

# **INVESTIGATION ON THE ALPHA SYSTEMATICS OF ACRIDOIDEA (ORTHOPTERA) OF KERALA**

Thesis submitted to the University of Calicut  
for the degree of  
**Doctor of Philosophy in Zoology**


**VIDHU PRIYA, A.**

Department of Zoology  
University of Calicut  
Kerala - 673 635  
India  
October, 2005

**DECLARATION**

I hereby declare that this is an authentic record of the work carried out by me under the supervision of Prof. T. C. Narendran, Department of Zoology, University of Calicut and no part of this has previously formed the basis for the award of any other degree or diploma as stipulated in the statutes of the University of Calicut.

**Date: 05. 10. 2005.**

  
**Vidhu Priya, A.**

DEPARTMENT OF ZOOLOGY  
UNIVERSITY OF CALICUT



**Dr. T. C. Narendran, FASc.**  
Professor & Head. (Retd),  
Calicut University,  
Kerala. 673 635.

Phone: (O) 0494 2401144 Extn 419  
(R) 0494 2400302

**CERTIFICATE**

This is to certify that this thesis is an authentic record of the work carried out by **Ms Vidhu Priya, A.** under my guidance and supervision in partial fulfillment of the requirement of the degree of Doctor of Philosophy in Zoology, under the faculty of Science of the University of Calicut. No part of this thesis has been presented before for any other degree.

It is further certified that the candidate has passed the M. Phil. Examination of the University of Calicut in August, 2001.

Date : 05 .10. 2005

  
**Prof. T. C. Narendran.**

## ACKNOWLEDGEMENT

*I am deeply indebted to my guide, Dr. T. C. Narendran, Professor and Head (Retd.), Department of Zoology, University of Calicut, for his expert guidance, precious advice, timely suggestions and immense patience, which formed the basis of the successful completion of my work.*

*Thanks are due to the University of Calicut for providing me the facilities and giving me the opportunity for carrying out this work.*

*For the facilities provided and for the fullest co-operation offered for carrying out my work, I am deeply grateful to Dr. Priyadarsanan, Ashoka Trust for Research in Ecology and the Environment, Bangalore.*

*I acknowledge with gratitude the help rendered by Dr Viraktamath, C. A. Professor (Retd), Department of Entomology, College of Agricultural Sciences, Bangalore, for identification of specimens and providing copies of papers.*

*I have a deep sense of gratitude to Dr. Rajmohana, ZSI, Calicut, for the helping hand she rendered me during the entire course of my work.*

*Dr M.C.Muralirangan, G.S.Gill Research Institute, Chennai, Mr Rajan, ZSI, Andaman and Nicobar Islands and Dr. Sarath, CARI, Andaman and Nicobar Islands are also remembered with appreciation for their co-operation extended to me.*

*I shall be failing in my duty if I do not thank my colleagues, Dr. Sudheer, Mr. Sinu, Ms. Merry, Mr. Kiran, Mr. Girish, Mr. Santhosh, and Ms. Sheeba for the support extended.*

*My heart felt thanks are due to*

- *My husband, Mr Shiva Shankaran, for his support and help that has made my thesis come true.*
- *My parents, Sri Aravind and Smt Vimala, whose inspiration and blessings are behind the completion of the work.*
- *My family members Mr Arun, Ms Rajalakshmy, Ms. Nirmuktha and my Mother in Law Smt. Devaki amma, for their well wishes and support .*
- *My daughter, Ms Hitha, though mentioned last deserves the utmost gratitude for permitting me to use the precious time that I should have spent with her.*

## TABLE OF CONTENTS

Sl.No	Contents	Page No
1	<b>Introduction</b>	1
2	<b>Review Of Literature</b>	11
3	<b>Materials and Methods</b>	23
4	<b>Terminology</b>	28
5	<b>Observations and Results</b>	32
	Key to families of Acridoidea	32
	Diagnostic features of family Acrididae	32
	Key to genera of family Acrididae	33
	Diagnostic features of family Pyrgomorphidae	36
	Key to genera of family Pyrgomorphidae	37
	 <b>Description of Species</b>	
	<b>FAMILY : Acrididae</b>	
	Subfamily : Gomphocerinae	
	1. <i>Dnopherula (Aulacobothrus) taeniatus</i> (Bolivar)	40
	2. <i>Dnopherula (Aulacobothrus) luteipes</i> (Walker)	42
	3. <i>Dnopherula (Aulacobothrus) socius</i> (Bolivar)	44
	4. <i>Dnopherula (Aulacobothrus) svenhedini</i> (Sjostedt)	46
	5. <i>Dnopherula (Dnopherula) bolivari</i> (Uvarov)	48
	6. <i>Dnopherula (Dnopherula) decisis</i> (Walker)	50
	Subfamily: Acridinae	
	1. <i>Acrida exaltata</i> Walker	53
	2. <i>Zygophlaeoba sinuatocollis</i> Bolivar	56
	3. <i>Parabida indica</i> sp.nov	59
	Subfamily: Oedipodinae	
	1. <i>Gastrimargus marmoratus</i> (Thunberg)	62
	2. <i>Locusta migratoria migratoria</i> Linnaeus	66
	3. <i>Oedaleus abruptus</i> (Thunberg)	69
	4. <i>Trilophidia annulata</i> (Thunberg)	72
	5. <i>Ditopternis venusta</i> (Walker)	76
	Subfamily: Hemiacridinae	
	1. <i>Euthymia finoti</i> Kirby	79
	2. <i>Spathosternum prasiniferum prasiniferum</i> Walker	82
	3. <i>Hieroglyphus banian</i> ( Fabricius)	86

	Subfamily: Oxyinae	
	1. <i>Cercina obtusa</i> Stal	89
	2. <i>Oxya hyla</i> Serville	93
	3. <i>Oxya japonica</i> ( Thunberg)	95
	4. <i>Oxya nitidula</i> Walker	97
	5. <i>Oxya tridentata</i> (Willemse)	99
	Subfamily: Coptacridinae	
	1. <i>Anupama absona</i> sp.nov	102
	2. <i>Epistaurus sinetyi</i> Bolivar	105
	3. <i>Coptacra ensifera</i> Bolivar	108
	4. <i>Eucoptacra ceylonica</i> Kirby	111
	Subfamily: Tropidopolinae	
	1. <i>Oxyrrhepes meyeri</i> Willemse	114
	Subfamily: Cyrtacanthacridinae	
	1. <i>Patanga succincta</i> ( Johansson)	117
	2. <i>Cyrtacanthacris tatarica</i> ( Linnaeus )	120
	Subfamily: Eyprepocnemidinae	
	1. <i>Tylotropidius varicornis</i> (Walker)	123
	2. <i>Eyprepocnemis hithae</i> sp.nov	126
	Subfamily: Catantopinae	
	1. <i>Mesambria keralica</i> sp.nov	129
	2. <i>Paraconophyma scabra</i> (Walker)	132
	3. <i>Catantops innotabilis</i> (Walker)	135
	4. <i>Stenocatantops splendens</i> (Thunberg)	138
	<b>Family : Pyrgomorphidae</b>	
	1. <i>Chrotogonus trachypterous trachypterous</i> (Blanchard)	141
	2. <i>Chrotogonus oxypterous</i> (Blanchard)	143
	3. <i>Neorthacris acuticeps acuticeps</i> Bolivar	146
	4. <i>Aularches miliaris miliaris</i> Linnaeus	149
	5. <i>Atractomorpha crenulata</i> Fabricius	153
	6. <i>Poekilocerus pictus</i> (Fabricius)	158
<b>6</b>	<b>Checklist</b>	161
<b>7</b>	<b>Summary</b>	184
<b>8</b>	<b>References</b>	187
<b>9</b>	<b>Plates</b>	
<b>10</b>	<b>Figures</b>	
<b>11</b>	<b>Publications</b>	

# INTRODUCTION

Vidhu Priya. A “Investigation on the alpha systematics of Acridoidea (Orthoptera) of Kerala” Thesis. Department of Zoology, University of Calicut, 2005

## **INTRODUCTION**

---

Tremendous scientific and technological achievements have been acquired in the latter half of the last century, especially in the frontier areas of biotechnology, atomic energy, and space research. Still we live amidst several irreversible catastrophes, the most pressing one of which is unprecedented loss of biodiversity on earth. Today we are faced with one of the greatest extinction spasms of geological history – the centinelan extinction – i.e. extinction of species, unknown before their extinction and hence unrecorded, is happening all around us. (Cherian, P.T, 2004)

Systematics plays a pivotal role in completing the inventory of world's biodiversity and its various components before they are lost forever. A large role is demanded from systematics by the extinction crisis. This is an uphill task because of the unsuspected vastness of biodiversity and vulnerability particularly in the tropic regions. Thus there is an over-riding importance of systematics and its creative role in fulfilling the emerging needs of science and society. (Pushpangadan & Nair, 2001)

Insects are by far the oldest, most numerous and smallest flying machines. Comprising 9.5 lakh described species, they account for more than 54% of all living organisms. The number of World's insect species is assumed to be 8 million (Hawksworth et. al, 1995). In this case the number of insect species so far known may account for hardly 11.9% of the total, leaving 88.1% still uncensored. Recent high profile of biodiversity as a scientific issue, is leading to increasing interest in insects because of their astonishingly high species richness. (Cherian, P.T, 2004)

Directly or indirectly most of the insects influence human life. They are of extreme value to mankind as they play an important role in the economy of the world. Some greatly benefit human society directly in the role of agricultural pollinators and food providers and indirectly in the form of parasites and predators of pests, weed controllers, scavengers etc. They affect human life adversely in the form of pests damaging crops and as vectors of diseases. Insects become pests when they conflict with human welfare, aesthetics or profits. Pest status of an insect population depends on abundance of



individuals as well as the type of nuisance or injury that the insects inflict. The short-horned grasshoppers are a category of pests that attack plants as short as rice to as tall as teak.

### **The Short-horned Grasshoppers**

Short-horned grasshoppers coming under superfamily Acridoidea are cosmopolitan insects being absent only from truly polar areas and few small groups of islands of oceanic origin. Very few species have global distribution, as distribution of these insects are limited owing to severe inhibiting ecological factors.

The size of these insects varies from small to large (15 mm to 70 mm). They are usually found on grounds in all sorts of herbs, shrubs, vegetations and agricultural fields. Majority are terrestrial and few live near edges of water sources (*Oxya* sp. and *Gesonula* sp. etc.).

Since grasshoppers are mainly phytophagous and depend largely on vegetation for food, some of them have gained considerable economic importance as enemies to mankind.

Grasshoppers that develop seasonal and occasional behaviour of mass migration are called 'locusts'. The reason for the migration though not obvious is apparently owing to stress of unexplainable nature. (Bhowmik 1985)

### **Ecological significance of Grasshoppers**

Grasshoppers exert an important ecological impact. Plant feeding by grasshoppers can deplete plant biomass and damage crops. It can shift plant community structure due to their differential plant preference; extreme cases can even cause ecosystem damage.

Grasshoppers are significant due to their role in nutrient cycle. Grasshoppers consume large amounts, often eating their own body weight in plant tissue daily, which may affect the relative abundance of plant species in an area. Grasshoppers also hasten the degradation of cellulose and other materials by breaking them to smaller units and even

their fecal matters are easily degradable and thus increase the availability of nutrients for plant growth.

Grasshoppers are also ecologically significant because they convert plant tissue into large units of animal material and serve as food for vertebrate animals. Grasshoppers are large enough and abundant enough that they attract large number of vertebrates such as reptiles, birds, skunks, raccoons, foxes and mice, which regularly consume them. Grasshoppers thus have a major role in the food chain.

### **Economic Importance Of Grasshoppers**

#### 1. As Crop Pests:

Both nymphs and adults devour many kinds of vegetation, particularly the succulent types. Most of them are minor pests occurring in small numbers on a wide range of crops. The following grasshopper are of major pest status:

*Hieroglyphus banian* (Fabricius): pest of rice and sugarcane.

*Hieroglyphus nigrorepletus* Bolivar: pest of millets, sugarcane and hemp.

*Oxya chinensis* Thunberg: pest of rice, millet and groundnut.

*Aularches miliaris* Linnaeus: pest of coffee, coconut, banana, cashew, grapevine and areca palm. In May 2005 there was an outbreak of this pest in Kanjikuzhi in Idukki district of Kerala and in certain parts of Kozhikode in May-June, 2005.

*Atractomorpha crenulata* Fabricius: pest of millets, pulses, groundnut, jute and vegetables.

*Chrotogonus* species: pest of pulses, groundnut, cotton and tobacco.

*Thiophidia* species: pest of sugarcane and groundnut.

*Acrida* species: pest of groundnut.

*Cyrtacanthacris* sp, *Eyprepocnemis alacris alacris* Serville, *Gastrimargus africanus* Saussure, *Catantops erubescens* Walker, *Patanga succincta* Linnaeus etc.: pests of millets.

A few species of grasshoppers, which sometimes occur in tremendous number and show mass migration, are called locusts. When locusts live in such crowded conditions, they

differ in both appearance and behaviour from solitary individuals of the same species. Locusts have been known for centuries as great agricultural scourge. Locust plagues are an ever present danger to agriculture and therefore to the lives of man in many subtropical and tropical countries. Uvarov (1951) has reported the economic losses due to locust plagues as being in the range of  $f$  30 million a year. A locust eats approximately its own weight of vegetation everyday and a swarm of several locusts consumes many tons of food in a day. Crops being devoured thus may even cause famine in minimum subsistence areas.

The common types of locusts are the migratory locust (*Locusta migratoria* Linnaeus) and the desert locust (*Schistocerca gregaria* (Forsk.)). The desert locust occurs in northern half of Africa and northern India. The different subspecies of the migratory locust have a range extending from west and south Europe and most of the African continent, through central and southern Asia to China and northern Australia.

#### 2.As Food:

The eggs, nymphs and adults of grasshoppers provide food for several predatory insects, spiders, frogs, reptiles, birds and mammals. They make a good fish bait, either living or dead. They are sometimes used even for human food. Locusts form an important dietary supplement during outbreaks. The Greeks ground locusts by mortars and made flour of them. They continue to be used as food in Mexico, Japan and Philippines. Some primitive tribes of N.America, India and other parts of world eat them. In 1975 when U.S. was overrun by their devastating hordes, people were advised to harvest grasshoppers by driving them into pits on ground or were herded into bed of coal by advancing people or fire.

#### 3. As intermediate host:

Certain flukes and round worms attack grasshoppers that serve as intermediate hosts for these parasites.

## Control

Various insecticides are used in the form of chemical sprays or dusts and poisoned baits, that kills either by contact or when eaten. Ploughing weeds and stubble fields exposes the egg masses and nymphs of grasshoppers. Parasitic insects laying eggs or larvae on grasshoppers also constitute a factor in their control. *Sarcophaga keliye* Alb. (Diptera: Sarcophagidae) parasitises grasshoppers by laying eggs on undersurface of their wings. *Epicauta vittata* Fabricius (blister beetle) (Coleoptera: Melalonthidae) larvae ravishes the nest of grasshoppers and devour eggs.

The indiscriminate use of insecticides on crops have lead to loss of biodiversity, appearance of insecticide resistant varieties, and hazardous residues in water, air etc. The grasshopper pest *Melanoplus spretus* Walsh (the rocky mountain grasshopper) has become extinct, the last live specimen reported being in 1902. The rocky mountain grasshopper was among the greatest impediments to the settlements of the Western United States. A commission was employed to suggest methods for the extermination of grasshoppers that recommended tactics like killing individuals or destroying egg beds. They killed as many as possible to avoid economic harm to themselves. This along with their habitat interference by man ultimately ended up in its extinction. The idea of IPM for pest control has thus arose which integrates chemicals along with the use of resistant plant varieties, predator and parasites, pheromones, hormones and lethal genes. All these methods are highly specific and can only succeed if the identity of the pest is accurately determined. Thus the taxonomic studies of grasshoppers become relevant.

## Biology

All grasshoppers are diurnal in their habit and greatly depend on sunlight for warmth. The grasshoppers live all over the world in open grasslands, feeding on grass or any other available leafy vegetation. Grasshoppers lay their eggs in groups which varies from 8 to more than 100, enclosed in a fairly tough case called an egg pod. The group of eggs is laid first and then a frothy liquid is poured over it. This solidifies rapidly, forming a spongy substance that serves to protect the eggs during the autumn and winter. The eggs are mostly laid a few inches deep in the soil with the help of ovipositor valves for

digging. After the eggs are laid, they undergo certain amount of development during incubation. The period of incubation varies according to the number of annual life cycles.

At the time of hatching, egg chorion becomes dry and splits longitudinally. When grasshoppers first emerge from the egg it is in the form of a vermiform larva. The young nymph is completely enclosed in a transparent sac, which has separate sleeves for the antennae and legs. The vermiform larvae work its way out of the egg pod by wriggling. As soon as it reaches the open air, it sheds its skin- the intermediate moult - and assumes a normal nymphal appearance.

The nymphs shed their skin four more times before becoming adults. Between each moult grasshoppers live uneventfully for a week, feeding by preference but almost taking any green thing at hand. During this time their abdomen lengthen by the extension of membrane between segments but the hard parts of the body do not change in size or shape. At the end of seven or eight days the insects cease their activities and remain quiet for a while, till the cuticle opens in lengthwise split over back of thorax and on top of head. Hoppers emerge from it carefully. The wing rudiments appear in the second instar in the form of downwardly directed lobes from the tergites of the second and third segments of the thorax. These wing pads become reversed in position in the last two nymphal instars, so that the costal margin is directed downwards in adult. The rate of development of the nymphs varies greatly with temperature. Sexual maturity is not reached until several days after the final moult. The emergence of grasshoppers usually occurs during the months of June, July. Males usually die after copulation and females after oviposition.

The mating call of grasshoppers is by stridulatory mechanism. The stridulation is usually produced by the friction between the tegmina and the hind legs. The tegmen is provided with a series of stridulatory veinlets in many grasshoppers and the inner side of hind femora is supplied with pegs, the friction of which with tegmina produces sound. The apparatus is well developed in males than females.

## SYSTEMATIC STATUS OF ACRIDOIDEA

The systematic position of Acridoidea as suggested in leading orthopterological and general entomological works is presented in the table.

Changes in the status of Acridoidea

AUTHOR	TAXONOMIC CATEGORIES		
	Order	Suborder	Super family
Jakobson and Bianki, 1904	Orthoptera	Acridoidea	-
Handlirsch 1908	Orthoptera	Acridoidea	-
Chopard 1920	Orthoptera	Locustoidea	-
Schroder 1925	Saltatoria	Locustoidea	-
Uvarov 1928	Orthoptera	Acridoidea	-
Ander 1939	Saltatoria	Acridoidea	Acridoidea
Chopard 1949	Orthoptera	Caelifera	Acridoidea
Shvanwitsch 1949	Orthoptera		Acridoidea
Bey-Bienko & Mistshenko 1951	Orthoptera	Caelifera	Acridoidea
Dirsh 1961	Orthoptera	Acridoidea	-

Handlirsch (1908) divided the order Orthoptera Latreille 1793 (=Saltatoria Latreille 1817) into suborder Locustoidea with the families Locustidae (=Tettigonidae) and Gryllotalpidae and the suborder Acridoidea with a single family Acrididae. Kirby (1914)

included seven families under the order Orthoptera, all short-horned grasshoppers were included under family Acrididae.

Ander (1939) divided the order Saltatoria into the suborders Ensifera and Caelifera, the first of which corresponds to Handlirsch's Locustoidea and the second to Handlirsch's Acridoidea, except that he transferred the family Tridactylidae to the suborder Caelifera as a superfamily. Acridoidea was considered as the second superfamily. Dirsh (1961) regarded Acridoidea as a suborder of the order Orthoptera,

The status and scope of families and subfamilies of Acridoidea have undergone many changes. In the revision of the families and subfamilies of Acridoidea by Dirsh (1961) fourteen families come under the suborder Acridoidea viz Eumasticidae, Proscopidae, Tanaoceridae, Pneumoridae, Xyronotidae, Trigonopteridae, Charifaidae, Pamphagidae, Lathiceridae, Pyrgomorphidae, Ommexechidae, Pauliniidae, Lentulidae and Acrididae.

Rehn (1948) divided the family Eumasticidae into seventeen subfamilies. One subfamily viz Tanacerinae has been raised to family rank by Dirsh (1955) and one new subfamily Socotrellinae was added by Popov (1957). Dirsh (1961) divided family Pamphagidae into four subfamilies and family Acrididae into sixteen subfamilies in 1965 viz Dericorythinae, Romaleinae, Lithidiinae, Hemiacidinae, Oxyinae, Coptacridinae, Tropidopolinae, Calliptaminae, Euryphyminae, Eyprepocnemidinae, Coptacridinae, Cyrtacanthacridinae, Eqnatiinae, Acridinae, Erymogryllinae, Truxalinae

The position of Tetrigidae also with short antennae has been a question. But the characters of the family like - the Pronotum almost covering the entire body, structure of the phallic complex, tegmina being strongly shortened, tympanum being absent and absence of areolae and one fore tarsal segment have given it the status of a separate suborder.

Studies carried out by Linnaeus (1758) stood first in the systematics of short-horned grasshoppers. Fieber, Schaum, Saussure, Uvarov, Dirsh and many others followed him. In India Kirby did remarkable work on systematics of grasshoppers in the posthumous

publication of fauna of British India including Ceylon and Burma Orthoptera, London Vol I. Valuable contributions are also given by workers like Bhowmik, Tandon, Shishodia, Day and Halder towards the taxonomy of short-horned grasshoppers in India.

The classification of Acridoidea, followed here is that of Dirsh (1965) which has been followed by most of the workers in India

### **Importance of the study**

A species level study grasshoppers is of great importance because:

- (1) Species vary in their biotic potential and their capacity for causing damage.
- (2) Certain species of grasshoppers are highly migratory and often pose a serious threat to distant crops.
- (3) Species vary in their seasonal cycle (period of hatching, development and reproduction), which in turn affects the timing of control treatment.
- (4) Because current chemical and biological methods of controlling grasshoppers are more sophisticated, their effective use require greater knowledge of the pest's life histories and habits.
- (5) As environmental impacts of control are more finely evaluated, recognition of pest species of grasshoppers has become essential in the selection of management strategies.

### **Species Diversity & Scope of the Study**

The present study includes the systematic aspects of the families Acrididae and Pyrgomorphidae of Acridoidea. Indian fauna of Acrididae comprises 13 subfamilies 138 genera and 310 species or subspecies while the world fauna considerably over 1000 genera and a neighbourhood of 6000 known species. From India about 19 genera and 40 species of Pyrgomorphids are reported and 148 genera and 440 species from the world. (Alfred et. Al., 1998)

The state of Kerala has been less explored for the systematic study of grasshoppers and its great potentiality has been exploited for this investigation. The present work has been



undertaken with a view to bring out the systematic data of Acrididae and Pyrgomorphidae of Kerala, to provide a workable key to the subfamilies, genera and species dealt with in this study.

# REVIEW OF LITERATURE

Vidhu Priya. A “Investigation on the alpha systematics of Acridoidea (Orthoptera) of Kerala” Thesis. Department of Zoology, University of Calicut, 2005

## REVIEW OF LITERATURE

---

The short-horned grasshoppers most of which form serious pests of crop plants come under the order Orthoptera and suborder Acridoidea.

The study of grasshoppers started off with LINNAEUS. In his "Systema Naturae"(1758) two genera of grasshoppers were erected, genus *Acrida* based on *Acrida turrata* as type species and *Locusta* based on *Gryllus Locusta migratorius* as type species.

In 1831 genus *Oxya* was erected by SERVILLE based on the type species *Oxya hyla* and the genus *Poekilocerus* based on the type species *Gryllus pictus* Fab. The genera *Chrotogonus* and *Pyrgomorpha* were described for the first time by SERVILLE in the year 1839. In 1852 FIEBER established the genera *Chorthippus* and *Spingonotus* for the first time. In 1853 FIEBER erected 3 more new genera *Bryodema*, *Acrotylus* and *Oedaleus*. In the same year SCHAUM erected the genus *Catantops* based on *Catantops melanosticus* Schaum as the type species and FIEBER established the genus *Stenobothrus* for the first time.

In 1860 genus *Phlaeoba* was described for the first time by STAL based on the type species *Gomphocerus rusticus* Stal. SAUSSURE erected the genus *Atractomorpha* in the year 1861, the type species being *Truxalis crenulata* Fab.

In the year 1870 WALKER erected four new genera. Viz. *Ceracris*, *Morphacris*, *Cyrtacanthacris* and *Heteracris*. STAL in the year 1875 described six genera for the first time. They are *Coptacra*, *Schistocerca*, *Tyiotropidius*, *Trilophidia*, *Aularches* and *Oxyrrhepes*. In 1877 KRAUSS described *Hieroglyphus* for the first time and *Spathosternum* by KARSCH

SAUSSURE (1884) erected the genus *Chloebora* based on the type *Chloebora grassa* Sauss. He also described *Pternoschta* and *Gastrimargus* for the first time in 1884. In 1884 genera *Orthacris* and *Aspidophyma* were established for the first time by Bolivar.

SAUSSURE (1884) erected the genera *Dittopternis Mecistopteryx* and *Erymopeza*. BOLIVAR erected genus *Gymnobotrus* in 1889 based on the type species *Gymnobotrus linea-alba* Bol.

In 1893 BRUNNER revised the world Orthoptera in which the short-horned grasshoppers were included in the family Acrididae containing nine subfamilies. In 1896 genus *Orthacanthacris* was described for the first time by KARSH. BOLIVAR (1897) erected the genus *Stauroderus* based on the type species *Stauroderus morri* Brunn.

BOLIVAR erected six new genera in the year 1902 viz. *Zygophlaeoba*, *Paraphlaeoba*, *Phlaeobida*, *Madurea*, *Aulacobothrus* and *Castetria*. Genus *Gelastorrinus* was described for the first time by BRUNNER in 1903. In 1904 BURR published a synopsis of Orthoptera of W. Europe. HANDLIRSCH (1908) divided order Orthoptera into suborders Locustoidea with families Locustidae (=Tettigonidae) Gryllidae, Tridactylidae and Gryllotalpidae and suborder Acridoidea with a single family Acrididae. *Colemania* was first established by BOLIVAR in 1910 based on the type *Colemania sphenarioides* Bol. In the same year KIRBY published a catalogue of synonyms of Orthoptera, Saltatoria.

A valuable contribution to Indian Acrididae was done by KIRBY in 1914 through the Fauna of British India and Ceylon. He described a number of new species and new genera *Kripa* and *Aswatthamanus* in the faunal volume.

In the 20<sup>th</sup> century a good number of contributions were made by UVAROV. In 1921 he published a work Records and Descriptions of Indian Acrididae (Orthoptera). In the year 1923, he revised tribe Cyrtacanthacridini of the Old World with a key to its genera. A revision of genus *Ceracris* Walker was done in 1925. In 1927 he made a distributional record of Indian Acrididae. HEBARD in 1929 studied the Acrydiinae of southern India.

In 1932 again a revision was carried out by UVAROV on the genus *Brachycorthapus* Krauss. In 1933, description of a new Indo-Malayan Acrididae was done by WILLEMSE. In 1935 UVAROV published notes on Acrididae of southern China, In the

same year MILLER published a paper on new and little known Malayan Acrididae. ANDER (1939) divided the order Sanatoria into suborders Ensifera and Caelifera; he transferred the family Tridactylidae to suborder Caelifera as a superfamily.

New and little known South Indian Acrididae was studied by HENRY in 1949. ROBERTS (1941) made a comparative study of subfamilies of the Acrididae, primarily on the basis of phallic structure. REHN and REHN (1941) made a study on the Orthoptera of Philippine Island particularly group Cyrtacanthacridines of subfamily Cyrtacanthacridinae. In 1943 Uvarov revised the group Mesopsis. REHN (1948) divided the family Eumasticidae into 17 subfamilies.

DIRSH (1950) revised the group Truxales. In 1951 WILLEMSE studied the Acridoidea of Indo-Malayan region and set up a synopsis of the subfamily Acridinae. REHN made a study on the genus *Gesonula* (Cyrtacanthacridini) in 1952. A new subfamily Charilainae of Acrididae was formulated by DIRSH in 1953. A revision of the species of *Acrida* Linn was done by DIRSH in 1954. In 1955 WILLEMSE prepared a synopsis of subfamily Catantopinae of Indo-Malayan region. Subfamily Tanacerinae has been raised to family rank by DIRSH (1955). DIRSH (1956a) studied the phallic complex of Acrididae in relation to their taxonomy. DIRSH (1956b) revised the genus *Catantops* and reviewed the group Catantopinae. JOHNSTON (1956) prepared an annotated catalogue of grasshoppers of Africa. Rehn in the year 1957, studied grasshoppers of Australia, coming under the tribe Oxyni, Spathosterni and Pruxubulini of subfamily Cyrtacanthacridinae, family Acrididae. The Genus *Eyprepocnemis* Fieber was revised in 1958 by DIRSH.

BANERGEE and KEVAN (1960) revised the genus *Atractomorpha* Saussure in 1961 DIRSH made a revision of the families and subfamilies of Acridoidea, fourteen families were included in the suborder Acridoidea. In the same year, EADES studied the tribes and their relationships of the subfamily Ommexechinae of Acrididae. KEVAN (1963a) revised the tribe Desmopterini of Pyrgomorphidae and genera *Mitricephala* and *Verdilia* of family Pyrgomorphidae (1963 b). In 1964, BHOWMIK described a new

species of grasshopper *Chlorizoina roonawali*. KEVAN and AKBAR studied the systematics, tribal division and distribution of grasshoppers of family Pyrgomorphidae. KEVAN and SINGH in the same year erected a new genus and subgenus of Orthacridini of Pyrgomorphidae. DIRSH in 1965 published the African genera of Acridoidea, in which the terminologies used in the taxonomy of Acridoidea are also given. HOLLIS (1965) revised the genus *Trilophidia*. The genus *Orthacris* Bolivar and its allies including *Neorhacris* (Pyrgomorphidae) was studied by ASKET SINGH and KEVAN in 1965. UVAROV in 1966 published a handbook of general Acridology. KEVAN in 1966 made additions to Verdulini of Pyrgomorphidae with a key to the genera and described some caelifera from Philippines, Bismarc and Solomon Islands with a few interesting records from New Guinea and Mluccas. In 1968 he studied the genus *Chrotogonus* Audinet Serville and in 1969 revised the Asiatic Chlorizenini of Pyrgomorphidae. In 1969, a collection of Acridoidea from Nagarjunsagar dam was studied by TANDON AND SHISHODIA

HOLLIS (1970a) revised the genus *Tristria*. HOLLIS (1970b) revised the genus *Oxya* in which the genus was redescribed and a key given to 18 species and 6 subspecies. KEVAN in the same year studied Indian Pyrgomorphini other than *Pyrogomorpha*. The problems of Bombay locust *Patanga succincta* was described by RAMACHANDRA RAO (1970). In 1971, JAGO reviewed the Gomphocerinae of the world and a key to the genera was formulated. HOLLIS (1971) revised genus *Oxya* Audinet Serville. MASON (1973) revised the genera *Hieroglyphus* Krauss *Parahieroglyphus* Carl and *Hieroglyphodes* Uvarov. In the same year the identity and distribution of the genus *Xenocatantops* Dirsh and Uvarov was detailed by TANDON.

HOLLIS in 1975, published a review of subfamily Oxyinae, Acrididae. DIRSH in 1975 classified Acridomorphoid insects. TANDON in 1975 studied the collection of Orthoptera from Tons valley, U.P. and in 1976 along with SHISHODIA studied the collection from Garhwal, U. P.

In 1976 TANDON prepared a checklist of the grasshoppers of India coming under Acrididea. In the same year MOEED erected a new species of *Oxyptema* Ramme, which was named *Oxypterna akbari*. KEVAN and TANDON studied the occurrence of subtribe Mekongeanina Kevan & Akbar of India in 1976. KEY in 1977 revised the tribe Morabini of family Eumasticidae up to species level. MASON (1977) studied the Acridoidea of South West Angola in which three new species were described. In the work a total of 95 species of 4 families were dealt with. CHENG (1977) described genera *Pseudoptigonotus* and *Kinshaties* for the first time along with a few new species. In 1977 TANDON and SHISHODIA reported 21 species in 17 genera and 2 families from Goa. In 1978 RENTZ revised the marginatus group of genus *Melanoplus*. The group reported from California has 24 species of which eleven are reported to be new. A key and distribution map was given along with. CHANG, WANG and KAN in 1978 studied locusts of Lanchow and its vicinity and recorded a total of 34 species, including one new species. SINGH in the same year described a new species *Brachycrotaphus hosiarpurensis* of Acrididae from North West India. In 1979 and with TANDON, a new species *Cataloipus* Bol was described.

ROFFEY (1979) studied the grasshoppers and locusts of economic importance of Thailand. OTTE in the same year revised grasshoppers of the tribe Oxphulelline, Acrididae in which the synonyms of *Orphullella* are also given. LIU (1979) studied locusts and grasshoppers from Sinkiang Uighus Autonomais Region with description of two new species of the genus *Beybientia*. POPOV and KEVAN (1979) revised the genus *Poekiloceus* Audinet Serville.

ZHEN (1980) described for the first time the species *Kingdonella pienbaensi*, *Gonista yunnana* and *Hypemephia xizangensis* along with illustrations. LAOSINCHAI and JAGO erected a new genus *Pseudotralia* based on *Pseudotralia corwata* in 1980 and synonyms of two genera were found out. RENTZ and WEISSMAN in the same year made an annotated checklist of the genera *Aerochoreatus*, *Circotettix* and *Tfimerotropis*. STOROZHENKO described and illustrated the new species *Zubovskia mistshenkoi* in 1980. KEY and KEVAN together revised the Australian Atractomorphi and FURROW

and COLLESS analysed the inter relationship of geographical races of *Locusta migratoria* by numerical taxonomy with special reference to sub speciation in the tropics and affinities of the Australian races in 1980.

In 1981, MISCHENKO erected a new species of genus *Asulconotus* Ying from Tibet. ZHEMIN and GOW described and illustrated two species each of Pamphagidea and Acrididae from Ningsiakansu region of China for the first time. PENG JU established a new species of *Euthystria* Fieber from Xinjiang region, the species being *Euthystria xjnyuanensis* and its morphology was described. ZHEMIN in the same year erected a new genus and 4 new species of Catantopinae from the southern part of Yunnan. BI and HSIA made a study on Chinese *Atractomorpha* with descriptions of four new species. RITCHIE (1981) made a taxonomic revision of the genus *Oedaleus*.

In 1982, JAGO studied the African genus *Phaeocatantops* Dirsh and its allies in the old world tropical genus *Xenocatantops* Dirsh with description of new species of Catantopinae. In the next year, he revised the genus *Gastrimargus* Saussure. LI (1982) made new records of grasshoppers from China. ZHEMIN 1982 reported a new *Phonogaster* grasshopper - *Phonogaster longigeniculate*, from Wang Mo Guizhou Province of China. In 1983 USMANI and SHAFEE erected a new genus and a new species of subfamily Acridinae. They were described with illustrations. VICKERY and KEVAN (1983) published a monograph of Orthopteroid insects of Canada and adjacent regions. JAGO (1983) studied the synonyms of *Nomadachs* and sited the new incorrect nomenclatural changes. BHOWMIK and HALDER (1983) made a distributional record with remarks on little known species of Acrididae from Western Himalayas and erected a new species of *Gerania* Stal.

USMANI and SHAFEE (1984) erected a new tribe of Oxyinae viz. Gesonulini, a key of subfamily Oxyinae is given along with. BHOWMIK and RUI (1984) prepared notes on collection of grasshoppers of Acrididae from Siwalik Hills. BHOWMIK in 1984 reported a collection of Orthoptera from districts of Purulia and Bankura of W. Bengal, and with HALDER studied 12 species of newly recorded grasshoppers from W. Bengal. In the same



year two new genera and 5 new species of grasshoppers were reported from Gansu China by LIAN and ZHEMIN. HUANG and XIA also in the same year erected four new species from Yunnan province of China. In 1985 BHOWMIK published an index catalogue of Indian grasshoppers of subfamilies Acridinae, Truxalinae Gomphocerinae and Oedipodinae along with an outline of distribution. KEY (1985) published a monograph of the Monistriini and Petasidini of Pyrgomorphidae. In this numerical taxonomic study was made of endemic Australian tribe Monistriini auct in relation to the African and Indian Poekilocerini. USMANI and SHAFEE revised Indian species of *Oxya* in 1985. The same authors described a new species *Ramakrishnaii kevani* from South India in the same year. LI, JI and LIN described two new species of grasshoppers from Guanxi region - *Caryanda gluaca* and *Eoscyllina ruffitibialis*. BHOWMIK made a redescription of *Peripolus pedarius* Stal from India in 1985. SHISHODIA and HAZRA in 1985 reported 7 species in Acridoidae from Nambdapha and Tirap districts of Arunachal Pradesh. In the same year KESAVARAM studied the collection of grasshoppers in the govt. museum Madras.

In (1986a) BHOWMIK studied the grasshopper fauna of West Bengal and also described three new species of grasshopper from India (1986b). KEY set up a provisional list of synonyms of Australian Acridoidea in the year 1986. GUAYGOOM, ALI and RAMZAN investigated the phenetic relations with respect to 24 genera of Acridoidea of Faisalabad in 1986. In 1986, SRINIVASAN studied grasshoppers from the Tamilnad Uplands – Eastern Ghats. In the same year LIANG, CHEN described a new species of genus *Phlaeobida* Bol. *Phlaeobia chloromana* from Hainan Island. MISTSHENKO (1986) studied the distinct species and probable synonyms of genus *Ocheilidia* Stal. Liu described a new species of *Asonus* - *Asonus qinghaiensis* in 1986.

In 1987 JOHNSEN studied the Acridoidea of Zambia. LIU and YIN studied the genus *Caryanda* stat of China in 1987. The study included key to twelve known species of China and the description of three new species of the genus from China. BLADERSON and Lin in 1987 studied the grasshoppers collected in Nepal, which included the details of 49 species belonging to 2 superfamilies 5 families 15 subfamilies, and 37 genera of

which one genus and 11 species were described new. In the year 1987 LI and YOU described two new species of *Eoscyllina* viz. *E. yaoshanensis*, *E. guangriensis*. Huang erected one new species viz, *Myrmeleotettix kunlunensis* and LIU described the new species *Cherthippaus changhaishanensis*. In 1988, TANDON studied the distributional pattern of Oxyinae of India and along with HAZRA and MANDAL, made an observation of the field biology and ecology of some grasshoppers near Calcutta. In the year 1988, HUANG described a new species *Pedopodisma dolichypyga* and *Pedopodisma epacroptera*. ZHEMIN, HUANG and LIU established new species *Geniman yunnanensis* and LIANG and ZHENG described the new species *Chlorophaeoba longiceps* from Hainan Island.

In 1989 KEY revised the genus *Praxibulus*. Keys to males and females were given separately. INGRISH (1989) published records, descriptions and revisionary studies of Acrididae from Thailand and adjacent regions. In this genera 8 species and one subspecies from Thailand are new to science. One genus two species and one subspecies previously described from Burma and China were listed as synonyms- Phallic complex of 7 species was first described from Indo-Malayan region. SHAFEE and MEINODAS (1989) described the taxonomic significance of sub genital plate of females in some Indian grasshoppers. Two new species, *Paratonkinachs lushanensis* and *Ceracrisoides virides* were described by ZHENG and YANG in 1989. In the same year, new species was erected by LIANG - *Sinacris longipennis* of genus *Sinopodisma* from Guangdong province, ZHEMIN and MA EN BO of genus *Stolzea* and Zhemín of genus *Chorthippus* from Liupanshan region.

KHAN (1990) identified six grasshoppers with the help of their excreta. The acridid grasshoppers *Cyrtacanthachs tatarica taracris Pulcher*, *Schistocerca gregaria*, *Poecilocerus pictus*, *Chrotogonus trachyptervs* and *Acrotylus humberianus* were identified with the help of their faecal pellet size, colour and shape. ZHANG and KIALING 1990 erected a new genus and species *Yupodisma ivfipennis* from Henan province of China. A new species of the genus *Aeuropedellus* was described for the first

time by KANG and CHENG in 1990. *Calliptamus baiulus* collected from Tasmania by Erichson in 1842 was rediscovered and described with figures by KEY in 1990.

JOHNSON in 1991 studied the Acridoidea of Botswana and included Truxalinae and Gomphocerinae under the study. In 1991, KUMAR and VIRAKTAMATH prepared an illustrated key for the identification of common species of short horned grasshoppers of Karnataka, which included 59 species under Acrididae and Pyrgomorphidae. Notes on their ecology and behaviour were also included. Key (1991) erected 2 new genera *Truganinia* and *Tasmanalpina*, described them and redescribed the *Tasmanalpina* genera *Russolpia* Sjostedt and *Tasmaniachs* Sjostedt, all endemic to Tasmania. ZHENG described a new genus and new species for the first time in 1991 from Jumping Shan Region of Sichuan. A general note on Acrididae and Pyrgomorphidae were given by SHISHODIA in 1991.

BLADERSON and XIANGCHU (1992) studied the grasshoppers collected from Himalayas, Kashmir. Details were given for fourteen species of Eumasticoidea and Acridoidea. Key (1992a) carried out a higher classification of Australian Acridoidea belonging to subfamily Acridinae. BHOWMIK in 1992 reported 29 species from Bihar district. Again KEY (1992b) revised comprehensively the genus *Phaulacridium*; two Australian and two New Zealand species were recognized and described, of which *Phaulacridium crassum* and *Phaulacridium howeanum* were new. Distribution of all species are plotted and interpreted. FENGLING and BINGEHENG in 1992 described a new species, *Euchorthippus dahinganligensis*. The species *Heteroptemis latisterma* was described from Henan province of China by YURSEN and KAILING in the same year. YUWEN and ZHENG described a new species of *Chorthippus* from Qinghai province of China. MA EN BO and ZHENG described *Caryanda rufofemorata* for the first time in 1992 and its C banding karyotype was analyzed. ZHEMIN with LIMIN described a new species of the genus *Squaroplantecris* for the first time.

In 1993 a review of oriental species of *Dnopherula* Karsch was done by INGRISH. *Dnopherula* earlier known as *Aulacobothrus* was revised from European collection, nine

species and subspecies were redescribed and illustrated. INGRISH (1993b) studied the taxonomy and stridulation of Gomphocerinae and Truxalinae of Thailand. SHISHODIA, MITRA and TANDON studied the orthoptera of Andaman & Nicobar Islands in 1993. In the same year (1993), MURALIRANGAN, SURESH and PARTHOPARTHIM studied species diversity, density and distributional pattern in Peninsular India. YAO and ZHEMIN erected a new genus and species *Dimerascris prasina* from Yunnan province, China in 1993. FENGLING, YIPING and QUINGYUN (1993) described a new species of *Chrysacris* viz *Chrysacris montanis* from China. First description and C banding karyotype analysis of a new species of *Oxya* was done by GUO and ZHENG. In 1993, FENGLING, YIPING and BINGZHONG described *Chorthippus keshanensis* for the first time in 1993. DIANZHONG and ZHEMIN described a new species *Conpusacris xinganensis* in 1993.

In 1994, JAGO reviewed the African genera of *Catantops* Sachaum, *Hadrolecocatantops* Jago and *Vitticatantops* Sjostedt. BO and PING (1994) redescribed genus Lemba and prepared a key to four species of the genus. KEY erected three new genera *Spectrophistes camelophistes* and *Charpantiorella* in 1994. KEY along with RENTZ (1994) studied the scientific name of Australian spur throated locust, studied its synonyms and confirmed that its valid scientific name as *Austrachs guttulosa*. ZHENG and GUODANG reported two new species of Oedipodidae in 1994. They were *Spingonotus micronacndius* and *Angarachs morulipennis*. *Ptygonotus gansuensis* was described in 1994 by ZHEMIN and MING for the first time. The new species belonged to family Acrypteridae.

A number of new species were reported from China in 1995 by various authors. MA EN BO and PING described a new species of *Aulacobothrus*. The same authors described two new species of *Chorthippus* from Shaanxi province. They again with ZHEMIN described two new species of *Chorthippus* in the same year viz *Chorthippus hengshanensis* and *Chorthippus taiyanensis*. TIANSHAN, WEN and ZHENGHUI described new species belonging to the genera *Paratonkinacris* and *Caryanda*. WANG,

YUMEN and JINGONG described a new species of the genus *Yunnanachs* in 1995. LI and TI described two new species of genus *Conophyma zhenminaid*. SHIGUT (1995) described a new species of genus *Foveofatans* and a key to the species of the genus was given. ZHEMIN and HE KE KE established a new species of *Chorthippus* for the first time in 1995. Two new species of *Pseudoptigonotus* are described by ZHEMIN. ZIYOU erected a new genus and two new species of Acridoidea from Hunan province. JUPENY and LID described a new species of genus *Omocestus* in the same year. A new species of *Pedopodisma* was described by ZHEMIN and JUN (1995). XIAOHONG with ZHEMIN and JUN described *Ceracris chuannanensis* for the first time in 1995.

In 1996, GRUNSHAW made a taxonomic revision of the genus *Leptacris* Walk and its allied genera (Hemiacridinae). In the year 1996, a new genus and new species of grasshoppers were reported from Xinjiang by LIMIN and ZHEMIN. From the same region in 1996, XUSHENGUANN and ZHEMIN erected a new genus and new species. ZHEMIN and BENYONG erected a new genus and new species in 1996.

SHARMA and GUPTA in 1997, prepared an identification key to short-horned grasshoppers of Acrididae from sub Shivalik plains of Jammu, India. VICKERY in 1997, classified Orthoptera (Sensu stricto) BAOPING 1997, described a new species of genus *Bryodemella* Yin and the characters differentiating it from other species were given with it.

MAHMOOD and YUSUF 1998 described three new species of genus *Gomphomastax* of family Eumasticidae from Azad Jammu and Kashmir. The three new species of the genus were *Gomphomastax unicuspidatus*, *Gomphomastax reductus* and *Gomphomastax longicuspidatus*. A key was also constructed. In 1999, SHISHODIA studied the orthoptera fauna of Patalkoty, Chindwara, Madhya Pradesh, which reported 31 genera in Acridoidea. In the year 2000 description of a new species of *Caryanada* Stal was done by MA EN BO, GUO and Zhemin. Its C banding karyotype had been analysed and a key to twenty-five species of the genus was also prepared.

In the year 2003, DAY and HAZRA studied the diversity and distribution of grasshopper fauna of greater Kolkota with notes on their ecology. In the same year VIDHU PRIYA and NARENDRAN published a key and a checklist of the short-horned grasshoppers of Kerala.

CHANDRA and RAJAN studied the faunal diversity of Mount Harriet National park (South Andaman) in 2004.

In 2005 SEETHARAMA MAYYA, K. S. SREEPADA and M. JAYARAMA HEGDE made a Survey of short-horned grasshoppers (Acrididae) from Dakshina Kannada District, Karnataka, in which 28 species were reported.

# MATERIALS AND METHODS

Vidhu Priya. A “Investigation on the alpha systematics of Acridoidea (Orthoptera) of Kerala” Thesis. Department of Zoology, University of Calicut, 2005

## **MATERIALS AND METHODS**

---

### **Collection Work:**

Knowing insects begins when one goes into the great outdoors and collects insects for preservation, rearing and experimentation. Capturing and preserving insects are essential for their taxonomic studies. The adult insects are captured alive from the field, while the immature stages captured are reared in the laboratory.

Short-horned grasshoppers are usually found among green vegetation especially among grasses. For collection, the ideal weather is calm and sunny, but not too hot a weather when insects will be difficult to be found or too active to be easily caught.

Collection was mainly done using insect nets (fig: 2) and glass specimen tubes (fig: 3)

### **Study Area:**

The state of Kerala stretches about 360 miles along the Malabar coast on the western side of the Indian Peninsula, with its width varying from 20 to 75 miles. It has an area of 38,863 square kilometers and located between  $8^{\circ} 18' N$  and  $12^{\circ} 48' N$  latitude and  $74^{\circ} 52' E$  and  $77^{\circ} 22' E$  longitudes. Kerala is bound by Arabian Sea on the west, Karnataka on the north and northeast and Tamil Nadu on the east.

Kerala is divided into three geographical regions. 1. Highlands 2. Midlands 3. Lowlands  
The highlands slope down from the Westernghats which rise to an average of 900m, with a number of peaks well over 1800m in height. The midlands lying between the mountains, is made up of undulating hills and valleys. The lowlands or the coastal area which is made-up of the river delta, back waters and the shore of the Arabian sea is essentially a land of coconut and rice.

The collections for the present study has been done mainly from the middle and northern sides of Kerala and also a few from Karnataka (adjacent to Kerala) as there is a possibility of overlapping of the fauna.



**Climate:**

The climate is equable and varies from season to season. Four alternate season covers the climate of Kerala. They are hot seasons (March to May), south-west monsoon (June to September) post-monsoon (October to November) and the north-east monsoon (December to February).

The temperature normally varies within the range of 22<sup>0</sup>C to 36<sup>0</sup>C. This state gets its due share of both the southwest and the northeast monsoon and the rainfall is heavy averaging around 3000 mm annually. The mean relative humidity ranges from 60 to 90 %.

**Methods of Collection:****Sweep Net:**

Grasshoppers were collected in warm but not too hot condition, especially in the morning hours.

Sweep net was found to be a very rewarding way of collecting these Orthopterans. The net used in the collection is essentially similar to an ordinary insect net which is a modified model designed by Noyes in 1982.

The frame is made up of iron or aluminium and is somewhat in a triangular shape (fig:2) The sides of the frame measures 48 cm X 46 cm X 48 cm. The triangular shape of the frame allows a larger area of the vegetation to be covered while sweeping for the catch. The net handle is made up of the ¾" aluminium tube about 4ft long. The frame is fitted to one end of the handle; this facilitates easy separation of the frame .The long handle makes sweeping underneath low and overhanging bushes easier and extends the area of sweep. The 60cm net bag is made up of a thin white cloth or terelene cloth having very fine mesh that permits the easy passage of air at the same time prevents the escape of insects. The rim of the bag is reinforced with a thick material preferably canvas.

For sweeping it is important to choose an area where the vegetation is as diverse as possible. Grasslands surrounded by several different kinds of bushes and trees provides

excellent location for collections. Paddy fields also have served as good collection site, as many of the grasshoppers are pests of paddy.

Good collection of adults, along with large number of immature stages were obtained by sweeping methods. The nymphs collected were then reared in a chamber in the laboratory.

#### **Glass Specimen Tube:**

Glass specimen tube is a simple gadget yet very efficient in the collection of short horned grasshoppers. An ordinary flat-bottomed glass specimen tube with cork stopper. The best size being 3''x 1''.

The open end is lowered very gradually over the insect, which usually seems unable to detect a slow movement of this sort (Fig 3). This method serves admirably well for the grasshoppers, which spend much of their time, motion less. The insect will usually crawl or jump into the tube voluntarily when it is within reach and then the stopper may be then replaced. On a sunny day it is perhaps best to approach the grasshopper from the side opposite to the sun. In this way the insect will not be disturbed by pursuer's shadow.

Larges specimens are best picked up by hand.

#### **Rearing:**

Nymphs of grasshoppers collected by the above methods were reared in a simple rearing chamber into adults. A box with glass walls and wire-meshed opening was used for this purpose. The jar was floored with sand of about one inch thickness and kept slightly moist. The nymphs were fed with grass, which needs to be changed daily. Though nymphs of first instars rarely survive, but those of the later instars could be successfully reared in the laboratory.

#### **Killing:**

The chemical used as a killing agent was ethyl acetate. It is a clear somewhat inflammable liquid which evaporates rapidly and produces fumes that are not highly

poisonous or too objectionable to human beings. The time required for the treatment varied from specimen to specimen.

### **Mounting:**

The only requirement for mounting grasshoppers is insect pins. Number 3 insect pins are used for mounting, which are about 36 to 38 mm long. Pinning is done to one side of the middle line on the pronotum so that all the parts and the characteristics can be clearly seen during observations. The pins should be inserted in such a way that there should be ample space for further manipulations above the specimen and for labelling below the specimen.

As the wings and the tegmina sometimes bear characteristics that are useful in identification and classifications, they are spread while mounting. For this purpose a setting board is required which is made-up of soft material with a groove so that the body fits into the groove and the wings spread will be at right angles with the body. The wings should be in a horizontal plane; the hind edge of the forewing should not overlap the leading edge of the hind wing and should be roughly at right angles with the body. A bristle or fine needle or forceps is used to move the wings to correct position, where they are held by means of strips of paper pinned to the board. The time taken for the specimen to dry depends on the specimen.

### **Labeling and Registering :**

After mounting, the labels indicating the collection data, identification (after the specimen is identified) and serial number is inserted. The data label includes the name of the country (in capitals), name of the state, name of the locality from where the specimen is collected, name of the person who collected and the date of collection.

After this the specimen were preserved in insect preserving boxes with naphthalene balls and para dichlorobenzene to protect the specimen from the attack of other insects and fungi.

Registration of specimen was done after the identification of the specimen. The registering entries consist of the following parameters. 1.Serial Number 2.Collection

Number 3.Scientific Names 4.Date of Collection 5.Locality 6.Name of the Collector  
7.Host Plants 8.Remarks

**Observation and Illustrations :**

Observation, illustrations and descriptions were done using Leica MZ7s Stereo zoom (Switzerland) with attached camera lucida.

**Treatment :**

This work presents consolidated faunal information of the Acrididae and Pyrgomorphide families known to occur in the state of Kerala. The number ranges from 10 subfamilies, 27 genera and 35 species in Acrididae and 5 genera and 6 species in Pyrgomorphide of which 2 genera and 4 species in Acrididae are new. For all genera, synonyms, junior homonyms and variations in spelling are listed. Generic character and the citation of the type species for all valid generic names and broad distributional and general ecology are recorded.

Similar treatment to that of genera has been given to species as well. The descriptions of species in light of modern taxonomic trends, illustrations and detailed measurements (in millimeters) and indices have also been provided.

Keys have been furnished for subfamilies genera and species wherever there is more than one form of taxa.

# TERMINOLOGY

Vidhu Priya. A “Investigation on the alpha systematics of Acridoidea (Orthoptera) of Kerala” Thesis. Department of Zoology, University of Calicut, 2005

## TERMINOLOGY

---

Morphological terms used in the work are those used by Dirsh (1965). The important terms used can be defined as follows,

1. **Antenna:** (fig: 9,10) Paired segmented sensory organ on the head.  
*Scape:* Basal antennal segment attached to head.  
*Pedicel:* Second antennal segment between scape and flagellum.  
*Flagellum:* Distal part of antenna, attached to pedicel.  
*Ensiform:* (fig:10) Flagellum compressed, widened in the basal part and gradually narrowing towards the apex  
*Filiform:* (fig:9) Flagellum thin thread-like.
2. **Apical fastigial areolae:** (fig: 4) A pair of small areas on apex of fastigium of vertex. At sides of fastigial furrow. Mostly rugose and mostly bounded by carinulae.
3. **Apterous:** Completely wingless.
4. **Arolium:** (fig: 15) Small scale- like lobe between tarsal claws.
5. **Brachypterous:** With tegmina and wings shorter than abdomen but overlapping or touching each other dorsally
6. **Brunner's organ:** (fig. 11) Small tubercle on lower surface near base of femur
7. **Cercus:** (fig: 20) A paired process variously shaped and sized, at base of Supra anal- plate and paraprocts.
8. **Claw:** (fig: 15) One of a pair of claws at apex of distal tarsal segment on either side of arolium.
9. **Clypeus:** (fig: 6) Facial sclerite between frons and labrum.
10. **Coxa:** (fig: 14) Basal segment of leg, by which leg is attached to the body
11. **External apical spine of hind tibia:** (fig: 12,13) Spine located on external side of hind tibia near spur.
12. **Face:** (fig: 6) Whole anterior part of head visible from front.
13. **Fastigial foveolae:** (fig: 5) A pair of more or less concave depressions on side of fastigium of vertex on its anterior margin or below.

- 14. Fastigial furrow:** (fig: 4) A deep thin furrow along middle of apex or whole fastigium of vertex.
- 15. Fastigium of vertex:** (fig: 4,5) Anterior part of vertex. Its base is the shortest line between the eyes, the apex protruding to the front or sloping down to merge with the frons.
- 16. Femur:** (fig: 11) Basal part of leg between tibia ad trochanter.  
*Basal lobe of hind femur:* Two short lobes, upper and lower, forming the base of femur.  
*Knee:* Apical part of hind femur with upper and lower lobes.
- 17. Frons:** (fig: 6) Anterior part of face merging above with fastigium of vertex, on sides with eyes and lateral carina and below with clypeus.
- 18. Frontal ridge:** (fig: 6) Ridge like longitudinal convexity on frons between antennae, merging above with fastigium of vertex and below with clypeus or not reaching clypeus. Sometimes slight or absent; sometimes with carinae and sulcus.
- 19. Furcula:** (fig:19) Two median processes arising from last Metasomal segment.
- 20. Gena:** (fig: 6) Lateral part of head.
- 21. Labrum:** Upper lip.
- 22. Mesosternum:** (fig:8) Median part of sternum.
- 23. Mesosternal interspace:** (fig: 8) Part of first Metasomal tergite protruding forwards between mesosternal lobes.
- 24. Mesosternal lobes:** (fig: 8) A pair of lateral lobes at the posterior end of mesosternum.
- 25. Metasternum :** (fig: 8) Posterior part of sternum between mesosternum and abdomen.
- 26. Metasternal interspace:** (fig:8) Part of first Metasomal sternite protruding forward into metasternum.
- 27. Ocelli:** (fig: 6) Three small, simple eyes, one in middle of frontal ridge and two near inner sides of compound eyes.
- 28. Ovipositor:** (fig:21) Four valved structure at the end of female abdomen for digging and depositing eggs.
- 29. Paraprocts:** (fig:20,21) A pair of lateral lobes, representing parts of eleventh

tergite and located on sides of anus partly below supra-anal plate.

**30. Pronotum :** (fig:7) Dorsal shield of prothorax.

*Carinae of Pronotum : Median carinae:* Carinae along middle line of pronotum.

*lateral lobes:* a pair of carina on, sides separating dorsum from lateral lobes.

*Prozona of pronotum:* Part of pronotum dorsal to basal sulcus.

*Transverse sulci of pronotum:* There are four transverse sulci on the pronotum.

