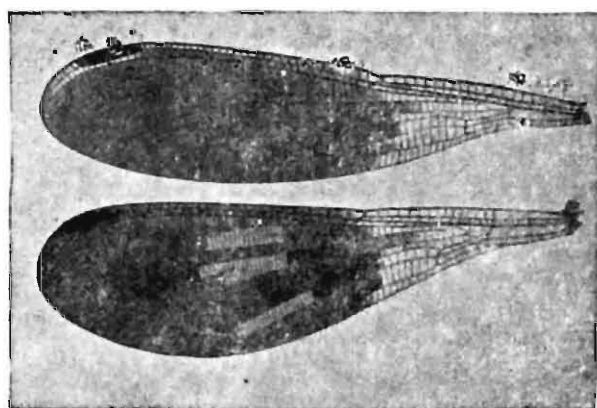
Fig. 515. *Rhinocypha vitrinella* Fraser.



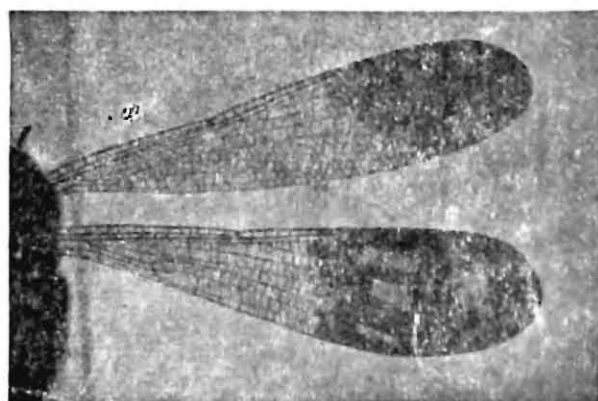
510



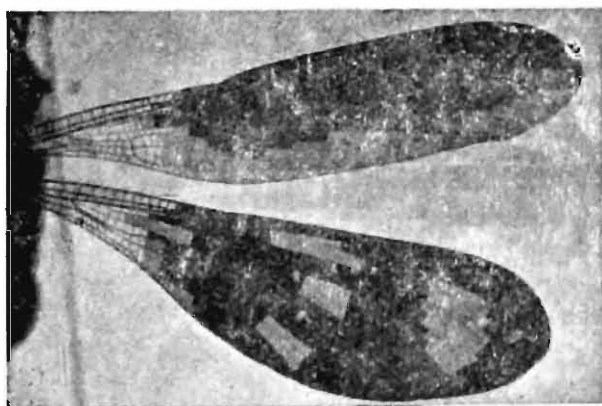
511



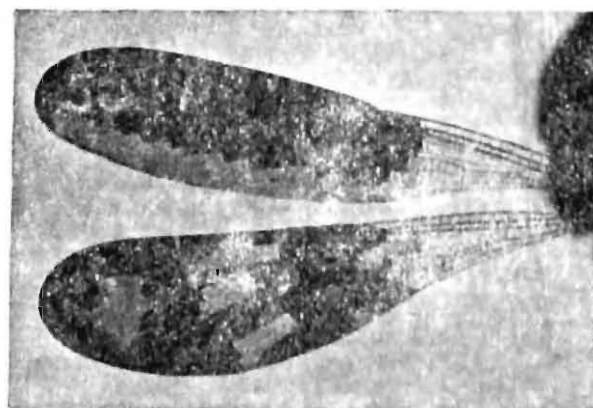
512



513



514



515

Figs. 516-521. Photographs of fore—and hindwings of male damselflies.

Fig. 516. *Anisopleura subplatystyla* Fraser.

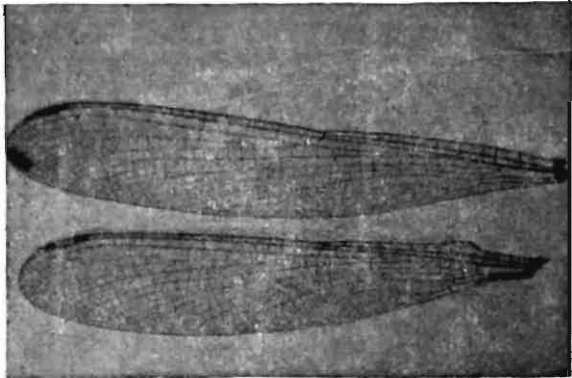
Fig. 517. *Caliphaea confusa* Selys.

Fig. 518. *Neurobasis c. chinensis* (Linnaeus).