First in most cases present only on the lateral lobes. The fourth is the basal or the posterior sulcus. Hitherto, almost invariably the first sulcus has been ignored and the posterior called the third.

*Metazona of pronotum:* Part of pronotum posterior to posterior sulcus.

**31. Prosternal process:** A process variable in form, in middle or anterior margin of prosternum.

**32. Spines of hind tibia:** (fig: 12, 13) Two rows of spines on sides of tibia.

**33. Spurs:** (fig: 12, 13) Two pairs of curved processes articulated with apex of hind tibia. One pair outer and one pair inner.

**34. Sternum:** Ventral part of thorax.

**35. Stridulatory serration:** Row of teeth or pegs on inner side of hind femur.

**36. Subgenital plate:** (fig: 20,21) In male ninth and in female eighth, Metasomal sternite, covering phallic complex in male and genital opening in female.

**37. Supra- anal plate:** (fig: 20,21) Eleventh Metasomal tergite covering the anus from above.

**38. Tarsus:** (fig: 14) Three segmented distal part of leg.

**39. Tibia:** (fig: 14) Part of leg between femur and tarsus.

**40. Tegmina:** Fore wing.

**41. Tympanal organ:** (fig: 18) Supposed auditory organ on the sides of first Metasomal tergite.

**42. Venation:** (fig: 16, 17) Distribution and pattern of main veins of elytra and wings and areas between them.

#### **Veins:**

*Precosta :* A small secondary anterior vein on the tegmina; often absent.

*Costa:* First main vein on tegmina and wing.



*Subcosta* : Second main vein on tegmina and wing.

*Radius*: Third main vein of tegmina and wing. On wing, basal part of radius is fused with next, medial vein.

*Radial sector*: Branch of radial vein, which forms several secondary branches.

*Media*: Fourth main branch, in most cases divides into two: media anterior and media posterior.

*Intercalary vein*: A short secondary vein between media and cubitus, often for stridulation.

*Cubitus*: Fifth main vein. On tegmina mostly branched into two, on wing unbranched.

*Postcubitus*: Sixth main vein on tegmina and wing.

*Vannal veins*: All veins on vannal part of tegmina and wing.

**Areas of wings:**

*Precostal area*: Area anterior to costa.

*Costal area*: Area between costa and subcosta.

*Subcostal area*: Area between subcosta and radius.

*Radial area*: Area between radius and media.

*Medial area*: Area between media and cubitus.

*Cubital area*: Area between cubitus and post cubitus.

*Postcubital area*: Area between postcubitus and vannal vein.

*Vannal area*: Area posterior to vannal vein.

43. **Vertex**: (fig: 5) Upper part of head merging in front with fastigium of vertex and behind with occiput.

# OBSERVATIONS AND RESULTS

Vidhu Priya. A “Investigation on the alpha systematics of Acridoidea (Orthoptera) of Kerala” Thesis. Department of Zoology, University of Calicut, 2005

## **OBSERVATIONS AND RESULTS**

---

Under this work taxonomic studies of 41 species coming under two families are done. Diagnostic features of each family, genus and descriptions of each species are given. Their distribution, biology and interrelationships are also sited, along with relevant figures and photographs. Based on the diagnostic characters a dichotomous key to the genera of Kerala is prepared. A checklist to the short-horned grasshoppers of India is also given.

### **KEY TO THE FAMILIES OF ACRIDOIDEA**

Fastigial furrow present; apical areolae generally present (fig: 4) lower basal lobe of hind femur longer than upper lobe (fig: 27).....PYRGOMORPHIDAE

Fastigial furrow absent; apical areolae absent; lower basal lobe of hind femur shorter than or as long as upper lobe (fig: 26).....ACRIDIDAE

#### **Diagnostic features of Family Acrididae**

Body and head of extremely variable shape. Fastigial furrow absent (rarely present, but apparently as a secondary formation). Prosternal process present or absent. Elytra and wings fully developed, reduced, or absent. Tympanum normally present. Stridulatory mechanism of variable structure, present in the majority of subfamilies. Lower basal lobe of hind femur mostly shorter than upper one. Brunner's organ present. External apical spine of hind tibia present or absent. Ectophallus differentiated; cingulum differentiated; valves of penis paired, fleured or divided. Epiphallus mostly bridge – shaped, sometimes disc-shaped, sometimes divided, ancorae and lophi present (sometimes lost). Oval sclerites present.

## KEY TO GENERA OF ACRIDIDAE

1. Prosternal process present; antenna filiform (fig: 9).....10  
 Prosternal process absent; if present antenna ensiform (fig: 10) body elongate  
 .....2
- 2(1) Stridulatory file in the form of a series of peg like hairs on inner lower side of hind  
 femur present (fig: 22).....GOMPHOCERINAE.....*Dnopherula* Karsch  
 Stridulatory file on inner side of hind femur absent.....3
- 3(2) Head with acute profile; face usually oblique and angulate, rarely subvertical;  
 generally angulate at fastigiofacial angle (fig: 28); antenna ensiform.....  
 .....ACRIDINAE.....4
- Head with rounded profile; face almost vertical never oblique and generally broadly  
 rounded at fastigial profile; antenna filiform.....OEDIPODINAE.....6
- 4(3) Head conically ascending (fig: 28); apical areolae present; posterior margin of  
 pronotum acutely angulated; tegmina fully developed.....*Acrida* Linnaeus  
 Head not conically ascending; apical areolae absent posterior margin of pronotum  
 emarginate tegmina rudimentary.....5
- 5(4) Fastigial foveolae visible from above .....*Zygophlaeoba* Bolivar  
 Fastigial foveolae absent .....*Parabida* Gen. nov
- 6(3) Pronotum tectiform.....7  
 Pronotum with well marked median carina; not tectiform.....8
- 7(6) Wings basally yellow and with well marked longitudinal band of fascia in the  
 middle.....*Gastrimargus* Saussure  
 Wings colourless, hyaline.....*Locusta* Linnaeus

- 8(6) Pronotum above with light yellow 'x' shaped marking  
 ..... ***Oedaleus* (De Geer)**  
 Pronotum above without 'x' shaped marking .....9
- 9(8) Median carina of pronotum traversed by 2 sulci; in prozona forming 2 tooth like  
 projections (fig: 23).. ..... ***Trilophidia* Stal**  
 Median carina of pronotum traversed by one sulci; in prozona not forming tooth  
 like projection..... ***Dittopternis* Saussure**
- 10(1) Radial area of elytron with a series of regular stridulatory veinlets, (fig: 24 ).....  
 ..... **HEMIACRIDINAE** .....11  
 Stridulatory veinlets of radial area on elytron absent .....13
- 11(10) Head short; face broader than long (fig: 86)..... ***Euthymia* Stal**  
 Face not remarkably broad ..... 12
- 12(11) Dorsum of Pronotum flat with well developed median and lateral carinae;  
 prosternal process spatulate; male cercus simple, conical ... ***Spathosternum* Karsch**  
 Dorsum of pronotum rounded with weak median carina; lateral carinae lacking;  
 prosternal process conical; male cercus bifurcate..... ***Hieroglyphus* Krauss**
- 13(10) Lower external lobe of hind knee spine like (fig: 26)..... **OXYINAE** .....14  
 Lower external lobe of hind knee with apex rounded angular or subacute but not  
 spine like .....15
- 14(13) Wings and tegmina rudimentary; last metasomal segment with node like furcula  
 (fig: 29)..... ***Cercina* Stal**  
 Wings and tegmina well developed; last metasomal segment without furcula  
 ..... ***Oxya* Audinet Serville**

- 15(13) Last metasomal tergite in male usually with well developed furcula; supra-anal plate with attenuate or trilobate apex; subgenital plate with transverse fold.....COPTACRIDINAE.....16
- Last metasomal tergite in male without well developed furcula; supra-anal plate variable; subgenital plate without transverse fold.....19
- 16(15)Tegmina and wings reduced.....*Anupama* gen. nov.  
Tegmina and wings well developed.....17
- 17(16)Median dorsal carina of pronotum interrupted by third sulcus only.....*Epistaurus* Bolivar  
Median dorsal carina of pronotum interrupted by 3 sulci.....18
- 18(17)Frontal ridge parallel sided, not wider between antennae.....*Coptacra* Stal  
Frontal costa distinctly wider between antennae (fig: 114).....*Eucoptacra* Bolivar
- 19(15)Mesosternal inter space closed (fig:128)..TROPIDOPOLINAE...*Oxyrrhepes* Stal  
Mesosternal interspace open.....20
- 20(19)Mesosternal lobes almost rectangular(fig:131)..CYRTACANTHACRIDINAE...21  
Mesosternal lobes rounded or obtuse angular or acutangular but not rectangular  
..... 22
- 21(20)Prosternal process straight, conical or sub conical.....*Patanga* Uvarov  
Prosternal process strongly curved backwards touching mesosternum inflated in the middle.....*Cyrtacanthacris* Walker
- 22(20)Dorsum of pronotum flat or with median and lateral carinae linear  
.....EYPREOCNEMIDINAE .....23

- Dorsum of pronotum of variable shape; carinae if present not linear  
 .....CATANTOPINAE .....24
- 23(22) Hind tibia with dense spines; interspace between outer row of spines equal to their basal width; prosternal process spatulate or trilobate; hind margin of subgenital plate of female entire and single lobed.....*Tyloptropidius* Stal  
 Hind tibia with sparse spines; interspace between outer row of spines thrice the width of base of spines; subgenital plate of female trilobate (fig: 25).....*Eyprepocnemis* Fieber
- 24(22) Tegmen lateral, lobiform, shortened not exceeding first metasomal segment  
 .....25  
 Tegmen wings well developed as long as or slightly shorter than metasoma  
 .....26
- 25(24) Fastigium of vertex separated from frontal ridge by a distinct transverse carina; fastigial foveolae absent lateral carina of pronotum obsolete.....*Mesambria* Stal  
 Fastigium reclinate sloping towards frontal ridge; foveolae prominently present; some sort of lateral carinae of pronotum always present....*Paraconophyma* Uvarov
- 26(24) Pronotum subcylindrical; slightly narrowing forwards, prosternal tubercle thick, cylindrical, apex rounded..... *Catantops* Schaum  
 Pronotum flattened; prosternal tubercle laterally compressed.  
 .....*Stenocatantops* Dirsh & Uvarov

#### **Diagnostic features of Family Pyrgomorphidae**

Body of variable size and shape. Head acutely conical. Fastigial furrow present. Prosternal process present. Elytra and wings fully developed, reduced or absent. Tympanum normally present. Lower basal lobe of hind femur usually longer than upper one. Brunner's organ normally present. External apical spine of hind tibia present or absent. Ectophallus differentiated; cingulum capsule-like; penis paired,

undivided; spermatophore sac in dorsal position. Epiphallus bridge-shaped, with dorso-lateral appendices; ancorae mostly absent; lophi hook-like. Oval sclerites absent. No stridulatory mechanism known.

#### KEY TO GENERA OF FAMILY PYRGOMORPHIDAE

1. Anterior margin of pronotum forming wide collar covering posterior and lower part of mouth; tympanum present..... *Chrotogonus* Serville  
Anterior margin of pronotum not covering posterior and lower part of mouth; tympanum present.....2
- 2(1) Wings and tegmina absent ..... *Neorthacris* Kevan & Singh  
Wings and tegmina present .....3
- 3(2) Pronotum strongly tuberculate above, with two large contiguous humps in front, hind area rugose and deeply pitted at sides..... *Aularches* Stal  
Pronotum not tuberculate ... .....4
- 4(3) Antennal base located in front of lateral ocelli (fig: 169).....*Atractomorpha* Saussure  
Antennal bases located below and behind lateral ocelli (fig: 176).....*Poecilocerus* Audinet Serville



### **DNOPHERULA KARSCH**

*Dnopherula* Karsch, 1896: Ent. Zeit. Stettin, 57, 259

Type Species : *Dnopherula Callosa* Karsch

*Aulacobothrus* Bolivar, 1902: Annl. Soc. Ent. Fr. 70 : 57

Type Species : *Aulacobothrus strictus* Bol.

*Dnopherula (Aulacobothrus)* Jago, 1971: Proc. Acad. Sci.nat. Philad. 245, 291

Type Species : *Dnopherula (Aulacobothrus) strictus* Jago

*Stauroderus* Kirby, 1914: Fauna of Bri. India vol. I, 127

Type species : *Stenobothrus morii* Brunn

*Stenobothrus* Kirby, 1914: Fauna of Bri. India vol. I, 121

Type species : *Gryllus lineaus* Panz

*Dociostraurus* Kirby, 1914: Fauna of Bri. India vol. I, 117

Type species : *Gryllus cruciates* Charp

*Bidentacris* Zheng, 1982: Zool. Res. Suppl. 3:84

Type species : not known

*Parvibothrus* Yin, 1984: Grass hoppers & locusts from Quinghai Xizang plateau of China 155, 274

#### DIAGNOSTIC FEATURES

Antenna filiform; foveolae visible from above, longer than broad; fastigium concave with lateral carinulae incurved and fading behind basal third of compound eyes; vertex with a more or less distinct median carinula, variable in length, always distinct between compound eyes; frontal ridge not furrowed; pronotum with median carina cut by principal sulcus only, lateral carina converging, diverging or compressed; precostal expansion of tegmen distinct; post tibia with internal apical spurs of unequal lengths; hind femur with internal lower row of stridulatory pegs.

DISTRIBUTION: Cosmopolitan.

BIOLOGY: Species of the genus *Dnopherula* usually live in arthropogenic disturbed habitats.

DISCUSSION: *Dnopherula* Karsh is similar to the genus *Leva* Bolivar in having stridulatory file present in inner posterior femur. But differs markedly from *Leva* in having weakly concave foveolae with rugose surface and indistinct edges (*Leva* has large foveolae that is trapezoidal, and sharply marginated)

#### KEY TO SUBGENERA OF GENUS *DNOPHERULA* KARSCH

Temporal foveolae not shallow; frontal ridge long extends till clypeus.....  
 .....*Dnopherula (Aulacobothrus)*  
 Temporal foveolae very shallow sometimes flat; frontal ridge short, obsolete below the transverse facial sulcus..... *Dnopherula (Dnopherula)*

#### KEY TO THE SPECIES OF *DNOPHERULA (AULACOBOTHRUS)*

1. Post tibiae with ventro internal apical spur little longer than dorso internal; pronotum with sulcus before or in middle..... **2**  
 Post tibiae with ventro internal apical spur much longer than dorso internal; pronotum with sulcus in or behind middle ..... **3**
- 2(1) Pronotum with principal sulcus in middle; apex of sub genital plate sinuate (fig: 33)..... *D. taeniatus* (Bolivar)  
 Pronotum with principal sulcus behind middle; apex of subgenital plate truncate or sub truncate with tip obtuse, triangularly projecting..... *D. luteipes* (Walker)
- 3(1) Apex of subgenital plate sub transverse, with tip triangularly projecting (fig: 41) frontal ridge sub obsolete below transverse facial furrow (fig: 38).....*D. socius* (Bolivar)  
 Apex of subgenital plate blunt triangular, with tip rounded (fig: 44 ) frontal ridge distinct below transverse facial furrow (fig: 42).....*D.svenhedini* (Sjostedt)

***DNOPHERULA (AULACOBOTHRUS) TAENIATUS (BOLIVAR)***

(Plate: 2, fig: 30-33)

*Aulacobothrus taeniatus* Bolivar, 1902 : Annl. Soc. Ent. Fr. 600.

*Stauroderus bicolor* (nec Carpentier 1825); Kirby 1914: Fauna of Bri. India, Vol. 127

*Aulacobothrus luteipes* (nec Walker, 1871) Suppl. Cat. Derm. Salt.

*Dnopherula (Aulacobothrus) luteipes* (nec Walker 1871) Suppl. Cat. Derm. Salt.

*Dnopherula (Aulacobothrus) taeniatus*; Jago 1971 : 245

*Scyllina physopoda* Navas, 1904 : Boln.Soc. aragon. Cienc. Nat. 3:133

*Aulacobothrus sinesis* (nec Uvarov, 1925) J. Proc. Asiat. Soc. Beng. 20.

DESCRIPTION: Female

**Head:** Antenna slightly longer or almost equal to head and pronotum together; foveolae visible from above, longer than broad; vertex with median carinula faint, but often reaching occiput; lateral carinulae obsolete on occiput; frontal ridge more or less parallel sided with slight sulcation below median ocellus, punctured; lateral carinae arising from inner margin of eyes; slightly diverging below.

**Mesosoma:** Pronotum with distinct median and lateral carinae; lateral carinae cut by sulci 2,3, and 4, sub parallel or faintly diverging anteriorly before second sulcus; median carina cut only by hind sulcus; prozona equal to metazona; mesosternal lobes separate; metasternal lobes narrowly separated; tegmen extending till metasoma tip and hind femur; hind femur moderately stout; hind tibia with internal apical spurs of subequal lengths, ventral moderately longer than dorsal, 13 external and 12 internal spines, legs hairy.

**Metasoma:** Apex of subgenital plate sinuate with two well-marked depressions cerci short conical slender; valves short, curved, hairy.

**Colour :** General colouration brown; dorsal part of head pale; head and pronotum with dorso-lateral dark bands; metasoma with dorsal longitudinal dark band; tegmen basally brown, opaque; wings hyaline; hind femur with light brown band on upper external area; hind tibia reddish, spines black tipped.

**Measurements:** Body : 20; pronotum : 3.75; tegmen : 14.12; hind femur : 10.8.

**Indices:** Width of fastigium : Eye Length - 0.46; length of prozona : length of pronotum - 0.59; apical width of tegmina : length of tegmina - 0.106; length of tegmina : length of hind femur - 1.3 length of antenna : length of head of pronotum together - 0.5

**Variations:** 4 Variations in colour are reported. 1 uniform throughout, irregularly mottled 2. dark with narrow pale dorso-medial stripe 3. dorsal area of head and pronotum dark, lateral areas pale. 4. disc of pronotum with dark spot at each corner; antennal length shorter than described in review of genus by Ingrish 1993

**MALES:** Not observed

**DISTRIBUTION:** India (Tamil Nadu, Kerala) China, Srilanka, Thailand.

**MATERIAL OBSERVED:** 1♀ INDIA : Kerala, Malappuram, Cali. Uni. Campus (75° 51' E11°7' N), Vidhu Priya, 17 V.2003.

**DISCUSSION:** *D. taeniatus* is similar to *Dnopherula luteipes* (Walker) especially in the subgenital plate being sinuate or transverse with tip triangularly projecting. But varies in the principal sulcus of pronotum being about in the middle (In *D. luteipes* prozona is distinctly longer than metazona)

***DNOPHERULA (AULACOBOTHRUS) LUTEIPES (WALKER)***

(Plate: 3, fig: 34-37)

*Stenobothrus luteipes* Walker, 1871:Suppl. Cat. Derm. Salt. 82

*Stenobothrus? Luteipes* Kirby, 1914 : Fauna of Bri. India, Vol. – I, 121

*Dnopherula (Aulacobothrus) luteipes* Bhowmik 1985 Rec. Zool. Surv. Ind. Occ. Pap.

DESCRIPTION: Female

**Head:** Antenna as long as or slightly longer than head and pronotum together; foveolae visible from above, long than wide, shallow; frontal ridge with slight furrow below ocellus and widening towards clypeus from median ocellus; face rugose.

**Mesosoma:** Pronotum with median carina traversed by hind sulcus and lateral carinae by 2<sup>nd</sup> 3<sup>rd</sup> and 4<sup>th</sup> sulcus; lateral carina faintly diverging anteriorly before 2<sup>nd</sup> or 3<sup>rd</sup> sulcus and diverging posteriorly; mesosternal lobes separate; and metasternal lobes slightly separate; hind femur moderately stout, with a row of stridulatory pegs on internal area; hind tibia with internal spurs of subequal length, ventral slightly longer than dorsal; tegmen reaching hind knee, cubital field widened, divided by an additional longitudinal vein

**Metasoma:** Supra-anal plate triangular with sides deeply sloping, with a shallow medio-longitudinal furrow and indication of a transverse sulcus, apex rounded; apex of subgenital plate with a triangular projection in middle.

**Colour:** Medium to dark brown with or without a whitish stripe in basal quarter; few blackish nervures in cubital region; hind femur brown, dorsal area with 2 or 3 black dots; ventral internal areas yellowish; hind knee black; hind tibia pale orange.

**Measurements:** Body : 18.5; pronotum : 3.5; tegmen :13.125; hind femur : 9.6 .

**Indices:** Width of fastigium : eye length – 0.46; prozona : pronotum - 0.49; apical field of tegmen : length of tegmen - 0.095; length of tegmen : length of hind femur - 1.36; length of antenna : head and pronotum together – 0.705

**MALES:** Not observed

**DISTRIBUTION:** India (Kerala, Maharashtra, Rajasthan)

**MATERIAL OBSERVED:** 2 ♀, India : Kerala, Malappuram, Cali.Uni. Campus (11<sup>o</sup> 7' N 75<sup>o</sup> 51' E) VidhuPriya, 17.V.2003, 25.V.2003

**DISCUSSION:** Resembles *D. taeniatus* (Bolivar) in having diverging lateral carina of pronotum and widened cubital region but cubital region of *D. taeniatus* is not as wide as in *D. luteipes*. Sub genital plate of *D. luteipes* is transverse with triangular projection in middle. (In *D. taeniatus* subgenital plate is sinuate)

**REMARKS:** First report from Kerala.

***DNOPHERULA (AULACOBOTHRUS) SOCIUS (BOLIVAR)***

(Plate: 4, fig: 38-41)

*Aulacobothrus socius* Bolivar, 1902: Annl. Soc. Ent. Fr. 70, 599; Kirby 1910:189;1914  
124

*Aulacobothrus decisus* Uvarov, 1921: Ann. Mag. Nat. Hist.9(7) 482

*Aulacobothrus socius* Uvarov, 1929 : Revue Suisse Zool. 542

*Dnopherula (Aulacobothrus) socius* Jago 1971 : 245; Bhowmik 1985 : Rec. Zool. Surv.  
Ind Occ. Pap: 22; Bhowmik & Rui, 1984 :Ind. Mus. Bull. 49

DESCRIPTION: Female

**Head:** Antenna about as long as head and pronotum together; foveolae largely dorsal, deep; vertex with median carinula distinct; frontal ridge with sub parallel margins below antennae, widening and indistinct, punctured; lateral carinae arising from inner margin of eye.

**Mesosoma:** Pronotum with well marked median carina, cut only by hind sulcus; lateral carinae distinct, sub parallel, slightly diverging posteriorly behind second or third sulcus, cut by sulci 2, 3 and 4; apical half of metazona and lateral lobes rugose; lateral lobes with 2 or 3 smooth areas; mesosternal lobes wider than interspace; metasternal lobes contiguous; tegmen slightly surpassing apex of metasoma; hind tibia with internal apical spurs of unequal length, ventral distinctly longer than upper.

**Metasoma:** Supra-anal plate lingulate, lateral margins sloping, with a shallow medio-longitudinal furrow in basal half and a transverse sulcus, apex rounded; subgenital plate transverse with triangular projection in middle.

**Colour:** Brownish testaceous; tegmen with dark brown spots in the medial, costal and cubital areas; hind femur with 3 dark brown spots on dorsal area, at base, before middle and between middle and apex; small patch at apex internally and small spots on external

dorsal and ventral carinae; hind tibia pale yellow; pronotum with black patch on anterior and posterior lobes, hind margin with black spots.

**Measurements:** Body : 19.8; pronotum : 4.125; tegmen : 15.75; hind femur : 11.375

**Indices:** Width of fastigium : eye length - 0.576; length of prozona : length of pronotum - 0.45; apical field of tegmen : length of tegmen - 0.09; length of tegmen : length of hind femur - 1.3; length of antenna : length of head and pronotum together - 1.01

MALES: Not observed

DISTRIBUTION: India (Tamil Nadu, Karnataka, Kerala)

MATERIAL EXAMINED: 1♀, India; Kerala; Chembra (11° 36' N 76° 6' E) Jobiraj; 1.IV.2001.

DISCUSSION: *Dnopherula socius* comes very close to *Dnopherula svenhedini* (Sjostedt) but varies in having subtransverse subgenital plate with triangular project (*D. svenhedini* has blunt triangular subgenital plate with rounded apex) and frontal ridge subobsolete below transverse facial furrow (*D. svenhedini* has distinct frontal ridge below transverse facial furrow)



***DNOPHERULA (AULACOBOTHRUS) SVENHEDINI (SJOSTEDT)***

(Plate: 5, fig: 42-45)

*Aulacobothrus sven-hedini* Sjosted, 1933: Ark. Zool. 23, pl.II

*Dnopherula sven-hedini* Jago 1971 : Proc. Acad. Nat. Sci. Philad 244

DESCRIPTION: Female

**Head:** Antenna as long as head and pronotum; foveolae shallow; frontal ridge with parallel margins, hardly furrowed between lateral margins, punctured.

**Mesosoma :** Pronotum with lateral carinae cut by 2, 3 and 4 sulci, diverging in front of second sulcus and behind third sulcus; metazona and lateral lobes with depressions; mesosternal lobes wider than interspace; metasternal lobes wider than interspace; metasternal lobes contiguous; tegmen surpassing apex of hind femur, rather wide until apex; hind femur moderately stout with inner row of stridulatory pegs; hind tibia with internal apical spurs of unequal length, ventral much longer than dorsal.

**Metasoma:** Supra-anal plate linguatae; apex of subgenital plate blunt, triangular with margins straight or slightly concave.

**Colour:** Brown, mottled with darker spots, dorsal side darker than front and ventral side; a narrow pale medial band on vertex; pronotum and dorsal area of tegmen with dark dorso lateral band; pronotum with white patches on lateral carina; tegmen translucent with brown spots; hind wing transparent, apex infumate; hind femur with three dorsal black spots middle one extending to outer area; hind tibia yellowish brown basally reddish apically.

**Measurement:** Body : 18.8; pronotum : 3.5; tegmen : 17; hind femur : 10.3

**Indices:** Width of fastigium : eye length – 0.54; length of prozona : length of pronotum-0.5; apical width of tegmina : length of tegmina – 0.12; length of tegmina : length of hind femur – 1.5; length of antenna : length of head and pronotum together – (antenna broken)

MALES: Not observed

DISTRIBUTION: India (Kerala) China, N. Thailand

MATERIAL OBSERVED: 1♀ India : Kerala; Wynad; Chembra (11° 36' N 76° 6' E)  
Jobiraj; 1.IV.2001.

DISCUSSION: Similar to *D. socius* (Bolivar) in having shallow foveolae, but differs in having frontal ridge distinct below transverse facial furrow and subgenital plate blunt triangular with rounded apex. (In *D. socius* frontal ridge is subobsolete below transverse furrow and subgenital plate is subtransverse with blunt triangular projection)

## KEY TO SPECIES OF DNOPHERULA (DNOPHERULA)

- Pronotum with metazona only slightly longer than prozona or both of sub equal length .....*D. bolivari* (Uvarov)  
 Pronotum with metazona distinctly longer than prozona .....*D. decisus* Walker

### *DNOPHERULA (DNOPHERULA) BOLIVARI (UVAROV)*

(Plate: 6, fig: 46-49)

*Aulacobothrus bolivari* Uvarov, 1921: Ann. Mag. Nat. Hist. 9 (7) 483; Cejchan 1969: Cas. Morav. Mus. Brno. 261

*Dnopherula (Aulacobothrus) bolivari* Bhowmik, 1985: Rec. Zool. Surv. Ind Occ. Pap 20

*Aulacobothrus collinus* Uvarov 1929 : Revue Suisse Zool. 543 syn.n

*Dnopherula (Aulacobothrus) collinus* Bhowmik, 1985 : Rec. Zool. Surv. Ind Occ. Pap 21

#### DESCRIPTION: Female

**Head:** Antenna about as long as head and pronotum together, slightly shorter in female; foveolae almost completely dorsal, oblong rhomboidal; almost flat vertex with a faint median carinula reaching occiput and with irregular transverse folds; frontal ridge with subparallel margins; lateral carinae arising from inner margin of eyes.

**Mesosoma:** Disc of pronotum with lateral carinae distinct, cut by sulci 2 and 4, diverging anteriorly before 2<sup>nd</sup> sulcus, diverging posteriorly behind second or third sulcus, lateral lobes with two or three smooth surfaces in dorsal area; mesosternal lobes about 1.5 – 2x wider than mesosternal interspace; metasternal lobes contiguous; tegmen of variable length, distinctly surpassing apex of hind knee; medial field wide; post femur moderately stout, inner side with a row of stridulatory pegs; post tibia with internal apical spurs of unequal length, ventral distinctly longer than dorsal.

**Metasoma:** Apex of subgenital plate almost transverse and slightly rounded, triangular projection in middle.

**Colour:** Testaceous in different shades of brown with black or brown markings; tegmen with a row of large black spots in central area and a row of smaller spots in costal area; wing base yellowish hyaline; hind femur carinae with black spots; hind tibia reddish, brown at base.

**Measurements:** Body : 19.5 mm; pronotum : 4.3 mm; tegmen : 13.25 mm; hind femur: 12.75 mm

**Indices:** Width of fastigium : length of eye - 0.56; length of prozona : length of pronotum - 0.45; apical field of tegmen : length of hind femur- 0.17; length of tegmen : length of hind femur- 1.02; length of antenna : length of head and pronotum together- 0.909

MALES: Not observed

VARIATION: Variation in colour of the species is mentioned by Ingrish (1993). Specimens with medio longitudinal band on vertex and disc of pronotum, bordered by black band on either side, the pale band extending to dorsal side of tegmen are described by him.

DISTRIBUTION: India (Kerala, Karnataka, Tamil Nadu, West Bengal, Uttar Pradesh) Pakistan

MATERIAL OBSERVED: 1♀ India: Karnataka; Mysore; (12° 8' N 76° 39' E); 21 X .2000; Sudha

DISCUSSION: The species is very much similar to *Dnopherula decisus* (Walker) in very shallow temporal foveolae and short frontal ridge, obsolete below transverse facial sulcus. But differs from it in having metazona slightly longer or subequal to prozona and body little more stouter (In *D. decisus* metazona is distinctly longer than prozona)

***DNOPHERULA (DNOPHERULA) DECISUS WALKER***

(Plate: 7, fig: 15-21)

*Stenobothrus decisus* Walker, 1871: Cat. Derm. Salt. Br. Mus 5:80

*Dociostaurus decisus* Kirby, 1914: Fauna of Bri. India, Vol. – I, 120

*Aulacobothrus decisus* Uvarov, 1921: Ann. Mag. Nat. Hist. 7(9) 482

*Dnopherula (Aulacobothrus) decisus* Bhowmik, 1985: Rec. Zool. Surv. India Occ. Pap. 21

DESCRIPTION: Female

**Head:** Antenna about as long as head and pronotum together; foveolae almost completely dorsal, oblong-rhomboidal, shallow; vertex concave with lateral carina extending behind almost to occiput and faint median carinula reaching occiput with irregular transverse folds; frontal ridge with subparallel margins at the median ocellus and obsolete below transverse facial furrow, flat between lateral margins.

**Mesosoma:** Pronotum with straight median carina cut only by hind sulcus, lateral carinae distinct cut by sulci 2 and 4, diverging anteriorly before second and third sulcus; tegmen surpassing apex of hind knees, costal area wide; mesosternal lobes about 1.8 – 2.2x wider than mesosternal interspace; metasternal lobes contiguous or subcontiguous; post femur longer than metasoma; post tibia with internal apical ventral spur longer than dorsal.

**Metasoma:** Apex of subgenital plate blunt, triangular with margins slightly concave and tip rounded; ovipositor valves short without denticles.

**Colour:** Body brownish testaceous; a whitish dorsal band on fastigium and vertex, continuing on pronotum and tegmen, bordered by a dark brown band on each side; pale white patches on upper side of lateral lobes; tegmina with brown fuscous centrally in basal half and with brown spots apically; hind tibia pale orange, with yellow base, hind tibial spines with black tips.

**Measurements:** Body: 21.25; pronotum: 4.6; tegmen: 15.5; hind femur: 14.12.

**Indices:** Width of fastigium : eye length - 0.53; length of prozona : length of pronotum - 0.45; apical expanse of tegmina : length of tegmina-0.125; length of tegmina : length of hind femur-1.06 antennal length : length of head and pronotum together-0.8.

**DISTRIBUTION:** India (W. Bengal, Karnataka), Australia, Burma, China, Chili, Europe, Japan, Madagascar, N.Africa.

**MATERIAL EXAMINED:** 1♀ India: Karnataka, Mysore(12<sup>0</sup>18' N 76<sup>0</sup>39' E) Sudha, 2.IX.2000

**DISCUSSION:** *Dnopherula decisus* differs from other oriental species markedly, but comes close to *Dnopherula (Dnopherula) bolivari* Uvarov. It differs from *D. bolivari* in the length of prozona: length of pronotum index being 0.46 (D bolivari has the index 0.5)

**REMARKS:** The difference of *D. decisus* and *D. bolivari* being only in the prozona : pronotum index makes it doubtful to be conspecific with *D. bolivari*.

### *ACRIDA* LINNAEUS

*Gryllus (Acrida)* Linnaeus, 1758: Syst. nat. 10<sup>th</sup> ed. 427

Type species : *Gryllus (Acrida) turritus* Linn.

*Truxalis (Partim)* Fabricius, 1775: Syst. Ent. 279

Type species : Not known.

*Acrida* Dirsh, 1954: Bull. Soc. Fouad ler Entom, 38:107

Type species : Not known.

#### DIAGNOSTIC FEATURES:

Body large (>40 mm) elongate, slender; head conical, sloping upwards; antennae ensiform shorter than head of pronotum together; fastigium of vertex extending considerably in front of eyes, parabolic or roundedly truncate at extremity, broader than space between eyes; face narrow, frontal ridge not prominent, marked only by a double carina enclosing median ocellus, raised only between antennae; lateral facial carina arising from base of antenna extending to clypeus; pronotum tricarinated dorsally, median carina cut only by posterior sulcus; hind margin of pronotum acutely angulated; mesosternal lobes separate with inner border rounded; metasternal lobes widely separated; tegmina and wings pointed, tegmina finely reticulated, medial area of wing widened forming a speculum. Legs slender, hind femur elongate, with knee lobes acute, pointed; hind tibia long stick like; metasoma carinated; male subgenital plate long, acute.

**DISTRIBUTION:** Africa Australia, The Australasian archipelago, Japan, Southern part of Asia, Southern part of Europe.

**BIOLOGY:** Found growing on grass lands and paddy fields, generally seen all through except January, varying in their density.

**DISCUSSION:** The genus is represented by two species in India. The genus *Acrida* remains close to the *Aswatthmanus* Kirby in general appearance. *Acrida* differs from *Aswatthmanus* in having the eyes near apex (In *Aswatthmanus* eyes are towards the base)

***ACRIDA EXALTATA* (WALKER)**

(Plate: 8, fig: 52-55)

*Truxalis exaltata* Walker, 1859: Ann. Mag. Nat. Hist, 4(3) : 222

*Truxalis bravicolis* Bolivar, 1893: Feuille Jeunes Nat, 27:162 No:8

*Acrida lugubris* Burr, 1902: Trans. R. ent. Soc. Lona 2; 170 p 13

*Acrida curta* Uvarov, 1936. Linn. Journ. Zool., 39:539

*Acrida exaltata* Kirby, 1914. Fauna of Bri. India, Vol. – I, 99 fig 80

DESCRIPTION: Male

**Head:** Long, conical sloping upwards; fastigium of vertex long extending well beyond eyes, wider than distance between eyes, slightly concave, apex roundedly truncate at extremity; fastigial foveolae absent; antenna ensiform, flattened at base, 3 sided, tapering towards tip, placed towards apex of head; eyes small; face strongly oblique; slightly concave; frontal ridge represented by carinae, compressed and slightly raised b/n antennae, almost joined at base of antennae gradually widening and becoming parallel, lateral carinae of face arising from base of antennae.

**Mesosoma:** Pronotum compressed, hind margin acutely angular, well marked median & lateral carinae present, media carina traversed by posterior sulcus, lateral carinae parallel in prozona, excurved in metazona; prozona compressed and metazona bulging, lateral lobes with longitudinal sulcus; mesosternal lobes separate with rounded inner margin; metasternal lobes separate; tegmina pointed at apex, finely reticulated; wings acutely pointed at apex; medial area dilated forming speculum traversed by 9 to 13 veinlets; legs slender; posterior femur long stick like; knee lobes acute (pointed); posterior tibia slender with 27 – 29 small spines on either carinae.

**Metasoma:** Carinated; supra-anal plate tongue like with broad sulcation subgenital plate long acutely conical; cercus short



**Colour:** Perfectly green, below eye is a longitudinal yellow line till pronotum, bordered below by a black line; lateral carina of pronotum yellow bordered above by black line; sometimes tegmen with whitish streak an medial region, wings infuscated.

**Measurements:** Body : 44; pronotum : 8.25; tegmen : 38.6; hind femur : 23.8

**Indices:** Width of fastigium : eye Length - 0.58; length of prozona : length of pronotum - 0.31; apical width of tegmina : length of tegmina - 0.06; length of tegmina : length of hind femur - 1.62; length of antenna : length of head and pronotum together - 0.71

**FEMALE:** Size larger than males; supra-anal plate tongue like with a median sulcation, subgenital plate short; cercus narrow, small, conical; valves short stout.

**DISTRIBUTION:** India (Kerala, T.N. Karnataka, Assam, Bihar, H.P., Orissa, W. Bengal) Afghanistan, Pakistan, Persia, Srilanka, Tibet, Yemen.

**MATERIAL OBSERVED:** 1♂ India: Kerala, Kottekkad, ( $10^{\circ} 46' N 76^{\circ} 39' E$ ) Vidhu Priya, 17.X.2000; 1♂, 1♀ India: Kerala, Nelliampathi (  $10^{\circ} 35' N 76^{\circ} 36' E$  ), Vyjayanthi, 9.IV.2001; 1♀ India: Kerala, Thalappara ( $11^{\circ} 15' N 75^{\circ} 47' E$ ) Mohana, 17.III. 2000; 1♂ India: Karnataka, Mysore ( $12^{\circ} 18' N 76^{\circ} 39' E$ ) Sudha, 2. IX.2000; 1♀ India: Kerala, Cali. Uni. Campus ( $11^{\circ} 7' N 75^{\circ} 51' E$ ), Anjana, 10.VIII.2000.

**DISCUSSION:** The only other species from India *A. indica* Dirsh 1954 is yet poorly known. *A. indica* is distinguished by its smaller size than *A. exaltata*.

### **ZYGOPHLEAOBA BOLIVAR**

*Zygophlaeoba* Bolivar, 1902: Ann. Soc. Ent. France, IXX, p5.

Type species : *Zygophlaeoba sinuatocollis* Bol.

#### DIAGNOSTIC FEATURES:

Body small (< 20 mm); head not ascending; fastigium broad or narrow, mostly rounded at extremity; foveolae present; antenna ensiform, flattened, suddenly arched in middle; face sloping; frontal ridge sulcated; fastigium and vertex with median carina; metazona shorter than prozona; tegmina and wings rudimentary; mesosternal lobes widely separated, narrow transverse; metasternal lobes contiguous; hind femur longer than metasoma; metasoma carinated.

DISTRIBUTION: India (Tamil Nadu, Kerala).

BIOLOGY: Not known.

DISCUSSION: *Zygophlaeoba* resembles *Paraphlaeoba* Bolivar in general appearance rudimentary tegmina and wings in particular. It differs from *Paraphlaeoba* in having foveolae visible from above (*Paraphlaeoba* lacks foveolae). Four species of *Zygophlaeoba* are reported from Indo- Malayan region.

**ZYGOPHLAEOBA SINUATOCOLLIS BOLIVAR**

(Plate: 9, fig: 59-62)

*Zygophlaeoba sinuatocollis* Bolivar, 1902: Ann. Soc. Ent. France, IXX, p591.

## DESCRIPTION : Male

**Head:** Conical, fastigium produced well in front of eyes; apex parabolic, median and lateral carinulae present, latter obtuse; a parabolic depression between fastigium and vertex present; foveolae visible from above, elongate, almost reaching apex; vertex with median carina extending till pronotum; obsolete behind; antenna ensiform, flattened, shorter than head and pronotum together; front oblique, frontal ridge sulcated, frontal carina sinuous between median ocellus and antenna (viewed from side) lateral carinae of face arising from base of lateral ocelli.

**Mesosoma:** Pronotum with front truncate and hind margin weakly emarginate, tricarinate; 3 transverse sulci present, first dorsal not traversing any carina, median carina cut by hind sulci; metazona shorter than prozona; lateral lobes slightly punctured; mesosternal lobes widely separated, wider than long; metasternal lobes contiguous behind foveolae; tegmina and wings reduced; tegmina extending to second segment of metasoma, oblong subparallel sided, rounded at tip; hind femur stout, longer than metasoma; hind tibia with nine short spines on each side.

**Metasoma:** Median carina and longitudinal subcallous ridge on each side present; supra-anal plate very short; cerci pointed almost reaching tip.

**Colour :** pale ferruginous, dotted with black especially on lateral lobes of pronotum; pale band on dorsal side, from head to metasoma tip; flanked by lateral carinae on pronotum and metasoma; frontal ridge with intermittent black spots; antenna brown basad, blackish apically; tibial spines black tipped.

**Measurements:** Body : 13.5; pronotum : 2.62; tegmen : 0.75; hind femur : 6

**Indices:** Width of fastigium : Eye Length - 0.8; length of prozona : length of pronotum - 0.66; apical width of tegmina : length of tegmina - 0.43; length of tegmina : length of hind femur - 0.16; length of antenna : length of head and pronotum together - 0.46.

**FEMALES:** Larger than males; tegmina extending to 3<sup>rd</sup> metasomal segment, genital valves very short, curved, upper valves slightly longer, lower valves more pointed; supra-anal plate broad tongue like, almost concealing valves; only tips of valves exposed; cerci short, pointed.

**DISTRIBUTION:** India (Kerala, Tamil Nadu)

**MATERIAL OBSERVED:** 1♂, 1♀, India: Kerala, Palakkad, Kottekkad, (10° 46' N 76° 39' E) Vidhu Priya, 17.X.2000; 1♂, India: Kerala, Palakkad, Kottekkad, (10° 46' N 76° 39' E) Vidhu Priya, 11.VII.2003.

**DISCUSSION:** *Z. sinuatocollis* resembles *Z. truncaticollis* Bolivar in general appearance but differs mainly in characters like – frontal ridge sinuated, mesosternal lobes strongly transverse; pronotum excised behind; metasoma with lateral ridge. (*Z. truncaticollis* frontal ridge is not sinuated, mesosternal lobes are not strongly transverse, pronotum is not truncated behind and metasoma lacks lateral ridges.)

**REMARKS:** *Z. sinuatocollis* is reported for the first time from Kerala or any other part of India other than Tamil Nadu.

***PARABIDA* GEN.NOV**

DIAGNOSTIC FEATURES:

Body moderately long (20 – 40 mm); head conical; fastigium triangular, with lateral carinulae obtuse; foveolae obsolete; eyes small; vertex with median carina; antenna ensiform; front sloping; frontal ridge elevated between antennae; pronotum tricarinate; carina cut by three transverse sulci; hind margin emarginate; metazona shorter than prozona; mesosternal and metasternal lobes separate; tegmina short, narrow, nearly parallel sided; wings obsolete; hind femur longer than or as long as metasoma; smooth externally; metasoma compressed, carinated; ovipositor valves curved, short.

DISTRIBUTION: India ( Kerala )

BIOLOGY: Unknown

DISCUSSION: The new genus forms an intermediate between the genera *Phlaeobida* Bolivar and *Paraphlaeoba* Bolivar. It differs from the genus *Phlaeobida* in not having foveolae, tegmen being more or less pointed (In *Phlaeobida* foveolae is present and tegmina is rounded ). It differs from genus *Paraphlaeoba* in having hind margin of pronotum emarginate and carinae of fastigium obtuse (In *Paraphlaeoba* hind margin of pronotum is truncate and carinae of fastigium is acute).

ETYMOLOGY: As the genus stands as an intermediate of *Phlaeobida* Bolivar and *Paraphlaeoba* Bolivar.

***PARABIDIA INDICA* SP.NOV**

(Plate: 10, fig: 56-58)

## DESCRIPTION: Female

**Head:** Head conical; fastigium triangular; carinulae obtuse; foveolae obsolete; median carina extending over vertex, obsolete behind; eyes small, not protruding; antennae ensiform, almost of same length as head and pronotum together; front sloping, frontal ridge between antenna elevated, smooth then sulcated; marginal carina somewhat expanded at base, slightly approximating at ocellus and diverging towards clypeus.

**Mesosoma:** Pronotum with 3 carinae; traversed by 3 weak sulci; hind sulci much beyond middle; front border truncate; hind border emarginate; mesosternal lobes separated by a space equal to their width; metasternal lobes also separate; tegmina parallel sided, almost pointed, extending to first metasomal segment; wings obsolete; hind femur almost as long as or longer than metasoma; hind tibia with 12 external and 11 internal spines, external apical spine absent.

**Metasoma:** Metasoma carinated; cerci short; narrow, conical; supra-anal plate with transversed groove above which is a longitudinal groove; valves curved; subgenital plate with a pointed protrusion.

**Colour:** Body homogeneously reddish brown; a broad brown streak running from eye to tip of metasoma; hind femur brown with black tipped spines.

**Measurements:** Body: 26.2; pronotum: 4.8; tegmen: 4.6; hind femur: 13.8.

**Indices:** Width of fastigium : eye length - 0.9; length of prozona: length of pronotum - 0.625; apical expanse of tegmina : length of tegmina-0.21; length of tegmina : length of hind femur-0.33 antennal length : length of head and pronotum together-1.

MALES: Unknown

DISTRUBUTION: India ( Kerala )

MATERIAL EXAMINED: Holotype: 1♀ India : Kerala, Chembra (11° 36 ' N 76 ° 6'E),  
Brijesh, 11.VIII. 1999.

ETYMOLOGY: The species is named after India, the country of its origin.

DISCUSSION: As no other species is reported from the genus a discussion is not  
attempted here.

### **GASTRIMARGUS SAUSSURE**

*Gastrimargus* Saussure, 1884: Mem. Soc. Phys. Hist. Nat, Geneva 28(9) p: 109, 110.  
Type species: *Gryllus verescens* Thunberg

#### DIAGNOSTIC FEATURES:

Medium sized (20-40mm) antenna filiform, slightly longer or shorter than head and pronotum together; fastigium of vertex concave, flat or convex, raised distinct or indistinct carinulae present or absent; frontal ridge with variable sulcation; pronotum tectiform with or without intersection by posterior sulcus; posterior margin of pronotum rectangular or acute-angular; pronotum with cruciform markings; tegmina and wings well developed; wings with fascia; inner hind tibial spur 1.5 times longer than outer spur; male supra-anal plate shield shaped, rounded or triangular; cerci subconical or finger shaped.

DISTRIBUTION: Europe, Asia, Australia, Africa.

BIOLOGY: Not known.

DISCUSSION: The genus resembles *Morphacris* Walker but differs in not having numerous longitudinal rugae on pronotum. (Genus *Morphacris* has numerous longitudinal rugae on pronotum )



***GASTRIMARGUS MARMORATUS* (THUNBERG)**

(Plate: 11, fig: 66-68)

*Gryllus marmoratus* Thunberg, 1815: Mem. Acad. Sci. St. Petersb., 5:23.

*Gryllus transversus* Thunberg, 1815: *ibid*, 232.

*Gryllus virescens* Thunberg, 1815: *ibid*, 245

*Gryllus assimilis* Thunberg, 1815: *ibid*, 246.

*Pachytylus (Oedaleus) marmoratus* Stal, 1873: Recens Orth, 1:123.

*Oedaleus (Gastrimargus) marmoratus* Saussure, 1884: Mem. Soc. Phys. Hist. Nat, Geneva 28(9); 112.

*Gastrimargus citrina* Burmeister, 1838: Handbuch der Entomologie, 2 (2):I-VIII: 645

*Gastrimargus transverses* Kirby, 1910: *ibid*, 227

*Gastrimargus sundaecus* Kirby, 1910: *ibid*, 228.

*Gastrimargus marmoratus* var *transversus* Sjostedt, 1928: K Svenska. Vetensk Akad. Handl. (3) 6 (1):37

*Gastrimargus marmoratus* var *grandis* Sjostedt, 1928: *ibid* 6(3) : 37.

*Gastrimargus marmoratus* Ritchie, 1982: Bull. Br. Mus. Nat, Hist. (Ent) 44 (4) 262-666.

DESCRIPTION: Female

**Head:** Fastigium of vertex concave, horizontally produced, with lateral and hind carinulae; front sloping to frontal ridge; lateral carinulae contiguous with carinae of frontal ridge; hind carinulae of fastigium traversed by median carina extending over vertex; foveolae with slight concavity; frontal ridge sulcated below median ocellus, slightly widening towards clypeus; lateral carina arising from inner margin of eyes; antenna filiform slender, about length of head and pronotum together; eyes small.

**Mesosoma:** Length of pronotum more than double of head and pronotum together; acutely angulated in front and hind margin; acutely tectiform, without rugae; four weak transverse sulci present, hind sulcus traversing median carina, third and fourth extending to lateral lobes; metazona slightly longer than prozona; mesosternal lobes wider than

long, with inner posterior angle being obtusely rounded; metasternal lobes separate; tegmen longer than metasoma and hind femur; stridulatory veinlets present between media and intercalary veins; hind femur as long as metasoma; hind tibia with 12 spines on outer carina.

**Metasoma:** Female genital valves short; upper ones shorter than lower, smooth, curved; cerci small conical.

**Colour:** Body brownish; two dark brown oblique streak on cheek; lower one extending to pronotum; tegmen with subtriangular whitish area towards subanterior part of basal half, broader area of triangle facing costal area; base clouded, apically hyaline; wings complete fascia, basal area bright yellow, apex hyaline; hind femur with black spots on upper and lower carinulae of external and internal sides; hind tibia red with yellow band basally; spines black tipped.

**Measurements:** Body : 34.8; pronotum : 9.6; tegmen : 39.6; hind femur : 23.8.

**Indices:** Width of fastigium : Eye Length – 0.9; length of prozona : length of pronotum - 0.72; apical width of tegmina : length of tegmina - 0.166; length of tegmina : length of hind femur - 1.63; length of antenna : length of head and pronotum together - 0.89

**MALES:** Unknown

**DISTRIBUTION:** India (Kerala, Andhra Pradesh, Tamil Nadu), South East Asia, Japan, New Guinea, Sumatra.

**MATERIAL OBSERVED:** 1♀, India: Karnataka, B. R. Hills, M. Koya, 26.I.2000; 1♀ India: Kerala, Thrissur, Mala (10°15' N 76°16' E), Sarasija, 16.IX.2000.

**DISCUSSION:** *Gastrimargus africanus africanus* (Sauss.) *Gastrimargus africanus orientalis* Sjostedt and *Gastrimargus sulphureus* (Bei Bienko) are also reported from

India. *Gastrimargus marmoratus* differs from *Gastrimargus africanus africanus* in having brown body colour ( Body of *Gastrimargus africanus africanus* has brownish markings). *Gastrimargus marmoratus* has black spots on upper and lower carinulae of hind femur. ( In *Gastrimargus sulphureus* hind femur has black colouration on medial area).

## *LOCUSTA* LINNAEUS

*Locusta* Linnaeus, 1758: Systema Naturae (10<sup>th</sup> edition) 1: 431.

Type species : *Gryllus migratoria* Linn.

*Acridium* Latrielle, 1804: Hist. Nat. Crust. Ins. 3(12) :282.

Type species : not known.

*Oedipus* Berthold, 1827: Latrielle's Fam. Their. 411

Type species : *Gryllus migratoria* Linn.

*Pachytylus* Fieber, 1852: Kekh. Ratibor, 6:5

Type species : not known.

### DIAGNOSTIC FEATURES:

Size large (>40mm); head short, rounded at extremity eyes small, not protruding; antenna filiform as long or longer than head and pronotum together; fastigium broad, short, blending with frontal ridge; front vertical; frontal ridge broad, parallel sided; lateral carina arising from base of ocelli; cheeks pilose; pronotum tectiform with only median carina, traversed by a single sulcus; mesosternal and metasternal lobes separate; tegmina much longer than metasoma and hind femur, provided with nervures; wings shorter than tegmina; hind femur extending till tip of metasoma; hind tibia with 10 external and 10 internal spines; ovipositor valves curved, upper ones shorter; cerci short, conical.

DISTRIBUTION: Old World.

BIOLOGY: A pest of all crops.

DISCUSSION: The genus resembles *Gastrimargus* Saussure in general appearance particularly in having tectiform pronotum, but differs in absence of a black fascia on hind wings. (*Gastrimargus* has black fascia towards base.)

***LOCUSTA MIGRATORIA MIGRATORIA* LINNAEUS**

(Plate: 12, fig: 63-65)

*Gryllus Locusta migratoia* Linnaeus, 1758: Systema Naturae (10<sup>th</sup> edition) 1: 431

## DESCRIPTION: Female

**Head:** Very short; fastigium horizontal, short; lateral carinulae straight, do not meet at apex; continues on to frontal ridge; foveolae oblong, visible from above; extremity gradually blending with frontal ridge; frontal ridge broad, parallel sided, not sulcated; lateral carina arising from inner border of eyes, slightly incurved; antenna very slender filiform, almost equal to head and pronotum taken together; eyes small, not bulging; cheeks sparsely pilose.

**Mesosoma:** Pronotum tectiform; median carina cut by a single transverse sulci; two transverse sulci present in front only on lateral lobes; a connection between hind and second sulci on lateral lobes present hind margin of pronotum obtusely angulated, apex rounded; meso-metasternal plate pilose; metasternal interspace wider than mesosternal interspace; foveolae absent; tegmina long, almost one third of its length extending beyond metasoma, almost parallel sided, tip rounded; wings rounded at tip slightly shorter than tegmina; hind femur moderately broad; hind tibia with 10 external and 10 internal spines, external apical spine absent.

**Metasoma:** Metasoma carinated; supra-anal plate broad triangular; cerci small conical; valves conical, upper valves longer than lower; subgenital plate rounded at extremity.

**Colour:** Green banded with brown; a brown stripe run behind eye, across head and pronotum, not reaching extremity, intersected by a white line on head; brown blotches present on metazona and lateral lobes; median carina brown; brown band below eyes on face extending till extremity; antenna pale brown, unicolourous; tegmina with brown

blotches, apical region with veins intermittently marked blackish; wings hyaline; hind femora green, internally black till middle and a black patch beyond; hind tibia yellowish basad and reddish distad, spines black tipped.

**Measurements:** Body : 51; pronotum : 12.2; tegmen : 51.2; hind femur : 29.6

**Indices:** Width of fastigium : Eye Length - 1; length of prozona : length of pronotum - 0.5; apical width of tegmina : length of tegmina - 0.12; length of tegmina : length of hind femur - 1.72; length of antenna : length of head and pronotum together - 0.95.

**MALES:** Unknown

**DISTRIBUTION:** India (Kerala, Karnataka, W. Bengal, Andaman and Nicobar Islands, Uttar Pradesh, Jammu and Kashmir)

**MATERIAL OBSERVED:** 1♀, India: Karnataka, Bangalore, (12° 58' N 77° 35' E )  
Vidhu Priya 1. XII.2003

**DISCUSSION:** *Locusta migratoria migratoria* Linn. resembles *Locusta migratoria migratoroides* R.F. in general appearance but differs in having moderately stout femur, green body and pronotum without granules. (*Locusta migratoria migratoroides* has slender hind femur, reddish brown body colour and pronotum granular)

**OEDALEUS (DE GEER)**

*Oedaleus* Fieber, 1853: Lotos; iii, p 126.

Type species : *Acridium nigrofasciatum* De Geer

**DIAGNOSTIC FEATURES:**

Body small to medium sized (10-40mm) antennae filiform, longer than head and pronotum together; fastigium concave, gradually merging with frontal ridge; obtuse lateral carinulae present, median carinula present or absent; frontal ridge sulcated below median ocellus diverging slightly towards clypeus; pronotum compressed in prozona; only median carina present, traversed by hind sulcus or none; posterior margin of pronotum rounded or rectangular; tegmina and wings fully developed; tegmina with erect veins at apex, cells square; wings with fascia; external ventral knee lobe of hind femur acutely rounded; male supra-anal plate shield like, rounded or triangular; cerci conical; ovipositor short moderately curved.

**DISTRIBUTION:** Cosmopolitan.

**BIOLOGY:** Host plants: Maize, rice, wheat, bajra, jowar, tomato pea and ground nut.

**DISCUSSION:** Three species are reported under this genus from India. *Oedaleus* resembles *Gastrimargus* Sauss. In having fascia on wings, apical area of wings with square cells and pronotum being cut by hind sulcus only, It differs from *Gastrimargus* mainly in having 'X' shaped marking on the pronotum and the posterior margin of pronotum being rectangular or obtuse-angular. (*Gastrimargus* Sauss has no 'X' shaped marking on the pronotum and is acute-angular behind)

**OEDALEUS ABRUPTUS (THUNBERG)**

(Plate: 13, fig: 69-71)

*Gryllus abruptus* Thunberg, 1815: Mem. Acad. Sci. St. Petersburg., 5:233*Pachytylus (Oedaleus) abruptus* Stal, 1873: Recens. Orth.; 1: 127.*Oedaleus (Oedaleus) abruptus* Saussure, 1884: Mem. Soc. Phys. Hist. Nat, Geneva 28(9);110, 117.

## DESCRIPTION: Female

**Head:** Short, fastigium of vertex longer than wide, narrowing anteriorly; lateral carinulae distinct, indistinct median carinulae, extending over vertex; antenna filiform, longer than head and pronotum together; eyes oval, bulging; frontal ridge smooth, convex, sulcated below median ocellus, diverging near clypeus; lateral carinae arising from lateral ocelli.

**Mesosoma:** Pronotum constricted in prozona, hind margin rectangular, anterior margin slightly angulated; median carina present, lateral carinae absent; no entire transverse sulci; prozona shorter than metazona; mesosternal lobes widely separated, wider than long, inner margin rounded; metasternal lobes widely separated; tegmen and wings fully developed; tegmen with square cells at apex; lower external knee of hind femur acutely rounded; hind tibia with 12 external and 13 internal spines.

**Metasoma:** Metasoma with a median carina; valves of ovipositor short curved, upper ones longer, lower ones more curved.

**Colour:** Body green with brown and white markings; tegmen infuscated in basal half with three or four pale transverse bands extending from costal margin to first radial or cubital vein; broad inter band region pale, triangular; apical half of tegmen hyaline with brown blotches; anal region green; wings with black fascia apically and basally yellow hyaline; posterior femora with indistinct bands on external upper marginal and medial



areas, sometimes obsolete; posterior knee dark brown; hind tibia straw coloured, paler towards base, spines black tipped.

**Measurements:** Body : 24; pronotum : 4.6; tegmen : 18.4; hind femur : 11.

**Indices:** Width of fastigium : Eye Length – 0.6; length of prozona : length of pronotum - 0.8; apical width of tegmina : length of tegmina - 0.08; length of tegmina : length of hind femur - 1.8; length of antenna : length of head and pronotum together – 1.06.

**MALES:** Unknown

**DISTRIBUTION:** India (Kerala, Andhra Pradesh, Bihar, Goa, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh), Bangladesh, China, Indo-China, Myanmar, E. Nepal, Pakistan, Sri Lanka, Thailand.

**MATERIAL OBSERVED:** 2 ♀ India: Kerala, Malappuram, Cali. Uni. Campus (11° 7' N 75° 51' E), Vidhu Priya, 10.VIII.2000, 16.XI.2000.

**DISCUSSION:** *O. abruptus* resembles *O. nigrofasciatus* Sauss. in general appearance and in having angular pronotum. *O. abruptus* differs from *O. nigrofasciatus* in its size, wings with black fascia apically and basally yellow hyaline, pale bands on femur and straw coloured tibia. (*O. nigrofasciatus* has moderately large body, wings with transverse black band, black band on hind femur and hind tibia red with basal band).

### **TRILOPHIDIA STAL**

*Trilophidia* Stal, 1873: Recens, Orth. 1:117.

Type species : *Oedipoda cristella* Stal.

#### **DIAGNOSTIC FEATURES:**

Size small (< 20mm) with integument strongly rugose and tuberculate; fastigium of vertex concave, lateral carinulae sinuous, converging towards front and behind, contiguous with frontal carinae; fastigium truncate at extremity, not provided with carinula; eyes rounded bulging; antenna slightly inflated apically; behind fastigium on vertex with two tubercles; frontal ridge sulcated incomplete; pronotum strongly tuberculate, slightly constricted in prozona; tectiform, carina forming two tooth in prozona; lateral carinae and sulci irregular; prozona shorter than metazona; metazona slightly inflated, hind margin rectangular; tegmina and wings well developed; intercalary veins of tegmina well developed; wing base coloured; posterior femora with inner side banded.

**DISTRIBUTION:** Ethiopian and Oriental regions.

**BIOLOGY:** The genus is generally geophilous- insects found in bare grassy lands. Breeds throughout the year but the population is high in August. One species found widely in India. Host plants- grass, cocoa, coconut, maize, mulberry, rice, sorghum, sugar cane, sweet potato, teak.

**DISCUSSION:** The genus resembles *Dittopternis* Sauss. In general appearance but differs in having two tooth like projections on pronotum and yellow and black bands on hind tibia. ( In *Dittopternis* Sauss. hind tibia is blue and pronotum does not have tooth like projection).

**TRILOPHIDIA ANNULATA (THUNBERG)**

(Plate: 14, fig: 72-75)

*Gryllus annulata* Thunberg, 1815:0: Mem. Acad. Sci. St. Petersb., 5:234*Gryllus bidens* Thunberg, 1815:0: Mem. Acad. Sci. St. Petersb., 5:235*Acridium (Oedipoda) vulneratum* de Haan, 1882: Bijd. Temminck: 163.taf 21.*Oedipoda cristella* Stal, 1860: Eugenie's Resa. Orth. 3: 34.*Epacromia aspera* Walker, 1870: Cat. Derm. Salt. Br. Mus 4:775*Epacromia turpis* Walker, 1870: Cat. Derm. Salt. Br. Mus 4:775*Epacromia nigricans* Walker, 1870: Cat. Derm. Salt. Br. Mus 4:776*Trilophidia annulata* var *ceylonica* Saussure, 1884: Mem. Soc. Phys. Hist. Nat, Geneva, 28 (9) 158.*Trilophidia annulata* var *japonica* Saussure, 1888: Mem. Soc. Phys. Hist. Nat, Geneva, 30(1) 54.*Trilophidia annulata* var *mangolica* Saussure, 1888: Mem. Soc. Phys. Hist. Nat. Geneva, 30(1) 54.*Trilophidia annulata* Hollis, 1965: Trans. R. Ent. Soc. Lond. 117(8): 251-253.**DESCRIPTION: Male**

**Head:** Eyes bulging, rounded; antenna filiform, slightly inflated at apex; fastigium concave, lateral carinulae sinuous continuing with frontal carinae; foveolae wide, shallow; vertex and occiput with tubercles; face almost straight, sparsely hairy; frontal ridge sulcated, convex with a median carina above antennal base; frontal ridge slightly compressed below median ocellus; between median ocellus and clypeus on either side of frontal ridge prominent tubercle present; lateral facial carinae arising from inner margin of eyes.

**Mesosoma:** Pronotum granulated, pilose, compressed in prozona and inflated in metazoan; hind margin rectangular, apex rounded; median carina prominent traversed by two transverse sulci and carina produced to two tooth like structures in prozona;

transverse sulci 4, first not traversing median carina, second intersecting median carina; third and fourth joining together near median carina and traversing it; lateral carinae well marked in metazoan; prozona highly tuberculate; mesosternal lobes separate, wider than long; metasternal lobes separate; foveolae present; tegmina longer than hind femur which in turn is longer than metasoma; legs pilose ; femoral base inflated.

**Metasoma:** Cerci slightly pointed; subgenital plate curved upwards.

**Colour:** General body colouration dark brown varied with yellow; tegmen with basal half brown with a large yellow blotch at one fourth of length extending half across; apical half subhyaline with cells tinted with brown; wings hyaline bright yellow at base; remaining portion suffused with brown; inner surface of hind femur with two bands basal one extends at both ends upto outer upper carinulae second one completely separate and ring like; knee dark; base of post tibia black followed by light yellow and black ring and then blue.

**Measurements:** Body : 15; pronotum : 3.3; tegmen : 15; hind femur : 8.

**Indices:** Width of fastigium : Eye Length – 0.6; length of prozona : length of pronotum - 0.37; apical width of tegmina : length of tegmina - 0.13; length of tegmina : length of hind femur - 1.84; length of antenna : length of head and pronotum together – 1.5.

**FEMALES:** Females stouter than males; supra-anal plate tongue like with dorsal longitudinal depression, sides vertical; ovipositor valves short curved.

**DISTRIBUTION:** India (Kerala, Tamil Nadu, Goa, Madhya Pradesh, Uttar Pradesh, Himachal Pradesh, Arunachal Pradesh, Bihar) N. Borneo, Japan, Korea, Mangolia, Pakistan.

MATERIAL OBSERVED: 3 ♂ India: Kerala, Malappuram, Cali. Uni. Campus (11° 7' N 75° 51' E), Vidhu Priya, 28.VII.2000; 1 ♀ India: Kerala, Malappuram, Cali. Uni. Campus (11° 7' N 75° 51' E), Vidhu Priya, 6.VIII.2000; 3 ♂ India: Kerala, Malappuram, Cali. Uni. Campus (11° 7' N 75° 51' E), Vidhu Priya, 3.VIII.2000; 1 ♀ India: Kerala, Malappuram, Villunniyal (11° 7' N 75° 51' E), Girish, 3.V.2001.

DISCUSSION: The species comes close to *T. cristella* Stal, but differs in having the crest of pronotum deeply cut. (In *T. cristella* Stal the crest is only slightly indented by sulci).

***DITTOPTERNIS SAUSSURE***

*Dittopternis* Saussure, 1884: Mem. Soc. Phys. Hist. Nat, Geneva 28(9);110, 117.p 52,125.

Type species : *Dittopternis ceylonica* Saussure

**DIAGNOSTIC FEATURES:**

Body medium sized (20-40mm) with integument granulose; antenna filiform, longer than head and pronotum taken together; head broad, globular, granulated; fastigium pentagonal, longer than broad; truncated in front; lateral carinulae not extending behind eyes; frontal ridge broadly sulcated, somewhat parallel sided; pronotum granulose, with median bituberculate structure in front; somewhat constricted prozona; median carina crossed by hind sulcus only; hind margin acutely angulated; lateral lobes nearly square, with margins slightly sinuated; tegmen long narrow, densely reticulate; opaque in basal half; wings generally coloured; male cercus conical.

**DISTRIBUTION:** India, Australia, S. Africa, Srilanka.

**BIOLOGY:** Found throughout the year, more active during rainy season, feeds on grass and teak.

**DISCUSSION:** The genus comes very close to *Aiolopus* Fieber in general appearance but differs markedly in having head granulated and hind margin of pronotum acute-angular. (In *Aiolopus* Fieber head is not granulated and hind margin of pronotum is obtuse-angular).

**DITTOPTERNIS VENUSTA (WALKER)**

(Plate: 15, fig: 76-79)

*Oedipoda venusta* Walker, 1870: Cat. Derm. Salt. Br. Mus 4:740*Dittopternis venusta* Saussure, 1888: Mem. Soc. Phys. Hist. Nat, Geneva, 30(1): 44

## DESCRIPTION: Male

**Head:** Granulated; antenna filiform, longer than head and pronotum together; eyes globular protruding; fastigium five sided, moderately concave, gradually narrowing towards tip, ultimately joining a transverse carina; foveolae small triangular; frontal ridge moderately sulcated, almost parallel, slightly diverging towards clypeus; lateral carina of face arising from inner margin of eye; a pair of tubercle present below median ocellus, between lateral carina and frontal ridge.

**Mesosoma:** Pronotum, granulated, pilose, laterally compressed at prozona; strong median carina traversed by posterior sulcus before middle; hind margin acutely angular; lateral lobes square with posterior margin rounded; tegmen extending much beyond metasoma and hind femur, apex obliquely rounded, intercalary vein incompletely developed square shaped cells apically; mesosternal lobes separated by space as wide or wider than lobes; metasternal lobes separated by an elliptical suture; hind femur stout, dentate; hind tibia with 11 internal and 8-9 external spines.

**Metasoma:** Pilose; supra-anal plate triangular with apex rounded; cerci long conical; subgenital plate thick, curved.

**Colour:** General body colouration dark brown varied with yellow; tegmen with basal half brown with a large yellow blotch at one fourth of length extending half across; apical half subhyaline with cells tinted with brown; wings hyaline bright yellow at base; remaining portion suffused with brown; inner surface of hind femur with two bands; basal one

extends at both ends upto outer upper carinulae, second one completely separate and ring like; knee dark; base of post tibia black, followed by light yellow and black ring and then blue.

**Measurements:** Body : 15; pronotum : 3.3; tegmen : 15; hind femur : 8.

**Indices:** Width of fastigium : Eye Length – 0.6; length of prozona : length of pronotum - 0.37; apical width of tegmina : length of tegmina - 0.13; length of tegmina : length of hind femur - 1.84; length of antenna : length of head and pronotum together – 1.5.

**FEMALES:** Stouter than males; supra-anal plate tongue like with dorsal longitudinal depression, sides vertical; ovipositor valves short curved.

**DISTRIBUTION:** India (Kerala, Tamil Nadu, West Bengal, Karnataka)

**MATERIAL OBSERVED:** 1 ♀, 3 ♂, India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>o</sup> 7' N 75<sup>o</sup> 51' E), Vidhu Priya, 25.VII.2000; 1♂, 1 ♀ India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>o</sup> 7' N 75<sup>o</sup> 51' E), Vidhu Priya, 3.VIII.2000; 1♂ India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>o</sup> 7' N 75<sup>o</sup> 51' E), Sr. Karmaly, 3.VIII.2000; 1♂ India: Kerala, Malappuram, Cali.Uni.Campus (11<sup>o</sup> 7' N 75<sup>o</sup> 51' E), Vidhu Priya, 10.VIII.2000; 2♂, 3 ♀ India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>o</sup> 7' N 75<sup>o</sup> 51' E), Vidhu Priya, 10.VIII.2000; 1 ♀ India: Kerala, Palakkad, Shornur ( 10<sup>o</sup> 46' N 76<sup>o</sup> 16' E ), Vidhu Priya, 1♂, India: Karnataka, Mysore (12<sup>o</sup> 18' N 76<sup>o</sup> 39' E), Sudha, 2.IX.2000; 1♂ India: Kerala, Thrissur, Agri. Uni. Campus (10<sup>o</sup> 31' N 76<sup>o</sup> 13' E), Santosh, 20.VII.2004.

**DISCUSSION:** The species comes close to *D. zebrata* Saussure but differs in having lateral lobes of pronotum rectangular behind. (Lateral lobes of pronotum is rounded in *D. zebrata*).



## ***EUTHYMIA* STAL**

*Euthymia* Stal 1875 Bih. Svensk. Akad. Handl iii (14) P. 29

Type species : *Euthymia melanocera* Stal.

### DIAGNOSTIC FEATURES:

Medium sized body (20-40mm), stout, closely punctured; vertex and fastigium broad, sloping to front; fastigium with weakly marked carinula; head with median carina; eyes large bulging; face as broad as long; frontal ridge broad, without carinae, converging below; pronotum without median carina, obtusely rounded behind, transverse sulci well marked; tegmina and wings well developed not extending beyond metasoma; tegmen uniformly coraceous; wings more or less coloured or infuscated; legs pilose; hind femur shorter than metasoma in females and as long in males; hind tibia with 7-15 spines of equal length on both carina. Second tarsal segment half of first; prosternal tubercle rounded; metasternal lobes contiguous; supra-anal lamina of males triangular with sides entire; male cercus acute

DISTRIBUTION: India, Borneo, Madagascar, Srilanka.

BIOLOGY: Unknown

DISCUSSION: *Euthymia* is a unique genus which differs from all the other genera in having characteristic short and very broad head however it superficially resembles *Oxyrrhepes* Stal in having larger eyes and in having posterior tibia with external apical spine.

***EUTHYMIA FINOTI* KIRBY**

(Plate: 16, fig.: 86-88)

*Euthymia finoti* Kirby, 1914: Fauna of Bri. India, Vol. – I, : 197

## DESCRIPTION : Female

**Head:** Short; eyes bulging; vertex slightly concave with weak median carina; foveolae obsolete; fastigium sloping on to front; face broad; frontal ridge not sulcated narrowing towards clypeus; antenna slender, filiform, longer than head and pronotum together; head punctured.

**Mesosoma:** Pronotum densely punctured, obtusely rounded behind, median carina vague on metazona, absent in prozona, prozona slightly bulging on either sides; four transverse sulci present, first not crossing dorsal side; metazona slightly longer or equal to prozona; prosternal process short stumpy flattened at tip; mesosternal lobes separate; metasternal lobes contiguous; tegmina as long as metasoma, narrow, rounded tip, wings clear hyaline; legs pilose, hind tibia densely pilose, 9 or 10 spines on external carina including apical one, hind tarsus long 2<sup>nd</sup> tarsal segment about half of others in length; hind femur shorter than metasoma.

**Metasoma:** Metasoma smooth, valves of ovipositor with upturned points, cerci pointed.

**Colour:** Ferruginous brown, paler below; tegmen lighter than pronotum, darker towards base, wings yellow hyaline, hind femur reddish with black spots on upper and lower carinula; medial area brown with black spots on ridges; two black vertical bands on inner surface of femur, hind tibia red with white hairs; spines black tipped, hind tarsus red.

**Measurements:** Body : 35; pronotum : 6.4; tegmen : 25; hind femur : 16.8

**Indices :** Width of fastigium : eye length - 0.64; length of prozona : length of pronotum - 0.75; apical expanse of tegmina : length of tegmina-0.201; length of tegmina : length of hind femur-1.26; antennal length : length of head and pronotum together - 1.31.

MALE: Unknown

VARIATION: Variations are reported in measurements and colour

DISTRIBUTION: India (Kerala), Srilanka

MATERIAL EXAMINED: 1 ♀ India: Kerala, Palakkad, Kottekkad ( $10^{\circ} 46' N 76^{\circ} 39' E$ ) Aravind, 26.VIII 2000; 1 ♀ India Kerala, Palakkad, Shoranur ( $10^{\circ} 46' N 76^{\circ} 16' E$ ) VidhuPriya, 3.III.2003

DISCUSSION: This species differs from other Indian species as follows: *Euthymia finoti* Kirby differs from *Euthymia kirbyi* Fin and *Euthymia greeni* Kirby in having yellow hyaline wings (*E. Kirbyi* has red wings and *E. greeni* has wings blue grey infuscated at apex) *E. finoti* also differs from *E. kirbyi* and *E. greeni* in having ferruginous brown body colour (*E. Kirby* has light brown body colour with green spots and blotches. *E. greeni* has dull yellowish brown body mottled with black) *E. finoti* also varies from *E. kirbyi* in having antenna longer than head and pronotum together (*E. kirbyi* has antenna smaller than head and pronotum together)

REMARKS: *Euthymia finoti* is reported for the first time from India.

### ***SPATHOSTERNUM* KRAUSS**

*Spathosternum* Krauss, 1877: *Ser. Akad. Wiss. Wien* 76(1) 44

Type species : *Tristria nigrotaeniatus* Stal

#### DIAGNOSTIC FEATURES:

Size small (< 20mm) head conical slightly convex; fastigium of vertex obtuse; frons oblique; frontal ridge narrow and deeply sulcated throughout; antenna filiform, hardly longer than head and pronotum together; pronotum flat, tricarinate, 3 sulci present, hind sulci crossing mid carina at middle; pronotum obtusely angulated behind prosternal process antero-posteriorly compressed, inclined backwards, spatulate, bi or trilobate; mesosternal lobes separate; metasternal lobes contiguous; tegmen and wings fully developed; tegmen narrow with rounded apex, stridulatory veinlets between radius and media; hind tibia with external apical spine; female genital valves rather short; upper crenulated or smooth, lower with tooth behind middle; male supra-anal plate long angular; cercus simple, conical; subgenital plate short obtuse.

DISTRIBUTION: India, Siam, W. Africa.

BIOLOGY: *Spathosternum* is found in all open fields on grasses. Breeds through out the year. Only one generation is completed in a year.

DISCUSSION: The genus resembles *Oxya Serville* superficially but differs mainly in not having the lower lobe of hind knee spine like and tegmina having stridulatory veinlets and nervures. (In *Oxya Serville* lower lobe of hind knee spine like and tegmina lacking stridulatory veinlets and nervures)

***SPATHOSTERNUM PRASINIFERUM PRASINIFERUM (WALKER)***

(Plate: 17, fig: 89-92)

*Heteracris(?) prasinifera* Walker, 1871 : Cat. Derm. Salt. Br. Mus 5:65

? *Calopternus caliginosus* Walker, 1871: ibid. 5:69.

*Stenobothrus strigulatus* Walker, 1871: ibid. 5:82.

*Stenobothrus simplex* Walker, 1871: ibid. 5:82.

*Stenobothrus venulosum* Stal, 1878: Bih. Svensk Akad. Handl. 5(4):97.

*Spathosternum caliginosum* Kirby, 1910: Syn. Cat. Orth. 3:400

*Oxya prasinifera* Kirby, 1910: ibid, 3:394

*Phlaeoba simplex* Kirby, 1910: ibid, 3:138.

*Roduina recta* Kirby, 1910: ibid, 3:140.

*Gymnobothrus (?) simplex* Kirby, 1914: Fauna of Bri. India vol. I, 14

*Spathosternum prasiniferum* Kirby, 1914: ibid, 1:208

*Spathosternum prasiniferum prasiniferum* Tinkham, 1936: Lingn. Sci. Joun. Canton. 15:51

DESCRIPTION: Male

**Head:** Convex; fastigium rounded with lateral carinulae slightly raised, more pronounced in males; foveolae obsolete; weak median carina extending over vertex; frontal ridge narrow, parallel sided, sulcated through out; antenna 21 segmented, shorter than head and pronotum taken together.

**Mesosoma:** Pronotum flat, tricarinate, three sulci present, median carina traversed only by hind sulci; prozona almost equal to metazona; posterior margin of pronotum angulated; prosternal process antero-posteriorly compressed, bilobed, inclined backwards, base narrower; mesosternal lobes separate; metasternal lobes contiguous; hind tibia long, hardly dilated, 10-11 spines apart from apical one.

**Metasoma:** Cerci short, cylindrical; supra-anal plate blunt with longitudinal groove.

**Colour:** Generally greenish in fresh material; a broad characteristic black band running from behind eyes to pronotum along lateral carinae; tegmina light brown with longitudinal central pale marking; wings hyaline, clouded towards apex; hind femur greenish or rufotestaceous; hind tibia green.

**Measurements:** Body : 14.25; pronotum : 2.87; tegmen : 10.87; hind femur : 7.6.

**Indices:** Width of fastigium : Eye Length – 0.58; length of prozona : length of pronotum - 1; apical width of tegmina : length of tegmina - 0.102; length of tegmina : length of hind femur - 1.4; length of antenna : length of head and pronotum together – 0.7.

**FEMALES:** Ovipositor valves short, incurved; lower valves armed with small tooth beyond middle.

**VARIATION:** Prosternal process is bilobed or trilobed. Band behind eyes may be green with black narrow upper border or black bordered above with pale yellow line and below by a paler band. Hind femur with dark longitudinal band.

**DISTRIBUTION:** India (Kerala, Tamil Nadu, Goa, Madhya Pradesh, Uttar Pradesh, Himachal Pradesh, Arunachal Pradesh, Bihar, Karnataka, W. Bengal, Andaman and Nicobar Islands, Andhra Pradesh, Assam, Rajasthan, Manipur, Orissa) Bangladesh, China, Myanmar, Srilanka, Thailand, Vietnam.

**MATERIAL OBSERVED:** 1 ♂ India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>0</sup> 7' N 75<sup>0</sup> 51' E), Vidhu Priya, 10.VIII.2000; 1 ♂ India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>0</sup> 7' N 75<sup>0</sup> 51' E), Vidhu Priya, 3.VIII.2000; 1 ♀ India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>0</sup> 7' N 75<sup>0</sup> 51' E), Vidhu Priya, 30.VII.2000; 1 ♀ 1 ♂ India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>0</sup> 7' N 75<sup>0</sup> 51' E), Vidhu Priya, 8.VIII.2000; 1 ♀ 1 ♂ India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>0</sup> 7' N 75<sup>0</sup> 51' E), Vidhu Priya, 3.IX.2000; 1 ♀ India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>0</sup> 7' N 75<sup>0</sup> 51' E), Vidhu Priya, 16.XI.2000; 1 ♀ India: Kerala, Palakkad, Kottakkad (10<sup>0</sup> 46' N 76<sup>0</sup> 39'

E) Vidhu Priya, 17.IX.2000; 5 ♀ 2♂ India: Kerala, Thrissur, Irinjalakuda ( 10<sup>o</sup>20' N 76<sup>o</sup> 13' E), Vidhu Priya, Aravind,Kiran,25.IX.2000; 1♂India: Kerala, Wynad, Kalpetta (11<sup>o</sup> 36' N 76<sup>o</sup> 6' E), Jobiraj, 2.X.2000.

DISCUSSION: Only one species under the genus *Spathosternum* is reported from India. Hence a discussion on this species is not attempted.

### **HIEROGLYPHUS KRAUSS**

*Hieroglyphus* Krauss, 1877: Sber. Akad. Wiss. Wien 76:41; Mason 1973 Bull. Br. Mus. Nat. Hist. (Ent) 28(7) : 512

Type species : *Hieroglyphus daganensis* Krauss. 1877

*Miramia* Uvarov, 1932: Trudy Zool. Inst. Lenigr 1:224

Type species : Not known.

#### DIAGNOSTIC FEATURES:

Medium to large size (20-40mm); body finely rugose; fastigium of vertex short, shallowly depressed in front of a bow shaped transverse furrow, broader than long, rounded in front; frontal ridge with moderately deep or shallow sulcus, parallel sided or widened towards base; antennae slender, filiform much longer than head or pronotum in males and as long as or longer in females; pronotum cylindrical, as broad as head, median carina weakly marked behind first sulcus; 3-4 well marked transverse sulci; lateral carina absent; prosternal tubercle conical, acute or bifurcate; mesosternal and metasternal lobes more or less widely separate; genicular lobes of hind femora pointed; hind tibia with 8-10 spines on outer carina; tegmina subhyaline and wings hyaline; supra-anal plate longer than wide cercus simple or bifurcate, subacute, pointed or obtuse, apex with a tooth on inner side female subgenital plate with median lobe or trilobate; female genital valves short, thick and curved, crenulated outer margins, lower valves with a pair of strong or weak teeth.

**BIOLOGY:** Found in August - November . Nymphs, and adults found in paddy fields forming a major pest of paddy

**DISTRIBUTION:** Africa, China, Oriental region, Russia.

**DISCUSSION:** Six species are reported from India. The genus comes close to *Spathosternum* Krauss but varies in its larger size, rounded pronotum and absence of lateral carinae. ( *Spathosternum* is smaller , with flat pronotum having lateral carinae).



***HIEROGLYPHUS BANIAN* (FABRICIUS)**

(Plate: 18, fig: 80-85)

*Gryllus banian* Fabricius, 1798, Ent. Syst. Supple : 194

*Acridium furcifer* servile, 1839, Hist. Nat Ins 677

*Hieroglyphus banian* var *elongata* Uvarov, 1922, Bull. Ent. Res 13:238

*Hieroglyphus banian* Mason 1973, Bull Br. Mus. Nat. His (Ent) 28(7) 540-541

**DESCRIPTION: Male**

**Head :** Fastigium broader than long with a depression margined by a slight ridge; frontal ridge sulcated with parallel carinae; from base of antennae arise lateral carina diverging basally; antennae filiform; as long as or longer than head and pronotum together.

**Mesosoma:** Pronotum cylindrical; median carina weak but entire; four sulci present, narrowly lined with black; first obsolete above, second on sides and last two entire, second and third slightly wavy; hind sulcus behind middle; posterior angle of metazona obtuse angular; tegmina as long as or longer than metasoma; wings slightly shorter than tegmina; hind tibia hairy, with 10 spines on outer carina including external apical spine; 1<sup>st</sup> tarsal segment sulcated, sulcus extending up to middle; prosternal tubercle pointed; mesosternal and metasternal lobes separated.

**Metasoma:** Supra-anal plate longer than wide, apically with 2 ridge like elevations; basally a longitudinal depression; cercus bifurcate, upper branch incurved and recurved.

**Colour:** Body green or yellowish brown frontal region with brown blotches; head with a median and two lateral broad dark bands; antenna brown with tip of each segment yellow; sulci of pronotum black; base of tegmina green; wing base greenish hyaline; knee of hind femur with black patch on each side, tibia bluish grey; spines yellow with black tips.

**Measurements:** Body : 34; pronotum : 7; tegmen: 28; hind femur : 18.

**Indices:** Width of fastigium : eye length - 0.56; length of prozona : length of pronotum - 0.6; apical expanse of tegmina : length of tegmina-0.12; length of tegmina : length of hind femur-1.5; antennal length : length of head and pronotum together-1.4.

**FEMALES:** Bigger than males; cercus pointed and slender; lower valves of ovipositor narrow, long, with two well defined teeth on each side; upper valves broader; subgenital plate with hairy triangular protuberance posteriorly.

**DISTRIBUTION:** Wide spread in India (Kerala, Tamil Nadu, Karnataka, Western Himalayas West Bengal, UP, Himachal Pradesh, Bihar, Rajasthan, Orissa), Afghanistan, Bhutan Burma, China, Thailand.

**MATERIALS EXAMINED:** 1 ♀, India: Kerala, Palakkad, Kottekkad ( $10^{\circ} 46' N 76^{\circ} 39'E$ ) Vidhu Priya, 22.VIII.2000; 1 ♂, India: Kerala, Malappuram, Manjeri ( $11^{\circ} 7' N 76^{\circ} 7' E$ ) Abdul Razak 22.VIII.2000; 1 ♀, India: Kerala, Palakkad, Kottekkad ( $10^{\circ} 46' N 76^{\circ} 39'E$ ) Aravind 3.X.2003; 2 ♂, India: Kerala, Palakkad, Kottekkad ( $10^{\circ} 46' N 76^{\circ} 39'E$ ) Aravind, 3.X.2003.

**DISCUSSION:** *Hieroglyphus banian* Fab resembles *H. bilineatus* Kirby and *H. bettoni* Kirby in having unicolourous pronotum but differs from them in not having longitudinal black line on each side of pronotum (*H. bilineatus* Kirby and *H. bettoni* Kirby have black lines on sides of pronotum) *Hieroglyphus banian* Fab also differs from *H. nigrorepletus* Bol and *H. oryzivorous* Carl in having a bifurcate apex for male cercus. (*H. nigrorepletus* Bol and *H. orizovyrous* Carl are having cercus with simple apex with oblique upper margin.

**CERCINA STAL**

*Cercina* Stal, 1878: Bih. Svensk Akad. Handl. 5(4):49, 97.

Type species: *Cercina obtusa* Stal.

**DIAGNOSTIC FEATURES:**

Small to medium sized (10-40mm); head smooth, mesosoma and metasoma punctured; head convex, fastigium horizontal with depression and a transverse furrow in front of vertex; antenna shorter than head and pronotum together; frontal ridge widely sulcated; pronotum with median carina weakly marked; three transverse sulci; front margin truncate, hind margin emarginate; prosternal process trilobate; mesosternal lobes separate, metasternal lobes contiguous; hind femur as long or slightly extending beyond metasoma; hind tibia slightly pilose; tegmina and wings reduced; valves of female genital organs narrow, bifid, denticulate; cerci pointed; characteristic black band run laterally from base of head.

**DISTRIBUTION:** India (Kerala), Srilanka.

**BIOLOGY:** Found generally in higher altitudes.

**DISCUSSION:** The genus comes close to *Tarbaleus* Brunner but differs in having imperfectly developed tegmina and wings. (*Tarbaleus* lacks tegmina and wings).

**CERCINA OBTUSA STAL**

(Plate: 19, fig: 93-97)

*Cercina obtusa* Stal, 1878: Bih. Svensk Akad. Handl. 5(4):49, 97.

**DESCRIPTION : Male**

**Head:** Convex; rather smooth; fastigium horizontal with depression; slightly raised lateral and well marked median carinulae; foveolae obsolete; antenna filiform, longer than head and pronotum together; frontal ridge widely carinated from base of antenna to clypeus, carinae parallel; lateral carinae of base arising from base of lateral ocelli.

**Mesosoma:** Pronotum longer than head, punctured, front truncate, emarginate behind; median carina represented by a line; four transverse sulci, first not cutting median carina, second not extending to lateral lobes; prozona more than twice metazona; prosternal tubercle antero-posteriorly compressed, trilobed; mesosternal lobes rectangular, separate; metasternal lobes contiguous; hind femur extending beyond metasoma, lower lobe of hind femur spine like; hind tibia pilose with 7-8 spines on external carina, obsolete external apical spine; tegmina and wings reduced, tegmina twice as long as wide.

**Metasoma:** Metasoma carinated; supra-anal plate long narrow deep groove; furcula present; cerci long narrow conical; subgenital plate short, blunt, thick.

**Colour:** Body brown, characteristic black band extending laterally from base of eyes to tip of metasoma, passing over tegmina, bordered on either sides by narrow yellow bands on head and pronotum; hind femur with black vertical bands on medial area on either sides, knee black; hind tibia with yellowish band at base, tibial spines black tipped.

**Measurements:** Body : 12.75; pronotum : 2.6; tegmen : 2; hind femur : 8.2.

**Indices:** Width of fastigium : Eye Length – 0.46; length of prozona : length of pronotum -0.71; apical width of tegmina : length of tegmina - 0.6; length of tegmina : length of hind femur – 0.23 length of antenna : length of head and pronotum together – 1.65.

**FEMALES:** Larger than males; antenna filiform longer than head and pronotum together; genitalia narrow, pilose with dents; cerci narrow.

**DISTRIBUTION:** India (Kerala), Srilanka.

**MATERIAL OBSERVED:** 2 ♀, India: Kerala, Calicut, Tushargiri ( 11<sup>0</sup> 30' N 75<sup>0</sup> 57' E), Vidhu Priya, 28.IX.2000; 1 ♀, India: Kerala, Wynad, Kalpetta (11<sup>0</sup> 36' N 76<sup>0</sup> 6' E), Jobiraj, 2.X.2000. 1 ♂, India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>0</sup> 7' N 75<sup>0</sup> 51' E), Sudheer, 9.V.2001

**DISCUSSION:** The only other species reported from India is *C. phillipsi* Henry.

**REMARKS:** Reported for the first time from India.

**OXYA AUDINET-SERVILLE**

*Oxya* Serville, 1831: Anns. Sci. nat. 22: 286; Hollis, 1971: Bull. Br. Mus. Nat. Hist. (Ent)

Type species: *Oxya hyla* Serville.

**DIAGNOSTIC FEATURES:**

Size small to medium (15-40mm); with integument finely rugose and shiny; fastigium of vertex short with rounded apex; shallowly concave; antenna filiform; eyes medium sized oval; front oblique, straight, or weakly convex; frontal ridge raised, almost parallel, sulcated; lateral facial carina straight arising from base of lateral ocelli; pronotum subcylindrical; dorsum almost flat; weak median carina, clear in metazona; traversed by 3 sulci; prosternal process conical with subacute apex, often inclined backwards; mesosternal lobes separate, metasternal lobes contiguous; tegmen well developed, anterior margin with spines in female; wings with dense hairs on dorsal surface of basal part of anal veins; lower lobe of knee of hind femur spine like; hind tibia expanded on apical two third, external apical spine present; male supra-anal plate rounded, triangular with rounded or angular apex or weakly trilobate; with or without basilateral folds and subapicolateral tubercles; cercus variable; conical or compressed with rounded acute, truncate or bifid apex; female subgenital plate with apical spine or subapical teeth; ventral margin often with longitudinal ridge or furrow; ovipositor valves with hook like marginal spines; inner ventral margin of basivalvular sclerite may have spines or unarmed.

**DISTRIBUTION:** Asia, Africa, Australia.

**BIOLOGY:** The rice grasshopper prefer moist habitat. A major pest of paddy.

DISCUSSION: The genus *Oxya* comes very close to *Gesonula* Uvarov in general appearance, but differs in having radial area of tegmen without stridulatory veinlets and fastigium of vertex with widely rounded apex

#### KEY TO THE SPECIES OF *OXYA* AUDINET-SERVILLE

1. Ventral surface of sub genital plate with a broad median longitudinal groove running from posterior margin at least to middle of plate with or lateral longitudinal ridge on each side.....2  
 Ventral surface of sub genital plat convex flat or almost with a weak apical concavity.....3
- 2 (1) Ovipositor valves with long hook like dents (fig: 106 ) posterior ventral basivavular sclerites with very small spinelets on its inner ventral margin; male cercus subacute or truncate .....*O. hyla* Serville  
 Ovipositor valves with short dents (fig: 104) posterior ventral basivalvular sclerites with a large spine on its inner ventral margin, male cercus with bifid apex.....*O. japonica* (Thunberg)
- 3 (1) Dorsal and ventral values of ovipositor with small and uniform blunt dents (fig: 102) ventral surface of sub genital plate without lateral carinae with a sub apical tooth on each side (fig: 101).....*O.nitidula* Walker  
 Dorsal and ventral valves of ovipositor with long and small dents on ventral valve long sharp (fig: 108) ventral side of sub genital plate with smooth lateral longitudinal carinae (fig: 107).....*O. tridentata* (Willemse)

**OXYA HYLA HYLA SERVILLE**

(Plate: 20, fig: 105,106)

*Oxya hyla* Serville, 1831: Ann. Sci. Nat. (Zool) 22: 287.*Oxya serrulata* Krauss, 1871: Zool. Jb. Syst. 5:662.*Oxya accunminata* Willemse, 1925: Tijdschr. Ent. 68:42*Oxya multidentata* Willemse, 1925: ibid 68:44*Oxya ebneri* Willemse, 1925: ibid 68:46*Heteracris viridivitta* Walker, 1870: Cat. Derm. Salt. Br. Mus 4:662.*Heteracris humeralis* Walker, 1870: ibid. 4: 662.*Oxya hyla hyla* Hollis 1971 Bull. Br. Mus. Nat. Hist. (Ent) 26(7) 282-283.

## DESCRIPTION: Female

**Head:** Smooth; eyes oval; antenna filiform, with fine bristles; antenna slightly shorter than head and pronotum together; fastigium horizontal, apex rounded, smooth and gradually merging with frontal ridge; fastigium with concavity, frontal ridge almost parallel, sulcated; lateral carina straight, arising from base of ocelli; face with sparse hairs.

**Mesosoma:** Pronotum smooth, finely punctured; median carina weak visible only in metazona; 4 transverse sulci present; first only on lateral lobes; pronotum with very fine sparse hairs; prozona almost equal to metazona; prosternal process conical slightly antero-posteriorly compressed with acute apex, hairy; mesosternal lobes separated by narrow space; metasternal lobes contiguous; meso-metasternal plate hairy; tegmen fully developed, extending beyond metasoma and hind femur; costal ridge present, from which upto before apex are arranged evenly a dense row of spines; hind femur extends slightly beyond apex of metasoma; upper and lower area with few fine hairs; apical portion of hind tibia expanded; 9 external spines including apical spine and 11 internal spines on hind tibia.



**Metasoma:** Ovipositor valves with long hook like dents; posterior ventral basivalvular sclerite with spinelets on its inner ventral margin, subgenital plate with a pair of median spines set close together at posterior margin; subgenital plate with a median linear concavity, bordered on each side by longitudinal ridge bearing spines at tip.

**Colour:** General body colouration green in fresh and yellow in preserved specimen; a brown band start from each eye along superior margin of lateral lobe continuing upto episternum; tegmen with costal region slightly opaque; wings hyaline; hind tibia blue.

**Measurements:** Body : 26.6; pronotum : 5; tegmen : 21.4; hind femur : 12.6.

**Indices:** Width of fastigium : Eye Length – 0.54; length of prozona : length of pronotum -0.53; apical width of tegmina : length of tegmina - 0.11; length of tegmina : length of hind femur – 1.6 length of antenna : length of head and pronotum together – 0.83.

**MALES:** Cercus conical or compressed laterally with subacute or truncate apex; smaller than females (Specimen not observed).

**DISTRIBUTION:** India (Kerala, Tamil Nadu, Uttar Pradesh, Himachal Pradesh, Arunachal Pradesh, Bihar, Karnataka, W. Bengal, Andra Pradesh, Assam, Rajasthan, Meghalaya, Orissa )Afghanistan, Angola, Africa, Bangladesh, Nepal, Maldives, Malawi, Pakistan, Srilanka.

**MATERIALS OBSERVED:** 3 ♀ India: Kerala, Palakkad, Kottekkad ( $10^{\circ} 46' N$   $76^{\circ} 39' E$ ) Vidhu Priya, 17.IX.2000.

**DISCUSSION:** Subspecies *Oxya hyla hyla* differs from *Oxya hyla intricata* (Stal) in having ventral surface of subgenital plate with two longitudinal ridges extending forward from posterior margin, these ridges often spined. (In *Oxya hyla intricata* ventral surface of subgenital plate is without longitudinal ridges, if present, in slight traces no apical spine present).

***OXYA JAPONICA JAPONICA* THUNBERG**

(Plate:21, fig: 103,104)

*Gryllus japonicus* Thunberg, 1824: Mem. Acad. Sci. St. Petersb., 9:429.*Acrydium sinense* Walker, 1870: Cat. Derm. Salt. Br. Mus 4:628.*Heteracris straminea* Walker, 1870: Cat. Derm. Salt. Br. Mus 4:666.*Oxya lobata* Stal, 1877: Ofver. Vetensk. Akad. Forh. 34: 53.*Oxya asinensis* Willemse, 1925: Tidjschr. Ent. 68: 23.*Oxya rufostriata* Willemse, 1925: Tidjschr. Ent. 68: 33.*Oxya japonica japonica* Hollis, 1971: Bull. Br. Mus. Nat. Hist. (Ent). 26: 302.

## DESCRIPTION: Female

**Head:** Smooth; eyes oval; antenna filiform, with fine bristles; antenna slightly shorter than head and pronotum together; fastigium horizontal, apex rounded, smooth and gradually merging with frontal ridge; fastigium with concavity, frontal ridge almost parallel, sulcated; lateral carina straight, arising from base of ocelli; face with hairs.

**Mesosoma:** Pronotum smooth, finely punctured; median carina weak visible only in metazona; 4 transverse sulci present; first only on lateral lobes; pronotum with very fine sparse hairs; lateral lobes with more hairs; prozona almost equal to metazona; prosternal process conical slightly antero-posteriorly compressed with acute apex, hairy; mesosternal lobes separated by narrow space; metasternal lobes contiguous; meso-metasternal plate hairy; tegmen fully developed, extending beyond metasoma and hind femur; anterior margin weakly spined; appendages hairy; hind femur extends slightly beyond apex of metasoma; upper and lower area with few fine hairs; apical portion of hind tibia expanded; 9 external spines including apical spine and 10 internal spines on hind tibia.

**Metasoma:** Ovipositor valves with short dents; post-ventral basivalvular sclerite with a large spine on its inner ventral margin; subgenital plate with two longitudinal ridges on

ventral surface with a spine at apex; posterior margin with a pair of median spines set close together.

**Colour:** General body colouration dark brownish green; a black band start from each eye along superior margin of lateral lobe continuing upto episternum; tegmen with costal region slightly opaque; wings hyaline; hind tibia blue.

**Measurements:** Body : 27.6; pronotum : 6.4; tegmen : 21.6; hind femur : 17.4.

**Indices:** Width of fastigium : Eye Length – 0.5; length of prozona : length of pronotum - 0.5; apical width of tegmina : length of tegmina - 0.1; length of tegmina : length of hind femur – 1.26 length of antenna : length of head and pronotum together – 0.84.

MALES: Unknown.

DISTRIBUTION: Oriental region, India (Kerala, W.Bengal, Karnataka, Uttar Pradesh, Andaman and Nicobar islands), Africa.

MATERIAL OBSERVED: 1 ♀ India: Kerala, Thrissur, Irinjalakuda ( 10°20' N 76° 13' E), Vidhu Priya, 25.IX.2000.

DISCUSSION: *Oxya japonica japonica* differs from *Oxya japonica vitticolis*(Blanchard) in having a spine on the lateral longitudinal ridge of subgenital plate only at apex ; and antenna as long or slightly longer than head and pronotum together. (In *Oxya japonica vitticolis* (Blanchard) longitudinal ridge on subgenital plate has spines along their length and antenna is much longer than head and pronotum)

***OXYA NITIDULA* WALKER**

(Plate: 22, fig: 98-102)

*Acridium nitidulum* Walker, 1870: Cat. Derm. Salt. Br. Mus 4:631.*Oxya nitidula* Walker, 1871: Cat. Derm. Salt. Br. Mus 5:64.

## DESCRIPTION: Males

**Head:** Smooth; eyes oval, not bulging; antenna filiform, with fine bristles; antenna slightly shorter than head and pronotum together; fastigium horizontal, apex rounded, smooth and gradually merging with frontal ridge; fastigium with concavity, frontal ridge almost parallel, sulcated; lateral carina straight, arising from base of ocelli; face with sparse hairs.

**Mesosoma:** Pronotum smooth, finely punctured; median carina weak visible only in metazona; 4 transverse sulci present; first only on lateral lobes; pronotum with very fine sparse hairs; prozona almost equal to metazona; prosternal process conical slightly antero-posteriorly compressed with acute apex, hairy; mesosternal lobes separated by narrow space; metasternal lobes contiguous; meso-metasternal plate hairy; tegmen fully developed, extending beyond metasoma and hind femur; costal ridge present, from which upto before apex are arranged weakly dense row of spines; hind femur extends slightly beyond apex of metasoma; upper and lower area with few fine hairs; apical portion of hind tibia expanded; 9 external spines including apical spine and 11 internal spines on hind tibia.

**Metasoma:** Supra-anal plate triangular, short subgenital plate almost double of supra-anal plate, thick, acute apex, hairy; cerci extending almost three fourth of subgenital plate, pointed, an obtuse protrusion near apex giving a slight bifurcate appearance.

**Colour:** General body colouration green in fresh and yellow in preserved specimens; a brown band start from each eye along superior margin of lateral lobe continuing upto episternum; tegmen with costal region slightly opaque; wings hyaline; hind tibia blue.

**Measurements:** Body : 20; pronotum : 4; tegmen : 16.2; hind femur : 11.2.

**Indices:** Width of fastigium : eye Length – 0.36; length of prozona : length of pronotum -0 .56; apical width of tegmina : length of tegmina - 0.11; length of tegmina : length of hind femur – 1.4 length of antenna : length of head and pronotum together – 0.83.

**VARIATION:** Cerci described as truncate apex by Usmani & Shafee 1985.

**FEMALES:** Ovipositor valves with small uniform blunt dents; posterior ventral basivalvular sclerite with a spine on its inner ventral margin; subgenital plate without lateral longitudinal carinae on ventral surface; posterior margin with a single median spine and a pair of lateral carina.

**DISTRIBUTION:** India (Kerala, Tamil Nadu, Karnataka, W. Bengal, Andra Pradesh, Rajastan, Orissa, Goa ) Srilanka.

**MATERIALS OBSERVED:** 2♂, 1 ♀ India: Kerala, Kottekkad (10<sup>0</sup> 46' N 76<sup>0</sup> 39' E) Vidhu Priya, 30.VII.2000. 2♂, India: Kerala, Kottekkad (10<sup>0</sup> 46' N 76<sup>0</sup> 39' E) Vidhu Priya, 17.IX.2000.

**DISCUSSION:** *Oxya nitidula* comes very close to *O. tridentata* Willemse in general characters, but varies in having ovipositor valves with small and uniform blunt dents, ventral surface of subgenital plate without longitudinal carinae but with a subapical tooth on each side. (*Oxya tridentata* has dorsal and ventral ovipositor valves with long and small dents, dents on lower valves long and sharp and ventral surface of subgenital plate with smooth lateral carinae).

***OXYA TRIDENTATA* WILLEMSE**

(Plate:23, fig: 107,108)

*Oxya tridentata* Willemse, 1925: Tidjschr. Ent. 68:30

## DESCRIPTION: Female

**Head:** Smooth; eyes oval; antenna filiform, with fine bristles; antenna slightly shorter than head and pronotum together; fastigium horizontal, apex rounded, smooth and gradually merging with frontal ridge; fastigium with concavity, frontal ridge almost parallel, sulcated; lateral carina straight, arising from base of ocelli; face with sparse hairs.

**Mesosoma:** Pronotum finely punctured; median carina weak visible only in metazona; 4 transverse sulci present; first only on lateral lobes; pronotum with very fine sparse hairs; prozona almost equal to metazona; prosternal process conical slightly antero-posteriorly compressed with acute apex, hairy; mesosternal lobes separated by narrow space; metasternal lobes contiguous; meso-metasternal plate hairy; tegmen fully developed, extending beyond metasoma and hind femur; costal ridge present, from which upto before apex are arranged evenly, a row of spines that is not very closely set; hind femur extends slightly beyond apex of metasoma; upper and lower area with few fine hairs; apical portion of hind tibia expanded; 8 external spines including apical spine and 10 internal spines on hind tibia.

**Metasoma:** Subgenital plate with ventral surface flat and slightly concave apically; apical one third with two smooth lateral longitudinal ridges; posterior margin with a pointed spine medially and a pair of spines laterally; margin of ovipositor valves with long and small uneven dents; posterior ventral basivalvular sclerite with one tooth like spine on inner ventral margin.

**Colour:** General body colouration light brownish green ; a brown band start from each eye along superior margin of lateral lobe continuing upto episternum; tegmen with costal region slightly opaque; wings hyaline; hind tibia bluish green.

**Measurements:** Body : 26.6; pronotum : 6; tegmen : 22; hind femur : 15.4.

**Indices:** Width of fastigium : Eye Length – 0.46; length of prozona : length of pronotum -0.53; apical width of tegmina : length of tegmina - 0.08; length of tegmina : length of hind femur – 1.45 length of antenna : length of head and pronotum together – 0.73.

**MALES:** Unknown.

**DISTRIBUTION:** Oriental region, India (Kerala)

**MATERIAL OBSERVED:** 3 ♀ India: Kerala, Palakkad, Kottekkad (10<sup>0</sup> 46' N 76<sup>0</sup> 39' E) Vidhu Priya, 17.IX.2000; 1 ♀ India: Kerala, Palakkad, Kottekkad (10<sup>0</sup> 46' N 76<sup>0</sup> 39' E) Vidhu Priya, 30.VII.2000; 3 ♀ India: Kerala, Palakkad, Kottekkad(10<sup>0</sup> 46' N 76<sup>0</sup> 39' E) Vidhu Priya, 30.IX.2000;

**DISCUSSION:** *Oxya tridentata* comes very close to *Oxya nitidula* (Walker) in general characters but differs in having dorsal and ventral ovipositor valves with long and small dents, dents on lower valves long and sharp, ventral surface of subgenital plate with smooth lateral carinae. (In *Oxya nitidula* valves of ovipositor are with small and uniform blunt dents, ventral surface of subgenital plate without longitudinal carinae but with a subapical tooth on each side).

*ANUPAMA* GEN.NOV.

## DIAGNOSTIC FEATURES

Body size medium (20-40mm) fastigium of vertex with concavity; foveolae absent; fastigium sloping with frontal ridge; antenna longer than head and pronotum together; pronotum without carina; four transverse sulci present; prosternal process pointed or conical; mesosternal lobes separate; metasternal lobes contiguous; tegmina and wings reduced; last metasomal segment with furcula in males male cerci slightly bifurcate; female cerci conical; hind tibia with external apical spine.

DISTRIBUTION: India (Kerala).

BIOLOGY: Not known. Generally found among grass.

ETYMOLOGY: Meaning that cannot be compared.

DISCUSSION: The genus *Anupama* stands separate from the other genera of the subfamily in having reduced wings and tegmina.

NB5616





***ANUPAMA ABSONA* SP. NOV.**

(Plate: 24, fig: 109-112)

## DESCRIPTION: Male

**Head:** Fastigium with a shallow concavity; front rounded, carinulae not well marked; vertex with depression; vertex and fastigium parted by a transverse depression; lateral carinulae extending to vertex; antenna filiform, longer than head and pronotum together; frontal ridge prominently furrowed; obsolete towards clypeus; lateral facial carinae straight, arising from lateral ocelli.

**Mesosoma:** Pronotum with anterior margin slightly incurved; posteriorly slightly emarginate; median and lateral carinae absent; four transverse sulci present, first only on lateral lobe, second on dorsal side, third and fourth entire; metazona almost half the length of prozona; prosternal tubercle pointed; mesosternal lobes separate with inner walls protruding; metasternal lobes contiguous, two foveolae present; tegmina and wings reduced; tegmina extending to tip of first metasomal segment; hind femur slightly longer than metasoma tip; lower lobe of hind femur knee almost equal to upper lobe; hind tibia with 8-9 external and 10 internal spines; hind tibia and tarsus pilose.

**Metasoma:** Metasoma with median carina; ventrally each segment with tufts of hairs; last metasomal segment with furcula; supra-anal plate with tip attenuate, basally a median longitudinal groove present; cerci long pointed, subapically with inward lobe.

**Colour:** Body testaceous; antenna apically darker; either corner of fastigium with dark spots; black band laterally on pronotum; black band dorsally on either side of median carina of metasoma; medially creamish; hind tibia bluish with black tipped spines.

**Measurements:** Body : 17.6; pronotum : 3.87; tegmen : 2.75; hind femur : 9.5.

**Indices:** Width of fastigium : Eye Length – 0.3; length of prozona : length of pronotum - 0.73; apical width of tegmina : length of tegmina - 0.3; length of tegmina : length of hind femur – 0.28; length of antenna : length of head and pronotum together – 1.27.

**FEMALES:** Much larger and stouter than males; mesosternal lobes with two foveolae; cerci short conical; ovipositor valves hairy.

**DISTRIBUTION:** India (Kerala).

**MATERIAL OBSERVED:** Holotype: 1 ♂, India: Kerala, Thrissur, Irinjalakuda (  $10^{\circ} 20' N 76^{\circ} 13' E$ ), Vidhu Priya, 25.IX.2000. Paratypes: 2 ♂, India: Kerala, Malappuram, Cali. Uni. Campus (  $11^{\circ} 7' N 75^{\circ} 51' E$ ), Vidhu Priya, 7.X.2000; 1 ♀, India: Kerala, Malappuram, Cali. Uni. Campus (  $11^{\circ} 7' N 75^{\circ} 51' E$ ), Vidhu Priya, 8.X.2000; 1 ♀, India: Kerala, Thrissur, Peechi, (  $10^{\circ} 31' N 76^{\circ} 13' E$ ) Santhosh.

**ETYMOLOGY:** Latin, meaning different.

**DISCUSSION:** As there is no other species described from the genus a discussion is not attempted. Uncertainty in this subfamily persists due to lack of transverse fold on subgenital plate, but is included in Coptacridinae due to the presence of furcula.

## ***EPISTAURUS BOLIVAR***

*Epistaurus Bolivar*, 1889: Journ. sci. Lisb (2) p164

Type species : *Epistaurus crucigerus* Bol

### DIAGNOSTIC FEATURES

Body small (<20mm), hairy, antenna filiform, eyes bulging; fastigium concave, vertex with longitudinal carinula and a transverse carina between eyes, frontal ridge arched at base, widened between antennae, narrowed and flattened towards clypeus, hardly sulcated; a deep transverse depression between fastigium and occiput pronotum with well marked median carina interrupted only by hind sulcus, acutely angulated behind prosternal tubercle conical acuminate; mesosternal lobes with rounded inner margin; tegmen well developed with obliquely truncate apex; cercus large curved; supra-anal plate tongue like at apex.

DISTRIBUTION: Africa, Burma, India.

BIOLOGY: Host plant teak

DISCUSSION: The genus comes very close to the genus *Eucoptacra* Bol. But differs in having arched frontal ridge (*Eucoptacra* has vertical frons) *Epistaurus* has a transverse depression behind fastigium (*Eucoptacra* lacks the transverse depression behind fastigium).

***EPISTAURUS SINETYI* BOLIVAR**

(Plate: 25, fig: 117-120)

*Epistaurus sinetyi* Bolivar, 1902: Anns Soc. Ent. Fr. 70, 623

## DESCRIPTION : Male

**Head:** Shorter than pronotum; fastigium of vertex extended before eyes, concave, sides carinated, behind fastigium a transverse depression between eyes hinder elevation of depression very prominent; vertex with longitudinal median carina and lateral carinulae, former extending till pronotum; foveolae prominent; frontal ridge hardly sulcated narrow near fastigium, wide between antenna and gradually converging towards clypeus; arched till base of antenna; lateral carina of face arising from base of ocelli; antenna filiform 20 to 21 segmented, longer than head and pronotum taken together, basally narrower gradually thickened.

**Mesosoma:** Pronotum tectiform, median carina interrupted by posterior that is 3<sup>rd</sup> transverse sulcus only posterior margin acutely angulated; pronotum highly punctured; prosternal process short acute, apex spine like mesosternal lobes with inner lower margin rounded, metasternal lobes separate; prozona longer than metazona; tegmen longer than metasoma; opaque, reticulate basally; wings as long as tegmen; posterior tibia with 10 to 11 internal used 9 to 16 external spines.

**Metasoma:** Carinated medially, supra-anal plate more or less tongue shaped with apex broadly angulated; furcula present; cerci longer than supra-anal plate conical incurved and acute at apex.

**Colour:** Body brown; antennae brownish apical segments darkened; tegmen brown with minute dark spots; wings dark yellowish hyaline; hind femur yellowish trifuscated; hind

tibia light brown basally followed by an ill defined yellow ring, thereafter reddish; spines black tipped; hind tarsus dark brown.

**Measurements:** Body : 12; pronotum : 5; tegmen : 9; hind femur : 7

**Indices :** Width of fastigium : eye length - 0.5; length of prozona : length of pronotum - 0.4; apical expanse of tegmina : length of tegmina-0.17; length of tegmina : length of hind femur-1.2; antennal length : length of head and pronotum together 1.45.

**FEMALES:** Unknown

**VARIATION:** Variation is seen in the general body colour being brown which is sited as pale reddish in original description.

**DISTRIBUTION:** India (Tamil Nadu, W. Bengal, Bihar, Kerala) Srilanka

**MATERIAL EXAMINED:** 1 ♂, India: Kerala, Thrissur, Irinjalakuda (10° 20' N 76° 39' E), Aravind, 25.IX.2000.

**DISCUSSION:** *Epistaurus sinetyi* resembles the species *E. aberrans* Brunn. in having longitudinal carina on vertex and transverse carina between eyes, basally arched frontal ridge wide between antennae and weakly sulcated and tectiform; pronotum traversed by post sulcus only. *E. sinetyi* differs from *E. aberrans* in having trifuscated posterior femur, male with tongue shaped supra-anal plate that is widely angulated at tip and curved cerci (*E. aberrans* has weakly bifuscated hind femur, supra-anal plate quadrate and pointed cerci)

**REMARKS:** Reported for the first time from Kerala.

## COPTACRA STAL

*Bibractoides* Rehn, 1914: Wiss Ergebn. Dtsch. Zent. Afr. Exped. 1907-1908, 5(1) 236.

Type species: *Acridium punctorium* Walker

*Syletria* Rehn, 1905: Proc. Acad. Nat. Sci. Philad. 62: 433.

Type species: *Syletria angulata* Rehn.

### DIAGNOSTIC FEATURES

Body size small (10-20mm) slightly rugose; head short, eyes large, fastigium broad with a central concavity bordered by carina; vertex between eyes broader than frontal ridge, tricarinate; antenna more or less ensiform, frontal ridge produced and parallel, non sulcated; lateral facial carina arising from base of ocelli; pronotum rugose; median carina well marked, traversed by three sulci; hind margin of pronotum acute; prosternal process conical with rounded apex; tegmina and wings well developed; hind femur robust; cerci simple conical.

DISTRIBUTION India (Kerala), Java.

BIOLOGY: Not known.

DISCUSSION: The genus *Coptacra* comes close to *Coptacrella* Bolivar in many characters but differs in having fully developed tegmina that is obliquely truncated at apex. (In *Coptacrella* tegmen is short scarcely longer than metasoma, truncated towards apex).