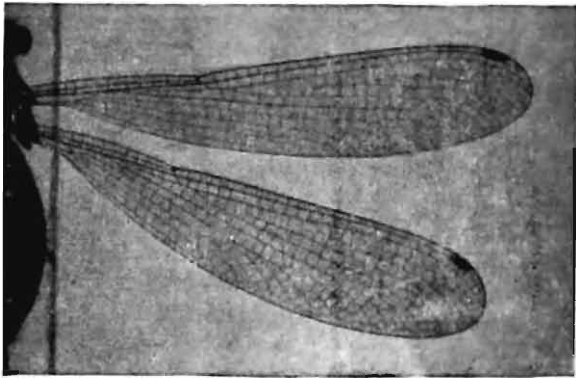
Fig. 519. *Megalestes raychoudhuria* sp. nov.

Fig. 520. *Orolestes durga* sp. nov.

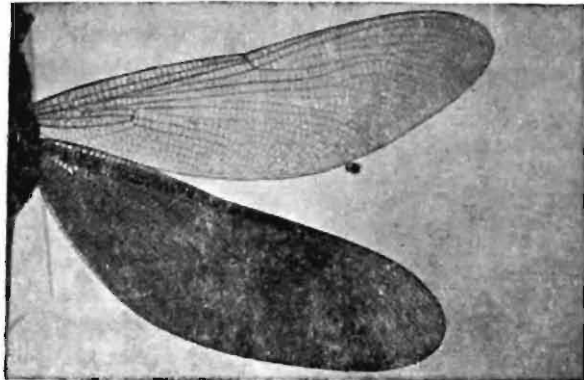
Fig. 521. *Elatoneura atkinsoni* (Selys).



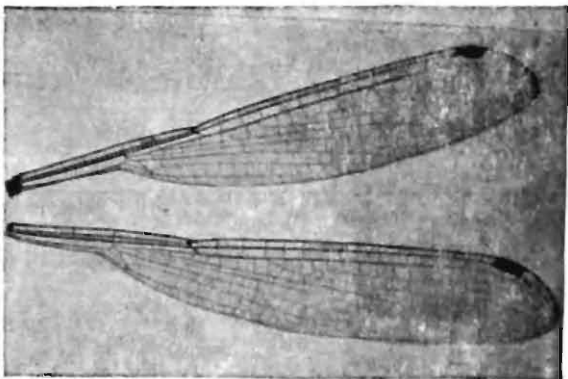
516



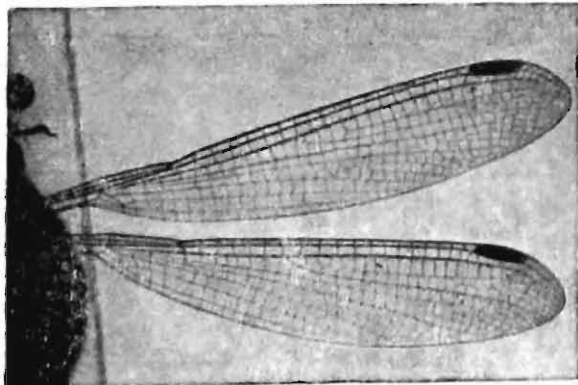
517



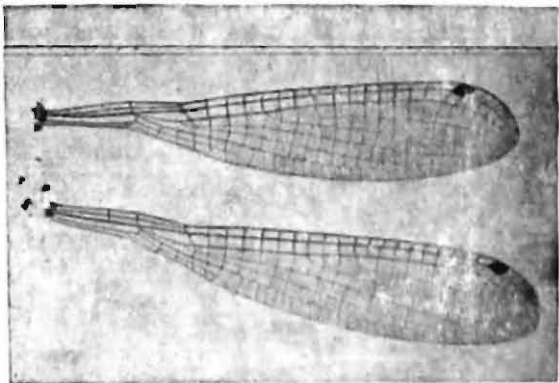
518



519



520



521

Figs. 522-527. Photographs of fore—and hindwings of damsel—and dragonflies

Fig. 522. *Copera vittata* (S. L) (Selys), male.

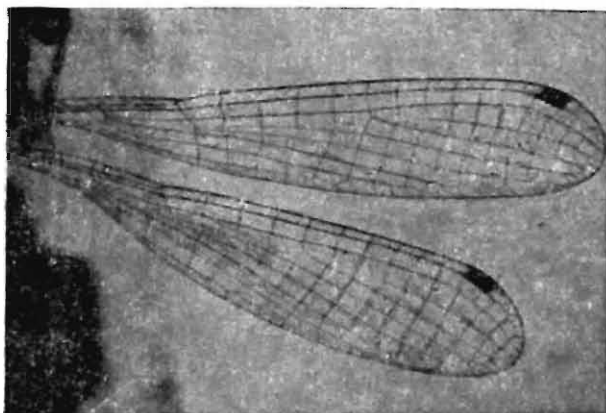
Fig. 523. *Coeliccia sarbottama* sp. nov., male.