**COPTACRA ENSIFERA BOLIVAR**

(Plate: 26, fig: 112-126)

*Coptacra ensifera* Bolivar, 1902 Ann. Soc. Ent. France IXX, P621

## DESCRIPTION: Male

**Head:** Short, rugose, eyes large prominent; antennae ensiform, longer than head and pronotum together; fastigium broad, bordered by carinulae, approximating to extremity, a longitudinal groove present; foveolae present; vertex broader than frontal ridge, tricarinate; median carina extending to occiput; front almost vertical; frontal ridge parallel sided, nonsulcated, sinuous below median ocellus; lateral carinae arising from base of lateral ocelli.

**Mesosoma:** Pronotum rugose, bordered by grey bristles; median carina prominent, traversed by 3 sulci; first being present on lateral lobes only; second joining first at extremity, prozona and metazona of almost equal length; hind margin of pronotum acutely angular; prosternal process short pointed, anteriorly placed; mesosternal lobes almost square, interspace as long as wide; metasternal lobes contiguous; tegmina slightly extending beyond hind femur and longer than metasoma; costal region dilated, tips obliquely truncated; hind femur longer than metasoma tip; upper area with hairs, lower area rugose; hind tibia with 8 external and 9 internal spines; first tarsal segment longitudinally grooved.

**Metasoma:** Metasoma hairy, last metasomal segment with short furcula; cerci wide at base pointed apicad; supra-anal plate triangular, rounded at extremity; subgenital plate short.

**Colour:** Brown, antenna paler basally, tegmina not hyaline; wings yellow hyaline; hind femora with black lower area; inner area of hind femur, hind tibia and first tarsal segment red; carina of hind femur with black spots.

**Measurements:** Body : 15.3; pronotum : 3.5; tegmen : 12.1; hind femur : 9.

**Indices:** Width of fastigium : Eye Length – 0.625; length of prozona : length of pronotum -0 .51; apical width of tegmina : length of tegmina - 0.15; length of tegmina : length of hind femur – 1.3; length of antenna : length of head and pronotum together – 1.45.

**FEMALES:** Bigger than males; ovipositor valves long curved; subgenital plate with a spine like protrusion at extremity.

**DISTRIBUTION:** India (Kerala, Tamil nadu).

**MATERIAL OBSERVED:** 1 ♂ India: Kerala, Calicut ( 11<sup>0</sup> 15' N 75<sup>0</sup> 47' E) Mohana, 22.X.2000; 1 ♀ India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>0</sup> 7' N 75<sup>0</sup> 51' E), Vidhu Priya 17.V.2003.

**DISCUSSION:** The other reported species *Coptacra punctifera* (Walker).



## *EUCOPTACRA* STAL

*Eucoptacra* Bolivar, 1902: Ann.Soc.Ent.France, 70:623-625.

Type species: *Acridium praemorsum* Stal

### DIAGNOSTIC FEATURES

Body medium sized (20-40mm) integument finely punctured; antenna filiform; eyes large bulging; fastigium wide, concave centrally, lateral carinulae present; fastigium sloping on to frontal ridge; frontal ridge widened between antenna, not sulcated; lateral facial carinae prominent; pronotum with prominent median carina traversed by 3 sulci; hind margin angular; prosternal process widely conical; mesosternal and metasternal lobes separate; tegmina with expanded costal area and extremity truncated; hind femur stout; male supra-anal plate with strongly attenuate apical part, apex truncate; cerci compressed widened basally.

DISTRIBUTION: Australian and Oriental region.

BIOLOGY: Active from May to September, seen on grass, pest of sugarcane.

DISCUSSION: The genus *Eucoptacra* resembles *Coptacra* Stal in having vertex narrower than frontal costa, median carina of pronotum being cut by 3 sulci. But differs in having frontal costa distinctly widened between antennae. (In *Coptacra* Stal frontal ridge is not widened between antennae).

***EUCOPTACRA CEYLONICA BOLIVAR***

(Plate: 27, fig: 114-116)

*Eucoptacra ceylonica* Kirby, 1914: Fauna of Bri. India vol. I, 241.

**Head:** Short, antenna filiform, longer than head and pronotum together; space between eyes and pronotum very short; vertex between eyes narrow than frontal ridge, with narrow longitudinal depression; fastigium wide with central concavity, provided with lateral carinulae; foveolae absent; front sloping gradually to frontal ridge; front vertical minute grey hairs present, finely punctured; frontal ridge wide, wider between antennae, not sulcated; lateral carinae of face arising from between eyes and antennal base, bracketed.

**Mesosoma:** Pronotum punctured median carina interrupted by three sulci; first on lateral lobes only; second dorsal joining first at extremity, third and fourth complete; prozona shorter than metazona; hind margin acute angular; prosternal tubercle obtusely conical; mesosternal lobes wider than long; internal margins rounded; metasternal lobes separate; tegmina extending beyond metasoma and hind femur; narrow, widened at costal region; extremity truncated; hind femur as long or longer than metasoma, stout, lower region with additional longitudinal carina; upper region with greyish hairs; hind tibia hairy with 9 external and 11 internal spines; first tarsal segment grooved.

**Metasoma:** Metasoma compressed; last metasomal segment with very short furcula; supra-anal plate with longitudinal groove; cerci short, conical, hairy, valves serrate, curved, hairy; upper and lower valves almost of equal length.

**Colour:** Testaceous brown, tegmen beyond middle subhyaline; wings yellow hyaline; antenna paler towards base; hind femur with black spots apically on inner side; lower outer area black; inner area and tibia red; tibial spines black tipped.

**Measurements:** Body : 23.3; pronotum : 5.2; tegmen : 19.6; hind femur : 10.

**Indices:** Width of fastigium : Eye Length – 0.6; length of prozona : length of pronotum - 0.41; apical width of tegmina : length of tegmina - 0.12; length of tegmina : length of hind femur – 1.9; length of antenna : length of head and pronotum together – 1.21.

**MALES:** Unknown.

**DISTRIBUTION:** India (Kerala, Tamil nadu) Srilanka.

**MATERIAL OBSERVED:** 2 ♀, India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>o</sup> 7' N 75<sup>o</sup> 51' E), Vidhu Priya 17.V.2003.

**DISCUSSION:** *Eucoptacra ceylonica* resembles *E.praemorsa* Stal in general generic characters but differs in wings being yellow, hyaline and antenna longer than head and pronotum together. (In *E. praemorsa* wing base is green and apically clouded and antenna hardly longer than head and pronotum together).

## ***OXYRRHEPES* STAL**

*Oxyrrhepes* Stal, 1873: Oefv. vet. Akad. Forh XXX (4) pp 40, 53

Type species : *Opsomala llineatitarsis* Stal

### DIAGNOSTIC FEATURES

Head conical, as broad as pronotum; fastigium short, broad with narrow parabolic depression; eyes oval; antenna filiform; fastigium sloping on the frontal ridge; frontal ridge raised sulcated, gradually widening towards clypeus; lateral carina straight; prosternal tubercle conical bent behind; pronotum with well marked median carina less marked lateral carina and 3 faint transverse sulci; hind margin obtusely femora extending upto metasoma tip; tegmen extending well beyond metasoma tip; hind tibia with 13-15 extenal apical spines; genital valves of females curved.

DISTRIBUTION: Africa, Oriental region.

BIOLOGY: Unknown

DISCUSSION: The genus *Oxyrrhepes* is similar to the genus *Leptacris* Walk in having external apical spine on hind tibia and meososternal lobes meeting on a straight line. The genus differs from *Leptacris* in post femur reaching apex of metasoma and post femur having 15 moderately strong spines on outer edge (*Leptacris* hind femur is shorter than metasoma; post tibia with about 20 small spines on outer ridge).

**OXYRRHEPES MEYERI WILLEMSE**

(Plate: 28, fig: 127-129)

*Oxyrrhepes meyeri* Willemse, 1931: Treubia 12 (suppl) : 234*Acridium extensa* (Walker), 1859: Ann. Nat. Hist 3(4) : 222*Oxyrrhepes obtuse* Willemse, 1955: Public nat. Hist. Gen. Limburg Reeks 8:32**DESCRIPTION : Female**

**Head:** Conical; fastigium broad triangular with central narrow parabolic depression, carina absent, sides of depression flattened; vertex with 3 sinuous carinae; eyes oval moderately raised, convex, smooth above median ocellus, sulcated below; gradually widening towards clypeus; lateral carina straight arising from base of antennae.

**Mesosoma:** Pronotum as wide as head, longer slightly compressed in prozona; hind margin roundedly angular, 3 feebly marked transverse sulci all cutting median carina; prozona longer than metazona; prosternal tubercle conical, bent obliquely backwards; mesosternal lobes contiguous forming a straight line; metasternal lobes contiguous; mesosternal and metasternal foveolae present; mid femur reaching hind femur, hind femur long slender reaching metasoma apex; hind tibia with 12-13 external spines . besides apical are 1<sup>st</sup> segment of hind tarsus with a dorsal furrow; tegmina extending well beyond apex of metasoma; wings pointed.

**Metasoma :** Genital valves curved; cerci short conical.

**Colour:** Body straw coloured; antenna lighter basally and darker towards apex; fastigium dark down; median and lateral carina of pronotum dark; lateral lobes dark with yellow patches; tegmina with anal region yellow and the rest darker giving a 'v' shape when folded; spines of hind tibia black tipped.

**Measurements:** Body : 49; pronotum : 9.6; tegmen : 48; hind femur :26.4

**Indices :** Width of fastigium : eye length - 1; length of prozona : length of pronotum - 0.57; apical expanse of tegmina : length of tegmina-0.06; length of tegmina : length of hind femur-1.76; antennal length : length of head and pronotum together – antenna damaged.

**MALES:** Unknown

**VARIATION:** No nervures seen on tegmina

**DISTRIBUTION:** India (Kerala, W. Bengal, Tamil Nadu), Burma, China, Srilanka.

**MATERIAL EXAMINED:** 1 ♀, India, Kerala, Palakkad, Silent Valley ( $11^{\circ} 8' N$   $76^{\circ} 26' E$ ), Binoy, 25 V 95.

**DISCUSSION:** Only one species reported from India.

## *PATANGA* UVAROV

*Patanga* Uvarov, 1923: Ann. Mag. Nat. Hist. 12(9): 364.

Type species: *Gryllus Locusta succincta* Johansson

### DIAGNOSTIC FEATURES

Body large (40-60mm); vertex horizontal, slightly concave, front sloping; frontal ridge rounded, impressed below median ocellus; antenna filiform; longer than head and pronotum together; pronotum compressed laterally in prozona, median carina well marked; intersected by three sulci; prosternal process somewhat compressed and slightly inclined; mesosternal lobes with their inner margins concave; posterior femur long and moderately slender; male cercus laterally compressed, long with apex attenuate, slightly incurved.

DISTRIBUTION: India, Indonesia, Malaya, Srilanka, Thailand.

BIOLOGY: *Patanga* (*P. succincta*) has attained the status of locust and stands third in terms of frequency of outbreak and damage caused. A single life cycle is completed in a year. Abundant in areas where vegetation is characterized by prevalence of long grass and paucity of large trees. Host plants: Bamboo, banana, cashew, castor, citrus, coconut, cow pea, ginger, mango, mulberry, millets etc.

DISCUSSION: *Patanga* comes close to *Pachyacris* Uvarov but differs in having the apex of tegmen rounded and veinlets of apical part more or less perpendicular to the veins. (In *Pachyacris* the apex of tegmen obliquely truncate and apex with regular oblique reticulations)

***PATANGA SUCCINCTA* (JOHANSSON)**

(Plate: 29, fig: 130-133)

*Gryllus Locusta succincta* Johansson , 1763: Amoen. Akad. 4:398.*Patanga succincta* Uvarov, 1923: Ann. Mag. Nat. Hist. 12(9): 364**DESCRIPTION: Male**

**Head:** Fastigium of vertex slightly concave, lateral carinulae not extending to occiput, front gradually sloping to frontal ridge; frontal ridge raised, sulcated below median ocellus; lateral carinae arising from inner margin of eyes, bent obtusely at base of eyes and diverging towards clypeus; two incomplete longitudinal ridges below transverse facial furrow; antenna filiform longer than head and pronotum together.

**Mesosoma:** Pronotum slightly compressed at prozona; front slightly arched; hind margin slightly angular; prozona almost equal to metazona; median carina well marked; four transverse sulci, three traversing median carina; pronotum highly punctate; prosternal process compressed laterally, slightly inclined with subacute apex; mesosternal interspace less than width of mesosternal lobes; mesosternal lobes almost rectangular with inner margin slightly concave and inner angle acute; metasternal lobes narrowly separated; hind femur longer than metasoma, upper carina with closely set denticles, external upper and lower carina with widely spaced denticles; hind tibia with 7 external spines; tegmina with straight veins and rectangular cells apically.

**Metasoma:** Supra-anal plate weakly trilobed; median one prominent and tongue like; cerci long, incurved; subgenital plate long pointed and curved upwards..

**Colour:** Body dull yellow; antenna darker towards apex; a pale yellow stripe runs from fastigium of vertex along median carina of pronotum and continues to suture of closed tegmina; a pale blue black stripe below each eye; tegmen brown basally and apically,



paler in middle; wing base pink; denticles on upper carina pale; external upper and lower carinae with dark denticles; medial area of hind femur white; hind tibia light brown, red between internal and external spines and tibial spines

**Measurements:** Body : 42; pronotum : 9.6; tegmen : 42; hind femur : 22.

**Indices:** Width of fastigium : Eye Length – 0.6; length of prozona : length of pronotum - 0.5; apical width of tegmina : length of tegmina - 0.1; length of tegmina : length of hind femur – 1.8; length of antenna : length of head and pronotum together – 1.3.

**FEMALES:** Larger than males; hind margin of pronotum rounded; supra-anal plate with a shallow longitudinal depression at base; cerci laterally compressed, conical slightly curved; ovipositor valves short curved.

**DISTRIBUTION:** India (Kerala, Tamil Nadu, Uttar Pradesh, Himachal Pradesh, Arunachal Pradesh, Bihar, Karnataka, Andra Pradesh, Assam, Rajasthan, Meghalaya, Orissa, Delhi, Goa, Jammu and Kashmir, Lakshadweep, Maharashtra) China, Myanmar, Nepal, Thailand.

**MATERIAL OBSERVED:** 1♂, India: Karnataka, B.R. Hills, Beena, 26.V. 2000; 1♀ India: Karnataka, B.R. Hills ( 77° 16' E, 11° 47' N), Taha, 26.V. 2000.

**DISCUSSION:** *Patanga succincta* resembles *Patanga japonica* (Bolivar) in general appearance, but differs in its prozona being longer than metazona, prosternal process conical with subacute apex. (In *Patanga japonica* Bolivar, prozona is as long or shorter than metazona and prosternal process is cylindrical with rounded apex).

### **CYRTACANTHACRIS WALKER**

*Cyrtacanthacris* Walker, 1870: Cat. Derm. Salt. Br. Mus, 3:550; Uvarov, 1923: Ann. Mag. Nat. Hist. 11(9) 139

Type species : *Gryllus Locusta tataricus* Linnaeus 1758

#### **DIAGNOSTIC FEATURES**

Size large (> 40mm), slightly granulate punctate or dotted body; antenna yellow with black apex; fastigium with depression, sloping to frontal ridge which is slightly sulcated; pronotum moderately tectiform, metazona angular behind; prosternal tubercle large, strongly curved backwards almost touching mesosternum compressed at base widened in middle tapering to subacute apex; tegmina with brownish spots; male supra-anal plate somewhat trifurcate, with angular apical lobe; cercus compressed subconical with subacute apex; ovipositor with curved valves.

**DISTRIBUTION:** Africa, China, Oriental countries.

**BIOLOGY:** More commonly reported from cotton but known to live on almost all crops.

**DISCUSSION:** This genus comes near the genus *Orthacanthacris* Karsch in general appearance but differs mainly in the prosternal tubercle being long and recurved (*Orthacanthacris* has conical straight and short prosternal tubercle.)

**CYRTACANTHACRIS TATARICA (LINNAEUS)**

(Plate: 30, fig: 134-136)

*Gryllus Locusta tatarica* Linnaeus, 1758: Syst. Nat. (10<sup>th</sup> ed) 432*Cyrtacanthacris tatarica* Uvarov, 1923 Ann. Mag. Nat. Hist 11(9) 139

## DESCRIPTION: Female

**Head:** Fastigium with almost rounded concave depression; frontal ridge prominent sulcated from region of median ocellus to clypeus; lateral carinae of face arising from antennae, gradually diverging; eyes twice long as wide.

**Mesosoma:** Pronotum with a distinct median carina which is slightly tectiform on prozonal portion, flat on metazona, latter being widened laterally and broadly angulated at posterior margin; prozona and metazona of subequal lengths, moderately punctured throughout, especially on lateral lobes with a few scattered yellowish granules on pronotal disc; prosternal process bent and almost touching mesosternum; mesosternal lobes rectangular with internal acute angles almost converging; metasternal lobes separate; tegmen 5 times longer than its maximum width and characterized by not having precostal vein, its place being occupied by strong irregular reticulation; post femur longer than metasoma, shorter than tegmina, upper carinae with dark denticles; post tibia with 8-11 internal and 6 to 8 external spines, spines white with red tips, internal spines stouter than external ones.

**Metasoma:** Supra-anal plate triangular with a median groove, subgenital plate conical in males, almost truncate in females, valves of ovipositor moderately curved, lower ones smaller than upper with subacute lateral external projection.

**Colour:** General colouration red or yellow; a median pale (yellowish) band runs from fastigium of vertex to pronotum, continuing on tegmen; on vertex and pronotum the band

bordered with dark bands on either side; antennae yellow with dark apex; a characteristic white patch on either lateral lobes of pronotum face and check with alternate dark and pale narrow bands; tegmen yellowish sub hyaline with a row of dark spots along the costa and many median irregular transverse brown spots. Wings hyaline yellowish basally; post femur whitish externally, upper carina and external upper and lower carina with narrow black streak.

**Measurements:** Body : 52; pronotum : 12; tegmen : 54; hind femur : 28

**Indices:** Width of fastigium : eye length - 0.87; length of prozona : length of pronotum - 0.46; apical expanse of tegmina : length of tegmina-0.08; length of tegmina : length of hind femur-1.9; antennal length : length of head and pronotum together - 1.07.

**DISTRIBUTION:** India (Andra Pradesh, Tamil Nadu, West Bengal, Kerala, Karnataka, Assam, Bihar, Goa, Himachal Pradesh, Meghalaya & Mizoram) Africa, Oriental countries, China.

**MATERIAL EXAMINED:** 1 ♀, India: Kerala, Malappuram, Cali. Uni. Campus ( $11^{\circ} 7' N 75^{\circ} 51' E$ ), Vidhu Priya, 25. V. 2003; 1 ♀, India: Karnataka, Bangalore ( $12^{\circ} 58' N 77^{\circ} 35' E$ ), MariSelvi, 7.VI.2003; 1 ♀, India: Karnataka, B.R.Hills, ( $77^{\circ} 16' E, 11^{\circ} 47' N$ ), Resmi, 26.V.2000; 1 ♀, India: Kerala, Thrissur, Peechi ( $10^{\circ} 31' N 76^{\circ} 13' E$ ), Mehaboob, 12.VI.2004.

**DISCUSSION:** According to Bhowmik (1986) only one species occurs in India.

## **TYLOTROPIDIUS STAL**

*Tylotropidius* Stal, 1873: Recens. Orth. 1:74.

Type species: *Pozotettix (Tylotropidius) didymuscta* Stal

### **DIAGNOSTIC FEATURES**

Body medium sized ( 20-40mm); head conical antenna filiform, slightly flattened; fastigium of vertex long, almost parabolic, without carinulae, with two characteristic depressions; fastigium rounded to frontal ridge; frontal ridge convex without sulcus, diverging basally; pronotum slightly tectiform; lateral carina obtuse, converging both towards head and metasoma; metazona shorter than prozona, posterior margin rounded; prosternal tubercle antero-posteriorly compressed, spatulate, bilobed, sometimes inflated apex; hind femur very slender, elongate; hind tibia and tarsus also elongated; cercus compressed, apex slightly downcurved with acute or subacute apex.

**DISTRIBUTION:** India, Africa, Burma, Srilanka.

**BIOLOGY:** Availability of an female nymph of late instar from Orissa on 30th September 1983 indicates that a new generation starts after monsoon (Bhowmik, 1985).

**DISCUSSION:** The genus comes near *Eyprepocnemis* Fieber in general appearance. It differs from *Eyprepocnemis* in having antero-posteriorly compressed prosternal process and hind tibia having interspace between outer row of spines equal to their basal width. (In *Eyprepocnemis* the prosternal process is straight, obtuse at apex and the interspace between outer row of spines twice the width of base of spines).

**TYLOTROPIDIUS VARICORNIS (WALKER)**

(Plate: 31, fig: 137-141)

*Heteracris varicornis* Walker, 1870: Cat. Derm. Salt. Br. Mus 4:667

*Tylotropidius ceylonicus* Brunner, 1893: Annali. Mus. Civ. Stor. Nat. Giacoma Doria, Geneva, 13(33): 164.

*E. (Uprepocnemis) varicornis* Kirby, 1910: Syn. Cat. Orth.3: 561.

*Tylotropidius varicornis* Kirby, 1914: Fauna of Bri. India vol. I, 265.

**DESCRIPTION: Male**

**Head:** Conical; eyes more or less flattened; antenna filiform, slightly flattened, as long as head and pronotum together; fastigium of vertex long, parabolic, with two characteristic basal depressions; frontal ridge, convex, smooth, nonsulcated, almost flattened towards clypeus; face sparsely punctured; lateral carina absent.

**Mesosoma:** Pronotum with median and lateral carina; lateral carina obtuse with either ends converging; median carina traversed by three transverse sulci, first not extending to lateral lobes; hind margin of pronotum obtusely rounded; prosternal process spatulate, antero-posteriorly compressed, bilobed; mesosternal lobes separate, inner posterior vertex rounded, lower margins incurved; metasternal lobes almost meeting; tegmen and wings well developed, longer than metasoma, not exceeding hind femur; hind femora with basal half very stout and apical half strikingly attenuate; hind tibia with 10-12 internal and 12-14 external spines.

**Metasoma:** Metasoma carinated; supra-anal plate tongue like; subgenital plate navicular with somewhat pointed apex; cercus long, incurved, pointed.

**Colour:** Yellowish to yellowish brown; dark triangular marking behind eyes; black line on cheek; pronotum dorsally dark velvety; sides bordered by pale lateral carinae; tegmen

with a row of triangular whitish spots on radial area and a paler longitudinal stripe on costal area that gives a 'v' shaped appearance when folded; wings hyaline with pinkish or yellowish base; hind femur externally dark between carinae, dark and two oblique bands internally; tibial spines black tipped.

**Measurements:** Body : 34; pronotum : 6.4; tegmen : 28; hind femur : 23.6.

**Indices:** Width of fastigium : Eye Length – 0.64; length of prozona : length of pronotum -0.57; apical width of tegmina : length of tegmina - 0.09; length of tegmina : length of hind femur – 1.07; length of antenna : length of head and pronotum together – 0.96.

**FEMALES:** Stouter than males; lobes of prosternal process less prominent than in males; metasternal lobes slightly separated; short pointed cerci; subgenital plate medially pointed; valves of ovipositor short curved.

**DISTRIBUTION:** India (Kerala, Himachal Pradesh, Karnataka, Tamil Nadu, Orissa, W.Bengal), Burma, Srilanka.

**MATERIAL OBSERVED:** 1 ♂, India: Karnataka, Bangalore ( 12<sup>o</sup> 58' N 77<sup>o</sup> 35' E), Vidhu Priya, 14.III.2003. 1 ♀, INDIA, Kerala, Wynad, Chembra ( 11<sup>o</sup> 36' N 76<sup>o</sup> 6' E), Jobiraj, 1.IV.2001; 1 ♀, India: Kerala, Palakkad, Silent Valley (11<sup>o</sup> 8' N 76<sup>o</sup> 26<sup>o</sup> E), Binoy, 2.V.1995.

**DISCUSSION:** Only one species is reported from India.

### **EYPREPOCNEMIS FIEBER**

*Eyprepocnemis* Fieber, 1853: Lotos, 3:98.

Type species: *Gryllus plorans* Carpentier

*Eyprepocnemis* Stal, 1873: Recens Orth1:75.

Type species: Not known.

*Euprocnemis* Kirby, 1910: syn. Cat. Orth. 3(2): 557.

Type species: Not known.

#### DIAGNOSTIC FEATURES

Body medium sized ( 20-40mm); fastigium of vertex with depression, apex parabolic; front sloping, oblique; frontal ridge flat , sometimes with a shallow concavity at ocellus; antenna filiform, longer than head and pronotum together; pronotum flat dorsally, rounded behind; median carina narrow linear; lateral carinae broad, lighter; metazona shorter than prozona; four transverse sulci present; prosternal process cylindrical, slightly inclined backwards, with rounded or slightly inflated apex; mesosternal lobes approximating with rounded inner margin; metasternal lobes contiguous; tegmina and wings well developed; supra-anal plate triangular; cerci moderately broad at base, tapering towards apex; female subgenital plate trilobed.

DISTRIBUTION: India, Africa, Srilanka, Mediterranean coast of Europe.

BIOLOGY: Available in both plains as well as in high altitudes. Nymphal stage seen both in September and February shows there are two generations in a year.

DISCUSSION: This genus comes near *Tylotropidius* Stal in general appearance but differs in having prosternal tubercle cylindrical, straight, with obtuse apex and in having interspace between outer row of spines of hind tibia twice as wide as base of spine. (*Tylotropidius* Stal has antero-posteriorly compressed prosternal tubercle and the hind tibia has their interspace between outer row of spines equal to the basal width of spines).



***EYPREPOCNEMIS HITHAE* SP. NOV.**

(Plate: 32, fig: 142-144)

## DESCRIPTION: Female

**Head:** Conical, eyes long, antennae slender filiform, as long as head and pronotum together; fastigium of vertex concave, with parabolic apex and prominent front and lateral carinulae; foveolae weakly present; frontal ridge flat, gradually narrowing towards fastigial end; from below median ocellus gradually diverging; lateral carina arising from base of antennae.

**Mesosoma:** Pronotum flat with prominent median carina and wider lateral carinae, lateral carinae slightly approximating towards head; four transverse sulci present; first only on lateral lobes, second on dorsal side, third and fourth complete, last three traversing median carina; prozona longer than metazona; metazona punctate; hind margin of pronotum rounded; prosternal process cylindrical, slightly curved backwards, with rounded apex; mesosternal lobes separate with rounded inner margins; metasternal lobes contiguous; tegmen longer than metasoma and hind femur; hind tibia with eight external spines.

**Metasoma:** Metasoma with median carina; supra-anal plate elongate, broadly triangular, with median groove; cercus broad basally, narrowing towards apex, incurved and slightly decurved with apex acute, subgenital plate trilobed.

**Colour:** Yellowish to yellowish testaceous; antenna yellowish towards base and darker towards apex; fastigium brown with two dark diverging streaks on vertex; eyes brown, dark line extending from base of eye to clypeus on face; lateral carinae of pronotum yellowish, velvety brown in between two carinae, dorsally; lateral lobes with oblique black band; tegmen subhyaline with numerous brown spots, patterned basally in a linear series; wings hyaline, yellowish tint basally; hind femur yellow with longitudinal black

band on both sides; knee with arched black band; hind tibia with two basal yellow rings; tibia and tarsus brownish.

**Measurements:** Body : 32; pronotum : 6.2; tegmen : 29; hind femur : 21.2.

**Indices:** Width of fastigium : Eye Length – 0.72; length of prozona : length of pronotum -0.47; apical width of tegmina : length of tegmina - 0.137; length of tegmina : length of hind femur – 1.36; length of antenna : length of head and pronotum together – 1.09.

**MALES:** Unknown.

**DISTRIBUTION:** India (Kerala).

**MATERIAL OBSERVED:** Holotype: 1♀, INDIA, Kerala, Wynad ( $11^{\circ} 36'N$   $76^{\circ} 6' E$ ), Jobiraj, 2.X.2000.

**ETYMOLOGY:** The species is named after the author's daughter's name.

**DISCUSSION:** The species is similar to *E. alacris* (Serville) in general colouration, pronotal carinae and sulcus, metasomal carina and appendages and tegminal markings. *E. hithae* differs from *E. alacris* in having 8 spines on external carina of hind tibia , not having 8 longitudinal stripes on eyes; having two diverging dark streaks on vertex , yellowish tint on wing basally, longitudinal stripe on hind femur and hind tibia being brownish. (*E. alacris* has 9-10 spines on external carina of hind tibia , 8 longitudinal stripes on eyes, a broad velvety brown subparallel sided stripe running from fastigium to vertex, wing basally green, two oblique bands on hind femur and hind tibia bluish grey).

**MESAMBRIA STAL**

*Mesambria* Stal, 1878: Bih. Sven. Acad. Handl. V (4) 28,72.  
Type species: *Mesambria geniculata* Stal

**DIAGNOSTIC FEATURES:**

Body small (< 20mm); head as broad as pronotum; eyes large; fastigium smooth, scarcely closed at extremity and very slightly carinated; antennae filiform sometimes slightly thickened beyond middle; frontal ridge raised between antenna, generally sulcated; pronotum longer than head; prozona longer than metazona; hind border truncate; lateral carina obsolete; tegmina rudimentary extending to first metasomal segment; hind femur long extending beyond metasoma; hind tibia with 6-8 strong spines.

**DISTRIBUTION:** India, Celebes, Madagascar, Srilanka.

**BIOLOGY:** Unknown.

**DISCUSSION:** *Mesambria* comes close to *Wacata* Kirby in having reduced tegmina but differs in having antennae with normal joints. (*Wacata* has elongated antennal joints)

**MESAMBRIA KERALICA SP.NOV.**

(Plate: 33, fig: 152-154)

**DESCRIPTION: Female**

**Head:** Short; eyes oval, prominent, not bulging; antennae filiform, shorter than head and pronotum together; fastigium wide, with no depression and carinulae; foveolae obsolete, extremity almost convex rounded to frontal ridge; frontal ridge weakly sulcated, raised between antennae, narrow at fastigium, widening then again narrowing below median ocellus then parallel and flattened; lateral carinae of face arising from inner margin of eyes, straight.

**Mesosoma:** Pronotum punctured, with median carina interrupted by three transverse sulci, first one not extending to dorsal side; prozona almost double of metazona; hind border truncate and sinuous; lateral lobes vertical with a wide depression giving a ridge like appearance on dorsal end; prosternal process short, pointed; mesosternal interspace wide metasternal lobes also separate; hind femur stout, hind tibia with 6 external and 7-8 internal spines; first tarsal segment with a dorsal groove; tegmina extending to first metasomal segment, venation reticulate, costal side arched, anal region straight.

**Metasoma:** Metasoma with median carina; supra-anal plate with a dorsal longitudinal groove; cerci short slender pointed; genital valves long curved; subgenital plate with two upcurves giving an 'M' shape

**Colour:** General colouration uniformly green, inner lower carina of hind femur, apical portion of hind tibia and hind tarsus bright red; tip of antenna dark.

**Measurements:** Body : 23.4; pronotum : 5.2; tegmen : 4.2; hind femur : 10.4.

**Indices:** Width of fastigium : Eye Length – 0.9; length of prozona : length of pronotum - 0.69; apical width of tegmina : length of tegmina - 0.38; length of tegmina : length of hind femur – 0.39; length of antenna : length of head and pronotum together – 0.8.

**FEMALES:** Unknown.

**DISTRIBUTION:** India (Kerala)

**MATERIAL OBSERVED:** Holotype: 1♀, INDIA, Kerala, Idukki, Mannavan sholai (9° 51'N 76° 6' E) Brijesh, 26.II. 1998.

**ETYMOLOGY:** The species is named after the state Kerala.

**DISCUSSION:** *Mesambria keralica* sp. nov. comes close to *M. tarsalis* Walker in general appearance and characters like 6 external spines on hind tibia but differs in having rounded fastigium and dull green colour (*M. tarsalis* dark brown with triangular fastigium).

**PARACONOPHYMA UVAROV**

*Paraconophyma* Uvarov, 1921: Ann. Mag. Nat. Hist. 7 (9) 497

Type species: *Paraconophyma polita* Uvarov

**DIAGNOSTIC FEATURES**

Body small (< 20mm); head as broad as pronotum; eyes large; fastigium of vertex reclinate, sulcated, lateral carinae converging towards apex; median carina over vertex, foveolae present; antennae filiform; frontal ridge raised, lowered towards clypeus; pronotum rugulose with well marked median carina; cut atleast by one sulcus; prozona twice as long as metazona; lateral carina present; sometimes not conspicuous; hind margin emarginate; prosternal tubercle short conical; meso and metasternal lobes separate; tegmen reaching first metasomal segment; all femora short and thickened; hind tibia gradually thickened apically; 7-9 external and internal spines; external spines distinctly shorter than internal; tegmen laterally lanceolate, reaching first metasomal segment; cerci long conical, pointed.

**DISTRIBUTION:** India (Kerala, Himachal Pradesh Jammu and Kashmir, W.Bengal), Nepal.

**BIOLOGY:** Unknown.

**DISCUSSION:** Resembles *Mesambria* Stal in general appearance but differs in having foveolae and lateral carinae on pronotum. (*Mesambria* lacks foveolae and lateral carinae on pronotum)

**PARACONOPHYMA SCABRA (WALKER)**

(Plate: 34, fig: 149-151)

*Catoptenus scaber* Walker, 1870: Cat. Derm. Salt. Br. Mus 4:707*Mesambria scabra* Kirby, 1914, Fauna. Brit. India: 1:221*Paraconophyma scabra* Uvarov, 1921: Ann. Mag. Nat. Hist. 7(9) 501-502

## DESCRIPTION: Male

**Head:** Antenna as long as head and pronotum together, filiform; fastigium with a furrow; lateral carinulae converging to front; fastigial foveolae present, longer than wide shallowly concave with weak margins; frontal ridge sulcated; slightly punctured above; raised gradually flattening towards clypeus; lateral carinae arising from base of lateral ocelli, diverging gradually towards clypeus; eyes bulging.

**Mesosoma:** Pronotum with well marked median carina traversed by three transverse sulci; hind margin emarginate; prozona double the length of metazona; lateral lobes with depression; prosternal tubercle short, pointed, conical; mesosternal lobes separate, inner margins rounded, interspace gradually widening; metasternal lobes separate; mesosternal and metasternal foveolae present; legs pilose; hind femur stout; hind tibia with external and 8 internal spines; outer pair of spurs markedly shorter than inner ones; tegmina extending till first metasomal segment, truncate at extremity; hind femur extending beyond metasoma.

**Metasoma:** Metasoma with median carina; supra-anal plate longitudinally sulcated in middle with angulate apex; cercus as long as supra-anal plate; subgenital plate rounded and strongly upcurved; short furcula present.

**Colour:** Body brown; face yellowish, antenna paler towards base; lateral lobes of pronotum glistening brown; sides of metathorax with thick yellowish streak; hind tibia

reddish with black tipped reddish spines; inner side of hind femur strikingly red; externally yellowish with two oblique not so well marked black bands.

**Measurements:** Body : 15; pronotum : 4; tegmen : 2.2; hind femur : 8.4.

**Indices:** Width of fastigium : eye Length – 0.73; length of prozona : length of pronotum -0.46; apical width of tegmina : length of tegmina - 0.47; length of tegmina : length of hind femur – 0.4; length of antenna : length of head and pronotum together – (antennae broken).

**FEMALES:** Unknown.

**VARIATION:** Varies from the description of Bhowmik (1985) in the median carina of pronotum being traversed by 3 sulci and lateral lobes of pronotum glistening black.

**DISTRIBUTION:** India (Kerala, Himachal Pradesh Jammu and Kashmir, W.Bengal).

**MATERIAL OBSERVED:** 1♂, INDIA, Kerala, Idukki, Mannavan sholai (9° 51' N 76° 6' E) Brijesh, 20.VIII. 1996.

**DISCUSSION:** Since only one species is reported from India a discussion is not attempted.

**REMARKS:** Good ecological tolerance, as it is reported from subtropical and evergreen localities.



## CATANTOPS SCHAUM

*Catantops* Schaum, 1853: Ber. Verh. Akad. Wiss. Berlin, 2: 779.

Type species: *Catantops melanosticus* Schaum

### DIAGNOSTIC FEATURES

Small to medium sized insects (15-36mm); with finely punctured body; fastigium horizontal, much wider than vertex between eyes, rounded at extremity with concavity in middle; face oblique or straight; frontal ridge flat or slightly depressed with no carinae; lateral facial carinae present; eyes oval; pronotum narrowing anteriorly, weakly anteriorly truncated; posterior margin obtusely angular; median carina weakly represented, cut by three transverse sulci; lateral carinae absent; prosternal tubercle cylindrical, short, with rounded apex; mesosternal lobes separate; metasternal lobes contiguous; tegmina and wings well developed; longer than metasoma and hind femur; hind tibia with no external apical spine; male cercus bilaterally flattened; apically hatched-shaped.

DISTRIBUTION: Africa , Australia, Oriental region.

BIOLOGY: Very commonly found in all habitats.

DISCUSSION: *Catantops* resembles *Xenocatantops* Dirsh &Uvarov in general appearance but varies in the inner disc of hind femur having 4 black spots. (In *Xenocatantops* inner region of hind femur has 3 black spots).

**CATANTOPS INNOTABILIS (WALKER)**

(Plate: 35, fig: 145-148)

*Acridum innotabile* Walker, 1870: Cat. Derm. Salt. Br. Mus 4:629*Catantops innotabilis* Uvarov, 1925: Orth. Acrid. 30*Catantops innotabile* Uvarov, 1927: Rec. Indian Mus. 29(4) 238*Catantops pinguis innotabilis* Dirsh & Uvarov, 1935: Tijdschr. Ent. 96(3):233.

## DESCRIPTION: Male

**Head:** Very short, mostly covered by oval eye; vertex between eye narrower than frontal ridge; a longitudinal depression centrally; antenna filiform; fastigium horizontal with a depression in center foveolae obsolete; frontal ridge parallel sided, impressed in middle, starting from median ocellus to clypeus, faintly punctured; lateral carinae arising from inner margin of eye, almost straight.

**Mesosoma:** Pronotum slightly punctured; posterior margin roundedly obtuse-angular; median carina weak lateral carinae absent; median carina traversed by 3 sulci; first sulcus only on lateral lobes, second dorsal, third and fourth complete; prosternal process short cylindrical, rounded at extremity, laterally compressed basally provided with grey hairs; mesosternal lobes separate, inner walls protruding into interspace; metasternal lobes contiguous; tegmina extends beyond metasoma tip and hind femur; hind femur as long as metasoma; hind tibia 10 external and 11 internal spines.

**Metasoma:** Supra-anal plate triangular, laterally seen sinuous, dorsally with median longitudinal groove; subgenital plate long thick, pointed, narrowed at tip, ventrally depressed; cerci long curved, laterally compressed, apex hammer like, hairy.

**Colour:** Body testaceous brown; antenna paler towards base, darker towards apex; tegmina mottled with brown, radial area with pale spots; wings hyaline; pale oblique

band laterally on metathorax; hind femur with two oblique black bands above, which extends to medial area internally; in addition there are one black spot at base and another at apex on inner side; lower part of outer medial area of hind femur yellowish, 3 or 4 black spots apically on lower carina; hind tibia red with black tipped spines.

**Measurements:** Body : 22.8; pronotum : 5.4; tegmen : 19.8; hind femur : 12.

**Indices:** Width of fastigium : Eye Length – 0.54; prozona : pronotum - 0.46; apical width of tegmina : length of tegmina - 0.1; length of tegmina : length of hind femur – 1.76; length of antenna : length of head and pronotum together – 0.92.

**FEMALES:** Very similar to males except in larger size; cercus short conical; valves of ovipositor moderately curved; subgenital plate with truncated apex.

**VARIATION:** In a few specimens first oblique band on hind femur extends to medial area.

**DISTRIBUTION:** India(Kerala, Himachal Pradesh,Goa, Madhya Pradesh, Arunachal Pradesh, Karnataka, Orissa, W.Bengal) Afghanistan, Korea, Srilanka.

**MATERIAL OBSERVED:** 3♂, 3♀, INDIA, Kerala, Palakkad, Shoranur (10° 46' N 76° 16' E) Vidhu Priya, 24.V.2003; 1♂, 2♀, India: Kerala, Thrissur, Irinjalakuda (10° 20' N 76° 13' E), Vidhu Priya, Aravind, 25.IX.2000; 1♀, India: Kerala, Malappuram, Cali. Uni. Campus (11° 7' N 75° 51' E), Vidhu Priya, 30.VIII.2000, 1♀, India: Kerala, Malappuram, Cali. Uni. Campus (11° 7' N 75° 51' E), Vidhu Priya, 2.IX.2000.

**DISCUSSION:** *C. innotabilis* comes close to *C. pinguis* Stal, in general appearance and in shape of male cerci, but differs distinguishably in its frontal ridge being parallel sided (The frontal ridge of *C. pinguis* is a little expanded between antennae).

**STENOCATANTOPS DIRSH & UVAROV**

*Stenocatantops* Dirsh&Uvarov, 1953: Tijdschr. Ent. 96: 237.

Type species: *Gryllus splendens* Thunberg.

**DIAGNOSTIC FEATURES**

Body medium sized (20-40mm); finely rugose or dotted; body slender, elongated; antenna filiform, slightly compressed on basal region; fastigium of vertex trapezoidal, having concavity in middle; interocular distance narrower than frontal ridge; frons oblique, straight or slightly excurved; frontal ridge mostly sulcated; pronotum with flattened dorsal region; lateral carinae absent, median carina cut by three sulci; prosternal process compressed laterally; metazona about as long as prozona; hind margin of metazona obtuse angular; hind tibia with no external apical spine.

**DISTRIBUTION:** Australian and Indian region.

**BIOLOGY:** Found on open places in the outskirts of forests grassland or crop fields or gardens.

**DISCUSSION:** This genus comes very close to *Xenocatantops* Dirsh& Uvarov, but differs in having pronotum flattened and prosternal process compressed and bent. (*Xenocatantops* has constricted pronotum and prosternal process conical).

**STENOCATANTOPS SPLENDENS (THUNBERG)**

(Plate: 36, fig: 155-157)

- Gryllus splendens* Thunberg, 1815: Mem. Acad. Sci. St. Petersb. 5: 236.  
*Acridium luteolum* Serville, 1839: Ins. Orth. 661  
*Acridium (Oxya) infuscatum* de Haan, 1842: Temminck, Verh. Orth. 16:155  
*Cyrtacanthacris nana* Walker, 1870: Cat. Derm. Salt. Br. MUS. 3: 568.  
*Cyrtacanthacris ferrina* Walker, 1870: ibid 3:568  
*Acridium ceramicum* Walker, 1870: ibid. 3:591  
*Cyrtacanthacris tenella* Walker, 1870: ibid. 4:618  
*Acridium corcanum* Walker, 1870: ibid. 4:629  
*Oxya infuscata* Walker, 1870: ibid. 4:647  
*Oxya lutcola* Walker, 1870: ibid. 4:648  
*Cyrtacanthacris oblique* Walker, 1871: ibid. 5 (Suppl):58  
*Catantops splendens* Stal, 1873: Recens. Orth. 1: 71.  
*Stenocatantops splendens* Dirsh & Uvarov, 1953: Tijdschr. Ent. 96:237

## DESCRIPTION: Male

**Head:** Small; eyes prominent; interocular distance very narrow; fastigium with median depression bordered by carinulae; antenna filiform, basally compressed, longer than head and pronotum together; frontal ridge parallel sided, sulcated below median ocellus; lateral carinae straight.

**Mesosoma:** Pronotum flat above, finely punctured, with well marked median carina, cut by three sulci; prozona almost of same length as metazona; metazona with hind margin obtusely angulated, apex rounded; lateral lobes with two or three smooth areas; prosternal process laterally compressed and curved; meso-metasternal plate elongate; mesosternal lobes narrowly separated with an internal protrusion on inner margin; metasternal lobes contiguous; tegmen long narrow rounded, extending beyond hind femur and metasoma

tip; hind femur slender or about as long or slightly shorter than metasoma tip; hind tibia with no external apical spine; 11 internal and 9 external spines.

**Metasoma:** Supra-anal plate somewhat tongue shaped with median longitudinal groove; subgenital plate long surpassing supra-anal plate; cerci long slender, acutely pointed, incurved.

**Colour:** General colouration brown; antenna yellowish; third episternum with characteristic pale oblique band; tegmina testaceous hyaline, with small dark spots; hind femur yellowish externally with linear dark line along medial area, inner face uniquely black above inner upper area with three dark spots; hind tibia and tarsus red.

**Measurements:** Body : 29.8; pronotum : 6.2; tegmen : 27; hind femur : 15.2.

**Indices:** Width of fastigium : Eye Length – 0.42; length of prozona : length of pronotum -0.48; apical width of tegmina : length of tegmina - 0.09; length of tegmina : length of hind femur – 1.7; length of antenna : length of head and pronotum together – 1.13.

FEMALES: Unknown.

**DISTRIBUTION:** India (Kerala, W. Bengal, Andaman and Nicobar Islands, Arunachal Pradesh, Assam, Madhya Pradesh, Meghalaya, Orissa, Tamil Nadu, Uttar Pradesh), Burma, Thailand, Java, Korea, Malaya, Phillipines.

**MATERIAL OBSERVED:** 1♂, INDIA, Kerala, Meenmutty, George Mathew, -.XI.2000.

**DISCUSSION:** This species comes close to *S.vitripennis* (Sjostedt) in having compressed curved prosternal process, but differs in prosternal process not touching mesosternum and subgenital plate moderately long and less acute. (In *S. vitripennis* prosternal process touches the mesosternum and subgenital plate is very long and strongly acute).

## **CHROTOGONUS SERVILLE**

*Chrotogonus* Serville, 1839, Ins. Orth. P 702.

Type species: *Ommexycha lugubre* Blanchard.

### DIAGNOSTIC FEATURES

Size small (< 20 mm); body short and stout; head narrowed towards apex; eyes large bulging, rounded; antenna filiform, with a dorsal longitudinal groove basally, inserted close together between eyes; frontal ridge raised before median ocellus, sulcus very narrow and ridges very closely set; pronotum rugose, widened behind, hind border obtusely angular or rounded; tegmina and wings present, tegmina nodose; hind femur stout, lower lobe of hind femur knee acute angular; hind tibia with 7-8 external spines, apical spine absent; anterior margin of prosternum forming a collar hiding mouth parts partially; metasoma with median carina; cerci short stumpy.

DISTRIBUTION: Africa, Asia, Australia.

BIOLOGY: Found on bare soil in fallow fields. They mainly attack seedlings as they lack climbing habits. Adults and all hopper stages are found through out the year, less active and less numerous in winter. Self burial and burrowing have been recorded (Prasad Kumar and Viraktamath, 1991).

DISCUSSION: *Chrotogonus* differs from the adjacent genus *Atractomorpha* Sauss. in having the anterior margin of prosternum strangely deflexed and dilated. (In *Atractomorpha* prosternum is neither deflexed nor dilated).

### KEY TO THE SPECIES OF *CHROTOGONUS* SERVILLE

- Tegmina reaching tip of metasoma.....  
 .....***Chrotogonus trachypterous trachypterous* (Blanchard)**
- Tegmina reaching about 4<sup>th</sup> metasomal segment.....  
 .....***Chrotogonus oxypterous* (Blanchard)**

**CHROTOGONUS TRACHYPTEROUS TRACHYPTEROUS (BLANCHARD)**

(Plate: 37, fig: 161-163)

*Ommexecha trachypteros* Blanchard, C. E. 1837: Ann. Soc. Ent. France (n.s)5:618.*Chrotogonus brevis* Bolivar, 1904: Bol. Soc. Espan, iv, p92-99.*Ommexecha pallidus* Blanchard, C. E, 1837: Ann. Soc. Ent. France (n.s)5:623.*Chrotogonus sordidus* Kirby, 1914: Fauna. Of Bri. India: 8 , 162,167.

## DESCRIPTION : Female

**Head:** Narrowed towards front; eyes large, rounded, bulging; antennae filiform with a dorsal longitudinal groove extending to about 7 basal segments, placed very close to each other; fastigium extending beyond eyes, with V shaped carinulae, meeting at front beyond which extends foveolae; foveolae oblong, wide, prominent, vertex concave with lateral carinulae lining eyes and median carina extending till pronotum, vertex with granules; frontal ridge raised high above median ocellus, almost flat below it, sulcus narrow, carinae almost touching each other; lateral carinae arising from between eyes and antennal base, diverging towards clypeus.

**Mesosoma:** Pronotum with rugae and granules; median and lateral carinae marked only on metazona; metazona as long as prozona, hind border obtusely angular with five lobe like markings; lateral lobes with concavity ; hind sulcus complete; prosternum forming a collar like extension hiding the lower mouth parts; mesosternal lobes separate, as wide as long, inner margin obtuse; metasternal lobes widely separate; tegmina longer than metasoma and hind femur; ulnar vein with nodes; wings longer than tegmina; hind femur stout slightly longer than metasoma; hind tibia without external apical spine, seven spines on external ridge.



**Metasoma:** Metasoma stout with median carina; supra-anal plate short, triangular with blunt apex; cerci short, conical, stumpy; valves curved, pointed, toothed; subgenital plate with an inverted 'U' shaped depression at posterior border.

**Colour:** Brown, pale, ventrally with black spots on thorax and metasoma; antennae darker towards tip; tegmen uniform brown, wings black hyaline; external carinae of hind femur with black spots; hind tibial spines black tipped

**Measurements:** Body : 18.6; pronotum : 4; tegmen : 15; hind femur : 8.6.

**Indices:** Width of fastigium : eye Length – 1; length of prozona : length of pronotum – 0.45; apical width of tegmina : length of tegmina - 0.09; length of tegmina : length of hind femur - 1.74; length of antenna : length of head and pronotum together – 0.96.

**MALES:** Not observed.

**DISTRIBUTION :** India ( Assam, Bihar, Delhi, Himachal Pradesh, Kerala, Maharashtra, Madhya Pradesh, Orissa, Punjab, Uttar Pradesh) Bangladesh, Iran, Nepal, Pakistan.

**MATERIAL EXAMINED:** 1♀, INDIA, Kerala, Kozhikode, Chattamangalam ( 11<sup>o</sup> 15' N 75<sup>o</sup> 47' E ) Raj Mohana , 2. x. 2000.

**DISCUSSION:** The species *C. trachypterous* come close to *C. oxypterous* Blanch. In general appearance, but differ mainly in having tegmina and wings longer than metasoma. (In *C. oxypterous* tegmina and wings are shorter than metasoma) *C. trachypterous* differs from *C. trachypterous robertsi* (Kirby) in having wings longer than tegmina (*C. trachypterous robertsi* has wings shorter than tegmina)

**CHROTOGONUS OXYPTEROUS BLANCHARD**

(Plate: 38, fig: 158-160)

*Ommexycha oxypterosus* Blanchard, 1836, Ann.Soc.Ent.France, V, P622.

*Chrotogonus fuscescens* Kirby, 1914, Fauna. Of Bri. India: 163.

*Ommexycha liaspis* Blanchard, 1837, Ann.Soc.France (n.s) 5: 620.

*Chrotogonus saussurei* Bolivar, 1884, Ann.Soc.Espan.Hist.Nat, 13:39, 49, 494.

*Gryllus scaber* Fabricius, 1796, Index alphabet. Fabr. Ent. Sjst,1:72.

**DESCRIPTION: Female**

**Head:** Subconical; fastigium concave; carinulae straight, converging anteriorly meeting at right angles, behind continuing as a border to eyes; medium carina extending till pronotum; fastigial foveolae prominent, rectangular, narrow; eyes large, protruding; antenna filiform with dorsal, basal, longitudinal groove; vertex with granules; frontal ridge raised high above median ocellus, almost flat below it, sulcus narrow, carinae almost touching each other; lateral carinae arising from between eyes and antennal base, diverging towards clypeus.

**Mesosoma:** Pronotum with rugae and granules; median and lateral carinae marked only on metazona; metazona longer or as long as prozona, hind border obtusely angular with five lobe like markings; lateral lobes with concavity; pronotum with two complete sulci; prosternum forming a collar like extension hiding the lower mouth parts; mesosternal lobes separate, as wide as long, inner margin obtuse; metasternal lobes widely separate; tegmina shorter than metasoma and hind femur, reaching about half of the metasoma; ulnar vein with nodes; hind femur stout slightly longer than metasoma inner side concave; hind tibia without external apical spine, seven spines on external ridge.

**Metasoma:** Metasoma stout with median carina; supra-anal plate short, triangular; cerci short, conical, stumpy; valves curved, pointed, toothed; subgenital plate with an upcurve at posterior border.

**Colour:** Brown, pale, ventrally with black spots on thorax and metasoma; antennae darker towards tip; tegmen uniform brown wings black hyaline; external carinae of hind femur with black spots; hind tibial spines black tipped

**Measurements:** Body : 19.2; pronotum : 4.4; tegmen : 7.8; hind femur : 8.6.

**Indices:** Width of fastigium : Eye Length – 0.7; length of prozona : length of pronotum - 0.45; apical width of tegmina : length of tegmina - 0.15; length of tegmina : length of hind femur - 1.9; length of antenna : length of head and pronotum together – 0.73.

**MALES:** Not observed.

**DISTRIBUTION:** India (Andhra Pradesh, Bihar, Goa, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal).

**MATERIAL EXAMINED:** 1♀, India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>o</sup> 7' N 75<sup>o</sup> 51' E) Vidhu Priya, 19.IV. 2001; 1♀, India: Kerala, Malappuram, Cali. Uni. Campus (11<sup>o</sup> 7' N 75<sup>o</sup> 51' E) Vidhu Priya , 26.IV.2001.

**DISCUSSION:** The species comes very close to *C.trachypterous* (Blanchard) in appearance but differs in the tegmina being shorter than metasoma and median carina of pronotum being cut by two sulci. (In *C.trachypterous* tegmina is longer than metasoma and median carina of pronotum is cut by only hind sulcus)

**NEORTHACRIS KEVAN & SINGH**

*Neorthacris* Kevan and Singh, 1964: Entomologist, London 97:173

Type Species : *Orthacris acuticeps* Bolivar

**DIAGNOSTIC FEATURES**

Body medium sized (20-40 mm); head conical; furrow of frontal ridge extending over fastigium; areolae present; foveolae superior obsolete; parabolic extremity carinated; eyes large bulging; antenna thick, filiform; frontal ridge sulcated through out; pronotum not carinated; apterous; hind femur filiform; hind tibia with external apical spine, space between 3<sup>rd</sup> and 4<sup>th</sup> spines more than double as others; prosternal process present; cerci long; subgenital plate broad vertically.

**DISTRIBUTION:** India (Maharashtra, Tamilnadu, Karnataka, Kerala)

**BIOLOGY:** Feeding in mulberry, aubergine, indigo, sandalwood, and sweet potato. Found through out the year, maximum during May to November.

**DISCUSSION:** *Neorthacris* differs from the other members of the family in lacking tegmina and wings.

**NEORTHACRIS ACUTICEPS ACUTICEPS BOLIVAR**

(Plate: 39, fig: 164-168)

*Orthacris acuticeps* Bolivar, 1902: Ann. Soc. Ent. France (n.s) 90: 602.

*Orthacris carli* Uvarov, 1929: Revue Suisse de Zool 36:551.

*Orthacris escheri* Uvarov, 1929: Revue Suisse de Zool 36:549.

## DESCRIPTION: Male

**Head:** Elongate; as long as pronotum; fastigium produced well in front of eyes, parabolic, demarcated from foveolae by a furrow; foveolae almost flat, extremity lined by carinulae; sulcus of frontal ridge extending dorsally till fastigium; fastigium with median carina extending over vertex; eyes large protruding, minimum width between eyes  $1/3^{\text{rd}}$  behind anterior end of eyes; antenna stout, filiform longer than head and pronotum together, basal segments shorter; front oblique; frontal ridge sulcated, sulcus very narrow, carinae wider towards clypeus median ocellus placed far behind antennal base; transverse ridge between frontal ridge and lateral carinae below antennal base; lateral carinae arising from base of antenna, obtuse.

**Mesosoma:** Pronotum as wide as head, punctured, not carinated, rounded dorsally, three sulci present, first only on lateral lobe, second placed beyond middle,  $2^{\text{nd}}$  and  $3^{\text{rd}}$  complete, prozona almost four times metazona; hind margin slightly emarginated; pronotum rounded dorsally; prosternal tubercle short, conical; mesosternal lobes longer than wide, narrowly separated; metasternal lobes also narrowly separated; foveolae present; hind femur filiform, inner side flat with no markings in between carinae; hind tibia pilose, external apical spine present, 7-8 external spines present; first tarsal segment sulcated, third longer than first; tegmina and wings absent.

**Metasoma:** Metasoma narrow almost cylindrical punctured; no carina supra-anal plate tongue like with a median longitudinal ridge; wide short furcula present; cerci long,

abruptly narrowed, curved towards each other; subgenital plate broad vertically, ventrally pilose.

**Colour:** Body bright green; A black band arising from base of eye extending over pronotum till mid of metasoma; bordered on lower side by white streak on thorax; pronotum has a red line beneath the black band and above black band on metathorax; legs green; ventral side yellowish green.

**Measurements:** Body: 22; pronotum: 3.4; post femur: 10.

**Indices:** Width of fastigium : eye length - 0.6; length of prozona : length of pronotum - 0.8; antennal length : length of head and pronotum together-1.5.

**FEMALES:** Body stouter and longer than males; antenna shorter than head and pronotum together; cerci short , conical; genital valves short, lower ones serrate.

**DISTRIBUTION:** India (Kerala, Tamil Nadu, Karnataka)

**MATERIAL EXAMINED:** 4 ♀, India: Kerala, Palakkad, Kottekkad (10° 46' N 76° 39' E) Vidhu Priya, 3.IX.2000; 1 ♂ 2 ♀, India: Kerala, Palakkad, Shoranur (10° 46' N 76° 16' E), Vidhu Priya, 24.V. 2003; 2 ♀, India: Kerala, Thrissur, Irinjalakuda ( 10° 20' N 76° 13' E), Vidhu Priya; 2 ♀, India: Kerala, Thrissur, Irinjalakuda ( 10° 20' N 76° 13' E), Aravind; 1 ♀, India: Kerala, Thrissur, Irinjalakuda ( 10° 20' N 76° 13' E)Janu, 25.IX.2000; 1 ♀, India: Kerala, Malappuram, Cali. Uni. Campus (11° 7' N 75° 51' E), Vidhu Priya, 21. X. 2000; 1 ♀, India: Kerala, Calicut (11° 15' N 75° 47' E), Mohana, 7.X. 2000.

**DISCUSSION:** *N.acuticeps acuticeps* comes very close to *N.acuticeps nilgirensis* Uvarov in characters and appearance but differs in having male cerci abruptly tapered apically and curved ( In *N.acuticeps nilgirensis* males cerci is pointed and not curved ).

## ***AULARCHES* STAL**

*Aularches* Stal, 1873: Ofv. K. Vetensk. Akad. Forh. 30(4): 51

Type species: *Gryllus miliaris* Linn

### DIAGNOSTIC FEATURES

Body large (more than 40 mm), stout; fastigium triangular; furrow between fastigium and vertex and parting two halves of fastigium; vertical furrow continuous with sulcus of frontal ridge; on vertex two tubercles adjacent to eyes; antenna long with long joints; eyes small, protruding; sulcus of frontal ridge ceasing below antenna; lateral carinae distinct running within eye, slightly divergent towards clypeus; pronotum strongly tuberculate, with two large humps in front; median carina more prominent in metazona; 3 transverse sulci present; small anteriorly placed prosternal tubercle; mesosternal and metasternal lobes separate; tegmina and wings well developed tegmina long moderately broad with callous spots; tegmina black hyaline; legs slender.

DISTRIBUTION: India, Nepal, Srilanka, Java.

BIOLOGY: Markedly phytophilous, usually occurs in shrubs and herb thickets of forest margins. It has been regarded as one of the chief insect pest of coffee.

DISCUSSION: *Aularches* resembles *Poeciloceris* Serv. in its body being large, robust and antenna placed near eyes below ocelli. It differs from *Poeciloceris* in metazona of pronotum being rugose tegmina being spotted and posterior lobe of pronotum raised above anterior lobe. (In *Poeciloceris* pronotum is not rugose. Tegmina not spotted and wings red. Posterior lobe of pronotum in level with anterior lobe.)

***AULARCHES MILIARIS MILIARIS* (LINNAEUS)**

(Plate: 40, fig: 173-175)

*Gryllus miliaris* Linnaeus, 1758: Syst. Nat. Per Regna tria natural (10<sup>th</sup> ed) 1:432*Aularches punctatus* Drury, 1773: III. Exot. Ent. ii.*Gryllus conspersus* Houttyn 1813, Stoll, C. Nat – Afbeald. Beschryv. Spooken wandel  
Blad. Zabelspringh 2:13*Gryllus scabiosus* Fabricius, 1793: supplementam Entomologiae systematicae 2:51*Acrydium verrucosus* de Geer, 1773: Memoires pour servir 'a1' histore desinsectes 3:488*Aularches miliaris* Stal, 1873: recens Orth I

## DESCRIPTION : Female

**Head:** Rounded dorsally, smooth; fastigium triangular separated from vertex by a furrow; fastigium divided to two halves by a fissure continuing in frons as sulcus of frontal ridge; on vertex two tubercles present adjacent to eyes; eyes small, bulging; antennae longer than head and pronotum together, segments long; frons almost vertical frontal ridge sulcated; extending only upto below antennae; below median ocellus is a short transverse groove; lateral carina arising from between antennal base and eyes diverging along margin of eye from lower point of eye straight till clypeus.

**Mesosoma:** Pronotum highly tuberculate; median carina and 3 transverse sulci present prozona almost equal to metazona; metazona raised than prozona; frontal lobe with two large rounded contiguous elevations in front; space between sulci with spinous tubercles; metazona rugose hind margin deeply pitted and rounded with a row of short spines on margin, not close together; lateral lobes not much tuberculate hind border rounded; prosternal tubercle short, conical placed anteriorly; mesosternal lobes widely separated; foveolae present; tegmina longer than metasoma, wide, oblong; wings slightly shorter than tegmen; hind femur slightly shorter than metasoma, slender; hind tibia with 8 external spines including apical one, 10-11 internal spines.



**Metasoma:** Callous spots as median line on metasoma dorsally; triangular supra-anal plate apex rounded cerci short stumpy; valves smooth curved. Subgenital plate with a narrow conical protuberance.

**Colour:** Head black, antenna black, face lighter; lateral carina of face yellowish; humps of pronotum dull greenish; the hind border yellow tegmina greenish with yellow spots; hind wing black hyaline; legs black; metasoma black with hind border of each segment red; genital valves reddish.

**Measurements:** Body: 48; pronotum: 12.2; tegmen: 34.6; post femur: 17.4.

**Indices:** Width of fastigium : eye length - 1; length of prozona : length of pronotum - 0.5; apical expanse of tegmina : length of tegmina-0.17; length of tegmina : length of hind femur-2.04; antennal length : length of head and pronotum together-1.13.

**DISTRIBUTION:** India (Kerala, Tamil Nadu, Madhya Pradesh, Karnataka)

**MATERIAL EXAMINED:** 1 ♀, India: Kerala, Thrissur, Agri. Uni. Campus ( $10^{\circ} 31' N$   $76^{\circ} 13' E$ ), Santosh, 20.VIII.2004; 1 ♀ India, Karnataka, Sringeri ( $13^{\circ} 25' N$   $75^{\circ} 15' E$ ), Sinu, 7.X.2004.

**DISCUSSION:** *Aularches miliaris* is the only species reported from India.

**ATRACTOMORPHA SAUSSURE**

*Atractomorpha* Saussure, 1861: Ann. Soc. Ent. France (n.s.) 4(1) 474  
Type species: *Truxalis crenulata* Fab.

*Minorissa* Thomas C, 1874: Bull. U.S. Geol Geog Sciev Territ 1(2) : 63  
Type : Not known.

*Perena* Walker, 1870: Cat. Derm. Salt. Br. Mus (3) IV : 506  
Type species: Not known.

**DIAGNOSTIC FEATURES**

Body slender, short (<20 mm), compressed; head conical rarely longer than pronotum; fastigium as long as length of eye; eyes oblong; antennae triquital stout sub filiform; front oblique ridge compressed between antennae, sulcated till extremity; sulcus extending to fastigium; antennae inserted ahead of lateral ocelli; cheeks with a row of granules extending to the middle coxae; pronotum subemarginate in front and obtusely angulated behind; very slightly tricarinate; hind sulcus placed behind middle, lateral lobe almost perpendicular; prosternal tubercle spatulate; mesosternal lobes separate metasternal lobes continuous, behind foveolae separated by a space; tegmina pointed, costal area slightly expanded towards base; wings as long as tegmina pointed; metasoma carinated; supra-anal plate narrow triangular; sub genital plate trigonate; cerci short conical; valves of ovipositor serrate, curved.

**DISTRIBUTION:** Bangladesh, India, Malaya, Myanmar, Pakistan, Srilanka, N.W. Sumatra, Thailand, S. Vietnam.

**BIOLOGY:** Host Plants : tobacco, oil seeds, vegetables, sugarcane. Seen throughout the year, reduced activity in December, January

DISCUSSION: Resembles *Tagasta* Bol. in having antennae remote from eyes placed in front of ocelli. It differs from *Tagasta* in having long narrow tegmina and slender body. ( In *Tagasta* tegmina is short and broad and body stout)

**ATRACTOMORPHA CRENULATA FABRICIUS**

(Plate: 41, fig: 169-172)

*Truxales crenulata* Fabricius, 1793: Suppl. Ent. Syst. 2:28*Truxalis scabra* Thunberg, 1815: Mem. Acad. Imp. Sci. St. Petersburg 5:266*Truxalis porrecta* Walker, 1859: Ann. Nat Hist. 3(4) 222*Atractomorpha consohrina* Saussure, 1862: Ann. Sx. Ent. France 4(1) 475*Atractomorpha obscura* Bolivar, 1917: rev. Ac. Madrid 16:392*Atractomorpha crenulata* Saussure, 1861: Ann. Soc. Ent. France, (4) I, p475*Atractomorpha crenulata* var *prasina* Bolivar, 1905: Bol. Soc. Espan. Hist. Nat. v, p197,207*Acridium psittacium* De haan, 1842: Temminck, Verhandel Orth p.149 xxiii p146**DESCRIPTION: Male**

**Head:** Conical; fastigium as long as length of eyes; narrow furrow at tip, obtusely rounded; eyes oblong; antennae stout, subfiliform, trigonate, inserted ahead of lateral ocelli; front oblique, granulated; frontal ridge compressed between antennae; lateral carina arising from inbetween antenna and ocellus, below eyes bracketed; cheek with a row of granules; continuing until base of mid coxa.

**Mesosoma:** Pronotum with sparse granules; very weakly marked median and lateral carinae; two transverse sulci; front of pronotum slightly emarginated; hind border obtusely rounded with a small notch at middle; prosternal process anteriorly placed, slanting behind, spatulate, flattened anteriorly; mesosternal lobes separate, longer than wide; inner corner rounded; foveolae present; metasternal lobes contiguous separated by a transverse space between foveolae; legs slender; hind femur filiform; hind tibia with 9 external 10 internal spines including apical ones; tegmina narrow, pointed costal expansion towards base; hind wings pointed slightly shorter than tegmen.

**Metasoma:** Metasoma compressed, with median carina; supra-anal plate large narrow triangular, cerci conical, abruptly narrowing; subgenital plate thick pilose with an up curve.

**Colour:** Green pubescent; antenna with a light pink shade externally; tip dark; row of granules on cheek and lateral lobes of pronotum yellowish; tegmina green with apical margin pink; hind wings basally red, hyaline; apical half of hind femur black.

**Measurements:** Body: 17; pronotum: 2.5; tegmen : 14.4; hind femur: 8

**Indices:** Width of fastigium : eye length - 0.6; length of prozona : length of pronotum - 0.55; apical expanse of tegmina : length of tegmina-0.59; length of tegmina : length of hind femur-1.9; antennal length : length of head and pronotum together-0.59.

**FEMALE:** Body longer and stouter than males; ovipositor valves curved, serrate, upper ones longer than lower ones.

**DISTRIBUTION:** India (Through out) Bangladesh, Malaya, Myanmar, Pakistan, Srilanka, N.W. Sumatra, Thailand, S. Vietnam.

**MATERIALS EXAMINED** 4 ♂, India: Kerala, Palakkad, Kottekkad ( $10^{\circ} 46' N 76^{\circ} 39' E$ ), Vidhu Priya, 30.VII.2000; 1 ♀, India: Kerala, Palakkad, Kottekkad ( $10^{\circ} 46' N 76^{\circ} 39' E$ ), Vidhu Priya, 1.IX.2000; 1 ♀, India: Kerala, Palakkad, Kottekkad ( $10^{\circ} 46' N 76^{\circ} 39' E$ ), Vidhu Priya, 17.IX.2000; 1 ♀, India: Kerala, Malappuram Cali.Uni.Campus ( $11^{\circ} 7' N 75^{\circ} 51' E$ ), Vidhu Priya, 3.VIII.2000; 1 ♂, India: Kerala, Malappuram, Cali.Uni. Campus ( $11^{\circ} 7' N 75^{\circ} 51' E$ ), Vidhu Priya, 16.VIII.2000; 1 ♂, India: Kerala, Malappuram, Cali.Uni. Campus ( $11^{\circ} 7' N 75^{\circ} 51' E$ ), Vidhu Priya, 16.IX.2000; 1 ♀, India: Kerala, Thrissur, Irinjalakuda ( $10^{\circ} 20' N 76^{\circ} 39' E$ ), Vidhu Priya, 25.IX.2000.

DISCUSSION: *Atractomorpha crenulata* comes close to *Atractomorpha burri* Bol. in general appearance but differs in frontal ridge being sulcated or shortly compressed and arched between antennae (In *A. burri* frontal ridge between antennae is not sulcated).

### **POEKILOCERUS AUDINET-SERVILLE**

*Poeciloceris* Serville, 1831: Ann. Sci. Nat. XXII 275.

Type species : *Gryllus pictus* Fabricius.

*Decticus* Klug, 1832: Symb. Phys. Zool. 2 (Ins.3) 1.

Type species : Not known

*Poecilocera* Westwood, 1845. Arcana Entomologica 1:11.

Type species : Not known

*Poeciloceris* Stal, 1855: Ofv. K. Vet. Acad. Forb. 12:352.

Type species : *Poeciloceris porosus* Stal.

#### DIAGNOSTIC FEATURES

Size large (>40mm); body stout subfusiform; fastigium of vertex triangular about as wide basally as long; distinctly sulcated; sulcus continuing on frontal ridge; eyes small; antennae filiform with basal segments atleast as long as wide; vertex carinated extending till pronotum. Frontal ridge raised only till base of antenna, narrow sulcus and carinae continues till just before clypeus; lateral carina arising from between antenna and eyes; pronotum gradually widening behind anterior lobe as high as posterior; 3 transverse sulci present; median carina only on metazona, hind margin rounded; prosternal tubercle short conical; mesosternal lobes separate inner margin rounded; metasternal lobes meeting in a very short distance; tegmen with costal margin sinuous; tegminae and wings well developed as long or shorter or slightly longer than metasoma; hind femur as long as metasoma hind tibia with 7-8 internal and external spines; external apical spine present.

DISTRIBUTION: India, Pakistan.

BIOLOGY: Common in June – November. Hoppers tend to aggregate.

DISCUSSION: *Poeciloceris* Serville resembles *Aularches* Stal. in its body being large, robust and antenna placed near eyes below ocelli. It differs from *Aularches* in pronotum

not being rugose, tegmina not spotted and wings being red. Posterior lobe of pronotum is in level with anterior lobe. ( In *Aularches* the metazona of pronotum is rugose, tegmina is spotted and posterior lobe of pronotum raised above anterior lobe.)



**POEKILOCERUS PICTUS (FABRICIUS)**

(Plate: 42, fig: 176-179)

*Poeciloceris sonneratii* Serville, 1831: Ann. Soc. Nat. Paris 22:276*Poeciloceris tassellatus* Bolivar, 1904. Bol. R-soc. Esp. Hist Nat 4:432

## DESCRIPTION: Male

**Head:** Convex, subconical; fastigium triangular, base as broad as long; foveolae obsolete; head slightly punctured dorsally; median carina vaguely marked; eyes small; antennae filiform, stout, basal segments as long as broad; front narrowing towards apex; slightly concave; frontal ridge gradually flattening towards clypeus, furrow narrow; median ocellus inconspicuous; lateral carina arising from in between antennal base and eyes, gradually diverging distally.

**Mesosoma:** Pronotum smooth punctured median carina present on metazona; 4 transverse sulci present, first lateral, second dorsal, third and fourth complete; prozona and metazona almost of same length; hind margin rounded with slight emargination; prosternal tubercle anteriorly placed, conical, abruptly narrowing distally; mesosternal lobes separate longer than wide; inner margin rounded lower margin with an upcurve; two lateral and a median foveolae present metasternal lobes protruding to meet medially; foveolae present; front coxa provided with a spine laterally; hind femur as long as metasoma; hind tibia with 8 internal and 8 external spines including apical one, external apical spine very small; tegmen and wings well developed; as long as, larger than or shorter than metasoma; tegmina with costal margin slightly sinuous, almost equally wide through out.

**Metasoma:** Metasoma smooth; supra-anal plate triangular, apex acute; cerci three fourth the length of supra-anal plate; sub genital plate with pilose triangular depression ventrally.

**Colour:** Entire body marked with blue black and yellow patches; head with median blue black longitudinal band and then entire head alternated with yellow and blue black bands; blue black and yellow band below eyes continues over entire thorax; antennae basally blue black and beyond, basal third with yellow intermittent segments; pronotum black with yellow patches; mesosternal lobes yellow; first and second pair of tibiae with alternate yellow and blue black rings; hind femur with a complete longitudinal blue band externally bordered by yellow; hind tibia yellow with a basal blue ring spines black tipped; tegmen greenish basally apically reddish, veinlets yellow; hind wings hyaline brick red coloured; each segment of metasoma with basal black and distal yellow rings.

**Measurements:** Body: 54.6; pronotum: 12; tegmen: 38; hind femur: 23.4.

**Indices:** Width of fastigium : eye length – 1.07; length of prozona : length of pronotum - 0.52; apical expanse of tegmina : length of tegmina-0.18; length of tegmina : length of hind femur-1.62; antennal length : length of head and pronotum together-1.06.

**FEMALES:** Stouter and longer than males ; genital valves smooth, curved, pilose; lower ones shorter than upper subgenital plate with a spine like protrusion; supra-anal plate with basal depression.

**DISTRIBUTION:** India (Andra Pradesh, Bihar Delhi, Hariyana, Jammu Kashmir, Maharashtra, Orissa, Punjab, Rajasthan, Uttar Pradesh, West Bengal, Kerala, Madhya Pradesh, Gujarat) and Pakistan

**MATERIAL OBSERVED:** 2 ♂, 2 ♀, India: Kerala, Palakkad, Attappadi (11<sup>o</sup> 5' N 76<sup>o</sup> 35' E), Vyjayanthi, 3.IX.2000; 2 ♀, India: Kerala, Palakkad, Shoranur (10<sup>o</sup> 46' N 76<sup>o</sup> 16' E), Vidhu Priya, 20.II.2002; 10 ♀, India: Karnataka, Mandya (12<sup>o</sup> 31' N 76<sup>o</sup> 54' E), Raju, 27.X.2003.

**DISCUSSION:** *Poekilocerus pictus* resembles *Poekilocerus punctiventris* Seville in general appearance, but differs in having no red spots in metasoma and antenna being

arranged with black and yellow (*P. punctiventris* has red spots on metasoma and green coloured antennae)

REMARKS: Commonly called ak grasshoppers and generally feed on plant *Calotropis gigantea* and is a pest of vegetables and fruit plants.

# CHECKLIST OF ACRIDIDAE AND PYRGOMORPHIDAE OF INDIA

Vidhu Priya. A “Investigation on the alpha systematics of Acridoidea (Orthoptera) of Kerala” Thesis. Department of Zoology, University of Calicut, 2005

**CHECKLIST OF ACRIDIDAE AND PYRGOMORPHIDAE OF INDIA**

---

<b>FAMILY :ACRIDIDAE</b>	<b>Distribution</b>
<b>Sub family: Gomphocerinae</b>	
<i>Azarea indica</i> Singh 1979	India
<i>Bababudinia bizonata</i> Bolivar,1917	India
<i>Brachycrotaphus hoshiarpurensis</i> Singh, 1978	India
<i>Brachycrotaphus indicus</i> Uvarov,1932	India
(=) <i>Brachycrotaphus longiceps</i> (Bolivar, 1917)	India
(=) <i>Ochrilidia longiceps</i> Bolivar, 1902	
(=) <i>Psectrocnemus longiceps</i> Henry, 1940	
<i>Capulica alata</i> Uvarov,1929	India
<i>Capulica chrysochraontes</i> Bolivar, 1917	India
<i>Capulica pulla</i> Bolivar, 1917	India
<i>Chorthippus (Chorthippus) almoranus</i> Uvarov, 1942	India
<i>Chorthippus (Chorthippus) indicus</i> Uvarov,1942	India
<i>Chorthippus(Glyptobothrus) hammerstroemi</i> (Miram1906)	India, China, Siberia.
<i>Dhimbama dawsoni</i> Henry, 1940	India.
<i>Dnopherula (Aulachobothrus) collinus</i> Uvarov,1929	India
<i>Dnopherula (Aulachobothrus) luteipes luteipes</i> (Walker,1871)	India.
(=) <i>Stenobothrus luteipes</i> Walker, 1871	
(=) <i>Stenobothrus? Luteipes</i> ; Kirby, 1914	
(=) <i>Dnopherula (Aulacobothrus) luteipes</i> ; Bhowmik 1985	
<i>Dnopherula (Aulachobothrus) luteipes infernus</i> Bolivar,1902.	India
(=) <i>Aulachobothrus infernus</i> Bolivar,1902.	
<i>Dnopherula (Aulachobothrus) socius</i> (Bolivar, 1902)	India.
(=) <i>Aulacobothrus socius</i> Bolivar,1902	
(=) <i>Aulacobothrus decius</i> Uvarov, 1921	
(=) <i>Aulacobothrus socius</i> Uvarov, 1929	
<i>Dnopherula (Aulachobothrus) strictus</i> (Bolivar,1902)	India
(=) <i>Aulachobothrus strictus</i> Bolivar 1902	

- Dnopherula (Aulacobothrus) svenhedini* (Sjostedt, 1933) India.  
 (=) *Aulacobothrus sven-hedini* Sjostedt, 1933  
 (=) *Dnopherula sven-hedini* (s.cl)l Jago, 1971
- Dnopherula (Aulacobothrus) taeniatus* (Bolivar, 1902) India, China,  
 Srilanka, Thailand  
 (=) *Aulacobothrus taeniatus* Bolivar, 1902  
 (=) *Stauroderus bicolor* (nec Carpentier 1825); Kirby 1914  
 (=) *Aulacobothrus luteipes* (nec Walker, 1871)  
 (=) *Dnopherula (Aulacobothrus) luteipes* (nec Walker 1871)  
 (=) *(Aulacobothrus) taeniatus*; Jago 1971  
 (=) *Scyllina physopoda* Navas, 1904  
 (=) *Aulacobothrus sinesis* (nec Uvarov, 1925)
- Dnopherula (Aulacobothrus) infernus* Bolivar, 1902 India  
*Dnopherula (Aulacobothrus) physopoda* Navas 1904 India.  
 (=) *Scyllina physopoda* Navas, 1904  
 (=) *Aulacobothrus physopoda* Kirby, 1914
- Dnopherula (Aulacobothrus) rubripes* Navas, 1905 India  
 (=) *Scyllina rubripes* Navas, 1905  
 (=) *(Aulacobothrus) rubripes* Kirby, 1914
- Dnopherula (Dnopherula) bolivari* (Uvarov, 1921) India, Pakistan  
 (=) *Aulacobothrus bolivari* Uvarov, 1921  
 (=) *Dnopherula (Aulacobothrus) bolivari* Bhowmik, 1985  
 (=) *Aulacobothrus collinus* Uvarov, 1929.  
 (=) *Dnopherula (Aulacobothrus) collinus* Bhowmik, 1985
- Dnopherula (Dnopherula) decisis* (Walker, 1871) India, Pakistan.  
 (=) *Stenobothrus decisis* Walker, 1871  
 (=) *Dociostaurus decisis* Kirby, 1914.  
 (=) *Aulacobothrus decisis* Uvarov, 1921  
 (=) *Dnopherula (Aulacobothrus) decisis* Bhowmik, 1985
- Leva apicalis* (Walker, 1871) India  
 (=) *Stenobothrus apicalis* Walker 1871

- (=) *Dociostaurus apicalis* Kirby, 1914  
 (=) *Leva soluta* Bolivar, 1914  
 (=) *Stenobothrus turbatus* Walker, 1871  
 (=) *Dociostaurus turbatus* Kirby, 1914  
*Leva cruciata* Bolivar, 1914 India, Srilanka  
*Leva indica* (Bolivar, 1902) India, Sri Lanka.  
 (=) *Gymnobothrus indicus* Bolivar, 1902  
*Leva mundus* (Walker, 1871) India  
 (=) *Stenobothrus mundus* Walker 1871  
 (=) *Dociostaurus mundus* Kirby, 1914  
 (=) *Stenobothrus epacromoides* Walker 1871  
 (=) *Dociostaurus epacromoides* Kirby, 1914  
 (=) *Leva epacromoides* Uvarov, 1921  
 (=) *Stauroderus exemplaris* Bolivar, 1918  
 (=) *Stenohippus mundus* Uvarov, 1925  
*Leva trapezoids* Bolivar, 1914 India  
*Madurea cephalotes* Bolivar, 1902 India  
*Mesopsis cylindricus* (Kirby, 1914) India.  
 (=) *Aswatthamanus cylindricus* Kirby, 1914  
*Morphacris citrina* Kirby, 1910 India, Abyssinia, Srilanka,  
 Syria.  
 (=) *Cosmorhyssa sulcata* Saussure, 1884  
*Ochridia geniculata* Bolivar, 1913 India, Afganistan, Iran, N.  
 Africa, Pakistan.  
 (=) *Platypterna geniculata* Bolivar, 1913  
 (=) *Platypterna kraussi* Bolivar, 1913  
 (=) *Platypterna rothsahildi* Bolivar, 1913  
 (=) *Platypterna pictipes* Uvarov, 1922  
 (=) *Platypterna ladakiae* Salfi, 1931  
 (=) *Platypterna nilotica* Salfi, 1931  
 (=) *Platypterna variopicta* Salfi, 1931

- (=) *Platypternopsi bivittata* Chopard, 1947
- Ochrilidia gracilis gracilis* (Krauss, 1902) India, Africa, Middle East.
- (=) *Platypterna gracilis* Krauss 1902
- (=) *Platypterna curvifrons* Bolivar, 1908
- (=) *Platypterna acuta* Bolivar, 1908
- (=) *Platypterna obtusa* Salfi, 1931
- (=) *Platypterna affinis* Salfi, 1931
- (=) *Platypternauvarovi* Salfi, 1931
- (=) *Platypterna aethiopica* Salfi, 1931
- (=) *Ochrilidia gracilis* Chopard, 1950
- Ochrilidia longiceps* Bolivar, 1913 India
- Pasiphimus sagittaeformis* Bolivar, 1914 India
- Phonogaster cariniventris* Henry, 1940 India
- Stenobothrus luteipes* Walker, 1871 India
- Sub family: Truxalinae**
- Truxalis exima* Eichwald, 1830 India, Afganistan, Middle East Countries, West Pakistan.
- Truxalis grandis fitzgeraldis* Dirsh, 1950 India.
- Truxalis indica* (Bolivar, 1902) India, Srilanka, Burma.
- (=) *Acrida (Acridella) unguiculata* Bolivar, 1902
- (=) *Acridella indica* Kirby, 1910
- Truxalis nasuta* Linnaeus, 1758 India, Africa, Baluchistan, Burma, Srilanka, W.Asia.
- (=) *Acrida nasuta* Linnaeus, 1758
- (=) *Acridella nasuta* Kirby, 1914
- Sub family: Acridinae**
- Acrida exaltata* Walker, 1859 India, Bangladesh, Pakistan.
- (=) *Truxalis exaltata* Walker, 1859
- (=) *Truxalis bravicolis* Bolivar, 1893
- (=) *Acrida lugubris* Burr, 1902
- (=) *Acrida curta* Uvarov, 1936



- (=) *Acrida exaltata* Kirby, 1914
- Acrida indica* Dirsh, 1954 India.
- Anaptygus rectus* Ragge, 1954 Central Himalayas
- Carliola carinata* (Uvarov, 1920) India
- (=) *Carlia carinata* Uvarov 1929
- Ceracris deflorata* (Brunner, 1893) India, Burma.
- (=) *Duronia deflorata* Brunner, 1893
- (=) *Plaeoba cinctalis* Kirby, 1914
- Ceracris nigricornis laeta* (Bolivar, 1914) India, S.China, Taiwan.
- (=) *Ceracis nigricornis* Walker, 1870
- (=) *Duronia versicolor* Brunner, 1893
- (=) *Kuthya laeta* Bolivar, 1914
- (=) *Parapleurus armillatus* Karny, 1915
- (=) *Geea conspicus* Caudell, 1921
- (=) *Ceracris nigricornis laeta* Bolivar, 1925
- Ceracris nigricornis nigricornis* Walker, 1870 India
- (=) *Ceracris nigricornis* Walker, 1870
- Ceracris striatus* Uvarov, 1925 India(?)
- Chloebora bramina* Saussure 1884 India
- Chloebora crassa* (Walker, 1870) India
- Duroniopsis bitaeniata* Bolivar, 1914 India
- Gelastorhinus laticornis* (Serville, 1839) India
- (=) *Opomala laticornis* Serville, 1839
- Gelastorhinus semipictus* (Walker, 1870.) India
- (=) *Opomala semipictus* Walker, 1870.
- Gonoista filata* (Walker, 1870) India, China
- (=) *Mesops filatus* Walker, 1870
- (=) *Gelastorrhinus filatus* Kirby, 1914
- Gonoista sagitta* (Uvarov, 1912) India, Burma, Srilanka.
- (=) *Gelastorrhinus sagitta* Uvarov, 1912
- (=) *Opomala semipicta* Walker 1870

(=) <i>Gelastorrhinus tryxaloides</i> Bolivar, 1902	
(=) <i>Gelastorrhinus selache</i> Burr 1902	
(=) <i>Gelastorrhinus semipictus</i> (Walker, 1870)	
(=) <i>Gelastorrhinus albolineatus</i> Brunner, 1893	
<i>Gymnbothrus indicus</i> Bolivar 1902	India
<i>Gymnbothrus simplex</i> Walker 1871	India
<i>Holoperena darjeelingensis</i> (Bolivar, 1914)	India.
(=) <i>Sjoestedtia darjeelingensis</i> Bolivar 1914	
(=) <i>Sikkimiana darjeelingensis</i> Bhowmik & Halder 1983	
<i>Holoperena sukhadae</i> (Bhowmik, 1965)	India
(=) <i>Sjostedtia sukhadae</i> Bhowmik, 1965	
<i>Orthochtha indica</i> Uvarov, 1942	India
<i>Parabida indica</i> sp.nov	India.
<i>Paradunoria carinata</i> Bolivar, 1902	India
(=) <i>Paraphlaeoba carinata</i> Bolivar, 1902	
<i>Paraphlaeoba platyceps</i> Bolivar, 1902	India
<i>Paraphlaeobida gracilis</i> Willemse, 1951	India
<i>Perella insignis</i> Bolivar, 1914	India
<i>Phlaeoba angustidorsis</i> Bolivar, 1892	India.
<i>Phlaeoba antennata</i> Brunner, 1893	India, Borneo, Burma, Malay, Sumatra, Sylhet.
<i>Phlaeoba antennata malayensis</i> Bolivar, 1914	India, Malay.
<i>Phlaeoba assama</i> Ramme, 1941	India.
<i>Phlaeoba infumata</i> Brunner, 1893	India, E.Bengal.
<i>Phlaeoba pantelli</i> Bolivar, 1902	India, Afganistan
(=) <i>Phlaeoba walhousie</i> Kirby, 1910	
<i>Phlaeoba ramakrishnai</i> Bolivar, 1914	India.
<i>Phlaeoba rotunda</i> Uvarov, 1929	India
<i>Phlaeoba sikkimensis</i> Ramme, 1941	India, Nepal
<i>Phlaeobida angustipennis</i> Bolivar, 1902	India.
<i>Zygophlaeoba collina</i> Uvarov, 1929	India

<i>Zygophlaeoba sinuatocollis</i> Bolivar, 1902	India.
<i>Zygophlaeoba truncaticollis</i> Bolivar, 1902	India.
<b>Sub family: Oedipodinae</b>	
<i>Acrotylus humbertianus</i> Saussure, 1884	India, Afganistan, Srilanka.
(=) <i>Oedipoda inficita</i> var. B. Walker, 1870	
<i>Acrotylus insubricus insubricus</i> (Scopoli, 1786)	India, Afganistan, Africa, Central Asia, Srilanka, USSR.
(=) <i>Gryllus insubricus</i> Scopoli, 1786	
(=) <i>Acrotylus insubricus</i> Kirby, 1910	
<i>Acrotylus insubricus inficita</i> (Walker, 1870)	India, Afganisthan ,Africa, Central Asia, Sri Lanka, USSR.
(=) <i>Oedipoda inficita</i> Walker, 1870	
(=) <i>Acrotylus patruelis</i> var. <i>inficita</i> Saussure, 1888	
(=) <i>Acrotylus inficita</i> Kirby, 1914	
<i>Ailopus simulatrix simulatrix</i> (Walker, 1870)	India, Africa, Arabia, Burma, Middle East
(=) <i>Eupacomia simulatrix</i> Walker 1870	
(=) <i>Heteropternis savingnyi</i> Krauss, 1890	
(=) <i>Eupacomia affinis</i> Bolivar, 1902	
(=) <i>Acrotylus simulatrix</i> Walker, 1870	
(=) <i>Aelopus laticosta</i> Bolivar, 1912	
(=) <i>Aelopus strepen deserticola</i> Uvarov, 1922	
<i>Ailopus thalassinus tamulus</i> (Fabricius, 1798)	India, Australia, Borneo, Brunei, Burma, China, E. Pakistan, Hainan, Java, Malaya, Singapore, Sri Lanka, Sumatra.
(=) <i>Gryllus tamulus</i> Fabricius, 1798	

- (=) *Gomphocerus tricoloripes* Burmeister, 1838  
 (=) *Epacromia rufostriatus* Kirby, 1888  
*Ailopus thalassinus thalassinus* (Fabricius, 1781) India, Ethiopian region, West to Palearctic region  
 (=) *Gryllus thalassinus* Fabricius 1781  
*Bryodema luctuosum indum* (Saussure, 1884) India, Tibet.  
 (=) *Bryodema inda* Saussure 1884  
*Chloebora crassa* (Walker, 1870) India, Pakistan.  
 (=) *Oedipoda crassa* Walker 1870  
*Chloebora grossa* Saussure 1884 India.  
 (=) *Chloebora bramina* Saussure, 1884  
 (=) *Scintharista Punjabi* Willemse, 1932  
*Chloebora marshalli* (Henry, 1933) India, Srilanka.  
 (=) *Chloebora grossa* Bolivar 1902  
 (=) *Scintharista marshalli* Henry 1933  
*Chondronotulus bengalensis* (Saussure, 1888) India.  
 (=) *Oedipoda balteata* Walker 1870  
 (=) *Sphingonotus bengalensis* Saussure 1888  
*Dittopternis venusta* (Walker, 1884) India  
 (=) *Oedipoda venusta* Walker, 1870  
*Dittopternis zebrata* Saussure 1884 India, Burma.  
*Gastrimargus marmoratus* (Thunberg, 1815) India, S.E. Asia, New Guinea, Sumatra.  
 (=) *Gryllus marmoratus* Thunberg, 1815  
 (=) *Gryllus transversus* Thunberg, 1815  
 (=) *Gryllus virescens* Thunberg, 1815  
 (=) *Gryllus assimilis* Thunberg, 1815.  
 (=) *(Oedaleus) marmoratus* Stal, 1873.  
 (=) *Oedaleus (Gastrimargus) marmoratus* Saussure, 1884  
 (=) *Gastrimargus citrina* Burmeister, 1838  
 (=) *Gastrimargus transverses* Kirby, 1910

- (=) *Gastrimargus sundaecus* Kirby, 1910
- (=) *Gastrimargus marmoratus* var *trasversus* Sjostedt, 1928
- (=) *Gastrimargus marmoratus* var *grandis* Sjostedt, 1928
- (=) *Gastrimargus marmoratus* Ritchie, 1982
- Gastrimargus africanus africanus* (Saussure, 1888)      India, Africa, Arabia, Burma,  
Nepal, Pakistan, Srilanka,  
Thailand, Tibet.
- (=) *Oedaleus (Gastrimargus) marmoratus* var. *africanus* Saussure 1888
- (=) *Gastrimargus africanus* Kirby, 1910
- (=) *Gastrimargus africanus* var. *zebrata* Sjostedt, 1928
- (=) *Gastrimargus africanus* var. *orientalis* Sjostedt, 1928
- Gastrimargus africanus sulphureus* (Bei-Beinko, 1951)      India, Nepal, Pakistan
- (=) *Gastrimargus sulphureus* Bei-Beinko 1951
- Hilethera oedipodioides* (Bolivar, 1902)      India.
- (=) *Lerina oedipodioides* Bolivar, 1902
- Heteropternis respondens* (Walker, 1859)      India, Burma, China, Java,  
Malacca, Nepal, Sri Lanka,  
Sumatra.
- (=) *Acridium respondens* Walker, 1859.
- (=) *Heteropternis pyrrboscelis* Stal, 1873
- Julea indica* Bolivar, 1914
- Locusta migratoria migratoria* Linnaeus, 1767      India.
- (=) *Gryllus Locusta migratoia* Linnaeus, 1758
- Leptopternis gracilis* (Eversmann, 1848)      India, China
- (=) *Oedipoda gracilis* Eversmann, 1848
- (=) *Sphingonotus angustipennis* Saussure. 1884
- (=) *Sphingonotus grobbeni* Werner. 1905
- (=) *Hyalorrhypis maculipennis* Chopard. 1949
- Meristopteryx rotundata* Walker, 1870      India.
- (=) *Oedipoda rotundata* Walker, 1870

- Morphacris fasciata sulcata* (Thunberg, 1815) India, Srilanka, W Africa  
 (=) *Gryllus faciatus* Thunberg, 1815  
 (=) *Gryllus sanguineus* Thunberg, 1815  
 (=) *Gryllus sulcatus* Thunberg, 1815  
 (=) *Oedipoda strigata* Serville, 1839  
 (=) *Oedipoda venusta* Fieber, 1863  
 (=) *Morphacris adjusta* Walker, 1870  
 (=) *Cosmorrhysa costata* Saussure, 1888  
 (=) *Morphacris citrina* Kirby, 1910
- Oedaleus abruptus* (Thunberg)1815 India, Afganistan, Burma, China, Nepal, Srilanka, Thailand  
 (=) *Gryllus abruptus* Thunberg, 1815  
 (=) *Pachytylus (Oedaleus) abruptus* Stal, 1873  
 (=) *Oedaleus (Oedaleus) abruptus* Saussure, 1884
- Oedaleus nigrofasciatus* (De Geer, 1773) India, Srilanka, S.Asia, W.Europe.  
 (=) *Gryllus flavus* Fabricius. 1775  
 (=) *Gryllus arcuatus* Thunberg. 1824  
 (=) *Oedaleus nigrofasciatus gracilis* Saussure. 1884.
- Oedaleus roscens* Uvarov, 1942
- Oedaleus senegalensis* (Krauss, 1877) Asia, Africa  
 (=) *Pachytylus senegalensis* Krauss, 1877  
 (=) *Ctypohippus arenivolans* Butler, 1881  
 (=) *Pachytylus mlokoziejewitcki* Bolivar, 1884  
 (=) *Oedaleus (Oedaleus) senegalensis* Saussure, 1888
- Oedipoda himalayana* Uvarov, 1925 India
- Oedipoda fedtshenkoi fedtshenkoi* (Saussure, 1884)
- Pternoscrita bimaculata* (Thunberg, 1815) India, Srilanka.  
 (=) *Gryllus bimaculatus* Thunberg, 1815  
 (=) *Epacromia turbata* Walker, 1870

- Pternoscrita calignosa* (de Haan, 1842) India  
 (=) *Acridium (Oedipoda) calignosum* de Haan 1842
- Pternoscrita cinctifemur* (Walker, 1859) India, Nepal, Srilanka.  
 (=) *Acridium cinctifemur* Walker, 1859  
 (=) *Oedipoda saturata* Walker, 1870  
 (=) *Pternoscrita saturata* Saussure, 1888  
 (=) *Pternoscrita humbertiana* Saussure, 1884
- Pusana leavis* Uvarov, 1921 India  
*Pusana rugulos* (Uvarov, 1921) India, Afganistan  
*Pseudosphingonotus savingnyi* Saussure, 1884 India, Pakistan, Africa  
 (=) *Sphingonotus savingnyi* Saussure, 1884
- Scintarista blanchardiana* Saussure, 1888 India, Africa, Arabia,  
 Pakistan, Palastein,  
 Somaliland.  
 (=) *Quiroguesia brullei* var *blanchardiana* Saussure, 1888  
 (=) *Quiroguesia blanchardiana* Kirby, 1914
- Scintarista notabilis pallipes* Uvarov, 1941 India, Afganistan, Iran.  
 (=) *Quiroguesia notabilis* Walker, 1870
- Sphingonotus balteatus balteatus* (Serville, 1839) India.  
 (=) *Oedipoda balteata* Serville, 1839  
 (=) *Oedipoda latifasciata* Walker, 1870  
 (=) *Sphingonotus amarnthinus* Saussure, 1884  
 (=) *Sphingonotus balteatus* Saussure, 1888
- Sphingonotus caerulans* (Linnaeus, 1767) India, Europe, N.Africa, W,  
 Central Africa  
 (=) *Gryllus caerulans* Linnaeus, 1767
- Sphingonotus kashmirensis* Uvarov, 1925 India.  
*Sphingonotus longipennis* Saussure, 1884 India, Bangladesh, Nepal.  
 (=) *Sphingonotus indus* Saussure, 1884
- Sphingonotus montanus* Mistshenko, 1937 India.  
*Sphingonotus orissaensis* Jago and Bhowmik, 1990 India.

- Sphingonotus rubescens rubescens* (Walker, 1870) India, Asia, Africa,  
Afganistan, Europe, Pakistan.
- (=) *Oedipoda rubescens* Walker, 1870
- (=) *Sphingonotus rubescens* Kirby, 1914
- Sphingonotus fallax* Mistshenko, 1937 India
- Trilophidia annulata* (Thunberg, 1815) India, W.Borneo, China,  
Japan, Korea, Mongolia,  
Pakistan.
- (=) *Gryllus annulata* Thunberg, 1815
- (=) *Gryllus bidens* Thunberg, 1815
- (=) *Acridium (Oedipoda) vulneratum* de Haan, 1882
- (=) *Oedipoda cristella* Stal, 1860
- (=) *Epacromia aspera* Walker, 1870
- (=) *Epacromia turpis* Walker, 1870
- (=) *Epacromia nigricans* Walker, 1870
- (=) *Trilophidia annulata* var *ceylonica* Saussure, 1884
- (=) *Trilophidia annulata* var *japonica* Saussure, 1888
- (=) *Trilophidia annulata* var *mangolica* Saussure, 1888
- Trilophidia cristella* (Thunberg, 1860) India, Java, Phillipines.
- Sub family: Romaleinae**
- Teratodes monticollis* (Gray, 1832) India
- (=) *Gryllus monticollis* Gray 1832
- Sub family: Hemiacridinae**
- Euthymia finoti* Kirby, 1914 India, Srilanka.
- Euthymia kirbyi* Finot, 1903 India
- Gesonula punctifrons* (Stal, 1860) India, Japan
- (=) *Acridium (Oxya) punctifrons* Stal, 1861
- (=) *Heteracris tenuis* Walker, 1870
- (=) *Oxya punctifrons* Walker, 1870
- (=) *Gesononia punctifrons* Stal 1878
- (=) *Racilia okinawensis* Matsumara, 1910



- Hieroglyphus banian* (Fabricius, 1798) India, Burma, Bhutan, China, Thailand, Vietnam
- (=) *Gryllus banian* Fabricius, 1798
- (=) *Acridium furcifer* servile, 1839
- (=) *Hieroglyphus banian* var *elongata* Uvarov, 1922
- Hieroglyphus concolor* (Walker, 1870) India, China.
- (=) *Hieroglyphus citrinolimbatus* Brunner, 1893
- (=) *Hieroglyphus tarsalis* Stal, 1878
- Hieroglyphus nigrorepletus* Bolivar, 1912 India, Pakistan.
- (=) *Hieroglyphus bettoni* Kirby, 1914
- (=) *Hieroglyphus vastator* Carl, 1916
- Hieroglyphus oryzivorus* Carl, 1916 India, Pakistan.
- Leptacris filiformis* Walker, 1870 India.
- (=) *Capelle argenteovittata* Bolivar, 1902
- (=) *Ischnacida maxima* Karny, 1907
- (=) *Leptacris greeni* Kirby, 1914
- Leptacris maxima* (Karny, 1907) India
- Leptacris vittata* (Fabricius, 1787) India, China, Indonesia, Pakistan, Srilanka.
- (=) *Truxalis vittatus* Fabricius, 1787
- (=) *Gryllus vittatus* Denovan, 1798
- (=) *Truxalis (Mesops) vittatus* Westwood, 1838
- (=) *Opomala convergens* Walker, 1870
- (=) *Ischnacrida vittata* Stal, 1873
- (=) *Ischnacrida convergens* Kirby, 1910
- Parahieroglyphus bilineatus* (Bolivar, 1912) India
- (=) *Heiroceryx bilineatus* Bolivar 1912
- (=) *Hieroglyphus bilineatus* Kirby, 1914
- Spathosternum prasiniferum prasiniferum* Walker, 1871 India, Siam, W.Africa.
- (=) *Heteracris(?) prasinifera* Walker, 1871

- (=) ? *Calopternus caliginosus* Walker, 1871
- (=) *Stenobothrus strigulatus* Walker, 1871
- (=) *Stenobothrus simplex* Walker, 1871
- (=) *Stenobothrus venulosum* Stal, 1878
- (=) *Spathosternum caliginosum* Kirby, 1910
- (=) *Oxya prasinifera* Kirby, 1910
- (=) *Phlaeoba simplex* Kirby, 1910
- (=) *Roduina recta* Kirby, 1910
- (=) *Gymnobothrus (?) simplex* Kirby, 1914

#### Sub family: Oxyinae

- Cercina obtusa* Stal, 1878 India, Srilanka.
- (=) *Cercina platycera* Willemse, 1925.
- (=) *Cledra simoni* Bolivar, 1918.
- Hygracris malabaricus* Willemse, 1962 India.
- Hygracris palustris* Uvarov, 1921 India.
- Oxya chinensis* (Thunberg, 1815) Antartic, Australian, Oriental  
and Palearctic regions
- (=) *Gryllus chinensis* Thunberg, 1815
- (=) *Gryllus luttescens* Thunberg, 1815
- (=) *Oxya vicinia* Brunner, 1893
- (=) *Oxya adentata* Willemse, 1925
- (=) *Oxya shanghaensis* Willemse, 1925
- (=) *Oxya manzhurica* Bei-Beinko 1929
- (=) *Oxya rammei* Tsai, 1931
- (=) *Oxya formosana* Shiraki, 1937
- (=) *Oxya sinuosa* Mishchenko, 1951
- (=) *Oxya maritima* Mishchenko, 1951
- (=) *Oxya sianensis* Cheng Tse-ming, 1964
- Oxya fuscovittata* (Marschall) 1836 India, Afganistan, Pakistan,  
USSR.
- (=) *Gryllus fuscovittata* Marschall, 1836

- (=) *Oxya turanica* Uvarov, 1912  
 (=) *Oxya oryzivora* Willemse, 1925  
 (=) *Oxya uvarovi* Willemse, 1925  
*Oxya gorakhpurensis* Uswmani & Shafee, 1985 India.  
*Oxya grandis* Willemse, 1925 India.  
*Oxya hyla hyla* Serville, 1831 India, Africa, Angola,  
 Bangladesh, Maldives, Nepal,  
 Pakistan.
- (=) *Oxya serrulata* Krauss, 1871  
 (=) *Oxya accunminata* Willemse, 1925  
 (=) *Oxya multidentata* Willemse, 1925  
 (=) *Oxya ebneri* Willemse, 1925  
 (=) *Heteracris viridivitta* Walker, 1870  
 (=) *Heteracris humeralis* Walker, 1870
- Oxya hyla intricata* (Stal, 1860) Oriental countries.  
 (=) *Acridium (Oxya) intricatum* Stal, 1860  
 (=) *Oxya inticata* Stal, 1873  
 (=) *Oxya universalis* Willemse, 1925  
 (=) *Oxya siamensis* Willemse, 1925  
 (=) *Oxya moluccensis* Ramme, 1941
- Oxya japonica japonica* (Thunberg, 1924) Oriental countries, Africa.  
 (=) *Gryllus japonicus* Thunberg, 1824  
 (=) *Acrydium sinense* Walker, 1870  
 (=) *Heteracris straminea* Walker, 1870  
 (=) *Oxya lobata* Stal, 1877  
 (=) *Oxya asinensis* Willemse, 1925  
 (=) *Oxya rufostriata* Willemse, 1925
- Oxya japonica vitticollis* (Blanchard, 1853) Australian and Oriental  
 countries.  
 (=) *Acridium vitticole* Blanchard, 1853
- Oxya nitidula* (Walker, 1870) Oriental countries.

- (=)*Acridium nitidulum* Walker, 1870
- Oxya tridentata* Willemse, 1925 India, Srilanka.
- Oxya velox* (Fabricius, 1787) India, Bangladesh, Burma, China, Pakistan, Thailand.
- (=)*Gryllus velox* Fabricius, 1787
- (=)*Gryllus squalidus* Marschall, 1836
- (=)*Heteracris apta* Walker, 1870
- Oxya vicina* Brunner, 1893 India, China, Japan
- Sub family: Coptacridinae**
- Anupama absona* sp.nov India.
- Circocephalus indica* Bhowmik and Halder, 1982 India.
- Coptacra ensifera* Bolivar, 1902 India
- Coptacra punctoria* (Walker, 1870) India
- Coptacrella martini* Bolivar, 1902 India
- Epistaurus sinetyi* Bolivar, 1902 India, Srilanka.
- Eucoptacra ceylonica* Kirby, 1914 India, Srilanka.
- Eucoptacra praemorsa* (Stal, 1860) India, Burma, China.
- (=) *Acridium (Catantops?) praemorsum* Stal, 1860
- (=) *Catantops? praemorsus* Walker, 1870
- (=) *Coptacra praemorsa* Stal, 1873
- (=) *Acridium saturatum* Walker, 1870
- (=) *Caloptenus obliterans* Walker, 1870
- (=) *Caloptenus sinensis* Walker, 1870
- (=) *Caloptenus strigifer* Walker, 1871
- Eucoptacra saturata* (Walker, 1870) India.
- (=) *Acridium saturatum* Walker, 1870
- Sub family: Tropidopolinae**
- Oxyrrhepes obtusa* (de Haan, 1842) India, Burma, China.
- (=) *Oxyrrhepes meyeri* Willemse, 1931
- (=) *Acridium extensa* (Walker, 1859)
- Tristria pulvinata* (Uvarov, 1921) India, Srilanka.

(=) *Tapinophyma pulvinata* Uvarov, 1921

**Sub family: Cyrtacanthacridinae**

*Chondracris rosea* (de Geer, 1773) India, China, Java, Phillipines.

(=) *Acridium roseum* de Geer, 1773

(=) *Cyrtacanthacris rosea* Kirby, 1914

*Cyrtacanthacris tatarica* (Linnaeus, 1758) Africa, China, Oriental countries.

(=) *Gryllus Locusta tatarica* Linnaeus, 1758

*Pachyacris violascens* (Walker, 1870) India, Srilanka

(=) *Acridium violascens* Walker 1870

(=) *Orthacanthacris violascens* Kirby, 1914

*Pachyacris vinosa* (Walker, 1923) India, Burma, China.

(=) *Acridium vinosum* Walker, 1870

(=) *Cyrtacanthacris wingatei* Kirby, 1900

(=) *Orthacanthacris vinosa* Kirby, 1914

*Patanga japonica* (Bolivar, 1898) India, China, Japan, Pakistan.

(=) *Acridium japonicum* Bolivar, 1898

(=) *Orthacanthacris japonica* Kirby, 1914

(=) *Acridium japonicum var immaculata* Sjostedt, 1933

*Patanga succincta* (Johansson, 1763) India.

(=) *Gryllus Locusta succincta* Johansson, 1763

**Sub family: Calliptaminae**

*Brachyxenina scutifera* (Walker, 1870) India

*Peripolus pedarius* Stal, 1878 India

(=) *Calliptamus pedarius* Stal, 1878

**Sub family: Eyprepocnemidinae**

*Cataloipus indicus* Uvarov, 1942 India

*Cataloipus himalayensis* Singh and Tandon, 1978 India

*Choreodocus robustus* (Serville, 1839) India.

(=) *Acridium robustum* Serville, 1839

(=) *Heteracris ducalis* Walker, 1870

- (=) *Heteracris robusta* Kirby, 1914  
 (=) *Choreodocus (?) robustus* Uvarov, 1921  
*Choreodocus illustris* (Walker, 1870) India.  
 (=) *Heteracris illustris* Walker, 1870  
*Eupreponotus inflatus* Uvarov, 1921 India.  
*Euprepocnemis punctatus* Singh, 1978 India  
*Eyprepocnemis alacris alacris* (Serville, 1839) India, Afganistan, Burma, Pakistan.  
 (=) *Acridium alacre* Serville, 1839  
 (=) *Acridium deponens* Walker, 1859  
 (=) *Heteracris rudis* Walker, 1870  
 (=) *Caloptenus reductus* Walker, 1870  
 (=) *Acridium scitulum* Walker, 1871  
 (=) *Euprepocnemis plorans var. intermedia* Bolivar, 1902  
*Eyprepocnemis hithae* sp.nov. India.  
*Eyprepocnemis pulchra* (Bolivar, 1902) India.  
*Eyprepocnemis rosea* Uvarov, 1942 India.  
 (=) *Euprepocnemis roseus* Uvarov, 1942  
*Heteracris nobilis* (Uvarov, 1942) India, Pakistan.  
 (=) *Thisoicitrus nobilis* Uvarov, 1942  
*Heteracris pulcher* (Bolivar, 1902) India, Srilanka.  
 (=) *Euprepocnemis pulchra* Bolivar, 1902  
 (=) *Thisoecetrus pulchra* Uvarov, 1927  
*Tylotropidius varicornis* (Walker, 1870) India, Burma, Srilanka.  
 (=) *Heteracris varicornis* Walker, 1870  
 (=) *Tylotropidius ceylonicus* Brunner, 1893  
 (=) *E. (Uprepocnemis) varicornis* Kirby, 1910  
**Sub family: Catantopinae**  
*Acorypha glaucopsis* (Walker, 1870) India  
 (=) *Acorypha bifida* Chopard. 1941  
 (=) *Acorypha glaucopsis collina* Uvarov, B. P. 1950

- (=) *Caloptenopsis crassiusculus* Martinez. 1898.  
 (=) *Caloptenus liturifer* Walker, 1870  
 (=) *Calliptamus meruensis* Sjöstedt. 1909.  
 (=) *Caloptenus orientalis* Schulthess. 1898  
 (=) *Calliptamus pachypus* Krauss, 1902  
 (=) *Acorypha glaucopsis sudanensis* Uvarov, 1950  
 (=) *Acorypha voltaensis* Sjöstedt. 1931.
- Acorypha insignis* (Walker, 1873) India  
 (=) *Caloptenus spissus* Walker, 1871
- Bibracte rugulosa* Bolivar, 1902 India  
*Catantops angustulus* Bolivar, 1902 India  
*Catantops erubescens* (Walker, 1870) India  
 (=) *Caloptenus erubescens* Walker, 1870
- Catantops henryi* Bolivar, 1918 India, Burma.  
*Catantops innotabilis* (Walker, 1870) India, Afghanistan, China.  
 (=) *Acridium innotabile* Walker, 1870  
 (=) *Catantops innotabilis* Uvarov, 1925  
 (=) *Catantops innotabile* Uvarov, 1927  
 (=) *Catantops pinguis innotabilis* Dirsh & Uvarov, 1935
- Catantops pinguis* (Stal, 1860) India, Burma, China  
 Cambodia, Japan, Srilanka  
 (=) *Acridium pingue* Stal, 1860  
 (=) *Acridium delineolatum* Walker, 1870
- Choroedocus robustus* Serville, 1839 India, Bangladesh.  
 (=) *Acridium robustum* Serville, 1839  
 (=) *Heteracris robusta* Kirby, 1910  
 (=) *Heteracris ducalis* Walker, 1870
- Gerania bengalensis* Bhowmik and Halder, 1983 India.  
*Gerania dorsalis* (Walker, 1870) India  
 (=) *Acridium dorsalis* Walker, 1870
- Lefroya acutipennis* Kirby, 1914 India.

<i>Mesambria keralica</i> sp.nov	India.
<i>Mesambria dubia</i> (Walker, 1870)	India, Srilanka.
(=) <i>Acridium dubium</i> Walker, 1870	
(=) <i>Acridium tarsale</i> Walker, 1870	
(=) <i>Mesambria geniculata</i> Stal, 1878	
<i>Navasia insularis</i> Kirby, 1914	India
<i>Paraconophyma scabra</i> (Walker, 1870)	India.
(=) <i>Catoptenus scaber</i> Walker, 1870	
(=) <i>Mesambria scabra</i> Kirby, 1914	
<i>Pelecnotus brachypterus</i> Bolivar, 1902	India
<i>Pelecnotus cristagalli</i> Bolivar, 1902	India
<i>Spodomerus undulatesi</i> (Kirby, 1914)	India
<i>Stenacroblytus femoratus</i> Bolivar, 1902	India
<i>Stenocatantops splendens</i> (Thunberg, 1815)	India, Burma, Java, Korea, Malaya, Phillipines, Srilanka, Sumatra, Thailand.
(=) <i>Gryllus splendens</i> Thunberg, 1815	
(=) <i>Acridium luteolum</i> Serville, 1839	
(=) <i>Acridium (Oxya) infuscatum</i> de Haan, 1842	
(=) <i>Cyrtacanthacris nana</i> Walker, 1870	
(=) <i>Cyrtacanthacris ferrina</i> Walker, 1870	
(=) <i>Acridium ceramicum</i> Walker, 1870	
(=) <i>Cyrtacanthacris tenella</i> Walker, 1870	
(=) <i>Acridium corcanum</i> Walker, 1870	
(=) <i>Oxya infuscata</i> Walker, 1870	
(=) <i>Oxya lutcola</i> Walker, 1870	
(=) <i>Cyrtacanthacris oblique</i> Walker, 1871	
(=) <i>Catantops splendens</i> Stal, 1873	
<i>Traulia incompleta</i> Willemse, 1921	India
<i>Xenocatantops humilis</i> (Serville, 1839)	Oriental countries
(=) <i>Acridium humile</i> Serville, 1839	



(=) *Acridium (Oxya) humile* de Haan, 1842

(=) *Caloptenus dominas* Walker 1870

(=) *Caloptenus signatipes* Walker 1870

(=) *Coptacra stricta* Kirby, 1910

(=) *Coptacra dominans* Kirby, 1910

(=) *Catantops humilis* Kirby, 1914

*Xenocatantops humilis humilis* Dirsh & Uvarov, 1953

*Xenocatantops jagabandhuri* Bhowmik, 1985 India.

*Xenocatantops karnyi* (Kirby, 1910) India

(=) *Catantops karnyi* Kirby, 1910

(=) *Catantops pulchellus* Karny (nec Walker) 1907

#### **FAMILY: PYRGOMORPHIDAE**

*Anarchita aptera* (Bolivar, 1902) India

(=) *P[yrgeomorpha] aptera* Bolivar 1902

(=) *Pyrgomorpha aptera* Bolivar, 1904

*Atractomorpha burri* Bolivar, 1905 India

*Atractomorpha crenulata* Fabricius, 1793 India, Bangladesh,  
Malaya, Myanmar, Srilanka,  
N.W Sumatra, Thailand, S.  
Vietnam.