Fig. 524. *Aclagrion tillyardi* Laidlaw, male.

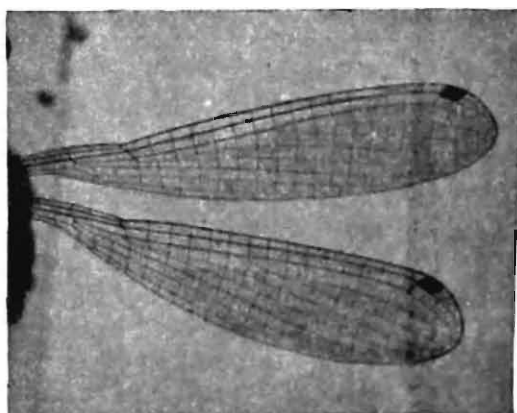
Fig. 525. *Nihonogomphus indicus* sp. nov.

Fig. 526. *Onychogomphus modestus* Selys, male.

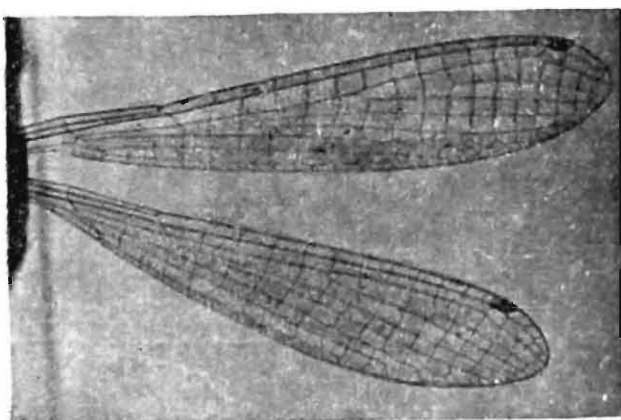
Fig. 527. *Paragomphus echinoccipitalis* (Fraser), male.



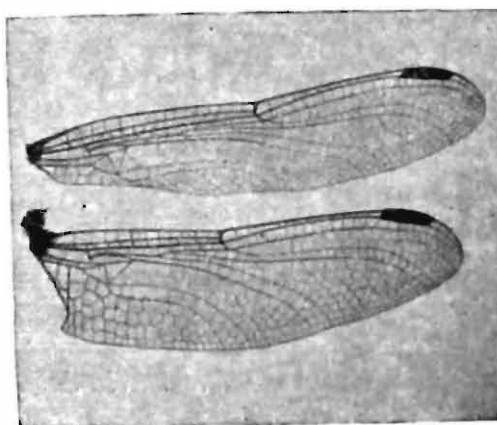
522



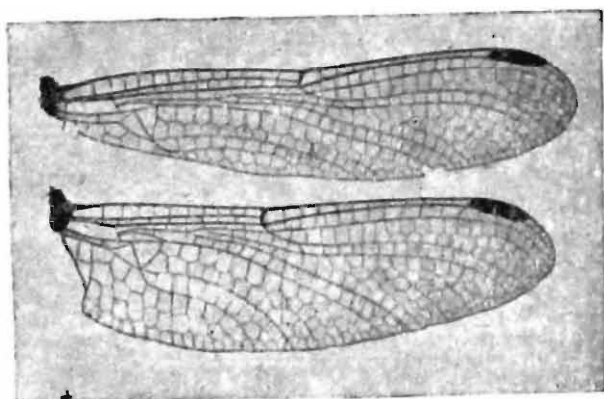
523



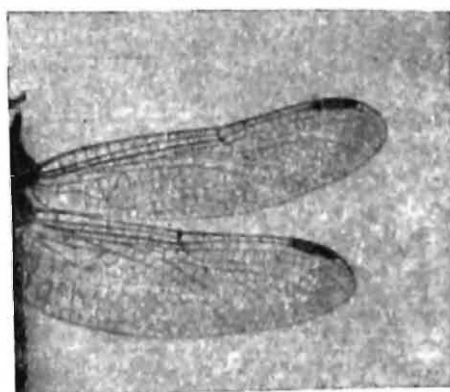
524



525



526



527

Fig. 528-533. Photographs of fore- and hindwings of dragonflies.

Fig. 528. *Perissogomphus stevensi* Laidlaw, female.

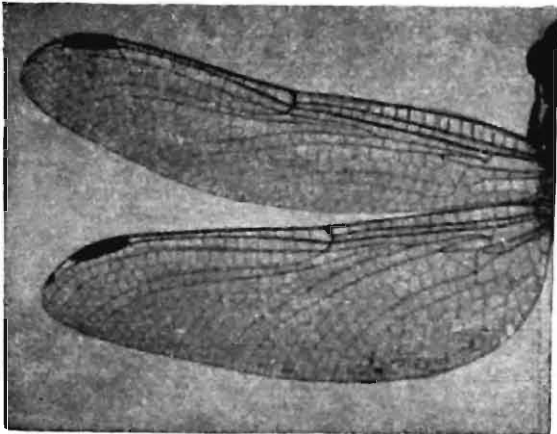
Eig. 529. *Onychogomphes aureus* Laidlaw, female.

Fig. 530. *Strylogomphus inglisi* Fraser, male.

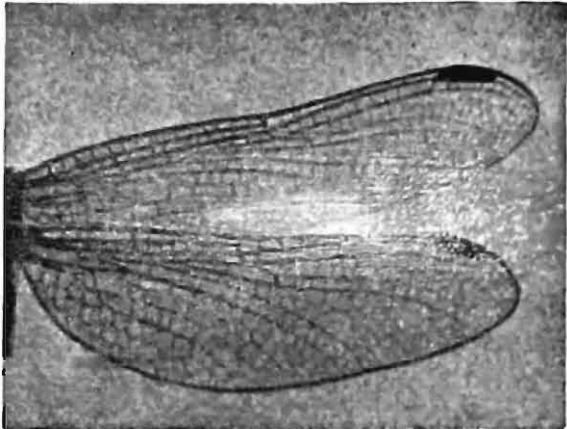
Fig. 531. *Periaeschna* ? *biguttata* (Fraser), female.

Fig. 532. *Chlorogomphus atkinsoni* (Selys), male.

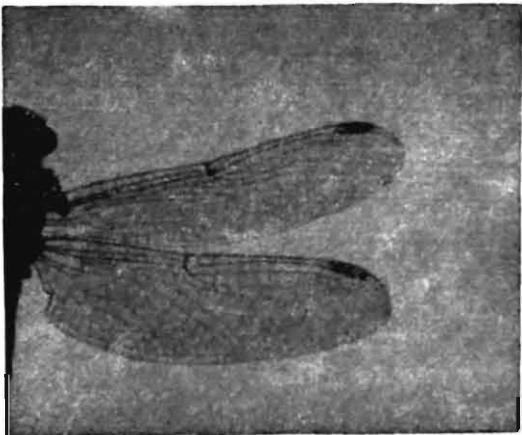
Fig. 533. *Hemicordulia asiatica* Selys, male.



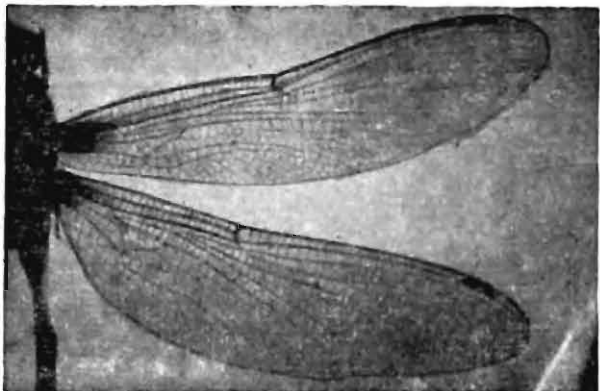
528



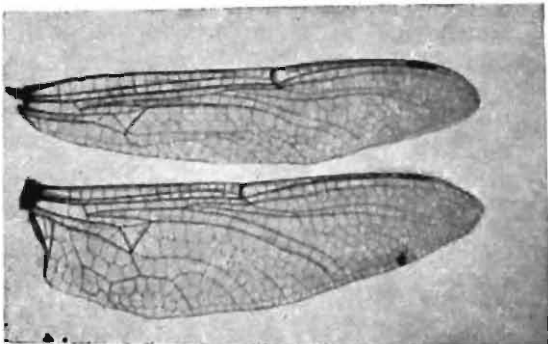
529



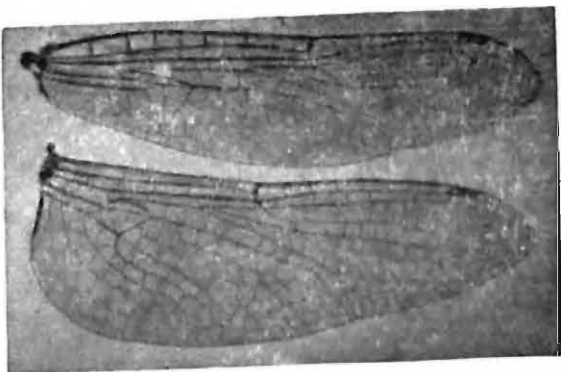
530



531



532



533

Fig. 534-539. Photographs of fore- and hindwings of dragonflies.