(=) *Truxales crenulata* Fabricius, 1793

(=) *Truxalis scabra* Thunberg, 1815

(=) *Truxalis porrecta* Walker, 1859

(=) *Atractomorpha consohrina* Saussure, 1862

(=) *Atractomorpha obscura* Bolivar, 1917

(=) *Atractomorpha crenulata* var *prasina* Bolivar, 1905

(=) *Acridium psittacium* De haan, 1842

*Atractomorpha himalayica* Bolivar, 1905 India, Tibet.

*Atractomorpha psittacina* (De Haan, 1842) India, China, Java.

- (=) *Acridium (Truxalis) psittacinum* De Haan 1842
- (=) *Atractomorpha paittacina* Kevan and Chen, 1969
- Aularches miliaris miliaris* (Linnaeus, 1758) India.
- (=) *Gryllus miliaris* Linnaeus, 1758
- (=) *Aularches punctatus* Drury, 1773
- (=) *Gryllus conspersus* Houttyn 1813
- (=) *Gryllus scabiosus* Fabricius, 1793
- (=) *Acrydium verrucosus* de Geer, 1773
- Chrotogonus oxypterus* (Blanchard, 1836) India
- (=) *Ommexycha oxypterus* Blanchard, 1836
- (=) *Chrotogonus fuscescens* Kirby, 1914.
- (=) *Ommexycha liaspis* Blanchard, 1837
- (=) *Chrotogonus saussurei* Bolivar, 1884
- (=) *Gryllus scaber* Fabricius, 1796
- Chrotogonus trachypterus trachypterus* (Blanchard, 1836) India, Bangladesh, Iran,
- (=) *Ommexycha trachypterus* Blanchard, C. E. 1837
- (=) *Chrotogonus brevis* Bolivar, 1904
- (=) *Ommexycha pallidus* Blanchard, C. E, 1837
- (=) *Chrotogonus sordidus* Kirby, 1914
- Chrotogonus trachypterus robertsi* (Kirby, 1914) India
- (=) *Chrotogonus robertsi* Kirby, 1914
- Colemania spenarioides* Bolivar, 1910 India
- Neorthacris acuticeps acuticeps* Bolivar, 1905 India
- (=) *Orthacris acuticeps* Bolivar, 1902
- (=) *Orthacris carli* Uvarov, 1929.
- (=) *Orthacris escheri* Uvarov, 1929
- Neorthacris acuticeps nilgirensis* Uvarov, 1929 India, Nepal, Pakistan.
- Orthacris elegans* Bolivar, 1902 India
- Orthacris maindroni* Bolivar, 1905 India
- Poecilocerus pictus* ( Fabricius, 1775) India, Pakistan
- (=) *Poecilocerus sonneratii* Serville, 1831

(=) <i>Poecilocerus tassellatus</i> Bolivar, 1904	
<i>Pyrgomorpha bispinosa</i> Walker, 1870	India
(=) <i>Pyrgomorpha indica</i> Bolivar, 1902	
<i>Pyrgomorpha brachycera</i> Kirby, 1914	India
<i>Tagasta indica</i> Bolivar, 1905	India, Bhutan
<i>Zarytus squalinus squalinus</i> (Bolivar, 1884)	India
(=) <i>Pyrgomorpha squalina</i> Bolivar 1884	
(=) <i>Zarytus squalina</i> Kirby, 1914	

# SUMMARY

Vidhu Priya. A “Investigation on the alpha systematics of Acridoidea (Orthoptera) of Kerala” Thesis. Department of Zoology, University of Calicut, 2005

## SUMMARY

---

The study entitled “Investigation on the alpha systematics of Acridoidea (Orthoptera) of Kerala” was undertaken to make a systematic study of the various species coming under families Acrididae and Pyrgomorphidae existing in Kerala.

Compared with many other groups of insects taxonomic studies of short-horned grasshoppers of Kerala has been greatly neglected. As a result of this work it has been possible to record various species of the families Acrididae and Pyrgomorphidae occurring in Kerala and a few adjacent places. Several specimens were collected from different localities of Kerala, mainly from the northern districts and a few from the south Canara region of Karnataka.

The techniques involved in collection of specimens included net sweeping, collection using glass specimen tubes and hand picking. The specimens collected are studied in the laboratory using Leica MZ75 stereozoom microscope and are classified upto species level.

In this work 35 species coming under 27 genera and 10 subfamilies are studied in Acrididae and 6 species coming under 5 genera are studied in Pyrgomorphidae. Two new genera and four new species are encountered during the study.

A complete description along with measurements, photographs and relevant illustrations are given for the new genera and species. As the original description of the remaining genera and species are inadequate a redescription along with measurements, photographs, illustrations and distribution are also given. Description of species are based on the male specimens, but differences in sexes which are mainly centered on the genitalia are also sited. In case of absence of male specimens female specimens are sought for description. Data regarding the distribution and latitude and longitude of the collection localities is given.

A checklist of the species of Acrididae and Pyrgomorphidae reported from India is also provided.

The species studied during this work are as follows.

FAMILY : Acrididae

Subfamily : Gomphocerinae

1. *Dnopherula (Aulacobothrus) taeniatus* (Bolivar)
2. *Dnopherula (Aulacobothrus) luteipes* (Walker)
3. *Dnopherula (Aulacobothrus) socius* (Bolivar)
4. *Dnopherula (Aulacobothrus) svenhedini* (Sjostedt)
5. *Dnopherula (Dnopherula) bolivari* (Uvarov)
6. *Dnopherula(Dnopherula) decisus* (Walker)

Subfamily: Acridinae

1. *Acrida exaltata* Walker
2. *Zygophlaeoba sinuatocollis* Bolivar
3. *Parabida indica* sp.nov

Subfamily: Oedipodinae

1. *Gastrimargus marmoratus* (Thunberg)
2. *Locusta migratoria migratoria* Linnaeus
3. *Oedaleus abruptus* (Thunberg)
4. *Trilophidia annulata* (Thunberg)
5. *Dittopternis venusta* (Walker)

Subfamily: Hemiacridinae

1. *Euthymia finoti* Kirby
2. *Spathosternum prasiniferum prasiniferum* Walker
3. *Hieroglyphus banian* (Fabricius)

Subfamily: Oxyinae

1. *Cercina obtusa* Stal
2. *Oxya hyla hyla* Serville
3. *Oxya japonica japonica* (Thunberg)
4. *Oxya nitidula* Walker
5. *Oxya tridentata* (Willemse)

## Subfamily: Coptacridinae

1. *Anupama absona* sp.nov
2. *Epistaurus sinetyi* Bolivar
3. *Coptacra ensifera* Bolivar
4. *Eucoptacra ceylonica* Kirby

## Subfamily: Tropidopolinae

1. *Oxyrrhepes meyeri* Willemse

## Subfamily: Cyrtacanthacridinae

1. *Patanga succincta* ( Johansson)
2. *Cyrtacanthacris tatarica* ( Linnaeus )

## Subfamily: Eyprepocnemidinae

1. *Tylotropidius varicornis* (Walker)
2. *Eyprepocnemis hithae* sp.nov

## Subfamily: Catantopinae

1. *Mesambria keralica* sp.nov
2. *Paraconophyma scabra* (Walker)
3. *Catantops innotabilis* (Walker)
4. *Stenocatantops splendens* (Thunberg)

## Family : Pyrgomorphidae

1. *Chrotogonus trachypteros trachypteros* (Blanchard)
2. *Chrotogonus oxypteros* (Blanchard)
3. *Neorthacris acuticeps acuticeps* Bolivar
4. *Aularches miliaris miliaris* Linnaeus
5. *Atractomorpha crenulata* Fabricius
6. *Poekilocerus pictus* ( Fabricius )

## References

---

- Alfred. et. al. 1998. *Faunal diversity of India*. I-viii, 1-495. Envis Centre, ZSI, Kolkotta
- Ander, K. 1939. Verleichend-anatomiche and phylogenetische studionuber die Ensifera (Saltatoria), *Opuse. Ent. Suppl. II Lund*.
- Arnett, R. H. 1985. *Jr. American Insects*, Newyork, Voin Nostrand Reinhjold Company.
- Banergee, S. K. and Kevan, Mc. E. 1960. A preliminary revision of the genus *Atractomorpha* Saussure 1862 (Orthoptera: Acridoidea: Pyrgomorphidae). *Treubia*, 25:165-189.
- Baoping, Li. 1997. A new species of *Bryodemella* Yin. (Orthoptera: Acridoidea: Oedipodidae) from Xinjiang, China, *Entomotaxonomia*, 19(2): pp 83-86.
- Barras, Robert. 1964. The Locust. A guide for laboratory practical work. London, Butterworths, pp 59.
- Beier, M. 1995. Orthopteroidea. In Bronn's Klassend and Ordnungen. Leipzig.
- Berthold, 1827: Latrielle's Fam. *Their*. 411
- Bey Bienko, G. J. and Mistshenko, L. L. 1951. Acridids of the fauna of USSR, Leningrad. Vol.1,2. . 14: 1-180. pi 1-12.
- Bhowmik, H. K. 1964. A new species of grasshopper *Chlorizeina roonwali* sp. nov. (Orthoptera: Acrididae) from India. *J. Bengal. Nat. Hist. Soc.* 32: 93-96.
- Bhowmik, H. K. 1984. Report on a collection of Orthoptera (Insecta) from districts of Purulia and Bankura, W. Bengal, *Bull. Zool. Surv. India*.6(1-3) 109-114.
- Bhowmik, H. K. 1985. Outline of distribution with an index catalogue of Indian grasshoppers (Orthoptera: Acridoidea) Part I Subfamilies Acridinae, Truxalinae, Gomphocerinae and Oedipodinae. *Rec. Zool. Surv. India Misc. Publ. Occ. Pap.* 78: 1-51 .
- Bhowmik, H. K. 1985. Redescription of grasshopper species *Peripolus pedarius* Stal from India, *Bull. Zool. Surv. India*.7(1) 63-68.
- Bhowmik, H. K. 1986. Grasshopper fauna of W. Bengal, India. (Orthoptera:Acrididae). *Zool. Surv. India, Techn. Monogr*
- Bhowmik, H. K. 1986. Three new species of grasshoppers (Orthoptera: Acrididae) from India. *Bull. Zool. Surv. India* 7: 291-296.
- Bhowmik, H. K. 1992. Notes on a collection of grasshoppers (Orthoptera: Acrididae) from Bihar state, India, *Rec. Zool. Surv. India*. 92(1-4) :253-264.
- Bhowmik, H. K. and Halder, P. 1983. A new species of *Gerenia* Stal 1878 (Orthoptera: Acrididae) from the foot hill of Eastern Himalayas, *Rec. Zool. Surv. India*. 81:23-26.
- Bhowmik, H. K. and Halder, P. 1983. Primary distributional records with remarks on little known species of Acrididae (Oerthoptera : Insecta ) from the Western Himalayas (Himachal Pradesh), *Rec. Zool. Surv. India*. 81:167- 191.



- Bhowmik, H. K. and Halder, P. 1984. Remarks on 12 newly recorded species of grasshoppers from W. Bengal, *Bull. Zool. Surv. India*.6(1-3) 45-55.
- Bhowmik, H. K. and Rui, K. N. 1984. Notes on a collection of grasshoppers (Orthoptera: Acrididae) from Siwalik hills. *Ind. Mus. Bull.* 17(1982): 48-55.
- Bi, D. Y. and Hsia, H. L. 1981. A study of the Chinese *Atractomorpha* Saussure with description of new species (Orthoptera: Acrididae; Pyrgomorphinae). *Acta Entomol, Sin.* 24(4): pp 407-414.
- Bladerson, J. and Yin, X. C. 1987. Grasshoppers (Orthoptera: Tetrigoidea and Acridoidea) collected in Nepal. *Entomol, Gaz.* 38(3-4):pp 268-299.
- Bladerson, J. and Yin, X. C. 1991. Grasshoppers (Orthoptera: Eumasticoidea and Acridoidea). *Entomol, Gaz.* 42(3): pp 189-205.
- Blanchard, C.E. 1836. Monographic du genre *Ommexecha*, de la famille des Acridiens, *Ann.Soc.Ent.France*, V, P603-624.
- Bolivar, I. 1884. Monografia de los pirgomorfinos. *Ann.Soc.Espan.Hist.Nat.* 13:1-73, 419-500.
- Bolivar, I. 1889. Ortópteros de Africa del Museo de Lisboa. *Jornal de Ciencias Mathematicas, Physicas, e Naturaes, Lisboa (Ser. 2)*. 1(2):73-112
- Bolivar, I. 1893. Tableau pour la determination du genre *Tryxalis* F.. *Feuille jeunes natural.* 23:161-164
- Bolivar, I. 1897. Catálogo sinóptico de los Ortópteros de la Fauna Iberica. *Annales de Ciencias Naturaes, Porto.* 4:105-135, 203-232
- Bolivar, I. 1902. Les Orthopteres de. St. Josephs College Trichinopoly (sud de l'Inde) 3e Partie, *Ann.Soc.Ent. Fr.* 580-6
- Bolivar, I. 1904. Notas sobre los Pirgomorfidos (Pyrgomorphidae). *Boletín de la Real Sociedad Española de Historia Natural.* 4:89-111
- Bolivar, I. 1905. Notas sobre los Pirgomorfidos (Pyrgomorphidae) VIII. Subfamily Desmopterinae, *Bol. Soc. Espan. Hist. Nat.* v, p197,207
- Bolivar, I. 1910. Mem. Soc. espan. Hist. nat. 19
- Bolivar, I. 1917. Contribution al concocementode la fauna India, *Rev. Ac. Madrid* 16:392
- Brunner, 1903 *Ann. Mus. Genova.* XXXIII pp 137,157.\*
- Brunner, V. M. 1893. Revision du systeme des orthopteres et descriptions des especes rapportee par M. Leonardo Fea de Birmanie, *Annli. Mus. Civ. Stor. Nat. Giacoma Doria, Geneva*,2, 13(33): 1-230.
- Burmeister, H. 1839. *Handbuch der Entomologie.* 2:1-1050
- Burr, M. 1904. Synopsis of the Orthoptera of W.Europe [VIII]. *Ent. Rec.* 16: 317-332.
- Burr, M. 1902. A monograph of the genus *Acrida* Stal (=Truxalis Fabr.) with notes of some allied genera, and descriptions of new species. *Transactions of the Entomological Society of London*:149-187
- Butler. 1881. VIII. Lepidoptera, Orthoptera and Hemiptera (account of the zoological collections made during the survey of H.M.S. Alert in the Straits of Magellan and on the coast of Patagonia). *Proc. Zool. Soc. London.* 1881:82-87

- Carl. 1916. Acridides nouveaux o peu connus du Museum du Geneve. *Revue Suisse de Zoologie*. 24(6):461-518, 1 pl.
- Caudell. 1921. Some new Orthoptera from Morkanshan, China. *Proceedings of the Entomological Society of Washington*. 23:27-35
- Cejchan, A. 1969. Beitrage zur Kenntnis der fauna Afganistan. Acridoidea, Cas. *Morav. Mus. Brne*. 54:229- 276.
- Chandra and Rajan. 2004. Faunal diversity of Mount Harriet National park (South Andaman) Conservation Area Series-17. ZSI, Kolkatta. 1-142
- Chang, H. L. Wang, C. C. and Kan, T. L. 1978. A study on the locusts of Lanchow and its vicinity with description of a new species of Pamphagidae (Orthoptera: Acridoidea). *Acta. Entomol, Sin*, 21 (3) 320-324.
- Cheng, T. M. 1977. New genera and new species of Acrididae from Yunnan Kweichow Plateau, China, *Acta Entomol, Sin*, 20(3) 303-313.
- Cherian, P. T. 2004. Getting the measure of India's Insect Diversity, *Perspectives on Biosystematics and Biodiversity T. C. N. Com. Vol.* 41-53.
- Chopard ,L. 1920. *Reckecher sur la confirmation et le development des derniers segments abdominaux chez les ortopteres, Paris*.
- Chopard ,L. 1949. Orthoptera. *In traite de zoologie. Ed. P. Grasse Vol. 9. Paris*.
- Day, A. and Hazra, A. H. 2003. Diversity and distribution of grasss hopper fauna of greater Kolkotta with notes on their ecology, *Memoirs of Z. S. I. Vol. 19, no: 3*.
- De Geer. 1773. *Mémoires pour servir à l' histoire des insectes*. 3:696 pp., 44 pls.
- De Haan. 1842. Bijdragen tot de kennis der Orthoptera. In Temminck. *Verhandelingen over de natuurlijke geschiedenis der Nederlandsche overzeesche bezittingen. Zoologie:45-248*
- Dianzhong, Li. And Zhemin, Z. 1993. A new species of genus *Confusacris* (Orthoptera: Acridoidea) from Heilongjiang Province, China. *Entomotaxonomia*, 15(1): 6-8.
- Dirsh V. M. & Uvarov, B. P. 1953. *Tijdschrift voor Entomologie*. 96(3)
- Dirsh V. M. 1953. Tree Locusts of the genus *Anacridium* (Orthoptera, Acrididae), *Inst. Espn. Ent* 7-66.
- Dirsh, V. M. 1950. Revision of the group Truxales (Orthoptera: Acrididae). *EOS, Madrid tom. Extr.* 119-247.
- Dirsh, V. M. 1953. Charilainae, a new subfamily of Acrididae (Orthoptera). *Ibid.* 6:161-173.
- Dirsh, V. M. 1954. Revision of species of genus *Acrida* Linn. *Bull. Soc. Fouad. Ier. Entom.* (107)
- Dirsh V. M. 1955. Taenoceridae and Xyronotidae : Two new families of Acridoidea (Orthoptera) *Ann. Mag. Nat. Hist.* (12) 5.
- Dirsh, V. M. 1956. Revision of the genus *Catantops* and review of the group Catantopini (Orthoptera: Acrididae). *Anti locust research center*.
- Dirsh, V. M. 1956. The phallic complex in Acridoidea (Orthoptera) in relation to taxonomy. *Trans. R. Ent. Soc. London*. 108: 223-356 pl 1-66.

- Dirsh, V. M. 1958. Revision of genus *Eyprepocnemis* Fieber 1853. (Orthoptera: Acrididae) *Proc. R. Ent. Soc. Lond.* (B) 27, 3-4, 33-45.
- Dirsh, V. M. 1961. A preliminary revision of the families and subfamilies of Acridoidea (Orthoptera: *Insecta*). *Bull. Br. Mus. Hist. (Ent)* 10:349-419
- Dirsh, V. M. 1965. The African genera of Acridoidea, *Cambridge Uty press for the Antilocus Research Centre* 579 pp
- Dirsh, V. M. 1975. Classification of Acridomorphoid insects. Faringdon Oxun (E W Classey):1-171.
- Drury, D. 1773. Illustrations of Natural history. Exotic insects, according to their different genera, *III. Exot. Ent.* ii.1-90.
- Eades, D. C. 1961 . The tribes and relationships of Ommexechinae (Orthoptera:Acrididae), *Proc. Acad. Nat. Sci. Phi/ad.* 113: 157-172.
- Fabricius, J. C. 1775. Systema entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus: 832 pp
- Fabricius, J. C. 1796. *Index alphabet Fabr. Ent. Syst.* 1
- Fabricius, J. C. 1798. Supplementum Entomologiae Systematicae. (4) 572 pp
- Farrow, R. A. and Colless, D. H. Analysis of the interrelationships of geographical races of *Locusta migratoria* (Linnaeus) (Orthoptera: Acrididae) by numerical taxonomy with special reference to sub-speciation in tropics and affinities of the Australian races. *Acrida*, 9(2) 77-99.
- Fengling, Z. and Ren, Bingzhong. 1992. A new species of the genus *Euchorthippus* Tarb.(Orthoptera: Acridoidea) from China, *Entomotaxonomia*, 14(1): 11-13.
- Fengling, Z. Zheng, Yiping. and Ren, Bingzhong. 1993. A new species of *Chorthippus* Fieber (Orthoptera: Acrididae). *Entomotaxonomia* 15(1 ):9-11.
- Fengling, Zhang; Zheng, Yiping; Zhang, Quigyun; 1993. A new species of the genus *Chrysacris* (Orthoptera:Acrididae) from China. *Entomotaxonomia* 15(2): 79-81.
- Fieber, F. X. 1853. Synopsis der europieschen Orthoptera, *Lotos; iii*, p 126.
- Fieber. F. X. 1852. Orthoptera Oliv. (et omn. Auct.) obereschlesiens. In Kelch. Grundlage zur Kenntniss der Orthopteren (Gradflügler) Oberschlesiens, und Grundlage zur Kenntniss der Käfer Oberschlesiens : erster Nachtrag. Ratibor (publication series). 6:1-19
- Fieber. 1853. Synopsis der europaischen Orthopteren mit besonderer Rücksicht der Böhmischen Arten. *Lotos.* 3:90-104, 115-129, 138-154, 168-176, 184-188, 201-207, 232-238, 252-261
- Fischer-Waldheim. 1853. Orthoptera Europaea:454 pp.
- Gray, G. R. 1832. In Griffith. Animal Kingdom. 15
- Guayyoom, M A; Ali, K; Ramzan, M; 1986. Phenetic taxonomy of some Acrididae of Faisalabad at generic level. *Publ. By Zoological Society of Pakisthan, Karachi, Pakisthan.* pp 199 - 215.
- Handlirsch, A. 1908. *Die foscilens Insecten und die Phylogenie der rezenten Formen . Leipzig.*

- Hawksworth, D. L. and Kalin-Arroyo, M. T. 1995. Magnitude and distribution of Biodiversity, *In Global Biodiversity Assessment* (ed. Heywood, V. H.) pp107-191
- Hebard, M. 1929. Acrydiinae (Orthoptera, Acrididae) of Southern India. *Revue. Suisse. Zool.* 36:565-592.
- Henry, G. M. 1940. New and little known South Indian Acrididae(Orthoptera) *Trans. R. Ent. Soc. Lond.* , 90:497-540.
- Hollis, D.1965. A revision of genus *Trilophidia* Stal (Orthoptera: Acridoidea) *Trans. R. Ent. Soc. Lond.* , 117(8).
- Hollis, D.1970. A revision of genus *Tristia* (Orthoptera: Acridoidea). *J. Nat. Hist.* 4: 457-450.
- Hollis, D. 1971. Revision of genus *Oxya* Audinet Serville (Orthoptera: Acridoidea), *Bull. Br. Mus. Nat. Hist. Ent.* 26(7) 269-343.
- Hollis, D.1975. A review of the subfamily Oxyinae (Orthoptera: Acridoidea), *Bull.Br. Mus. Nat. His.* 31 (6): 189-234.
- Huang, C. M.and Xia, K. I. 1984. New species of grasshoppers from Yunnan (Acrididae:Catantopinae). *Entomotaxonomia* 6(2-3): 241-245.
- Huang, Chung Mei. 1988. Two new species of *Pedopodisma* Zheng (Orthoptera:Catantopinae),*Acta. Entomol, Sin*, 31 (1): 73-76.
- Huang, R. X. 1987. A new species of the genus *Myrmoleotettix* from Xinjiang (Orthoptera: Acrididae), *Entomotaxonomia*, 9(2): 109-111.
- Ingrish, Sigfrid. 1989. Record, description and revisionary studies of Acrididae from Thailand and adjacent regions (Orthoptera: Acridoidea). *Spixiana.* II (3): 205-242.
- Ingrish, Sigfrid. 1993. A review of Oriental species of *Onopherula* Karsch (Orthoptera: Acrididae), *Ent. Scand.* 24: 313-341.
- Ingrish, Sigfrid. 1993. Taxonomy and stridulation of the Gomphocerinae and Truxalinae of Thailand (Orthoptera: Acrididae), *Revue Suisse De Zoologie*, 100 (4) , 929-947.
- Jacobson, G. and Bainki, V. L. 1904. *Orthoptera and Pseudoneuroptera of the Russian Empire* . St. Petersburg.
- Jago, N. D. 1969. A revision of the systematics and taxonomy of certain North American Gomphocerine grasshoppers (Gomphocerinae: Acrididae: Orthoptera). *Proc. Acad. Nat. Sci. Philad.* 121: 230-344.
- Jago, N. D. 1971. A review of Gomphocerinae of the world and key to the genera (Orthoptera: Acrididae), *Proc. Acad. Nat. Sci. Philad.* 123: 205-343.
- Jago, N. D. 1982. The African genus *Phaeocatantops* Dirsh and its allies in the Old world tropical genus *Xenocatantops* Dirsh. with description of new species (Orthoptera: Acridoidea: Acrididae: Catantopinae). *Trans. American Entomol. Soc.* 108(3): 429-457.

- Jago, N. D. 1983. The genus *Nomadacris* Uvarov and its recent incorrect synonymy under *Cyrtacanthacris* Walk. (Acrididae: Cyrtacanthacridinae) with new nomenclatural changes in the *Patanga*, *Nomadacris*, *Austracris* complex. *Plant Protection Bull. India*, 33: 139–143
- Johannson, B. 1763. Centurio insectorum rariorum. In *Linnaeus. Amoenitates Academicae seu dissertationes variae Physicae, Medicae, Botanicae antheac seorsim editae*, 2nd ed. 6:384-415
- Johnsen, P. 1987. Acridoidea of Zambia (7) pp 439-505.
- Johnsen, P. 1991. Acridoidea of Botswana Part III Acrididae, Truxalinae and Gomphocerinae. 372
- Johnston, A. B. 1956. Annotated catalogue of African grasshoppers. *Cambridge Uty. Press*, Cambridge.
- Kang, Le. And Cheng, Y. 1990. A new species of the genus *Aeuropedellus* Heb. (Orthoptera: Acridoidea). *Entomotaxonomia*, 21 (3-4): 95-198.
- Karny. 1907. Sitzungsberichte der Österreichischen Akademie der Wissenschaften. Mathematisch-Naturwissenschaftliche Klasse (Abt. 1). 96(1)
- Karsch, F. 1896. Neue Orthopteren aus dem tropischen Afrika, *Ent. Zeit. Stettin*, 57, 242-253.
- Karsch. 1877. *Stettin. Ent. Zeit.* IXII p 303.\*
- Karsch. 1877. *Sitz. Akad. Wiss. Wien, Math-Nat.* CI.IXXVI (1) P 44.\*
- Keith, and Kevan D. K. McE. 1966. Some Orthoptera from the Phillipines Bismark and Solomon Islands, with a few interesting records from New Guinea and the mollusks. *Ent. Medd.* 34(1996)375-420.
- Kesavaram, G. 1985. Grasshoppers in the collection of Government Museum, Madras, *New series, Nat. Hist. Sec. Vol. IX:2*
- Kevan & Singh. 1964. Preliminary diagnoses of a new genus and a new subgenus of Orthacridini (Orthoptera: Pyrgomorphidae) from South India. *Entomologist, London.* 97:173-176
- Kevan, D. K. McE and Singh A; 1964. Preliminary diagnosis of a new genus and a new subgenus of Orghacridini (Orthoptera: Pyrgomorphidae) from S.India. *Entomologist*, 97: 173-176.
- Kevan, D. K. McE. and Tandon, S. K. 1976. On the occurrence of subtribe Mekongeanina Kevan and Akbar (Orthoptera: Acridoidea, Pyrgomorphidae) in India, *Oriental insects* 10 (4) 589-592).
- Kevan, D. K. McE. 1963. A preliminary revision of the genera *Mitricephala* Bolivar 1898 and *Verdulia* Bolivar 1905 (Orthoptera: Acridoidea:Pyrgomorphidae). *Pacific Ins.* 5: 771-795.
- Kevan, D. K. McE. 1963. A revision of Desmopterini (Orthoptera: Acridoidea: Pyrgomorphidae) Part I genera other than *Desmopterella-Nova Guinea* (n.s) 10(*Zool.* 19): 361-407.pI.XVIII-XXIII.

- Kevan, D. K. McE. 1968. A study of the genus *Chrotogonus* Serville (Pyrgomorphidae) The phallic structures with a second suppliment to the bibliography of the Chrotogonini. *Entomologists monthly magazine* . vol. 104 10-15.
- Kevan, D. K. McE. 1969. A preliminary revision of Asiatic Chlorizeinini. (Orthoptera: Acridoidea: Pyrgomorphidae), *Transactions of the American Ent. Soc.* 94: 355-378.
- Kevan, D. K. McE. 1970. Indian Pyrgomorphini other than *Pyrgomorpha* (Orthoptera: Acridoidea:Pyrgomorphidae). *Revue Suisse De Zoologie, Tome 77, Fasc 4*, no. 53, 851-866.
- Kevan, D. K. McE. and Akbar, S. S. 1964. The Pyrgomorphidae (Orthoptera: Acridoidea) t heir systematics, tribal divisions and distribution, *Can. En!*. 96: 1505-1536.
- Kevan, D. K. McE.1966. Additions to Verduliini (Orthoptera: Acridoidea:Pyrgomorphidae) from the Philippines. *Pacific insects*, 8(1).
- Key, K. H. L.1977. The genera and species of the tribe Morabini (Orthoptera:Eumasticidae Morabinae). *Aust. J. Zool.* 25(3): 499-565.
- Key, K. H. L.1985. Monograph of the Monistriini and Petasidini (Orthoptera:Pyrgomorphidae). *Aust. Zool Suppl. Ser. no.1 07*: 213pp.
- Key, K. H. L. 1990. On the identity of Erichson's species *Calliptamus baiulus* (Orthoptera: Acrididae),*Invertebr. Taxon.* 3(5): 519-522.
- Key, K. H. L. 1991. On four endemic genera of Tasmanian Acrididae (Orthoptera), *Invertebr. Taxon.* 5(2): 241-288.
- Key, K. H. L. 1992. A higher classification of Australian Acridoidea(Orthoptera),*Invertebr. Taxon.* 7(4): 779-786.
- Key, K. H. L. 1992. Taxonomy of the genus *Phaulacridium* and a related new genus (Orthoptera: Acrididae). *Invertebr. Taxon.* 6(1): 197-243.
- Key, K. H. L. 1994. New genera of Catantopini. in the subtribe Copyphistina (Orthoptera: Acrididae). *Invertebr. Taxon.* 8(1 ):75-89.
- Key, K. H. L. and Kevan, D. K. McE. 1980. A revision of the Australian Atractomorphini (Orthoptera: Pyrgomorphidae). *Aust. J. Zool.* 28 (5-6): 717-773.
- Key, K. H. L. and Rentz, D. C. F. 1994. On the scientific name of the Australian "Spur throated locust" (Orthoptera: Acrididae). *J. Aust. Entomol. Soc.* 33(4): 345 346.I
- Khan, A, A. 1990. Identification of some grasshoppers of range land with the help of their excreta. *Pakistan J. Entomol. Karachi*, 5(1-2): 67 -70.
- Kirby, W. F. 1910. A synonymic catalogue of Orthoptera Vol. III *Orthoptera Saltatoria* Part II. IX+ 674 pp. London.
- Kirby, W. F. 1914. The fauna of British India,including Burma.Orthoptera-vol.1. 276.
- Klug, J. C. F. 1832. Symbolae physicae seu icons et descriptions Insectorum, quae ex itinere per Africum borealem et Asiam F G Hemprich et C H Eherenberg studio nova aut illustratae redierunt, *Symb. Phys. Zool.* 2 (Ins.3) 1.

- Krauss, H. A. 1877. Orthopteran vom Senegal gessammelt von Dr Franz Sleindachner *Sber. Akad. Wiss. Wien* 76:41;
- Kumar, P. and Viraktamath. S. A. 1991. Illustrated keys for identification of common species of short-horned grasshoppers' (Orthoptera: Acridoidea) of Karnataka and notes on their ecology and behaviour. *Hexapoda*, 3(1-2): 53-70.
- Laosinchai, B. and Jago, N. C. 1980. A new acridid from Thailand and synonym of two Malaysian genera (Orthoptera: Acrididae: Catantopinae). *Entomol. Mon. Mag*, 16 (1388- '391): 7-11.
- Latrielle, P. A. 1804. *History Naturelle....des Crustaces et des insects*, 12 424pp Paris
- Li, B. and Ti, X. 1995. Two new species of *Conophyma* Zub. From Xinjiang (Acridoidea: Catantopidae). *Entomol. Sin.* 2 (4): 311-315.
- Li, T. S. 1982. New records of grasshoppers from China, *Entomotaxonomia*, 4:258
- Li, T. S. Ji, H. X. and Lin, R. H. 1985. Two new species of grasshoppers from Guangxi, *Entomotaxonomia*, 7(1): 57-60.
- Lian, Z. M. and Zhemin, Z. 1984. New genera and new species of grasshoppers from Gansu, China, *Entomotaxonomia*, 6(4):309-312.
- Liang, G. Q. 1989. A new species of *Sinacris* from Yunnan province China (Acrididae: Catantopinae). *Oriental insects*, 23: 153-155.
- Liang, G. Q. 1989. A new species of the genus *Sinopodisma* Chang from Guangdong, China (Orthoptera: Catantopidae), *Entomotaxonomia*, 11 (4): 259-260.
- Liang, G. Q. and Chen, Z Q; 1986. A new species of the genus *Phlaeobida* Bolivar from Hainan Island (Orthoptera: Acrididae), *Entomotaxonomia*, 8(3): 221-223.
- Liang, G. Q. and Zhemin, Z. 1988. A new species of grasshopper from Hainan Island (Orthoptera: Acrididae). *Acta. Entomo/. Sin.* 31(2): 184-185.
- Limin, Cao. and Zhemin, Z. A new genus and new species of Arcypteridae (Orthoptera: Acridoidea) from Xinjing. *Entomotaxonomia*, 18(2): 79-82.
- Linnaeus, C. 1758. *Systema Naturae per Regna Tria naturae*. (10<sup>th</sup> ed) 432
- Liu, J P. 1995. A new species of the genus *Omocestus* 801. (Orthoptera: Acridoidea) *Sinozoologica*, 12: 285-287.
- Liu, J. P. 1979. Study of locusts and grasshoppers from Sinkiang Uighus region with descriptions of two new species of genus *Beybienkia* Tzypf, Pamphaginae (Orthoptera: Acridoidea: Pamphagidae). *Acta. Entomo/. Sin.* 22 (4): 448 - 452.
- Liu, J. P. 1986. A new species of the genus *Asonus* Yin. (Orthoptera: Acrididae) *Sinozoologica. no. 4*, pp 89 - 90.
- Liu, J. P. 1987. A new species of *Chorthippus* Fieber from Chanbaishan, *Entomotaxonomia*, 9(1): 51-52.
- Liu, Z. W. and Yin, X. C. 1987. A study of the genus *Caryanda* Stal (Orthoptera: Acrididae) from China, *Entomotaxonomia*, 9(1): 53-60.

- Ma En Bo, and Zhemin, Z. 1992. A new species of Acrididae namely *Caryanda rufofemorata* is described from PR China. Its C- banding karyotype is analysed, *Oriental insects*, 26: 197-200.
- Ma En Bo. and Guo Ya Ping. 1995. Two new species of *Chorthippus* (Orthoptera: Archypteridae) from Shanxi Province. *Entomotaxonomia*, 17(1): 5-8.
- Ma En Bo. and Zheng, Z. 1992. A new species of *Caryanda* Stal and its chromosome C-banding karyotype (Orthoptera: Acridoidea), *Oriental insects*, 26: 195 - 200.
- Ma En Bo. Guo, Ya Ping. And Zhemin, Z. 2000. Description of a new species of *Caryanda* Stal and its C - banding karyotype. (Orthoptera: Acridoidea), *Oriental insects*, 34: 331-340.
- Ma En Bo. Guo, Ya, Ping. and Zhemin, Z. 1993. A new species of *Oxya* Audinet Serville is described as new from P. R China. Its chromosomal C- banding karyotype is analysed, *Oriental insects*, 27: 211-215.
- Ma En Bo. and Guo, Ya, Ping. 1995. A new species of *Aulacobothrus* Bolivar (Orthoptera: Acridoidea) from Sichuan Province, *Entomotaxonomia*, 17, (3): 172-174.
- Ma En Bo; Guo Va, Ping; Zhemin, Z; 1995. Description of two new species of *Chorthippus* (Orthoptera: Acridoidea). *Entomotaxonomia*, 17(4): 254 258.
- Ma En Bo; Guo, Ya Ping; Li, Chun-Xuan; 1994. The genus *Lemba* Huang 1983 is redescribed. A new species *Lemba sinhuanensis* Ma is described from Sinhuan Province, PR China and a key to the four species of the genus is given, *Oriental insects*, 28: 97-101.
- Mahmood, K. and Yousuf, M. 1998. Three new species of genus *Gomphomastax* (Orthoptera: Eumasticidae) from Azad Jammu and Kashmir, *Pak. J. Zool.* 30(1): 1-5
- Martinez. 1898. Actas de la Sociedad Española de Historia Natural. 25
- Mason, J. B. 1973. A revision of the genera *Hieroglyphus* Krauss *Paraheiroglyphus* Carl and *Hieroglyphodes* Uvarov Orthoptera: Acridoidea). *Bull. Br. Mus. Nat. His.* 28 (1) 507 - 560.
- Mason, J. B. 1973. A revision of the genus *Hieroglyphus* Krauss, *Parahieroglyphus* Carl and *Hieroglyphoides* Uvarov. (Orthoptera: Acridoidea), *Bull. Br. Mus. Nat. Hist. Ent.* 28(7) 507-560.
- Mason, J. B. 1977. Acridoidea of South West Angola (Orthoptera). *EOS Madrid* 53 (1-4): 91 -132.
- Miller, N. C. E. 1935. New and little known Malayan Acrididae. *J. Fed. Malay. St. Mus.* 17: 686-709.
- Mishchenko, L L. 1986. On the knowledge of grasshoppers of the genus *Orchilidia* Stal. *Entomol Obozr*, 65(4): 709-718.
- Mishchenko, L. L. 1981. A new species of the genus *Asulconotus* Ying (Orthoptera: Acrididae) from Tibet. *Entomol Obozr*, 60(1): 117-118.



- Moeed, A. 1976. A new species of *Oxyptema* Ramme (Orthoptera: Acrididae) from Pakistan. *Pak. J. Zool.* 8(2): 155-157.
- Muralirangan, M. C. Suresh, P. and Parthopartim, D. 1993. Observation of the grasshopper species diversity , density and distributional pattern in penisular India, *The Entomologist*, 112(3-4) 201-210.
- Navas, R. P. L. 1904. Algunos insectos de Kurseong en la cordillera del Himalaya, *Boln.Soc. aragon. Cienc. Nat.* 3:133
- Otte, D. 1979. Revision of grasshopper tribe (Orphulellini Gomphocerinae:Acrididae). *Proc. Acad. Nat. Sci. Phi/a.* 131: 52 - 88.
- Otte, D. Eades, D. Naskrecki, P. Orthoptera species file online 2.  
<http://osf2x.orthoptera.org/osf2.2/OSF2X2Frameset.htm>
- Peng, L Ju. 1981. A new species of *Euthysttia* Fieber from Xinjiang (Orthoptera: Acrididae). *Acta. Entomol. Sin.* 24(4): 415-416.
- Popov, G. B.and Kevan, D. K. McE. 1979. A revision of the genus *Poekilocerus* Audinet-Serville 1831 (Orthoptera: Acridoidea: Pyrgomorphidae). *Anti locust Bulletin no.* 51 :81 pp.
- Pushpangadan, P. and Narayanan Nair K. 2001. Future of Systematics and Biodiversity Research in India. Need for a national consortium and national agenda for systematic biology research. *Current Science* 80: 631-638.
- Ragge, R. D. 1965. Grasshoppers Crickets and cockroaches of the British Isles. Frederick Warne and co. Ltd. pp 299.
- Ramachandra Rao, Y. 1970. The problem of Bombay Locust (*Patanga succincta*) in India. *Pro. Int. Study Conf. Current and future problems of Acridology, London.* 299-300.
- Rehn, A. G. 1952. On genus *Gesonula* (Orthoptera: Acrididae: Cyrtacanthacridinae) *Trans. Amer. Ent. Soc.* I. XXVIII.
- Rehn, J. A. G. 1914. Orthop[tera I, Mantidae, Phasmidae, Acrididae, tettigonidae and Gryllidae aus dem Zentral Afrikanischensecengebiet, Uganda und dem Itury- Becken des Congo, *Wiss Ergebn. Dtsch. Zent. Afr. Exped.* 1907-1908, 5(1) 1-226.
- Rehn, J.A.G. 1957. The grasshoppers and locusts (Acridoidea) of Australia Fam. Acrididae, Subfam. Cyrtacanthacridinae, Tribes Oxyini, Spathosterni and Pruxabilini. Melbourne, 270 pp
- Rehn, J.A.G. and Rehn, J. W. H. 1941. The Orthoptera of the Philippine island. PartII Acrididae, Cyrtacanthacridinae, Gp. Cyrtacanthacridus. *Proc. Acad. Nat. Sci. Phi/ad.* 92(1940): 245-287.pl. 910.
- Rentz, D. C .F. 1978. The grasshopper of the marginatus group of the genus *Melanoplus* (Orthoptera: Acrididae: Melanopliinae). *Acrida* 7(3): 165-196.
- Rentz, D. C. F. and Weissman, D. B. 1980. An annotated checklist of the grasshopperspecies of *Aerochoreutes*, *Circotettix* and *Trimerotropis* (Orthoptera: Acrididae: Oedipodinae). *Trans. Ann. Entomol. Soc.* 106 (2): 223-252.

- Ritchie J. M. 1982. A taxonomic revision of the genus *Gastrimargus* Saussure (Orthoptera: Acrididae). *Bull. Br. Mus. Nat. Hist. (Ent)* 44: 239-329.
- Ritchie, J. M. 1981. A taxonomic revision of the genus *Oedaleus* (Orthoptera:Acrididae). *Bull. Br. Mus. Nat. Hist. (Ent)* 42: 83-183.
- Ritchie, J. M. 1982. A taxonomic revision of the genus *Gastrimargus* Saussure (Orthoptera: Acrididae), *Bull. Br. Mus. Nat. Hist. (Ent)* 44 (4) 239-666.
- Roberts, H. R. 1941. A comparative study of the subfamilies of the Acrididae (Orthoptera) primarily on the basis of phallic structure, *Proc. Acad. Nat. Sci. Phi/ad.* 93: 201-246.
- Roffey, J. 1979. Locusts and grasshoppers of economic importance in Thailand. *Anti-locust Mem.* 14: 1-200.
- Salfi. 1931. Orthoptera palaeartica critica. X. Revision du genre *Platypterna* Fieber(Acrid.). *Eos, Revista española de Entomologia.* 7:255
- Saussure, H. DE. 1861. Etides sur quelques Orthopteres du musee de genova nouveaux ou imparfaitment connus, *Ann. Soc. Ent. France*, (4) I, p469- 494.
- Saussure, H. DE.1884.Adimenta ad prodromum Oedipodiorum, insectorum ex ordine Orthopterorum, *Mem. Soc. Phys. Hist. Nat, Geneva* 28(9) 1-254.
- Saussure, H. DE. 1888. Addimentum ad prodromum, Oedipodiorum Insectorum ex Ordine Orthopterorum, *Mem. Soc. Phys. Hist. Nat, Geneva*,30(1):1-180.
- Schaum. 1853. Uebersicht der von ihm in Mossambique beobachteten Orthopteren nebst Beschreibung der neu entdeckten Gattungen und Arten durch
- Schroder, CH. 1925. Handbuch de Entmologie. Jena.
- Scopoli. 1786. Delicidae forae et faunae insubricae species *Acrotylus insubricus* (Scopoli, 1786): Page(s) 64
- Seetharama Mayya. K. S. Sreepada, M. Jayarama Hegde. Survey of short-horned grasshoppers (Acrididae) from Dakshina Kannada District, Karnataka. *Zoos' print Journal* 20(9)
- Serville, J. G. A. 1831. Revue methodique des insects de pordredes Orthopteres, *Ann. Sci. Nat. (Zool)* 22: 262-292.
- Serville, J. G. A. 1839. In collection des suites a Buffon Orthopteres, *Hist. Nat Ins.* 1-776.
- Serville. 1839[1838]. Histoire naturelle des insectes. Orthoptères:i-xviii, 1-776, pl. 1-14 Herrn Dr. Hermann Schaum. *Ber. Akad. Wiss. Berlin.* 2:775-780
- Shafee, S. A.and Meinodas, K. 1989. Taxonomic significance of female sub-genital plate in some Indian grasshoppers (Orthoptera: Acrididae). *J. Insect Sci.*2(2): 84-87.
- Sharma, B. and Guptha, N. 1997. Identification key to the short horned grasshoppers from Subshivalik plains of Jammu. *J. Insect Sci.* 10(1): 5-7.
- Shengquan, X. U.and Zhemin, Z. 1996. A new genus and a new species of grasshoppers (Orthoptera: Arcypteridae) from Xinjiang. *Entomotaxonomia*,18(2):, 83-86.
- Shishodia, M. S. 1991. Animal resources of India, Protozoa to Mammalia. *State of Art, ZSI.*
- Shishodia, M. S. 2000. Short and long horned grasshoppers and crickets of Bastar district, Madhya Pradesh, India, *Rec. Zool. Surv. India.* 98(part 1) 27-80.

- Shishodia, M. S. Hazra A. K. Insecta : Orthoptera, *Rec. Zool. Surv. India.* 82(1-4) : 15-32.
- Shishodia, M. S. Mitra, B. Tandon, S. K. 1993. On the orthoptera of Andaman and Nicobar Islands, *J. Andaman Sci. Assoc.* 9(1&2) : 35-43.
- Shishodia, M. S. 1999. Orthoptera fauna of Patalkot Chindwara, Madhya Pradesh, India, *Rec. Zool. Surv. India.* 97(part4) 33-43.
- Shvanwitsh, B. N. 1949. General Entomology (In Russian) . Leningrad.
- Singh, A. 1978. A new species of *Brachycrotaphus* Krauss(Orthoptera: Acrididae, Truxalinae) from north west India, *Entomon*, vol. 3 no:2 277-280.
- Singh, A. and Kevan D. K. McE. 1965. The genus *Orthacris* and its allies. (Orthoptera: Acridoidea, Pyrgomorphae) *Trans. R. Ent. Soc. Lond.* , 117(13) 367-411.
- Sjostedt, Y. 1928. Monographic der Gattung *Gastrimargus* Sauss. (Orth: Oedipodinae) *Bih. K Svenska. Vetensk Akad. Handl.* (3) 6 (1):37
- Sjostedt, Y. 1933. Swedisch-chinasische wissenschaftliche expedition nach den nordwestlichen Provinzen Chinas, under leitung von Dr Svenhedin und prof Su Ping Chan. Insekten. Einleitung und Orthoptera 1Acrididae, *Ark. Zool.* 23, pl.II
- Snodgrass, and Robert Evans. 1967. Insects, their ways and means of life. *DoverPublication Inc.* 362pp.
- Srinivasan, C. 1986. On a collection of grasshoppers (Acridoidea: Orthoptera ) from Tamilnad uplands, Eastern Ghats. *Eastern Ghats Insects-* I,1986.
- Stal, C. 1855. Entomologiska Notiser. Nya Orthoptera. Öfversigt af Kongl. Vetenskaps-Akademiens Förhandlingar Stockholm. 12:348-53
- Stal, C. 1861[1860]. Orthoptera species novas descripsit. Kongliga Svenska fregatten Eugenie's Resa omkring jorden under befäl af C.A. Virgin åren 1851-1853 (Zoologi). 2(1):299-350
- Stal, C. 1873: Orthoptera nova descripsit C. Stal, *Oefv. vet. Akad. Forh* XXX (4) pp40, 53
- Stal, C. 1873. Revue critique des Orthopteres descripsit per Linne De Geer et Thunberg. 1. Acridoidea, *Recens Orth* I:154pp
- Stal, C.1878. Systema Acridiodeorum . Essi d'une Systematisation des Acridiodes, *Bih. Sven. Acad. Handl.* V(4) 1-100.
- Stal, C.1860. (On genus *Phlaeoba*) *Eugenie's Resa, Orth.* p360.\*
- Stal, C. 1875. Observations orthoptérologiques [part 1 of 3] . Bihang till Kungliga Svenska Vetenskaps-Akademiens Handlingar. 33
- Stal,C. 1877. Orthoptera nova ex Insulis Philippinis descripsit. Öfversigt af Kongl. Vetenskaps-Akademiens Förhandlingar Stockholm. 34(10):33-58
- Storozhenko, S. Yu. 1980. A new species of the genus *Zubovskia* (Orthoptera:Acrididae) from the south far-east marine territory. *Zool. Zh.* 59 (5): 786,788.
- Tandon, S. K. 1988. Distributional pattern of grasshoppers of India: The distribution of Oxyinae in Indian region, *Rec. Zool. Surv. India.* 85(1) :101-110.
- Tandon, S. K. Hazra A. K. and Shishodia, M. S. 1988. Observation on the field biology and Ecology of some grasshoppers (Orthoptera: Acridoidea) near Calcutta, *Rec. Zool. Surv. India.* 85(2) :301-318.

- Tandon, S. K. 1973. The identity and distribution of the genus *Xenocatantops* Dirsh and Uvarov (Orthoptera: Acridoidea, Acrididae), *Rec. Zool. Surv. India*, 67(1-4): 59-64
- Tandon, S. K. 1975. On a collection of Orthoptera and Dermapera from the Tons Valley (Uttar Pradesh), *Newl. Zool. Surv. India*, 2(1): 13-15.
- Tandon, S. K. 1976. A checklist of the Acridoidea (Orthoptera) of India Part I Acrididae. *Rec. Zool. SUN. India. Dcc. Pap. No.3*: 1-48.
- Tandon, S. K. and Shishodia, M. S. 1969. On a collection of Acridoidea from Nagarjunsagar Dam. *Oriental insects*, 3(3) 265-267.
- Tandon, S. K. and Shishodia, M. S. 1976. On a collection of Acridoidea (Orthoptera : Insecta ) from Gharwal, Uttar Pradesh, India, *Newl. Zool. Surv. India*, 2(6): 269-271.
- Tandon, S. K. and Shishodia, M. S. 1977. The Acridoidea (Insecta : Orthoptera) *Rec. Zool. Surv. India*. 72:295-307.
- Thomas, C. 1874. Descriptions of some new Orthoptera, and notes on some species but little known. *Bulletin of the United States Geological and Geographical Survey of the Territories*. 1(2):63-71
- Thunberg, C. P. 1815. Hemipterorum maxillosorum genera illustrata plurimisque vovis speciebus, *Mem. Acad. Sci. St. Petersb.*, 5:211-301.
- Tianshan, Li. Wen, Lu. Jiang, and Zhenghui. 1995. Description on new species of grasshoppers (Orthoptera: Acridoidea) from Guanxi. *Entomotaxonomia*, 17(3): 175-179.
- Tianshan, Li. and Qijing, Li. 1987. Description of two new species of grasshoppers from Guangxi. *Entomotaxonomia*, 9(4): 303-306.
- Usmani, M. K. and Shafee, S. A. 1985. A revision of the Indian species of *Oxya Acrididae: Oxyinae*. *Oriental insects*, 19: 311 - 322.
- Usmani, M. K. Shafee, S.A. 1984. A new tribe of Oxyinae (Orthoptera: Acrididae), *Mitt. Schweiz. Entomol*, 57(2 - 3): 295-296.
- Usmani, M. K. and Shafee, S. A. 1983. A new genus and two species of the subfamily Acridinae (Orthoptera: Acrididae) from India. *Mitt. Schweiz. Entomol*, 56(3 - 4): 401-403.
- Usmani, M. K. and Shafee, S. A. 1985. A new species of the genus *Ramakrishnaia* (Orthoptera: Pyrgomorphidae) from southern India. *Int. J. Entomal*. 27(3): 204-207.
- Uvarov, B.P 1932: *Trudy zool. Inst. Lenigr* 1:224
- Uvarov, B. P. 1925. Orthoptera except Blattidae collected by Prof. Gregory's expedition to Yunnan, *J. Proc. Asiat. Soc. Beng.* 20:313-335.
- Uvarov, B. P. 1929. Acrididen (Orthoptera) aus sud Indien, *Revue Suisse Zool.* 533-563.
- Uvarov, B. P. 1921. Records and revision of Indian Acrididae, *Ann. Mag. Nat. Hist.* 7 (9) 480-509
- Uvarov, B. P. 1922. Rice grasshoppers of the genus *Heiroglyphus* and their allies, *Bull. Ent. Res* 13:225-241.

- Uvarov, B. P. 1923. A revision of old world Cyrtacanthacridini (Orthoptera: Acrididae) Part I introduction and key to genera. Part II Genera *Phyzacra* to *Willemsea*. Part III Genera *Valanga* to *Patanga*. *Ann. Mag. Nat. Hist.* (p): 11: 130 - 144; 473 - 490: 12: 345 - 366.
- Uvarov, B. P. 1925. A revision of the genus *Ceracris* Walk. (Orthoptera: Acridoidea). *Ent. Mitt.* 14: 11-17.
- Uvarov, B. P. 1927. Distributional records of Indian Acrididae. *Rec. Ind. Mus.* 25: 233-239
- Uvarov, B. P. 1928. Locusts and Grasshoppers. London.
- Uvarov, B. P. 1929. Acrididen (Orthoptera ) aus Sud-Indian, *Revue Suisse de Zool* 36:533-563.
- Uvarov, B. P. 1932. A revision of genus *Brachycrotaphus* Krauss (Orthoptera: Acrididae). *Soc. Ent. France, Livre du Centenaire*, 285-300.
- Uvarov, B. P. 1935. Notes on Acrididae from S. China. *Lignan. Sci. J.* 14: 267 269
- Uvarov, B. P. 1936. Studies in the Arabian Orthoptera I. Description of new genera, species, and subspecies. *Zoological Journal of the Linnean Society, London.* 39:531-554, pl. 10-11
- Uvarov, B. P. 1943. A revision of group *Mesopsis* (Orthoptera: Acrididae). *EOS, Madrid*, 19: 69-78.
- Uvarov, B. P. 1951. Some synonymy in the genus *Locusta* Linne. *Bull. off. nat. Antiacridienne.* 1:1-4
- Uvarov, B. P. 1956. Recent trends and developments of Acridological research. *Proceedings of the 10<sup>th</sup> Congress of Entomology.* Vol. 3.
- Uvarov, B. P. 1966. Grasshoppers and locusts. A handbook of general Acridology, Cambridge, 1: 481 pp.
- Vickery, V. R. 1997. Classification of Orthoptera (Sensu stricto) or Caelifera, *CAB International. The Bionomics of Katyids and their kins*, 5-30.
- Vickery, V. R. and Kevan, D. K. McE. 1983. A monograph of the Orthopteroid insects of Canada and adjacent regions, vol. I and II *Mem. Lyman. Ent. Mus. Res.Lab.* 13: 1-680 and 681-1467.
- Vidhu Priya, A. and Narendran, T. C. 2003. A Key and a checklist of the short horned grasshoppers of Kerala, *Entomon* 28 (3) 223-230.
- Walker, F. 1870. Catalogue of the specimens of Dermaptera Saltatoria in the collection of the British Museum Vol. 3 Locustidae and Acrididae, 425-604, Vol. 4 Acrididae, 605-809.
- Walker, F. 1859. Characters of some apparently undescribed Ceylon Insects, *Ann. Nat. Hist* 3(4) : 217-223.
- Walker, F. 1871. Supplement to the Catalogue of Dermaptera Saltatoria, 116pp, London.
- Werner. 1905. Sitzungsberichte der Österreichischen Akademie der Wissenschaften. Mathematisch-Naturwissenschaftliche Klasse (Abt. 1). 114(1)

- Westwood. 1845[1843-1945]. *Arcana Entomologica* or illustrations of new, rare and interesting insects. *Arcana Entomologica*. 2:1-190 pls. 49-95
- Willemse, C. 1925. Revision der Gattung *Oxya* Serville (Orthoptera, Subfam. Acridioidea, trib. Cyrtacanthacrinae). *Tijdschrift voor Entomologie*. 68:1-60
- Willemse, C. 1931. Acridide Celebicae. *Treubia*. 12(suppl.):189-270
- Willemse, C. 1933. Description of new Indo-malayan Acrididae (Orthoptera) Part I. *Naturhist. Maandb/ad*.
- Willemse, C. 1951. Synopsis of Acridoidea of Indo-Malayan and adjacent regions (Insecta: Orthoptera) Fam. Acrididae, Sub fam. Acridinae. *Publicaties Natuurhist. Genootschap, Limburg* 4: 41-114.
- Willemse, C. 1955. Synopsis of the Acridoidea of Indo-malayan and adjacent regions (Insecta: Orthoptera) Part II Fam: Acrididae Subfam. Catantopinae Part I. ), *publicities nat. Hist. Gen. Limburg Reeks* 8:3-225
- Xiaohong, Ou, Zhemin, Z. and Chen, Jun. 1995. A new species of *Ceracris* Walker (Orthoptera: Acridoidea). *Entomol. Sin.* 2(2): 119-121.
- Yao, Niu, Zhemin, Z. 1993. A new genus and species of grasshopper from China (Orthoptera: Catantopidae). *Entomotaxonomia*, 15(1): 1-5.
- Yin, 1984: Grass hoppers & locusts from Qinghai Xizang plateau of China 287 pp, Beijing.
- Yuwen, Wang, Xia, Kailing. 1992. A new species of *Heteroptemis* Stal (Orthoptera: Acridoidea) from Henan province China, *Entomotaxonomia*, 14(1): 8-10. 14(1): 8-10.
- Yuwen, Wang. and Xiangyu, Jingong. 1995. A new species of genus *Yunnanacris* Chang (Orthoptera: Catantopidae) from Yunnan Province, China, *Entomotaxonomia*, 17(2): 91-93.
- Yuwen, Wang. and Xiangyu, Jingong. 1995. A new species of *Paratonkinacris* You (Orthoptera: Acridoidea: Catantopidae) from Jianxi Province, China. *Entomotaxonomia*, 17(3): 157-161.
- Yuwen, Wang; Zhemin, Z; 1992. A new species of the genus *Chorthippus* (Orthoptera: Acridoidea: Acrypteridae) from Qinghai Province China. *Entomotaxonomia*, 14(3): 161-164.
- Zhang, Xiujiang. and Xia, Kialing. 1990. A new genus and species of grasshopper (Orthoptera: Acridoidea: Catantopidae) from Henan Province, China *Entomotaxonomia*, 12(1): 1-4.
- Zhemin, Z. 1980. New species of grasshopper from China (Orthoptera: Acrididae). *Acta Entomol. Sin.* 23 (2): 191-194.
- Zhemin, Z. 1982. A new Phonogaster grasshopper from China (Acrididae: Gomphocerinae). *Syst. Entomol.* 7(2): 239-242.
- Zhemin, Z. 1989. A new species of *Chorthippus* Fieber from Liupanshan Region (Orthoptera: Acridoidea), *Acta Entomol. Sin.* 32(4):462-464.