Fig. 534. *Macromia moorei* Selys, male.

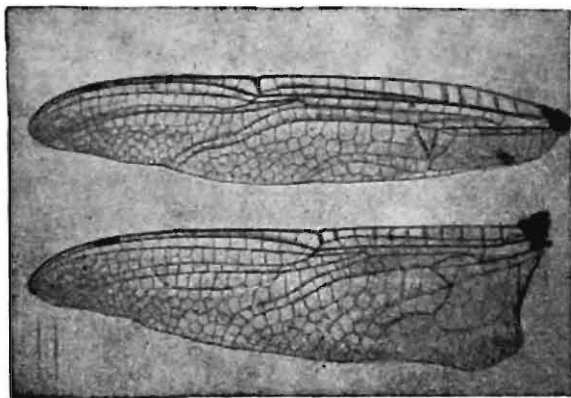
Fig. 535. *Tetrathemis platyptera* Selys, male.

Fig. 536. *Lyriothemis ? bivittata* (Rambur), female.

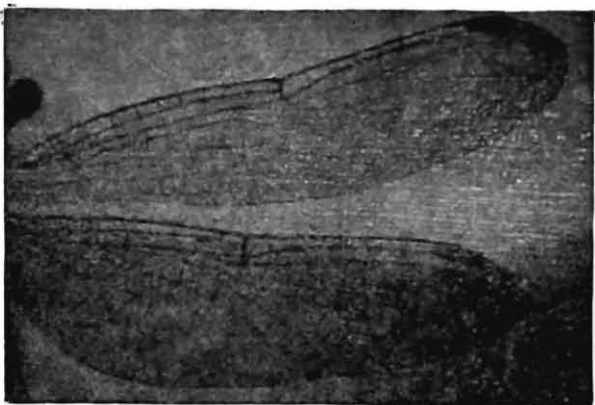
Fig. 537. *Palpopleura s. sexmaculata* (Fabricius), male.

Fig. 538. *Nannophya pygmaea* Rambur, male.

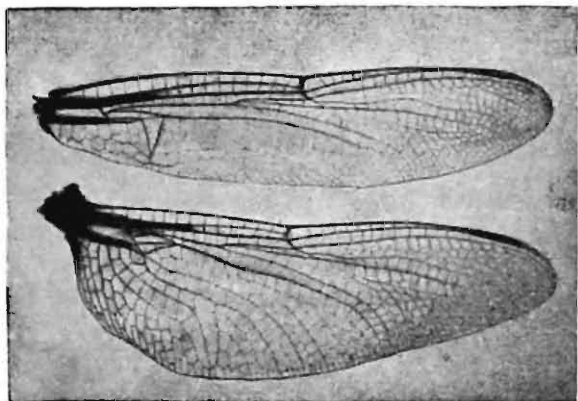
Fig. 539. *Pantala flavescens* (Fabricius), male.