- Zhemin, Z. 1991. A new genus and new species of Oedipodidae (Orthoptera: Acridoidea) from Jingping Shan Region. *Entomotaxonomia*, 13(3): 171 - 174.
- Zhemin, Z. and Gow, C-n. 1981. New species of grasshopper from Ningsia-Kansu Region. *Acta. Entomol. Sin.* 24 (1): 72-77.
- Zhemin, Z. and Guodong, Ren. 1994. Two new species of grasshoppers (Orthoptera: Oedipodidae) from Gansu and Ningxia. *Entomotaxonomia*, 16(4): 249-253.
- Zhemin, Z. and He, Ke, Ke. 1995. A new species of Chorthippus Fieber (Orthoptera: Acridoidea: Acrypteridae) in North Western China. *Entomotaxonomia*, 17, (2): 84-86.
- Zhemin, Z. and Limin, Cao. 1992. A new species of Squaroplatacris Liang et. Zheng (Acridoidea: Catantopidae). *Entomotaxonomia*, 14(3): 159-161.
- Zhemin, Z. and Mao, Benyong. 1996. New genus and new species of Catantopidae(Orthoptera: Acridoidea) from Western Yunnan. *Entomotaxonomia*, 18(1):11-16.
- Zhemin, Z. and Xioa-Yan, Yang. 1989. Two new species of grasshoppers from Lushan China (Orthoptera: Acridoidea). *Oriental insects*, 23: 333-336.
- Zhemin, Z. and Zhang, Ziyou. 1995. Two new species of genus Pseudoptigonotus Cheng (Acridoidea: Catantopidae). *Entomotaxonomia*, 14(3): 4.
- Zhemin, Z. Huan, Quanjin. and Zhibin, Liu. 1988. A new species and a new record of grasshoppers from Yunnan. *Entomotaxonomia*, 10(1-2): 83-86.
- Zhemin, Z. Ma, En, Bo. 1989. A new species of Stolzia Willemse and its karyotype and C - banding pattern (Orthoptera: Acridoidea). *Acta. Entomol. Sin.* 32(3): 325-329.
- Zhemin, Z. 1981. New genus and new species of grasshoppers from Xishuangbanna, China, *Acta. Entomol. Sin.* 24(3):295-304.
- Zhemin, Z. and Chen, Jun. 1995. A new species of the genus Pedopodisma Zheng (Orthoptera: Acridoidea: Catantopidae) from Sichuan. *Entomotaxonomia*, 17(4): 259-261.
- Zhemin, Z. and Ming, Chang. 1994. A new species of Ptyganotus Tarb. (Orthoptera: Acridoidea: Acrypteridae). *Entomotaxonomia*, 16(3): 170-172.
- Zheng, Z. 1982. New genus and new species of grasshoppers from Yunnan Guizhou, and Sichuan, China, *Zool. Res. Suppl.* 3:83-87.
- Zhenmin, Lian. and Shigui, Wang. 1995. Description of a new species of genus Foveolatacris (Orthoptera: Acridoidea: Acrididae). *Entomotaxonomia*, 17(2): 87-90.
- Zhiwei, Liu. and Baoping, Li. 1995. A new genus and new species of atantopidae from Hunan Province China. (Orthoptera: Acridoidea). *Entomol. Sin.* 2(2): 104-109

---

\* Title could not be traced. Indirect reference

**Plate : 1**  
**Collection Sites**



**Kottekkad, Palakkad**



**Kottekkad, Palakkad**



**Shoranur, Palakkad**



**Calicut University Campus,  
Malappuram**



**Calicut University Campus,  
Malappuram**



Plate : 2

*Dnopherula (Aulacobothrus) taeniatus* (Bolivar)



Female: Dorsal view



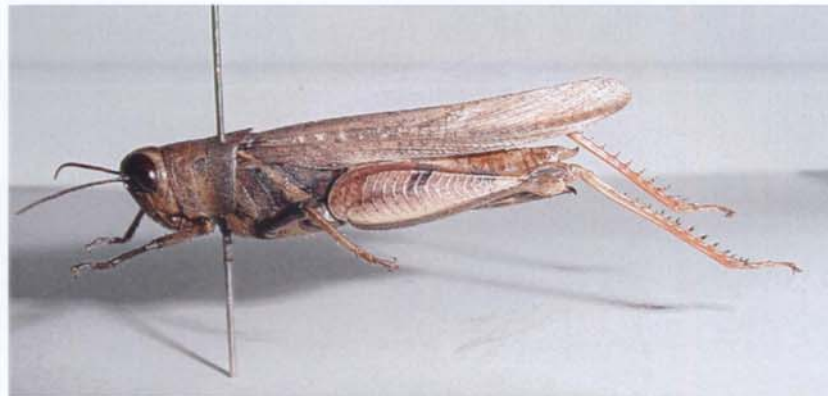
Female: Lateral view

Plate : 3

*Dnopherula (Aulacobothrus) luteipes* (Walker)



Female: Dorsal view



Female: Lateral view

## Plate : 4

*Dnopherula (Aulacobothrus) socius* (Bolivar)

Female: Dorsal view



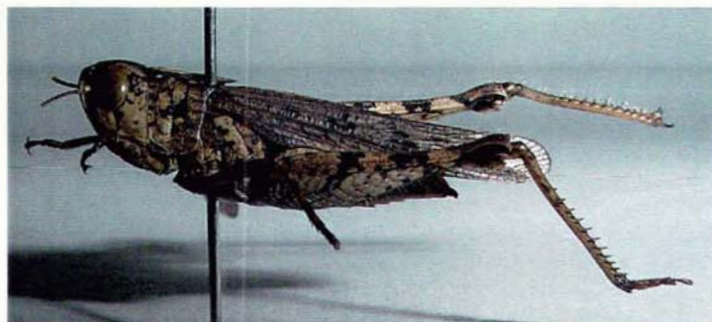
Female: Lateral view

**Plate : 5**

***Dnopherula (Aulacobothrus) svenhedini* (Sjostedt)**



**Female: Dorsal view**



**Female: lateral view**

## Plate : 6

*Dnopherula (Dnopherula) bolivari* (Uvarov)

Female: Dorsal view



Female; Lateral view

## Plate : 7

*Dnopherula (Dnopherula) decisus* (Walker)

Female: Dorsal view



Female: Lateral view

**Plate : 8*****Acrida exaltata* Walker****Female: Dorsal view****Male: Dorsal view****Male: Lateral view**

**Plate : 9**

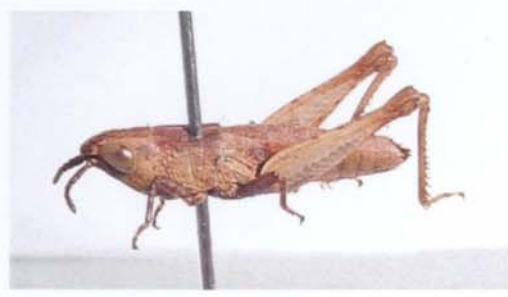
***Zygophlaeoba sinuatocollis* Bolivar**



**Female: Dorsal view**

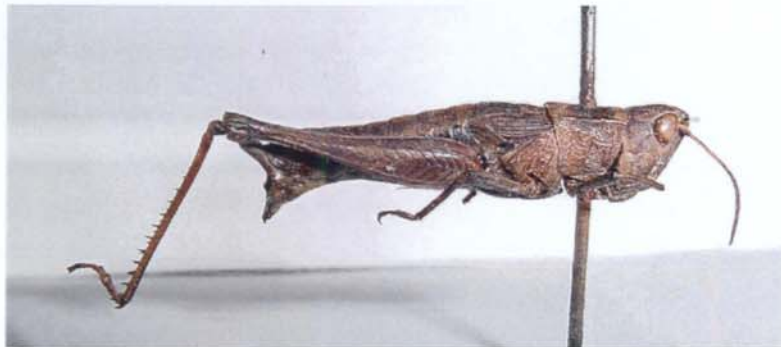


**Male: Dorsal view**



**Male: Lateral view**



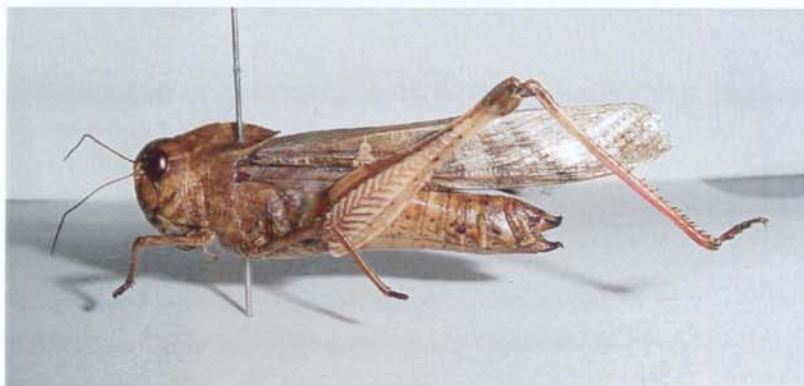
**Plate : 10*****Parabida indica* sp. nov.****Female: Dorsal view****Female : lateral view**

**Plate : 11**

***Gastrimargus marmoratus* (Thunberg)**



**Female: Dorsal view**



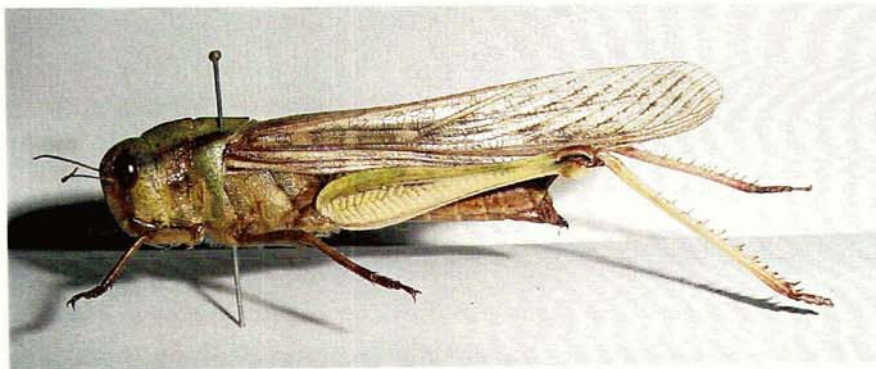
**Female: Lateral view**

Plate : 12

*Locusta migratoria migratoria* Linnaeus



Female: Dorsal view



Female: Lateral view

Plate : 13

*Oedaleus abruptus* (Thunberg)



Female: Dorsal view



Female: Lateral view

## Plate : 14

*Trilophidia annulata* (Thunberg)

Female: Dorsal view



Male: Dorsal view



Male: Lateral view

**Plate : 15**

***Dittopternis venusta* (Walker)**



**Female: Dorsal view**



**Male: Dorsal view**



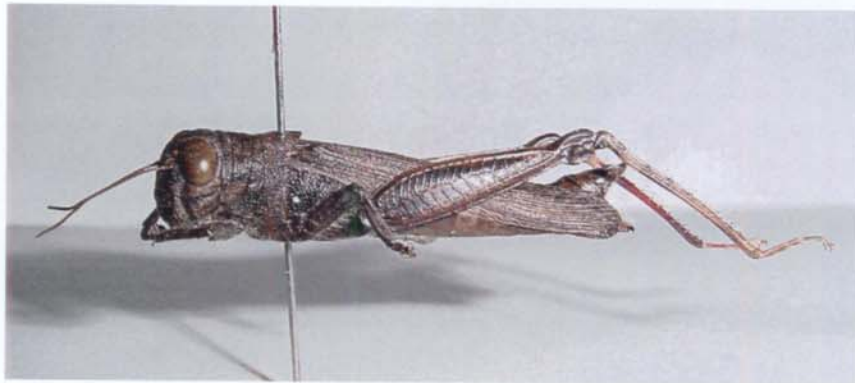
**Male: Lateral view**

Plate : 16

*Euthymia finoti* Kirby



Female: Dorsal view



Female: Lateral view

Plate : 17

*Spathosternum prasiniferum prasiniferum* Walker



Female: Dorsal view



Male: Dorsal view



Female: Lateral view



**Plate : 18**

***Hieroglyphus banian* (Thunberg)**



**Female: Dorsal view**



**Male: Dorsal view**



**Female: Lateral view**

Plate : 19

*Cercina obtusa* Stal



Female: Dorsal view



Male: Dorsal view



Male: Lateral view

Plate : 20

*Oxya hyla hyla* Serville



Female: Dorsal view



Female: Lateral view

Plate : 21

*Oxya japonica japonica* (Thunberg)



Female: Dorsal view



Female: Lateral view

Plate : 22

*Oxya nitidula* Walker



Female: Dorsal view



Male: Dorsal view



Male: Lateral view

**Plate : 23*****Oxya tridentata* (Willemsse)****Female: Dorsal view****Female: Lateral view**

## Plate : 24

*Anupama absona* sp.nov.

Female: Dorsal view



Male: Dorsal view



Male: Lateral view

Plate : 25

*Epistaurus sinetyi* Bolivar



Male: Dorsal view



Male: Lateral view



Plate : 26

*Coptacra ensifera* Bolivar



Female: Dorsal view



Male: Dorsal view



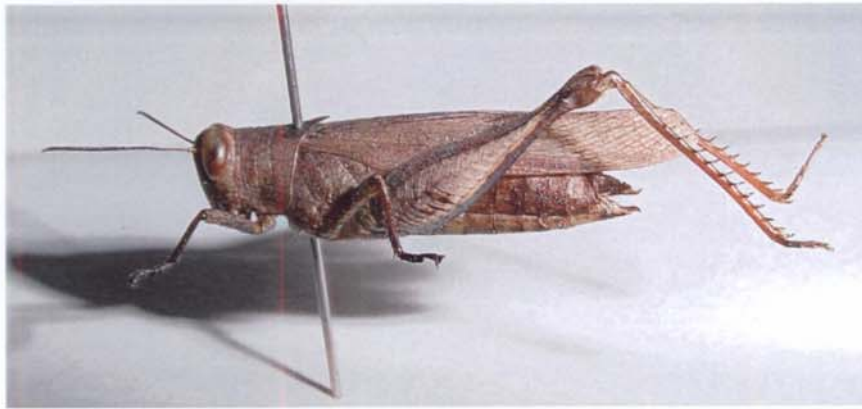
Male: Lateral view

Plate : 27

*Eucoptacra ceylonica* Kirby



Female: Dorsal view



Female: Lateral view

Plate : 28

*Oxyrrhepes meyeri* Willemse



Female : Dorsal View



Female : Lateral View

Plate : 29

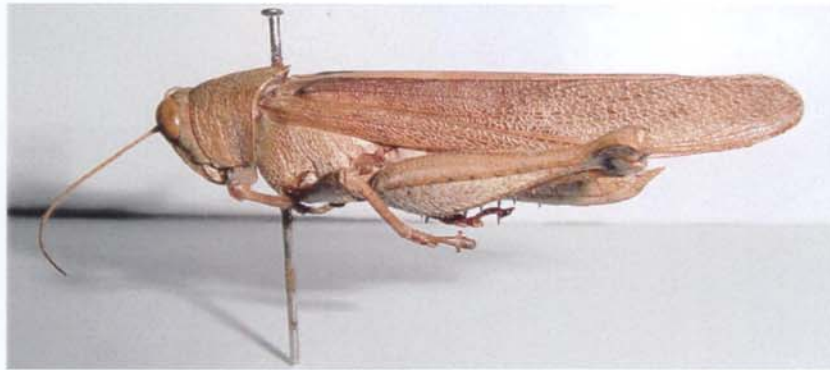
*Patanga succincta* (Johansson)



Female: Dorsal view



Male: Dorsal view



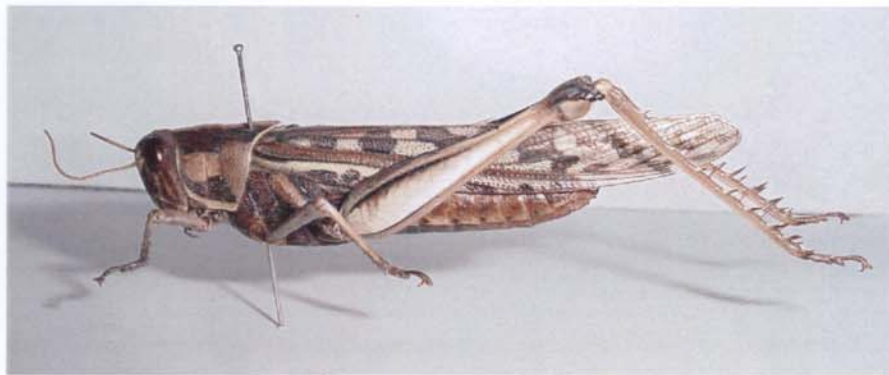
Male: Lateral view

Plate : 30

*Cyrtacanthacris tatarica* (Linnaeus)



Female: Dorsal view



Female: Lateral view

Plate : 31

*Tylotropidius varicornis* (Walker)



Female: Dorsal view



Male: Dorsal view



Male: Lateral view

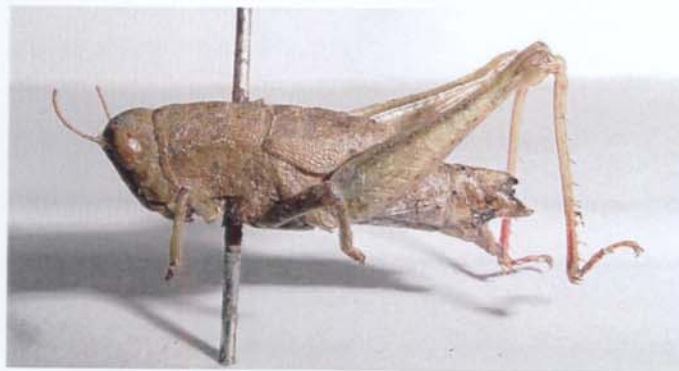
**Plate : 32*****Eyprepocnemis hithae* sp. nov.****Female: Dorsal view****Female: Lateral view**

Plate : 33

*Mesambria keralica* sp. nov.



Female: Dorsal view



Female: Lateral view



Plate : 34

*Paraconophyma scabra* (Walker)



Male: Dorsal view



Male: Lateral view

Plate : 35

*Catantops innotabilis* (Walker)



Female: Dorsal view



Male: Dorsal view



Male: Lateral view

## Plate : 36

*Stenocatantops splendens* (Thunberg)

Male: Dorsal view



Male: Lateral view

Plate : 37

*Chrotogonus trachypteros trachypteros* (Blanchard)



Female: Dorsal view



Female: Lateral view

**Plate : 38**

***Chrotogonus oxypteros* (Blanchard)**



**Female: Dorsal view**



**Female: Lateral view**

**Plate : 39**

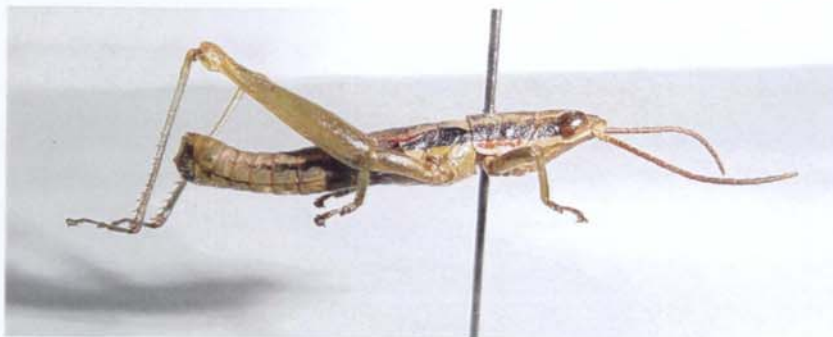
***Neorthacris acuticeps acuticeps* Bolivar**



Female: Dorsal view



Male: Dorsal view



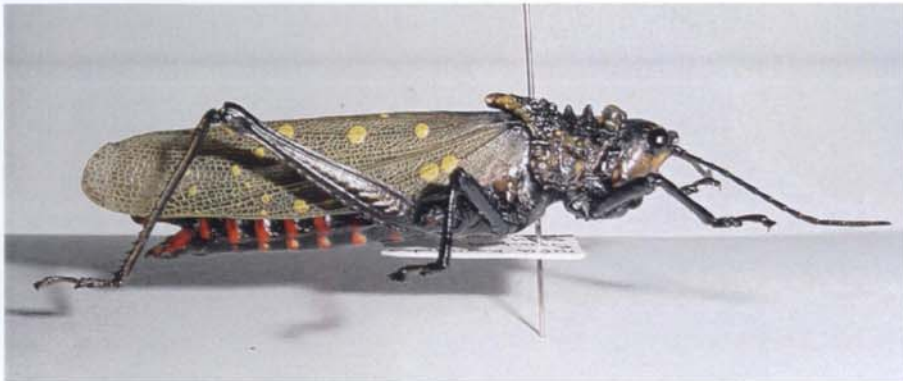
Male: Lateral view

Plate : 40

*Aurarches miliaris miliaris* Linnaeus



Female: Dorsal view



Female: Lateral view

203MM

41

Plate : 41

*Atractomorpha crenulata* Fabricius



Female:Dorsal view



Male: Dorsal view



Female: Lateral view



Plate : 42

*Poekilocerus pictus* (Fabricius)



Female: Dorsal view

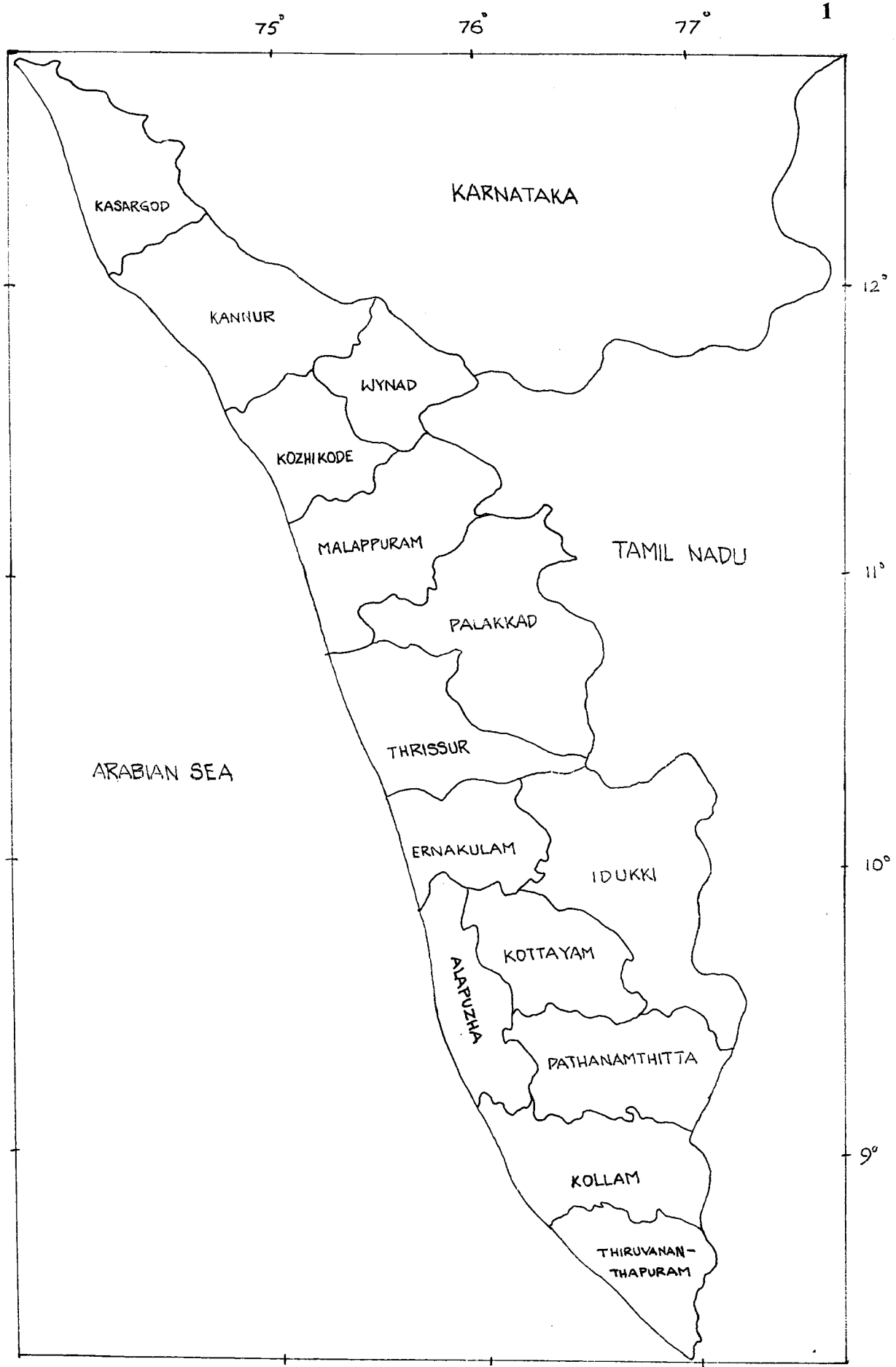


Male: Dorsal view



Male: Lateral view

**Fig. 1: Kerala.**



30

Fig. 2: Sweep net  
Fig. 3: Collection using specimen tube

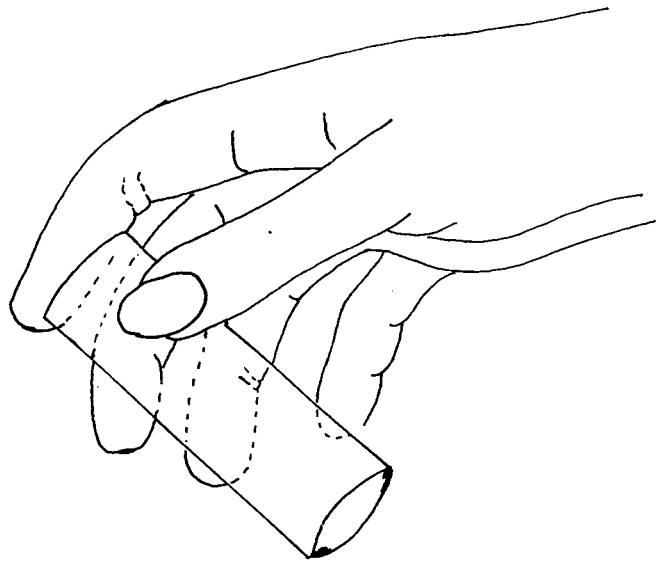
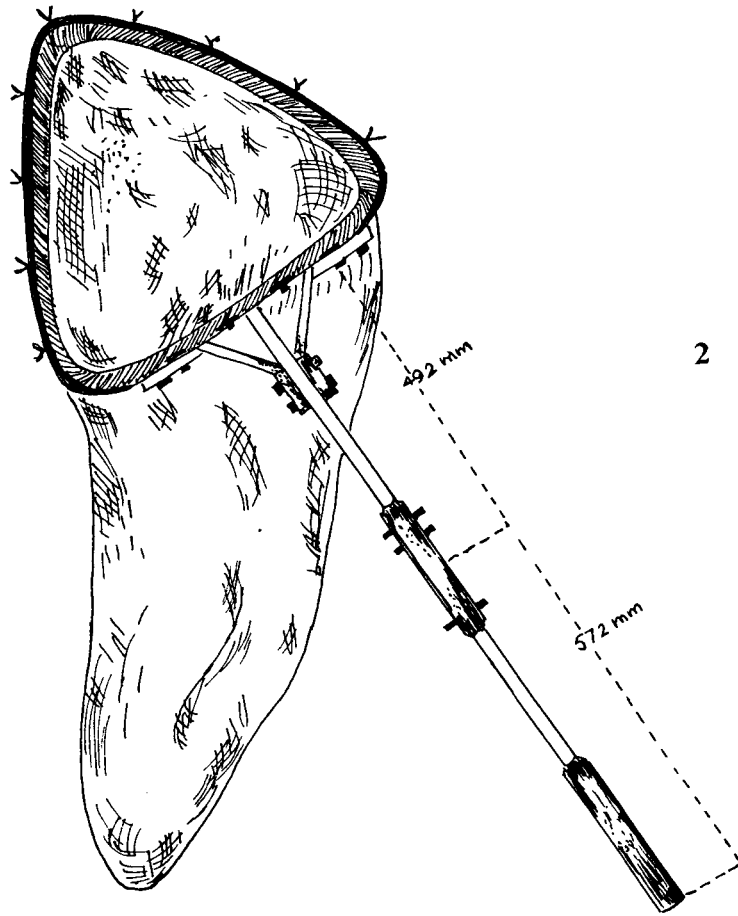
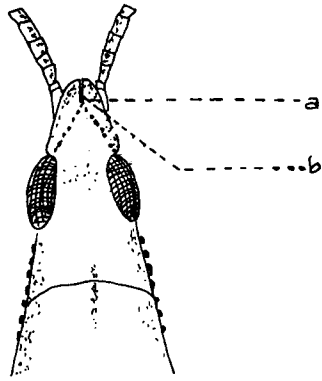
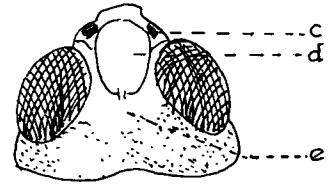


Fig. 4, 5: Head- Dorsal view  
Fig. 6: Face  
Fig. 7: Pronotum  
Fig. 8: Mesosternum and Metasternum

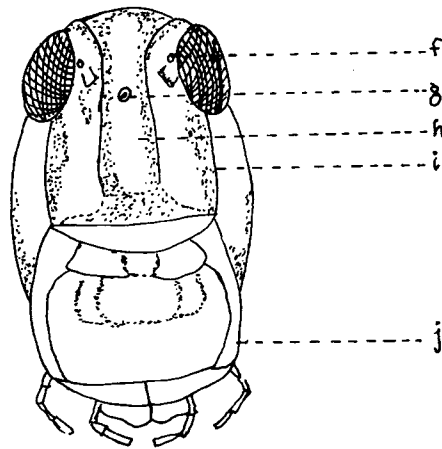
- a. Fastigial areolae
- b. Fastigial furrow
- c. Fastigial foveolae
- d. Fastigium of vertex
- e. Vertex
- f. Lateral ocellus
- g. Median ocellus
- h. Frontal ridge
- i. Lateral carina
- j. Gena
- k. Median carina of pronotum
- l. Lateral carina of pronotum
- m. Transverse sulcus
- n. Prozona
- o. Metazona
- p. Mesosternal lobe
- q. Mesosternal interspace
- r. Metasternal interspace
- s. Metasternal lobe



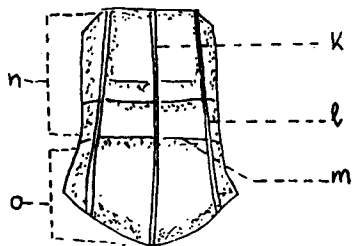
4



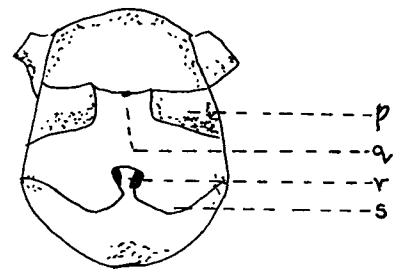
5



6



7

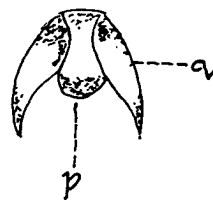
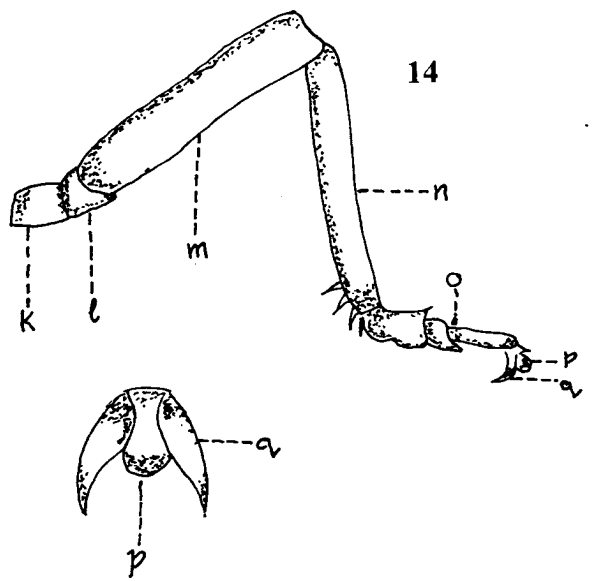
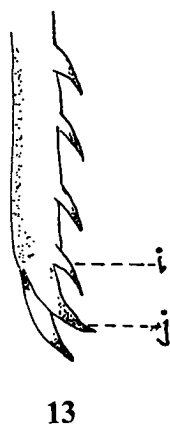
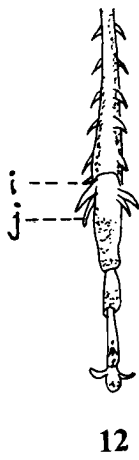
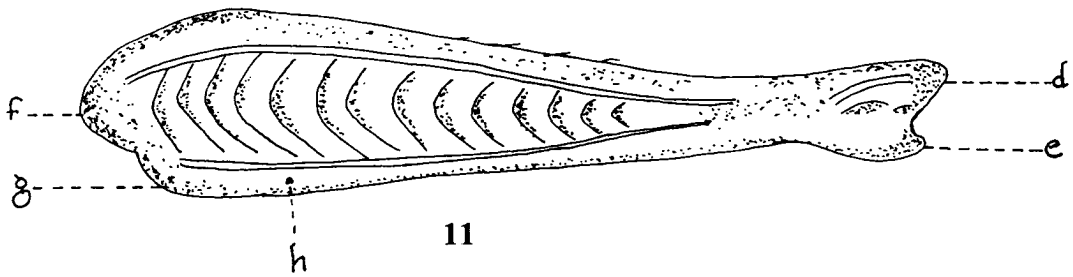
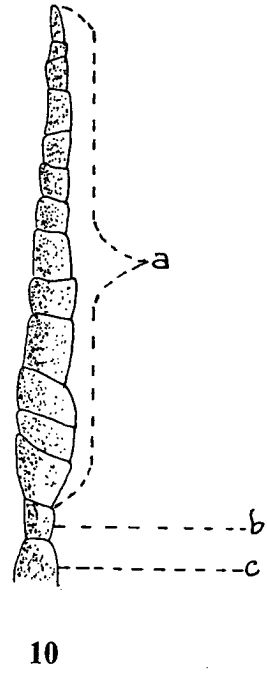
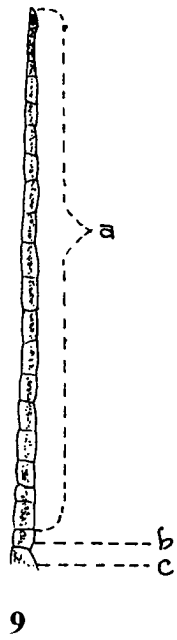


8

- Fig. 9: Filiform antenna
- Fig. 10: Ensiform antenna
- Fig. 11: Femora of hind leg
- Fig. 12: Hind tibia and tarsus
- Fig. 13: Apical part of hind tibia
- Fig. 14: Fore leg
- Fig. 15: Areolae and claws

- a. Flagellum
- b. Pedicel
- c. Scape
- d. Upper lobe of knee
- e. Lower lobe of knee
- f. Upper basal lobe
- g. Lower basal lobe
- h. Brunner's organ
- i. External apical spine
- j. Spur
- k. Coxa
- l. Trochanter
- m. Femur
- n. Tibia
- o. Tarsus
- p. Areolae
- q. Claws

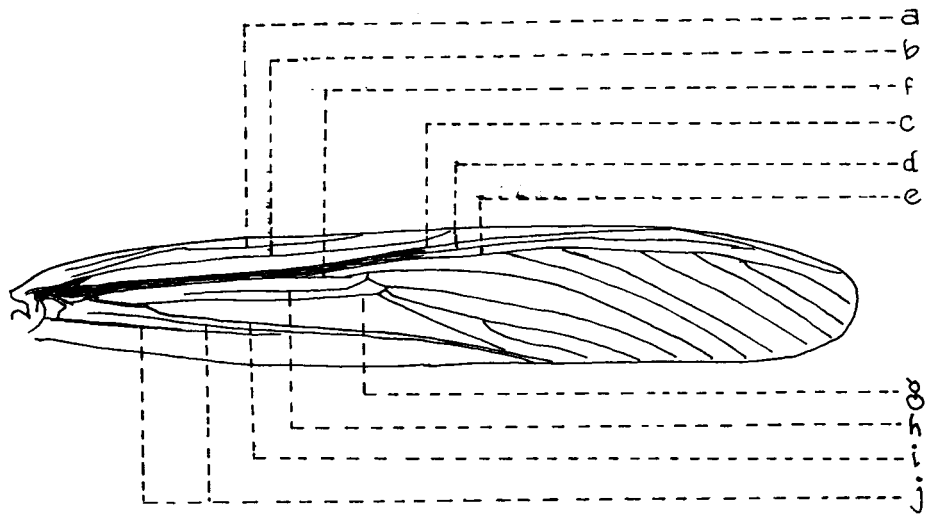




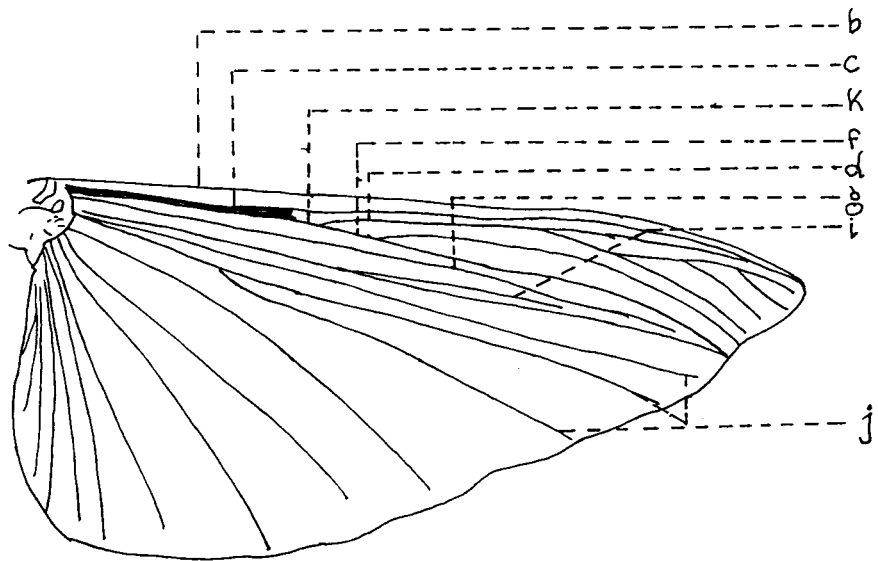
15

Fig. 16: Tegmina  
Fig. 17: Hind wing

- a. Precosta
- b. Costa
- c. Subcosta
- d. Radius
- e. Radial sector
- f. Media
- g. Cubitus
- h. Intercalary vein
- i. Postcubitus
- j. Vannal
- k. Radius+Media



16



17

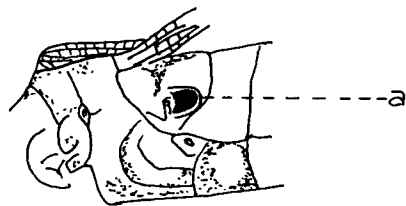
Fig. 18: Anterior part of abdomen (Lateral view)

Fig. 19: Terminalia (Dorsal view)

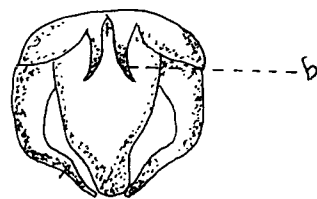
Fig. 20: Terminalia- Male (Lateral view)

Fig. 21: Terminalia- Female (Lateral view)

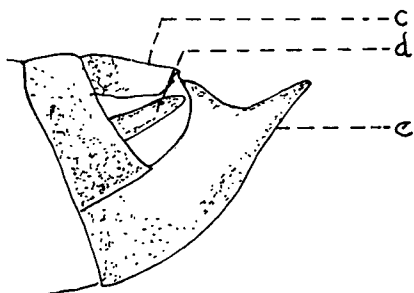
- a. Tympanum
- b. Furcula
- c. Supra-anal lamina
- d. Cerci
- e. Subgenital plate
- f. Upper valve of ovipositor
- g. Lower valve of ovipositor
- h. Paraproct



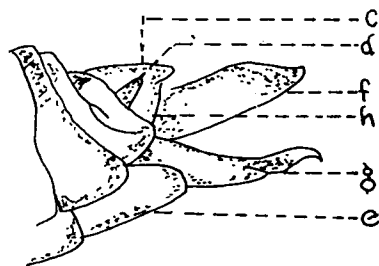
18



19

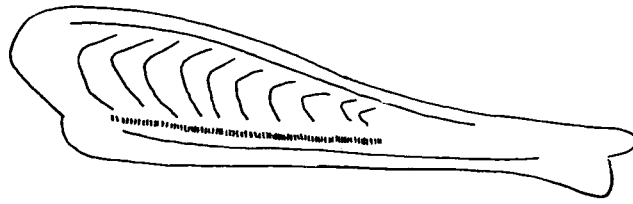


20

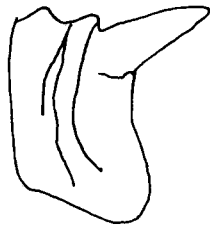


21

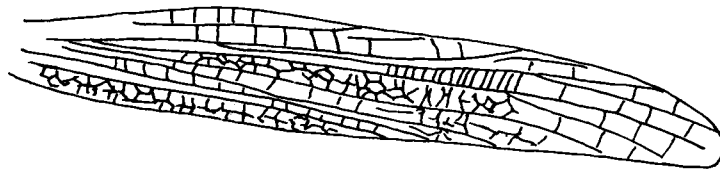
- Fig. 22: Hind femur- stridulatory file on inner surface  
Fig. 23: Pronotum-lateral view  
Fig. 24: Forewing- stridulatory veinlets  
Fig. 25: Subgenital plate-trilobed



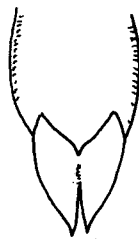
22



23



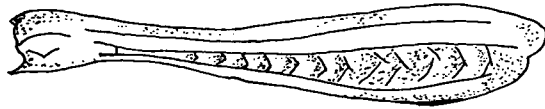
24



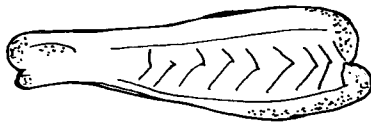
25

- Fig. 26: Hind femur- lower lobe of hind knee spine like  
Fig. 27: Hind femur- lower basal lobe longer than upper lobe  
Fig. 28: Head- conically ascending  
Fig. 29: Abdominal terminalia  
a: Node like furcula

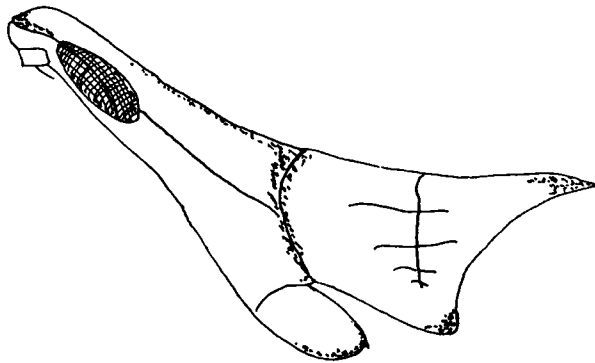




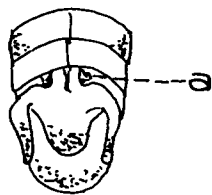
26



27



28



29

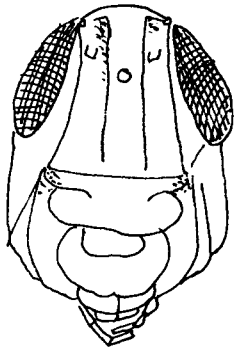
Fig. 30-33: *Dnopherula (Aulacobothrus) taeniatus* (Bolivar)  
Fig. 34-37: *Dnopherula (Aulacobothrus) luteipes* (Walker)  
Fig. 38-41: *Dnopherula (Aulacobothrus) socius* (Bolivar)

Fig. 30, 34, 38: Face

Fig. 31, 35, 39: Mesosternum and Metasternum

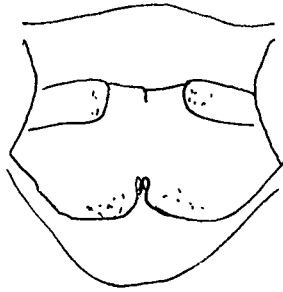
Fig. 32, 36, 40: Female abdominal terminalia (lateral view)

Fig. 33, 37, 41: Female abdominal terminalia (ventral view)



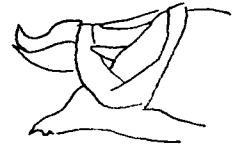
30

1mm



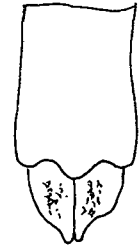
31

1mm



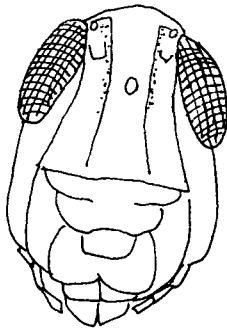
1mm

32



1mm

33



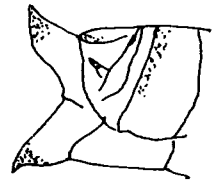
34

1mm



35

1mm



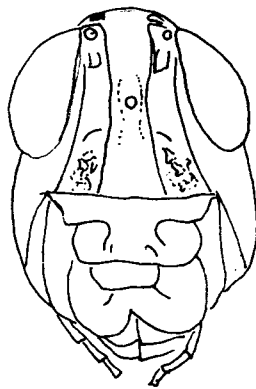
1mm

36



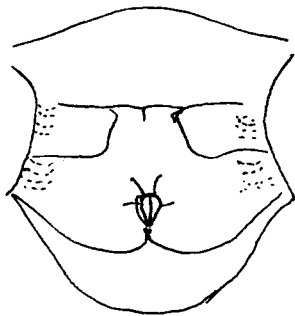
1mm

37

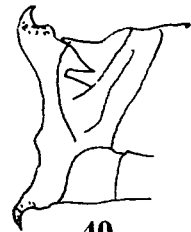


38

1mm

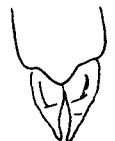


39



1mm

40



1mm

41

Fig. 42-45: *Dnopherula (Aulachobothrus) svenhedini* (Sjostedt)

Fig. 46-49: *Dnopherula (Dnopherula) bolivari* (Uvarov)

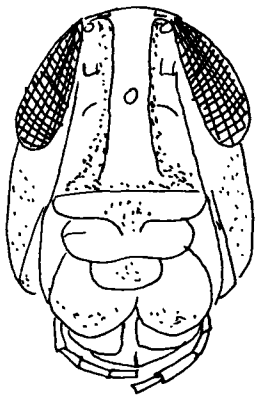
Fig. 50-51: *Dnopherula (Dnopherula) deciskus* (Walker)

Fig. 42, 49, 50: Face

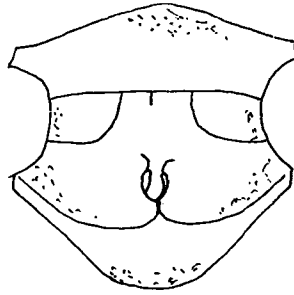
Fig. 43, 48, 51: Mesosternum and Metasternum

Fig. 45, 46: Female abdominal terminalia (lateral view)

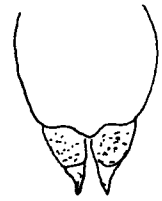
Fig. 44, 47: Female abdominal terminalia (ventral view)



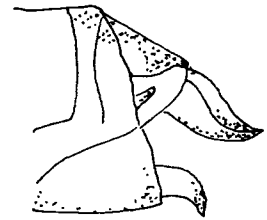
42



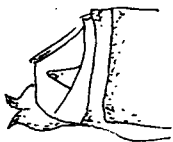
43



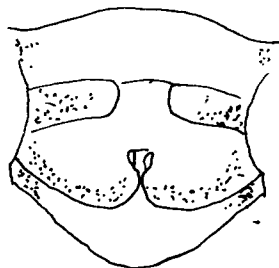
44



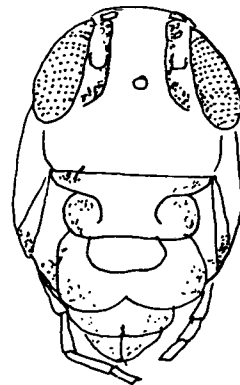
45



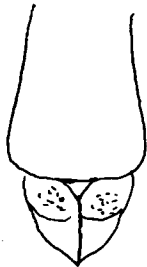
46



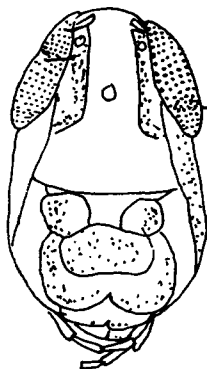
48



49



47



50



51

1mm.