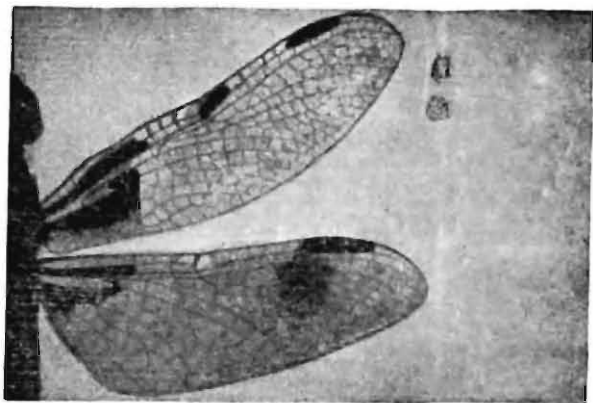
534



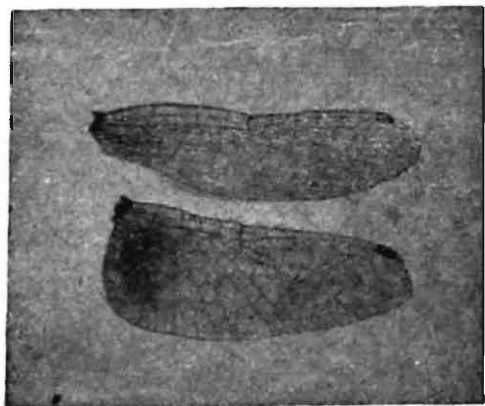
535



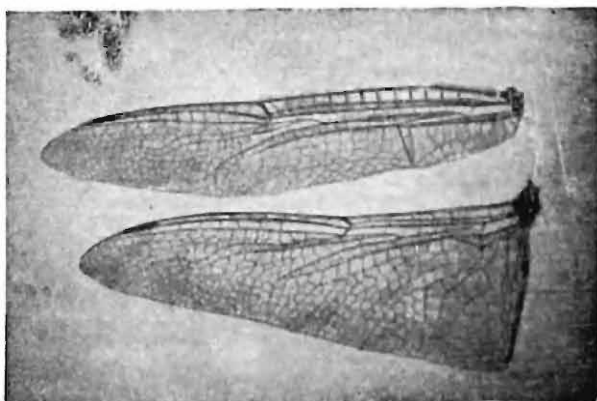
536



537



538



539

TAXONOMIC INDEX

<i>Aciagrion</i> Selys	90, 98
<i>Acisoma</i> Rambur	172, 193
Aeshnidae	115, 146
Aeshnini	146, 152
Aeshnoidea	114
<i>Agriocnemis</i> Selys	90, 106
Amphipterygidae	17, 18
Anactinae	152
<i>Anax</i> Leach	153
<i>Anisogomphus</i> Selys	116, 117
<i>Anisopleura</i> Selys	34
Anisoptera	16, 113
Anisozypgotera	16
<i>annulata</i> (Copera)	74, 75
<i>Anotogaster</i> Selys	159
<i>Argiocnemis</i> Selys	90, 110
<i>asiatica</i> (Hemicordulia)	166
<i>atkinsoni</i> (Chlorogomphus)	163
<i>atkinsoni</i> (Elattonura)	69
<i>atlanta</i> (N. intermedia)	205, 206
<i>aureus</i> (Onychogomphus)	132
<i>aurora</i> (ischnura)	104
<i>aurora</i> (Trithemis)	212
<i>australasiae</i> (Pseudagrion)	96
<i>Austroaeschna</i> Selys	147
<i>autumnalis</i> (Prodasineura)	72
<i>basilaris</i> (Matrona)	46
<i>bayadera</i> (Gynacantha)	156, 157
<i>Bayadera</i> Selys	34, 36
<i>beatifica</i> (Rhinocypha)	24, 25
<i>biforata</i> (Rhinocypha)	24, 27
<i>biguttata</i> (Periaeschna)	149
<i>bimaculata</i> (Coelicia)	82
<i>bivittata</i> (Lyriothemis)	176
<i>Brachydiplax</i> Brauer	172, 190
<i>Brachythemis</i> Brauer	173, 195
Brachytrini	146

<i>brunnea</i> (<i>E. ochracea</i>)	40
<i>Burmagomphus</i> Williamson	116, 119
<i>Calicnemia</i> Strand	73, 78
<i>Caliphaea</i> Selys	42
Caliphaeinae	41
Calopterygidae	18, 41
Calopteryginae	41, 43
Calopterygoidea	17
<i>campioni</i> (<i>Elattoneura</i>)	69, 70
<i>caudalis</i> (<i>Anisogomphus</i>)	118
<i>Ceriagrion</i> Selys	90
<i>chinensis</i> (<i>Neurobasis</i>)	48
Chlorocyphidae	18, 20
Chlorogomphinae	159, 162
<i>Chlorogomphus</i> Selys	162
<i>Chlorolestidae</i>	52
<i>clauseni</i> (<i>Agriocnemis</i>)	107, 108
<i>Coeliccia</i> Kirby	73, 81
Coenagrionidae	67, 89
Coenagrionoidea	17, 67
<i>concinus</i> (<i>Lestes</i>)	64
<i>confusa</i> (<i>Calliphaea</i>)	42
<i>congener</i> (<i>Potamarcha</i>)	187
<i>contaminata</i> (<i>Brachythemis</i>)	196
<i>Copera</i> Kirby	73
Cordulegasteridae	158
Cordulegasterinae	159
Cordulegasteriodes	114, 158
Corduliidae	164
Corduliinae	165
<i>coromandelianum</i> (<i>Ceriagrion</i>)	92
<i>croceus</i> (<i>Hydrobasileus</i>)	224
<i>Crocothemis</i> Brauer	173, 197
<i>delimbata</i> (<i>R. betifica</i>)	24, 27
<i>didyma</i> (<i>Coeliccia</i>)	82, 83
<i>Diplacodes</i> Kirby	173, 200
<i>dorothea</i> (<i>Lestes</i>)	64, 65
<i>duaricus</i> (<i>O. saundersi</i>)	136
<i>durga</i> (<i>Orolestes</i>)	61
<i>echinoccipitalis</i> (<i>Paragomphus</i>)	139