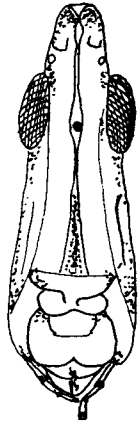
Fig. 52-55: *Acrida exaltata* Walker

Fig. 52: Face

Fig. 53: Mesosternum and Metasternum

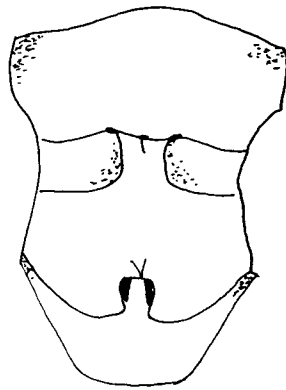
Fig. 54: Female abdominal terminalia (lateral view)

Fig. 55: Male abdominal terminalia (lateral view)



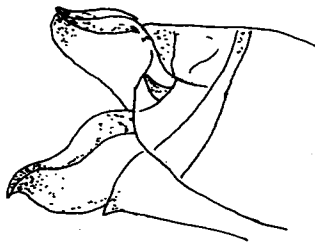
1mm

52



1mm

53



1mm

54



1mm

55

Fig. 56-58: *Parabida indica* sp.nov

Fig. 59-62: *Zygophlaeoba sinuatocollis* Bolivar

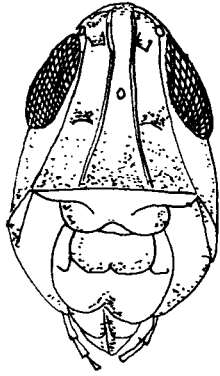
Fig. 56, 59: Face

Fig. 57, 60: Mesosternum and Metasternum

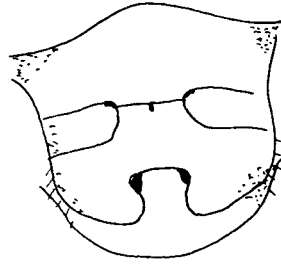
Fig. 58, 62: Female abdominal terminalia (lateral view)

Fig. 61: Male abdominal terminalia (lateral view)

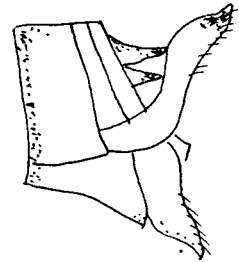




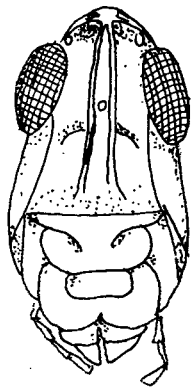
56



57



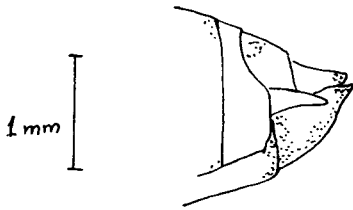
58



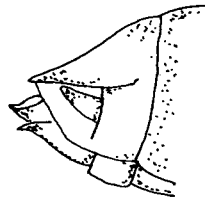
59



60



61



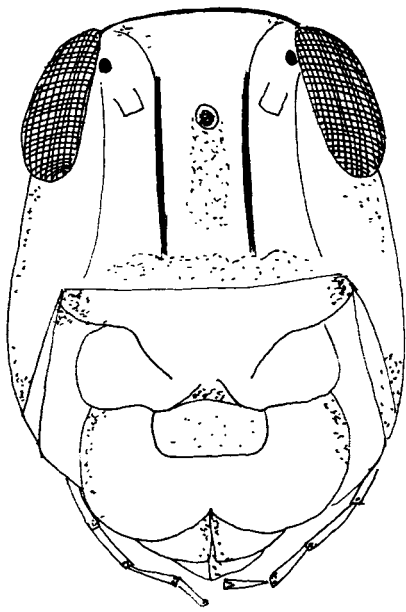
62

Fig. 63-65: *Locusta migratoria migratoria* Linnaeus

Fig. 63: Face

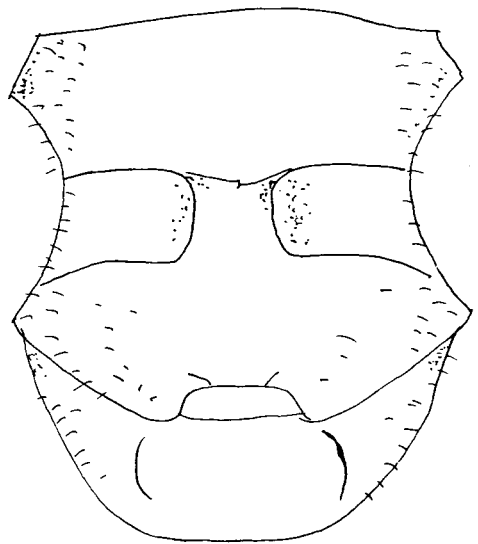
Fig. 64: Mesosternum and Metasternum

Fig. 65 Female abdominal terminalia (lateral view)



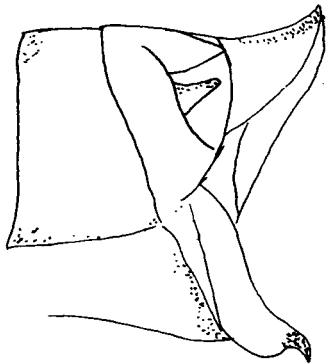
63

1mm



1mm

64



65

1mm

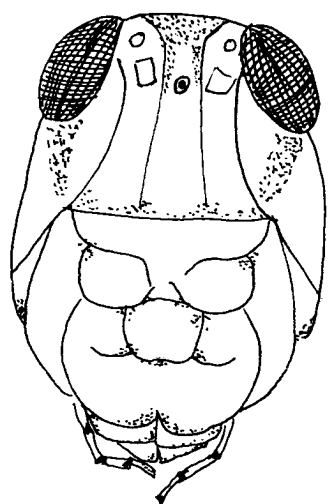
Fig. 66-68: *Gastrimargus marmoratus* (Thunberg)

Fig. 69-71: *Oedaleus abruptus* (Thunberg)

Fig. 66, 69: Face

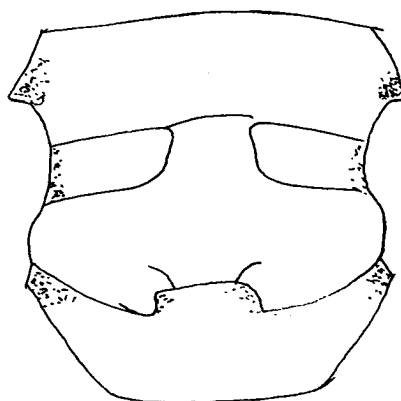
Fig. 67, 70: Mesosternum and Metasternum

Fig. 68, 71: Female abdominal terminalia (lateral view)



66

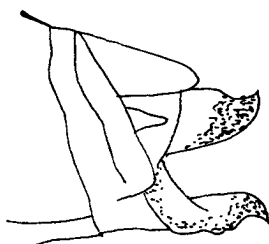
1mm



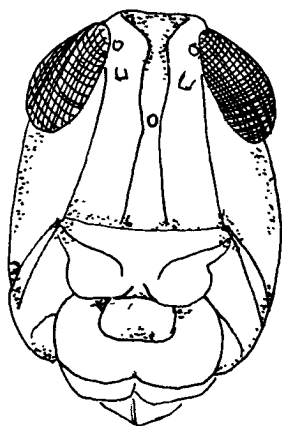
67

1mm

1mm

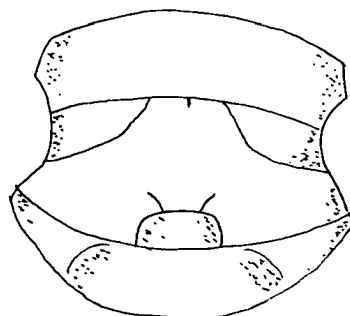


68



69

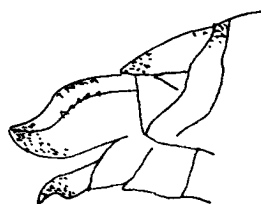
1mm



70

1mm

1mm



71

Fig. 72-75: *Trilophidia annulata* (Thunberg)

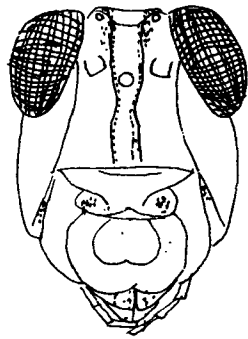
Fig. 76-79: *Dittopternis venusta* (Walker)

Fig. 72, 76: Face

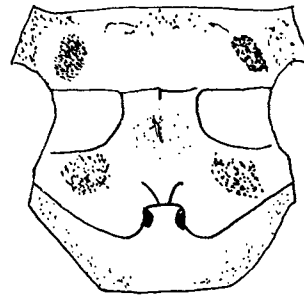
Fig. 73, 77: Mesosternum and Metasternum

Fig. 74, 78: Female abdominal terminalia (lateral view)

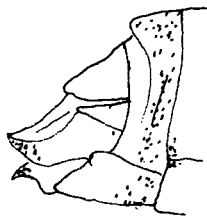
Fig. 75,79: Male abdominal terminalia (lateral view)



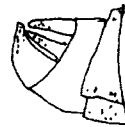
72



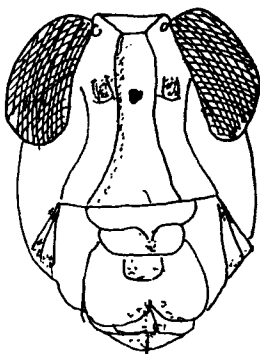
73



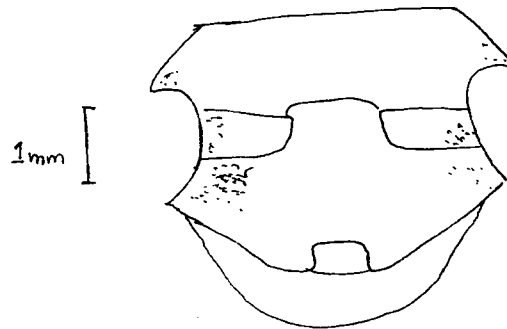
74



75



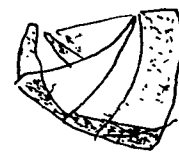
76



77



78



79

Fig. 80-85: *Hieroglyphus banian* ( Fabricius)

Fig. 80: Face

Fig. 81: Mesosternum and Metasternum

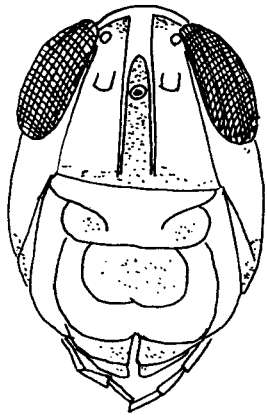
Fig. 82: Male abdominal terminalia (Dorsal view)

Fig. 83: Male abdominal terminalia (lateral view)

Fig. 84: Female abdominal terminalia (ventral view)

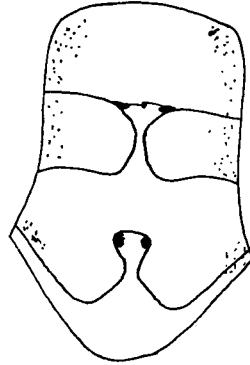
Fig. 85: Female abdominal terminalia (lateral view)





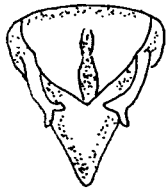
I 1mm

80



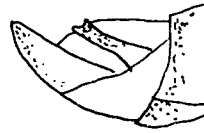
I 1mm

81



I 1mm

82



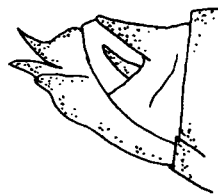
I 1mm

83



I 1mm

84



I 1mm

85

Fig. 86- 88: *Euthymia finoti* Kirby

Fig. 89-92: *Spathosternum prasiniferum prasiniferum* Walker

Fig. 86, 89: Face

Fig. 87, 90: Mesosternum and Metasternum

Fig. 88, 91: Female abdominal terminalia (lateral view)

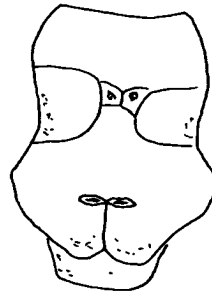
Fig. 92: Male abdominal terminalia (lateral view)



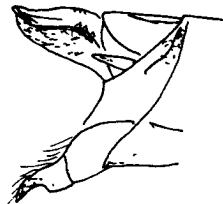
86

1mm

1mm

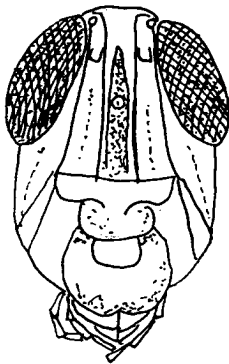


87



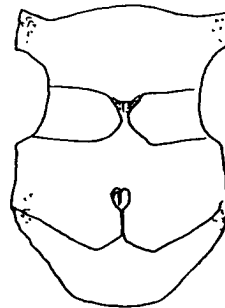
88

1mm



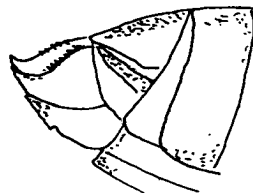
89

1mm



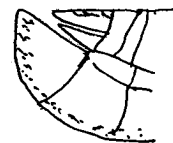
90

1mm



91

1mm



92

1mm

Fig. 93-97: *Cercina obtusa* Stal

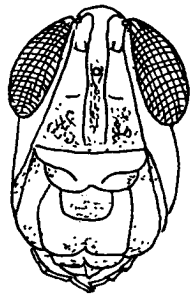
Fig. 93: Face

Fig. 94: Mesosternum and Metasternum

Fig. 95: Female abdominal terminalia (lateral view)

Fig. 96: Male abdominal terminalia (lateral view)

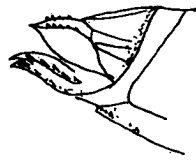
Fig. 97: Male abdominal terminalia (Dorsal view)



93



94



95



96



97

Fig. 98-102: *Oxya nitidula* Walker

Fig. 103, 104: *Oxya japonica japonica* (Thunberg)

Fig. 105, 106: *Oxya hyla hyla* Serville

Fig. 107, 108: *Oxya tridentata* (Willemse)

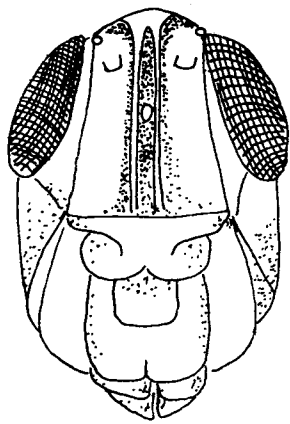
Fig. 98: Face

Fig. 99: Mesosternum and Metasternum

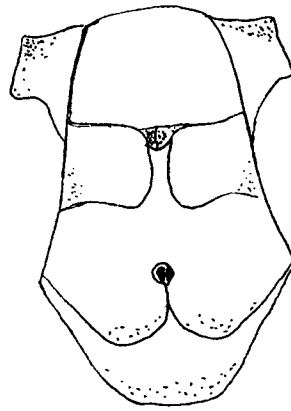
Fig. 100: Male abdominal terminalia (lateral view)

Fig. 101, 103, 105, 107: Female abdominal terminalia (ventral view)

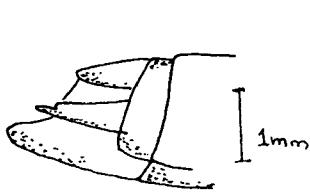
Fig. 102, 104, 106, 108: Female abdominal terminalia (lateral view)



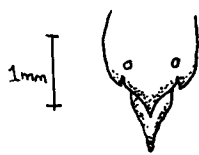
98



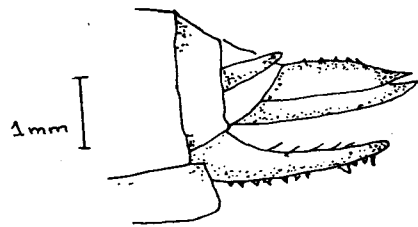
99



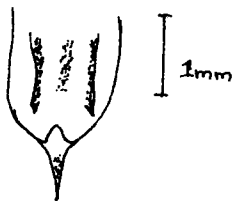
100



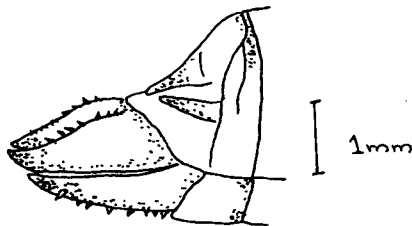
101



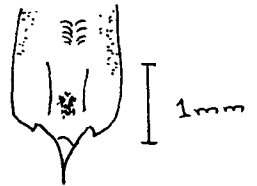
102



103



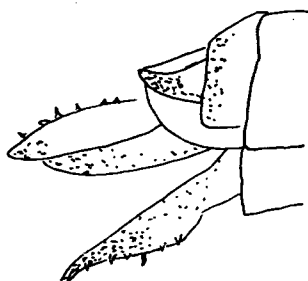
104



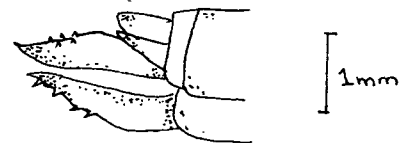
105



107



108



106

Fig. 109-112: *Anupama absona* sp.nov

Fig. 109: Face

Fig. 110: Mesosternum and Metasternum

Fig. 111: Female abdominal terminalia (lateral view)

Fig. 112: Female abdominal terminalia (ventral view)

Fig. 113: Male abdominal terminalia (lateral view)



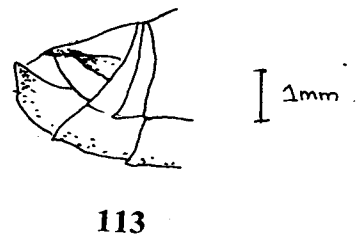
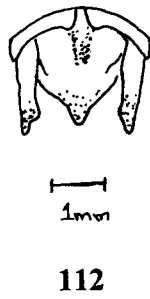
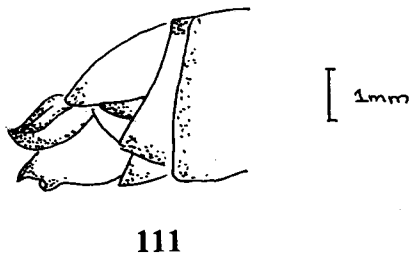
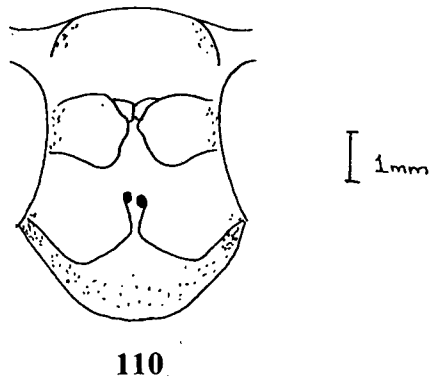
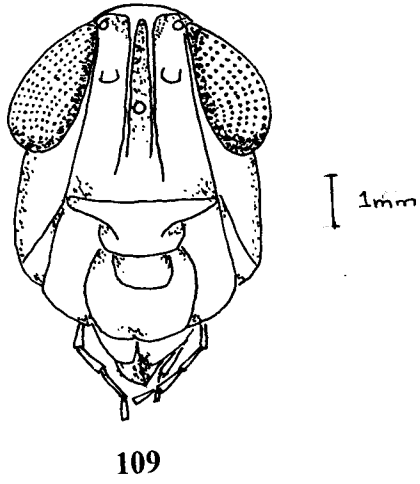


Fig. 114-116: *Eucoptra ceylonica* Kirby

Fig. 117-120: *Epistaurus sinetyi* Bolivar

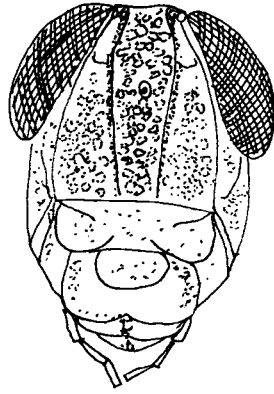
Fig. 114, 117: Face

Fig. 115, 118 Mesosternum and Metasternum

Fig. 116: Female abdominal terminalia (lateral view)

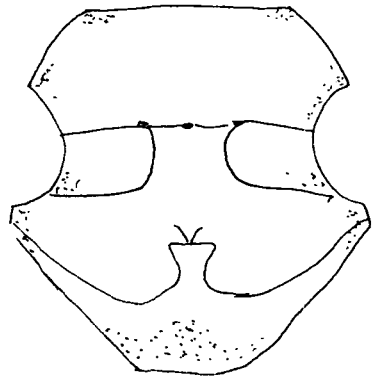
Fig. 119: Male abdominal terminalia (dorsal view)

Fig. 120: Male abdominal terminalia (lateral view)



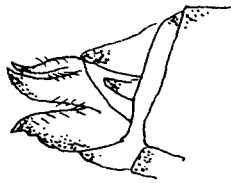
114

1mm



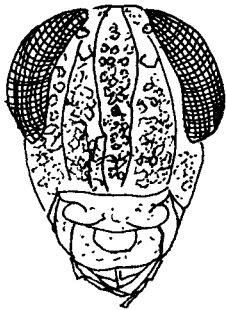
115

1mm



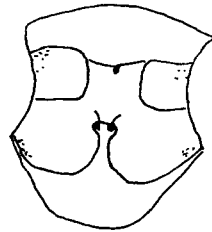
116

1mm



117

1mm



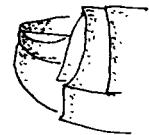
118

1mm



119

1mm



120

1mm

Fig.121-126: *Coptacra ensifera* Bolivar

Fig. 121: Face

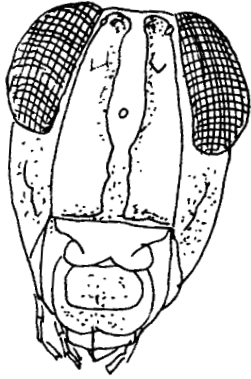
Fig. 122: Mesosternum and Metasternum

Fig. 123: Male abdominal terminalia (dorsal view)

Fig. 124: Male abdominal terminalia (lateral view)

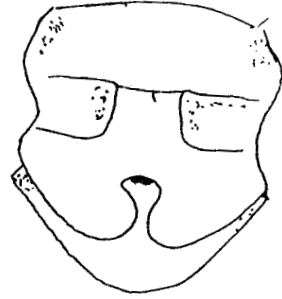
Fig. 125: Female abdominal terminalia (ventral view)

Fig. 126: Female abdominal terminalia (lateral view)



121

1mm



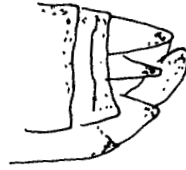
1mm

122



1mm

123



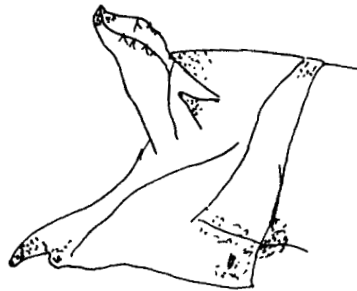
1mm

124



1mm

125



1mm

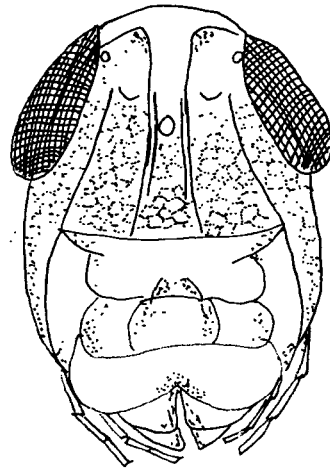
126

**Fig. 127-129: *Oxyrrhepes meyeri* Willemsse**

**Fig. 127: Face**

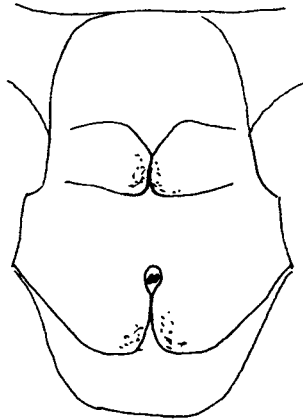
**Fig. 128: Mesosternum and Metasternum**

**Fig. 129: Female abdominal terminalia (lateral view)**



1mm

127



1mm

128



1mm

129

Fig. 130-133: *Patanga succincta* ( Johansson)

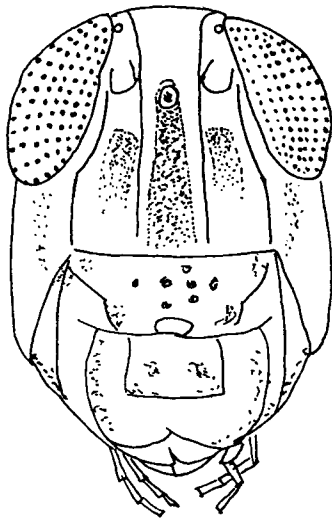
Fig. 130: Face

Fig. 131: Mesosternum and Metasternum

Fig. 132: Female abdominal terminalia (lateral view)

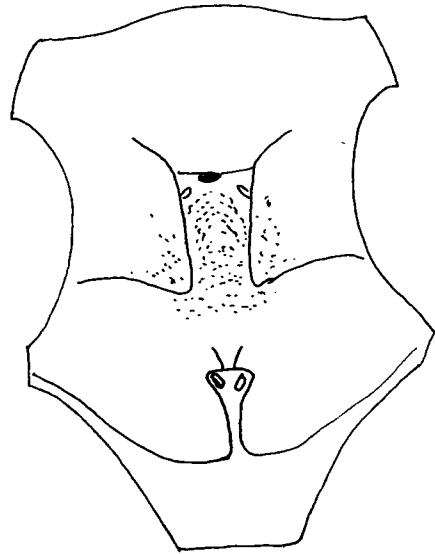
Fig. 133: Male abdominal terminalia (lateral view)





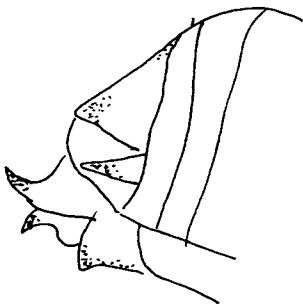
130

1mm



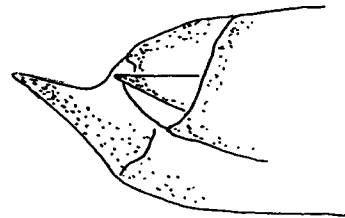
131

1mm



132

1mm



133

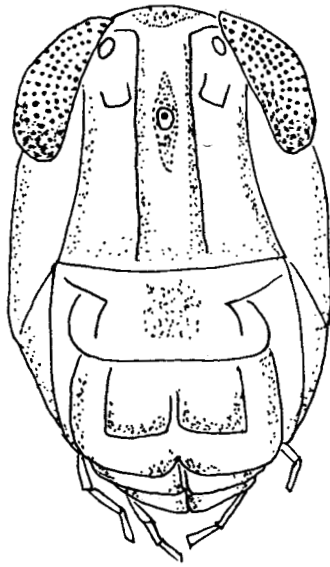
1mm

Fig.134-136: *Crytanthacris tatarica* ( Linnaeus )

Fig.134: Face

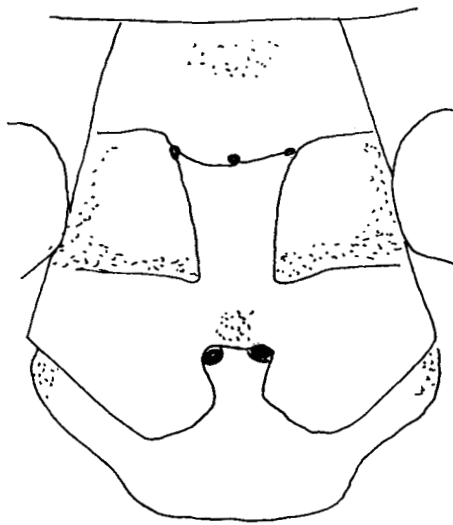
Fig.135: Mesosternum and Metasternum

Fig.136: Female abdominal terminalia (lateral view)



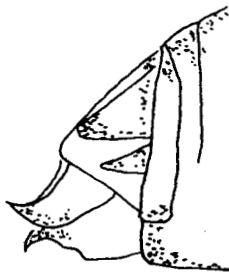
I 1mm

134



I 1mm

135



I 1mm

136

Fig. 137-141: *Tylotropidius varicornis* (Walker)

Fig. 142-144: *Eyprepocnemis hithae* sp.nov

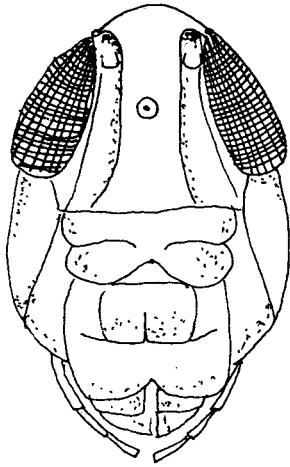
Fig. 137, 142: Face

Fig. 138, 143: Mesosternum and Metasternum

Fig. 141,144: Female abdominal terminalia (lateral view)

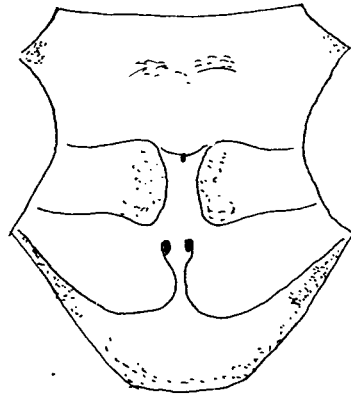
Fig. 139: Male abdominal terminalia (dorsal view)

Fig. 140: Male abdominal terminalia (lateral view)



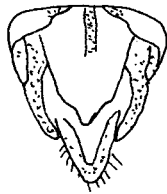
137

1mm



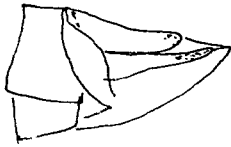
1mm

138



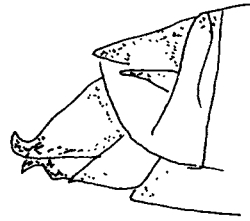
1mm

139



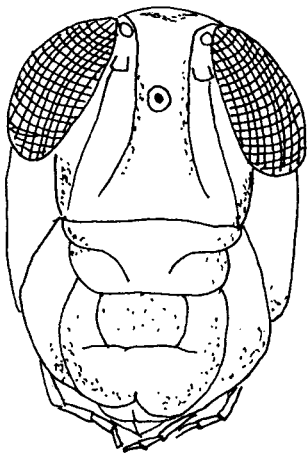
1mm

140



1mm

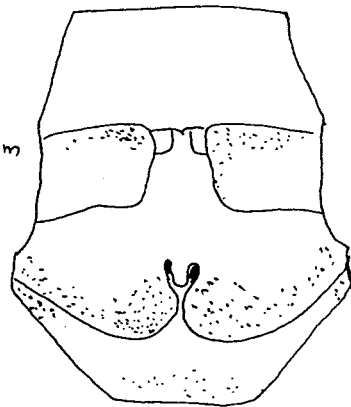
141



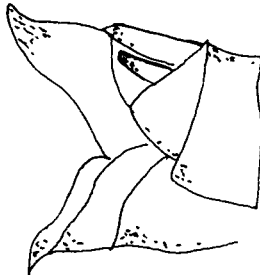
142

1mm

1mm



143



1mm

144

Fig. 145-148: *Catantops innotabilis* (Walker)

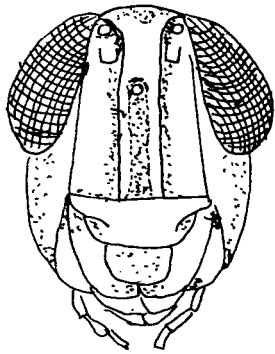
Fig. 149-151: *Paraconophyma scabra* (Walker)

Fig. 145, 149: Face

Fig. 146, 150: Mesosternum and Metasternum

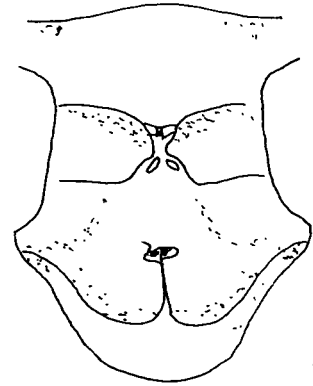
Fig. 148, 151: Male abdominal terminalia (lateral view)

Fig. 147: Female abdominal terminalia (lateral view)



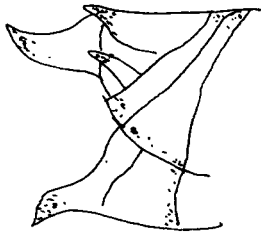
145

1mm



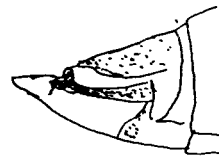
146

1mm



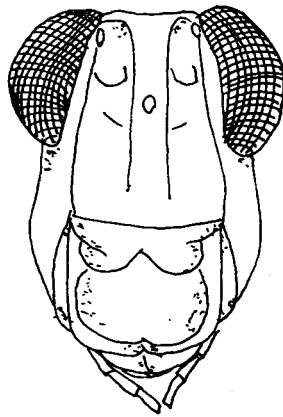
147

1mm



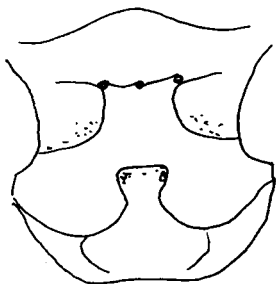
148

1mm



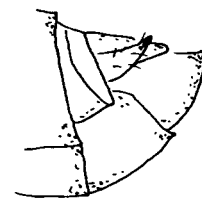
149

1mm



150

1mm



151

1mm

Fig. 152-154: *Mesambria keralica* sp.nov

Fig. 155-157: *Stenocatantops splendens* (Thunberg)

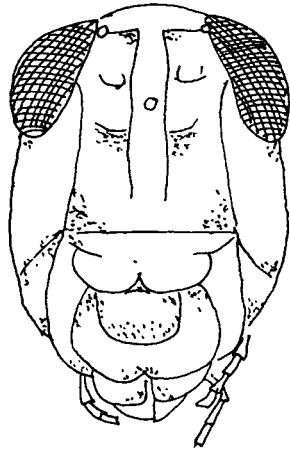
Fig. 152,155: Face

Fig.153,156: Mesosternum and Metasternum

Fig. 154: Female abdominal terminalia (lateral view)

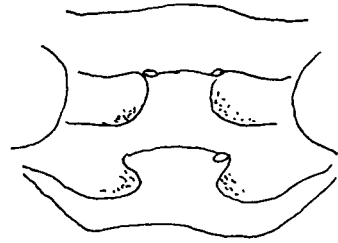
Fig. 157: Male abdominal terminalia (lateral view)





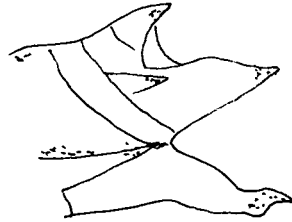
152

[ 1mm



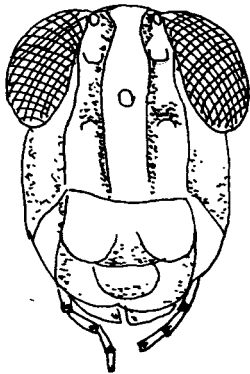
[ 1mm

153



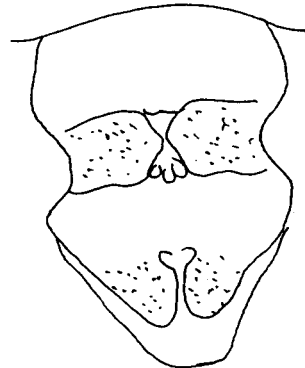
[ 1mm

154



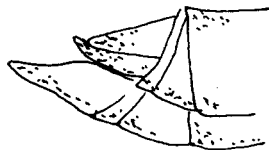
155

[ 1mm



1mm [

156



[ 1mm.

157

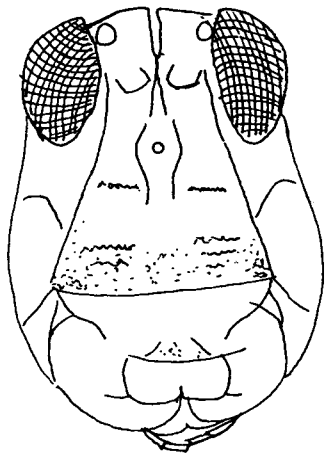
Fig. 158-160: *Chrotogonus trachypteros trachypteros* (Blanchard)

Fig. 161-163: *Chrotogonus oxypteros* (Blanchard)

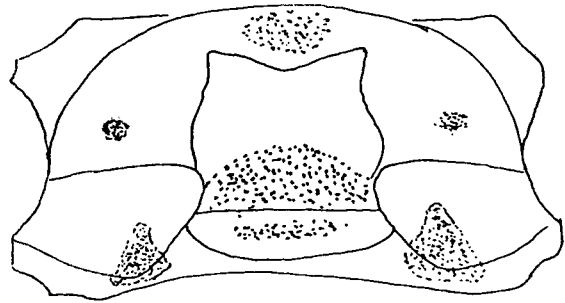
Fig. 158, 161: Face

Fig. 159, 162: Mesosternum and Metasternum

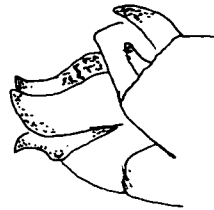
Fig. 160, 163: Female abdominal terminalia (lateral view)



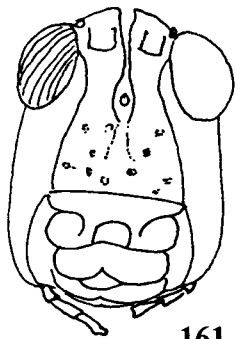
158



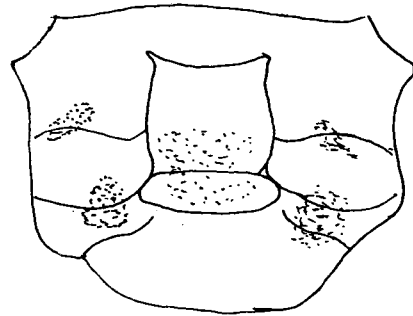
159



160



161



162



163

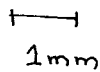


Fig. 164-168: *Neorthacris acuticeps acuticeps* Bolivar

Fig. 169-172: *Atractomorpha crenulata* Fabricius

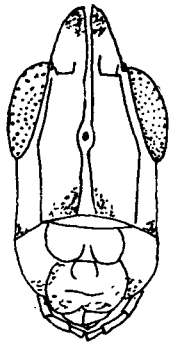
Fig. 164, 169: Face

Fig. 165, 170: Mesosternum and Metasternum

Fig. 166, 171: Male abdominal terminalia (lateral view)

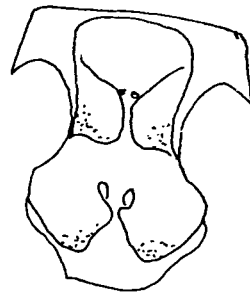
Fig. 168, 172: Female abdominal terminalia (lateral view)

Fig. 167: Male abdominal terminalia (dorsal view)



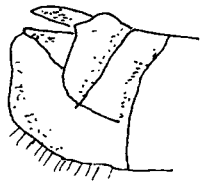
164

1mm



165

1mm



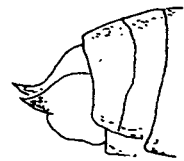
166

1mm



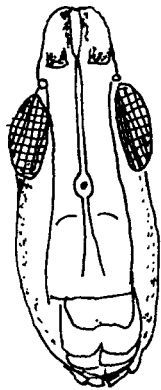
167

1mm



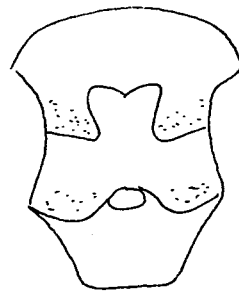
168

1mm



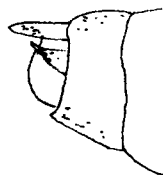
169

1mm



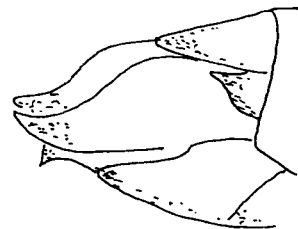
170

1mm



171

1mm



172

1mm

Fig. 173-175: *Aularches miliaris miliaris* Linnaeus

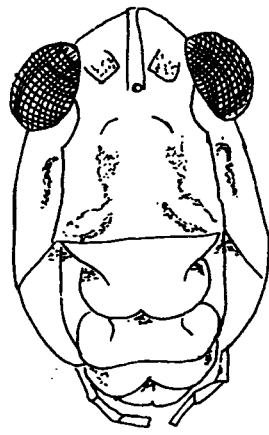
Fig. 176-179: *Poecilocerus pictus* ( Fabricius )

Fig. 173,176 Face

Fig. 175,177: Mesosternum and Metasternum

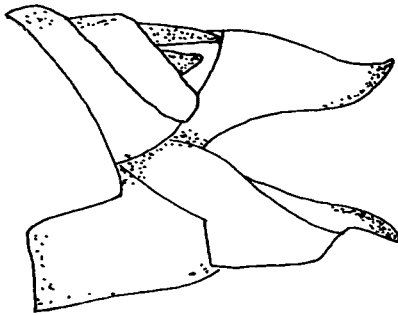
Fig. 174,179: Female abdominal terminalia (lateral view)

Fig. 178: Male abdominal terminalia (lateral view)



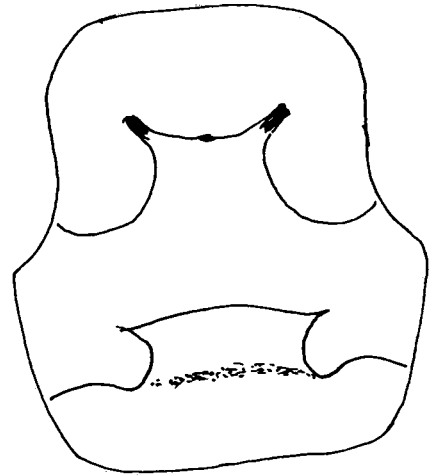
173

1mm



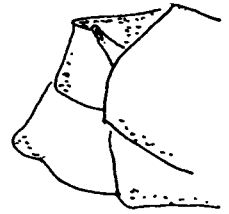
1mm

174



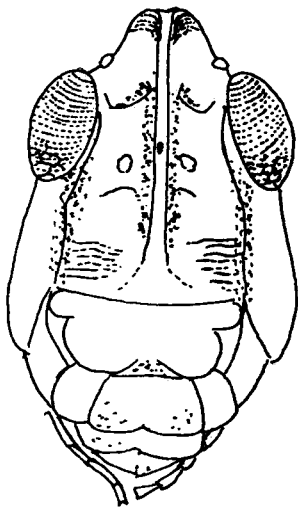
1mm

175

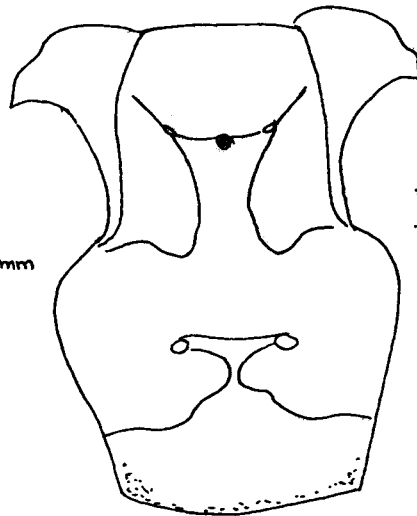


1mm

178



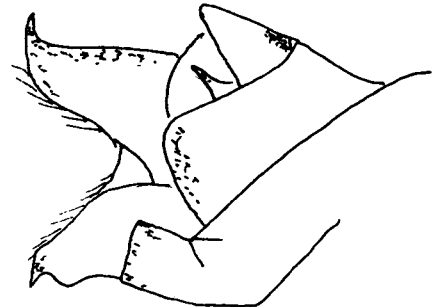
176



1mm

177

1mm



179

1mm



## A key and a checklist of the genera of short-horned grasshoppers (Orthoptera: Acridoidea) of Kerala

A. Vidhu Priya\* and T. C. Narendran

*Systematic Entomology Laboratory, Department of Zoology, University of Calicut, Kerala, India*

**ABSTRACT:** A dichotomous key for the easy identification of the genera of short horned grasshoppers of Kerala is provided. A checklist of the genera of Acridoidea is also given. © 2003 Association for Advancement of Entomology

**KEYWORDS:** Acridoidea, generic key, checklist-Kerala

### INTRODUCTION

Short-horned grasshoppers form a major pest of crops. Taxonomic studies of short horned grasshoppers hence become relevant in the control of these pests.

Ander (1939); Chopard (1949); Bay Bienko and Mistshenko (1951) and Uvarov (1966) included the short-horned grasshoppers under the superfamily Acridoidea of the suborder Caelifera. Dirsh (1961) considered Acridoidea as Suborder.

In the Fauna of British India Kirby (1914) has reported 91 genera under Acridoidea. In the present paper twenty-eight genera are reported from Kerala. A dichotomous key for the easy identification of these genera is provided in this paper along with a checklist of the genera of Acridoidea of Kerala.

### Key to the genera of Acridoidea of Kerala

1. Face mostly flattened, cubital vein of tegmina (Fig. 1) and medial vein of hind wing unbranched. (Fig. 2). Antenna shorter than front femur; basal segment of hind tarsus with serrated margins (Fig. 5) or with teeth or atleast with a basal external tubercle . . . . . **Eumasticidae . . . . . 2**
- Face not flattened, cubital vein of tegmina (Fig. 3) and medial vein of hind wing usually branched, (Fig. 4) antenna longer than front femur, basal segment of hind tarsus never serrated, never with tooth or tubercle . . . . . **3**

\*Corresponding author



- 2(1) Pronotum tectiform (= roof-like) and foliaceous; hind femora dilated and compressed ..... *Phyllochoreia* Westwood
- Pronotum not as above and hind femora not dilated ..... *Erianthus* Stal
- 3(1) Fastigial furrow (Fig. 6) present; apical areolae (Fig. 6) generally present; lower basal lobe of hind femur longer than upper lobe ..... **Pyrgomorphidae** ..... 4
- Fastigial furrow absent; apical areolae absent, lower basal lobe of hind femur shorter than or as long as upper lobe ..... **Acrididae** ..... 9
- 4(3) Tegmina and wings absent ..... 5
- Tegmina and wings present ..... 6
- 5(4) Fastigium horizontally elongated; antenna filiform; Pronotum without carina ..... *Orthacris* Bolivar
- Fastigium longitudinally elongated; antenna basally ensiform; Pronotum with weak carina ..... *Neorthacris* Kevan and Singh
- 6(4) Anterior margin of pronotum forming wide collar, covering posterior and lower part of mouth; tympanum absent ..... *Chrotogonus* Serville
- Anterior margin of pronotum not covering posterior and lower part of mouth; tympanum present ..... 7
- 7(6) Body slender; antennal bases located in front of lateral ocelli ..... *Atractomorpha* Saussure
- Body robust; antennal bases located between or behind lateral ocelli .. 8
- 8(7) Posterior lobe of pronotum convex raised above level of anterior lobe; with strong rugae ..... *Aularches* Stal
- Posterior lobe of pronotum level, not raised; without rugae ..... *Poecilocerus* Seville
- 9(3) Prosternal process present; antenna filiform ..... 17
- Prosternal process absent; if present antenna ensiform, body elongate ..... **Acridinae** ..... 10
- 10(9) Antenna ensiform ..... 11
- Antenna filiform ..... 14
- 11(10) Prosternal process present ..... *Gelastorrhinus* Brunner
- Prosternal process absent ..... 12
- 12(11) Head conically ascending (Fig. 7) apical areolae present; posterior angle of pronotum acutely angulated (Fig. 8) ..... *Acrida* Stal

- Head not conically ascending; apical areolae absent; posterior angle of pronotum not acutely angulated ..... 13
- 13(12) Wings and tegmina well developed ..... *Phlaeoba* Stal  
 Wings and tegmina not fully developed ..... *Phlaeobida* Bolivar
- 14(10) Median carina of pronotum well raised; wings basally yellow and with well marked longitudinal band of fascia in the middle.....  
 ..... *Gastrimargus* Saussure  
 Median carina of pronotum not raised; wings without longitudinal band of black fascia in the middle ..... 15
- 15(14) Pronotum above with light yellow 'x' shaped marking (Fig. 9).....  
 ..... *Oedaleus* Fieber  
 Pronotum without 'x' shaped marking ..... 16
- 16(15) Median carina in prozona forming two tooth-like projections  
 ..... *Trilophidia* Stal  
 Median carina of pronotum in prozona not forming tooth-like projections  
 ..... *Dittopternis* Saussure
- 17(9) Lower external lobe of hind knee with spine like apex .... (Fig. 10) ....  
 ..... **Oxyinae** ..... 18  
 Lower external lobe of hind knee with rounded angular or subacute apex, never spine like..... 19
- 18(17) Wings and tegmina well developed; male terminalia without furcula ...  
 ..... *Oxya* Serville  
 Wings and tegmina not well developed; male terminalia with node like furcula ..... (Fig. 11) ..... *Cercina* Stal
- 19(17) Radial area of tegmina with series of regular parallel stridulatory veinlets  
 ..... **Hemiacridinae** ..... 20  
 Radial area of tegmina without a series of regular parallel stridulatory veinlets ..... 21
- 20(19) Dorsum of pronotum flat with well developed median and lateral carinae; prosternal process spatulate; male cercus simple, conical; tegmina with nervures ..... *Spathosternum* Karsch  
 Dorsum of pronotum rounded with weak median carina; lateral carinae lacking; prosternal process conical; male cercus bifurcate; tegmina without nervures ..... *Hieroglyphus* Krauss

- 21(19) Mesosternal interspace closed (Fig. 12) ..... **Tropidopolinae**  
 ..... **Oxyrrhepes Stal**  
 Mesosternal interspace open (Fig. 13)..... **22**
- 22(21) Mesosternal lobes rectangular (Fig. 13); head and pronotum with light  
 coloured median stripe ..... **Cyrtacanthacridinae** ..... **23**  
 Mesosternal lobes rounded (Fig. 14) or obtuse angular not rectangular;  
 head and pronotum without light coloured median stripe ..... **24**
- 23(22) Prosternal process straight, conical or subconical ..... **Patanga Uvarov**  
 Prosternal process strongly curved backwards, touching mesosternum,  
 inflated in the middle ..... **Cyrtacanthacris Walker**
- 24(22) Dorsum of pronotum flat or weakly tectiform with median and lateral  
 carinae ..... **Eyprepcnemidinae** ..... **25**  
 Dorsum of pronotum variable shape, lateral carinae absent.....  
**Catantopinae** ..... **26**
- 25(24) Hind tibia with dense spines; interspace between outer row of spines  
 equal to their basal width; prosternal process spatulate or trilobate; hind  
 margin of subgenital plate of female entire and single lobed .....  
 ..... **Tylotropidius Stal**  
 Hind tibia with sparse spines; interspace between outer row of spines  
 twice the width of base of spines; subgenital plate of female trilobate...  
 ..... **Eyprepcnemis Fieber**
- 26(24) Head short and very broad; face broader than long ..... **Euthymia Stal**  
 Head not remarkably long ..... **27**
- 27(26) Wings and tegmina well developed ..... **Catantops Schaum**  
 Wings not well developed, tegmina rudimentary..... **Mesambria Stal**

### Checklist of the genera of the suborder Acridoidea of Kerala

#### Family: Acrididae

##### (i) Subfamily: Acridinae

- |    |                                    |  |
|----|------------------------------------|--|
| 1. | <i>Acrida</i> Stal 1873            | Asia, Australia, Africa                |
| 2. | <i>Ditopternis</i> Saussure 1884   | India, Sri Lanka, Australia, S. Africa |
| 3. | <i>Gastrimargus</i> Saussure 1884  | Asia, Australia, Africa                |
| 4. | <i>Gelastorrhinus</i> Brunner 1903 | India, Africa, Madagascar              |
| 5. | <i>Oedaleus</i> Fieber 1835        | Asia, Australia, Africa                |
| 6. | <i>Phlaeoba</i> Stal 1860          | Oriental region                        |
| 7. | <i>Phlaeobida</i> Bolivar 1902     | India                                  |

8. *Trilophidia* Stal 1872                                  Oriental region
- (ii) Subfamily: Catantopinae
9. *Catantops* Schaum 1853                              Africa, Oriental region, Australia
10. *Euthymia* Stal 1875                                  India, Sri Lanka, Madagascar, Borneo
11. *Mesambria* Stal 1878                                  India, Sri Lanka, Madagascar, Celebes
- (iii) Subfamily: Cyrtacanthacridinae
12. *Cyrtacanthacirs* Walker 1870                      Oriental region  
       = *Acrydium* Oliver 1791  
       = *Acridium* Uvarov 1831
13. *Patanga* Uvarov 1923                                  India
- (iv) Subfamily: Eyprepocnemidinae
14. *Eyprepocnemis* Fieber 1853                        S. Europe, Africa, W. Asia,  
    Oriental region
15. *Tylotrypidius* Stal 1873                              Africa, Sri Lanka, Burma, India
- (v) Subfamily: Hemiacridinae
16. *Heiroglyphus* Krauss 1877                        China, India, Burma, Senegal
17. *Spathosternum* Karsch 1877                        India, Siam, W. Africa
- (vi) Subfamily: Oxyinae
18. *Cercina* Stal 1878                                      Sri Lanka, India
19. *Oxya* Serville 1831                                      Africa, Asia, Australia
- (vii) Subfamily: Tropidopolinae
20. *Oxyrrhepes* Stal 1873                                  Oriental region, Africa
- Family: Eumasticidae
21. *Erianthus* Stal 1875                                      Indo Malayan region
22. *Phyllochoreia* Westwood 1839                        India, Sri Lanka, Borneo
- Family: Pyrgomorphidae
23. *Atractomorpha* Saussure 1861                        Ethiopian, Australian and Oriental region
24. *Aularches* Stal 1873                                      India
25. *Chrotogonus* Serville 1839                              Africa, Australia, Asia
26. *Neorthacris* Kevan and Singh                        India
27. *Orthacris* Bolivar 1884                                India, Sri Lanka
28. *Poecilocerus* Serville 1831                              India, W. Asia, North East Africa  
       = *Poecilocerus* Stal 1873

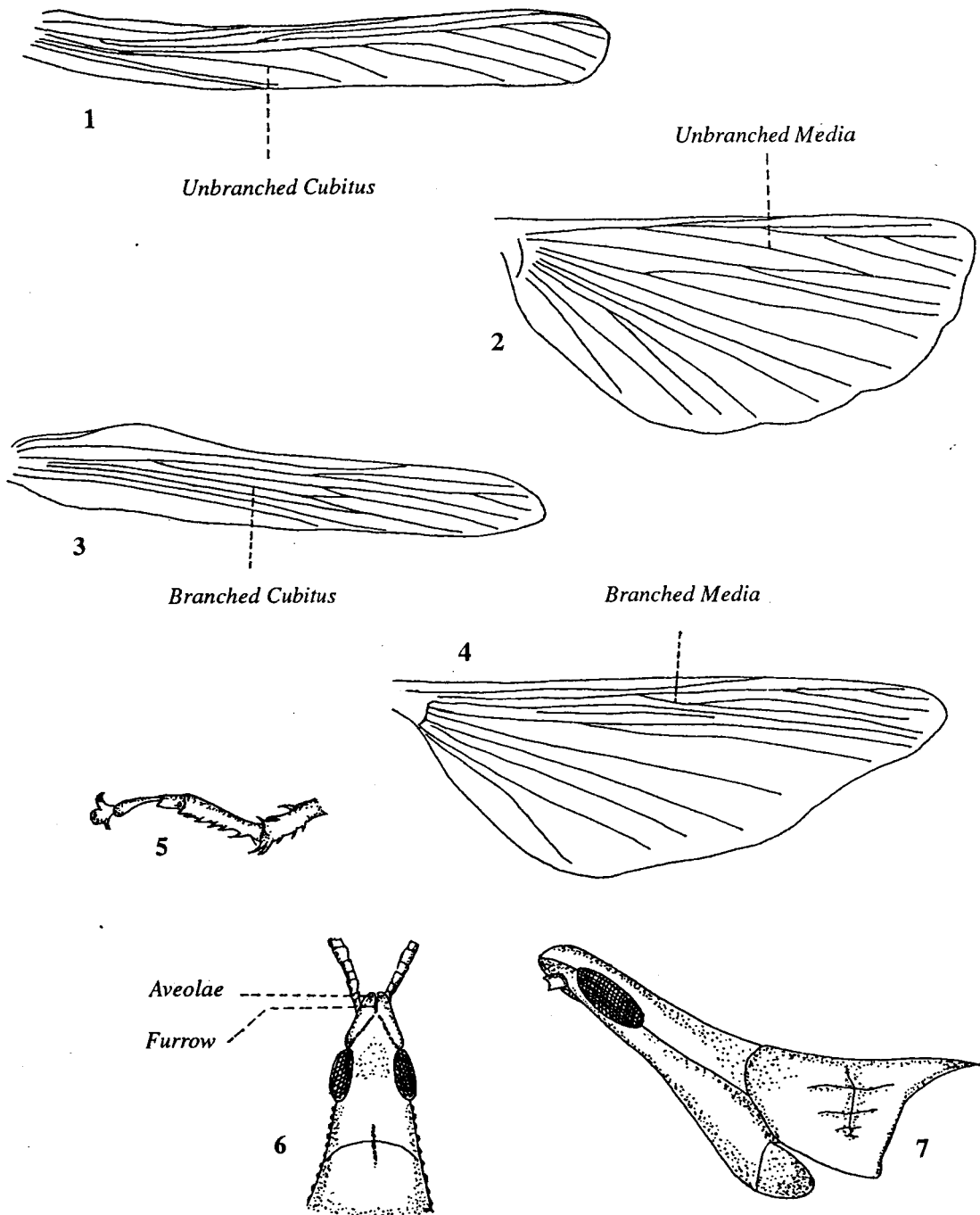


FIGURE 1-7: 1. Tegmina with unbranched cubitus; 2. Hind wing with unbranched media; 3. Tegmina with branched cubitus; 4. Hind wing with branched media; 5. Basal segment of hind tarsus with serrated margins; 6. Dorsal view of head showing fastigial furrow and areolae; 7. Lateral view of conically ascending head.

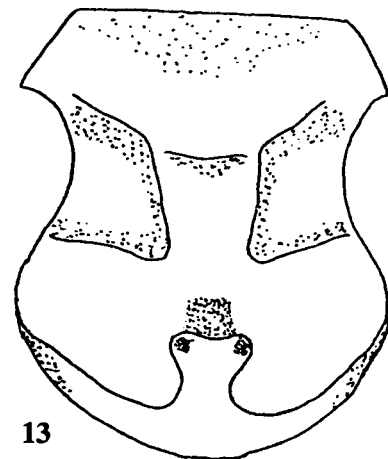
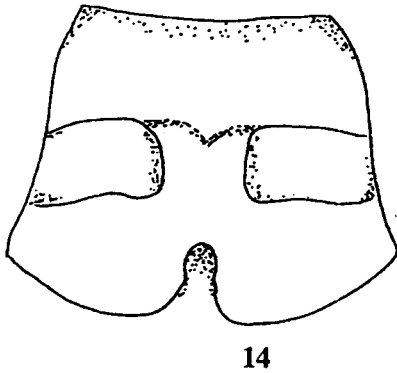
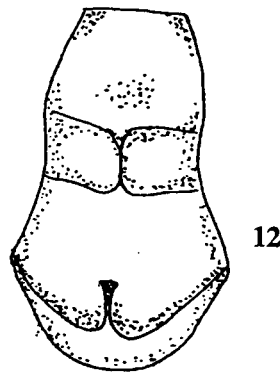
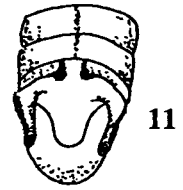
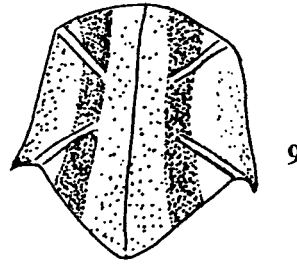
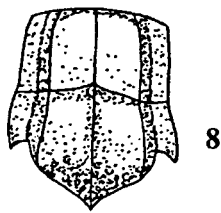


FIGURE8-14: 8. Acutely angulated pronotum; 9. Pronotum with x shaped marking; 10. Lower external lobe of hind knee with spine like apex; 11. Male terminalia with node like furcula; 12. Closed mesosternal interspace; 13. Rounded mesosternal lobes with open interspace; 14. Rectangular mesosternal lobes.

## ACKNOWLEDGEMENT

We are grateful to the authorities of the University of Calicut for the facilities provided for this work.

## REFERENCES

- Ander, K. (1939) Verleichend-anatome und phylogenetische studien über die Ensifera (Saltatoria) *Opusc. Ent. Suppl. II Lund*.
- Bay-Bienko, G. J. and Mistshenko, L. L. (1951) Acridids of the fauna of USSR *Leningrad* **1**, 2(14): 1–180.
- Chopard, L. (1949) Orthoptera In: *Traite' de Zoologie*, Vol. ix. Grasse, P. (Ed). Paris.
- Dirsh, V. M. (1961) A preliminary revision of families and subfamilies of Acridoidea (Orthoptera: Insecta) *Bull. Br. Mus. Hist. (Ent)* **10**: 349–419.
- Kirby, W. F. (1914) *The fauna of British India, including Ceylon and Burma. Orthoptera*, Today and Tomorrow's Publishers: New Delhi, 276 pp.
- Uvarov, B. P. (1966) *Grasshoppers and Locusts. A Handbook of General Acridology*, Vol I. Cambridge University Press: Cambridge XI, 481 pp.

(Received on 2 May 2002; accepted on 12 June 2003)

# Grasshopper menace in Kerala

K. Rajmohana and Vidhupriya, A\*  
Zoological Survey of India

Western Ghats Field Research Station, Kozhikode- 673 002

Quite recently, during May-June this year, a serious grasshopper infestation causing extensive damage to the vast arecanut and coconut plantations of Koodaranhi, Tiruvambadi, Manjakkadavu and Kakkadampoyil panchayats of Kozhikode District was in the limelight. Reports said that nearly 500 acres of plantations were affected and the farmers were in great panic due to the lack of specific control measures. The media added to their anxiety, by concluding that the pests were a group of locusts having a potential to devastate an entire area. Meanwhile some entomologists who visited the site identified the pest as *Aularches miliaris* (Linnaeus), commonly called the Northern Spotted Grasshopper or the coffee grasshopper. Though this species had at times become a major sporadic pest, the identification that they were not locusts should have had lessened the fright of the farmers.

Most people get confused between grasshoppers and locusts. There exists a common notion that a large grasshopper is a locust. But locust is the name generally given to the swarming phase of short-horned grasshoppers exclusive of the family Acrididae. The Migratory locust (*Locusta migratoria*), the Desert locust (*Schistocerca gregaria*) and *Patanga succincta* are the major locust species that had caused widespread damage to crops in India.

*Aularches miliaris* (Linnaeus) belongs to family Pyrgomorphidae (Orthoptera) and not to the locust family Acrididae. Pyrgomorphids are usually very colourful grasshoppers, also called gaudy grasshoppers, the bright colours warning that they are poisonous to predators.

The insect is brightly coloured with brown-green wings and a red banded abdomen. Yellow

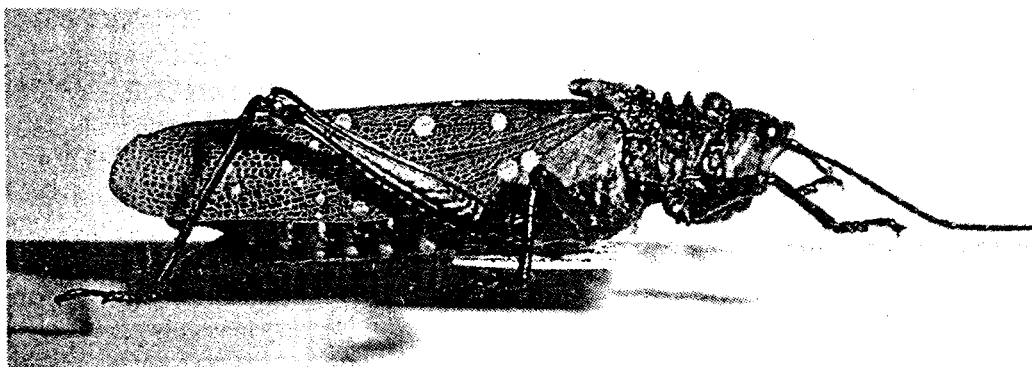


spots of different sizes are seen scattered on the tegmen. The prominent tubercles on the pronotal part of the thorax also serve as a distinguishing character. Generally the size of an adult ranges from 4-6cm. Though sexual dimorphism is not distinct, females are much larger than males. Eggs are laid on the ground in mid- November. A female lays upto 80 eggs in soil, which hatch in about four months. As per the life-history of this species described by

pea, cardamom, pepper, sugarcane, banana, tea, coffee, cashew, arecanut, coconut, teak and rubber throughout India. These leaf feeders can cause serious damage to crops by extensive defoliation.

Teak plantations suffer drastically when the pests attack in large numbers usually from May to November, when the trees are recovering from pre-monsoon attacks of *Hyblaea puera* and *Pyrausta machaeralis* in southern India as well as in Srilanka.

An outbreak much similar to the prevailing one was reported from Malappuram district of Kerala in June 1975 and had caused severe loss to cashew, coconut and arecanut crops.



Katiyar (1951) through field as well as laboratory observations from Dehradun, there exists only one generation per year. The adult is the seventh stage, emerging after the sixth moult (though occasionally an extra moult occurs after the third stage). The third to sixth stage hoppers when caught, exude a black, offensive-smelling liquid from the metanotum and base of the hind and front legs. The adults when disturbed emit from the thorax, a white frothy secretion, having a repulsive odour, which serves to protect them against predators. Both adults and hoppers are highly gregarious. They bask on tree-tops and bushes in early mornings.

*A. miliaris* is polyphagous attacking a wide range of crops like paddy, maize, finger-millet, pigeon

Chemical pesticides seem to be the only remedy in controlling such outbreaks, as of now as no natural enemies has hitherto been reported. The practice of raising monoculture crops may be one reason for such uncontrollable pest attacks.

#### Reference:

K.N. Katiyar 1951. The life-history and ecology of the Northern Spotted Grasshopper *Aularches punctatus* Drury (Orthoptera: Acrididae). *Agra Univ. J. Res. (Sci.)* 4, 397-414 (1955).

\*Systematic Entomology Laboratory,  
University of Calicut, Kerala.

NB 5616