<i>Echo</i> Selys	43
<i>Elattoneura</i> Cowley	68
<i>Enallagma</i> Charpentier	80, 101
<i>Euphaea</i> Selys	34, 39
Euphaeidae	18, 33
<i>eximia</i> (<i>Calicnemia</i>)	79
<i>fallax</i> (<i>Ceriagrion</i>)	91, 92
<i>festiva</i> (<i>Trithemis</i>)	212, 213
<i>flavescens</i> (<i>Pantala</i>)	226
<i>fraseri</i> (<i>Coeliccia</i>)	82, 84
<i>fulvia</i> (<i>Neurothemis</i>)	205
<i>garoensis</i> (<i>Lestes</i>)	64, 66
<i>glaucum</i> (<i>Orthetrum</i>)	179
Gomphidae	115
Gomphinae	115
<i>Gomphus</i> Leach	116, 123
<i>gracilis</i> (<i>Vestalis</i>)	51
<i>Gynacantha</i> Rambur	155
Gynacanthaginae	152, 155
<i>Hemicordulia</i> Selys	165
<i>hyalina</i> (<i>Bayadera</i>)	37
<i>Hydrobasilius</i> Kirby	173, 223
<i>hypomelas</i> (<i>Sympetrum</i>)	209
<i>Idionyx</i> Hagen	167
<i>ignipennis</i> (<i>Rhinocypha</i>)	24, 28
<i>immaculata</i> (<i>Rhinocypha</i>)	24, 25, 29
<i>imitans</i> (<i>Calicnemia</i>)	79, 80
<i>indica</i> (<i>Bayadera</i>)	37, 38
<i>indica</i> (<i>Indolestes</i>)	59
<i>indicus</i> (<i>Nihonogomphus</i>)	128
<i>Indocnemis</i> Laidlaw	73, 88
<i>Indolestes</i> Fraser	58
<i>inglisi</i> (<i>Stylogomphus</i>)	145
<i>intermedia</i> (<i>Neurothemis</i>)	205, 207
<i>intermedia</i> group (<i>Neurothemis</i>)	205
<i>intermedia</i> (<i>Z. iris</i>)	216
<i>internum</i> (<i>O. japonicum</i>)	179, 181
<i>intersedens</i> (<i>Austroaeschna</i>)	148
<i>iris</i> (<i>Zygonyx</i>)	216
<i>Ischnura</i> Charpentier	90, 102

<i>japonicum</i> (<i>Orthetrum</i>)	179, 181
<i>kepmi</i> (<i>Indocimis</i>)	89
<i>lacteola</i> (<i>Agriocnemis</i>)	107, 109
<i>Lestes</i> Leach	60, 62
Lestidae	57
Lestinae	57, 60
Lestidoidea	17, 51
<i>Libellago</i> Selys	21
Libellulidae	167, 171
Libelluloidea	114, 164
<i>lineata</i> (<i>Libellago</i>)	22
<i>lineatus</i> (<i>Paragomphus</i>)	139, 141
<i>luzonicum</i> (<i>Orthetrum</i>)	179, 181
<i>Lyriothemis</i> Brauer	172, 175
<i>Macromia</i> Rambur	167, 169
Macromiinae	165, 167
<i>maculivertex</i> (<i>Onychogomphus</i>)	133
<i>margarita</i> (<i>Echo</i>)	44
<i>marginipes</i> (<i>Copera</i>)	74, 75
<i>martini</i> (<i>Merogomphus</i>)	126
<i>Matrona</i> Selys	43, 45
<i>Magalestes</i> Selys	53
Magalestinae	53
<i>meghalayanus</i> (<i>Onychogomphus</i>)	135
<i>Merogomphus</i> Martin	116, 125
<i>modestus</i> (<i>Onychogomphus</i>)	136
<i>montana</i> (<i>Philoganga</i>)	19
<i>moorei</i> (<i>Macromia</i>)	171
<i>mukherjeei</i> (<i>Calicnemia</i>)	79, 80
<i>Nannophya</i> Rambur	172, 191
<i>nebulosa</i> (<i>Diplacodes</i>)	201, 202
<i>neglectum</i> (<i>O. pruinatum</i>)	178, 179, 182
<i>Neurobasis</i> Selys	43, 47
<i>Neurothemis</i> Brauer	173, 203
<i>nigripectus</i> (<i>M. basilaris</i>)	46
<i>Nihonogomphus</i> Oguma	116, 127
<i>obscura</i> (<i>Argioctnemis</i>)	111
<i>ochracea</i> (<i>Euphaea</i>)	40
Odonata	16
<i>olivaceum</i> (<i>Ceragrion</i>)	92, 94

<i>Onychogomphus</i> Selys	116, 130
<i>Onychothemis</i> Brauer	172, 217
<i>optata</i> (<i>Idionyx</i>)	169
<i>orientale</i> (<i>Sympetrum</i>)	209, 210
<i>Orolestes</i> McLachlan	60
<i>Orthetrum</i> Newman	172, 177
<i>pallidinervis</i> (<i>Trihemisk</i>)	212, 214
<i>pallidum</i> (<i>Aciagrion</i>)	99
<i>Palpolpeura</i> Rambur	173, 187
<i>panorpoides</i> (<i>Acisoma</i>)	194
<i>Pantala</i> Hagen	173, 225
<i>Paragomphus</i> Cowley	116, 137
<i>Parvum</i> (<i>Enallagma</i>)	102
<i>Periaeschna</i> Martin	147, 148
<i>Perissogomphus</i> Laidlaw	116, 142
<i>personatus</i> (<i>Gomphus</i>)	124
<i>Philoganga</i> Kirby	18
Philoganginae	18
Platycnemididae	67, 73
<i>platyptera</i> (<i>Tetrathemis</i>)	174
<i>Potamarcha</i> Karsch	173, 185
<i>Prodasineura</i> Cowley	68, 71
Protoncuridae	67
<i>pruinatum</i> (<i>Orthetrum</i>)	178, 179, 182
<i>Pseudagrion</i> Selys	90, 95
<i>pygmaea</i> (<i>Agriocnemis</i>)	107, 109
<i>pygmaea</i> (<i>Nannophya</i>)	192
<i>quadrifasciata</i> (<i>Rhinocypha</i>)	24, 25, 30
<i>raychoudhuryi</i> (<i>Megalestes</i>)	54
<i>Rhinocypha</i> Rambur	21, 22
<i>rubriceps</i> (<i>Pseudagrion</i>)	96, 97
<i>rufostigma</i> (<i>Ischnura</i>)	104, 105
<i>sabina</i> (<i>Orthetrum</i>)	178, 179, 183
<i>sarbotama</i> (<i>Coeliccia</i>)	82, 86
<i>saundersi</i> (<i>Onychogomphus</i>)	136
<i>servilia</i> (<i>Crocothemis</i>)	198
<i>sexmaculata</i> (<i>Palpopleura</i>)	188
<i>signata</i> (<i>Urothemis</i>)	228
<i>sobrina</i> (<i>Brachydiplax</i>)	191
sp. A. (<i>Anax</i>)	154

<i>sp. A. (Gynacantha)</i>	156, 157
<i>sp. A. (Anotogaster)</i>	160
<i>spencei (Pseudagrion)</i>	96, 98
<i>spuria (Rhinocypha)</i>	24, 25, 31
<i>Sympecmatinae</i>	57
<i>Sympetrum</i> Newman	173, 208
<i>stevensi (Perissogomphus)</i>	143
<i>Stylogomphus</i> Fraser	116, 144
<i>subplatystyla (Anisopleura)</i>	35
<i>Tetracanthagyna</i> Selys	150
<i>testacea (Onychothemis)</i>	218
<i>Tetrathemis</i> Brauer	172, 173
<i>Tholymis</i> Hagen	172, 221
<i>tillarga (Tholymis)</i>	222
<i>tillyardi (Aciagrion)</i>	99, 100
<i>triangulare (Orthetrum)</i>	179, 184
<i>Trithemis</i> Brauer	173, 211
<i>trivialis (Diplacodes)</i>	201, 202
<i>tullia (Neurothemis)</i>	205, 207
<i>tripartita (E. margarita)</i>	44
<i>Urothemis</i> Brauer	172, 227
<i>vacca (Coeliccia)</i>	82, 87
<i>variegata (Rhyothemis)</i>	220
<i>vermicularis (Burmagomphus)</i>	121
<i>vestalis</i> Selys	43, 50
<i>virtrinella (Rhinocypha)</i>	24 32
<i>vittata (Copera)</i>	74, 76
<i>waterhousei (Tetracanthagyna)</i>	151
<i>Zygonyx</i> Hagen	172, 215
<i>Zygoptera</i>	16