

Memoirs of the Zoological Survey of India

Volume : 21

No. 1

Studies on Proctotrupoidea and Platygastroidea (Hymenoptera : Insecta) of Kerala

RAJMOHANA K.



ZOOLOGICAL SURVEY OF INDIA

VOLUME : 21
NUMBER : 1

MEMOIRS
OF THE
ZOOLOGICAL SURVEY OF INDIA

Studies on Proctotrupoidea and Platygastroidea
(Hymenoptera : Insecta) of Kerala

RAJMOHANA K.

*Zoological Survey of India, Western Ghat Field Research Station, Kamala Building (1st floor),
13/787-A, Annie Hall Road, Calicut-673002 (Kerala)*

Edited by the Director, Zoological Survey of India, Kolkata



Zoological Survey of India
Kolkata

CITATION

Rajmohana, K. 2006. Studies on Proctotrupoidea and Platygastroidea (Hymenoptera : Insecta) of Kerala. *Memoirs zool Surv. India*, Volume **21**(No. 1) : 1-153. (Published by the Director, *Zool. Surv. India*, Kolkata)

Published : May, 2006

ISBN 81-8171-1 '1-7

© Govt. of India, 2006

ALL RIGHTS RESERVED

- No part of this publication may be reproduced stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission of the publisher.
- This book is sold subject to the condition that it shall not, by way of trade, be lent, resold hired out or otherwise disposed of without the publisher's consent, in an form of binding or cover other than that in which, it is published.
- The correct price of this publication is the price printed on this page. Any revised price indicated by a rubber stamp or by a sticker or by any other means is incorrect and should be unacceptable.

PRICE

Indian Rs. 500.00

Foreign : \$ 30; £ 25

Published at the Publication Division by the Director Zoological Survey of India, 234/4, AJC Bose Road, 2nd MSO Building, 13th floor, Nizam Palace, Kolkata 700020 and printed at Power Printers, New Delhi 110 002.

MEMOIRS OF THE ZOOLOGICAL SURVEY OF INDIA

Volume 21(No. 1)

2006

1-153

CONTENTS

INTRODUCTION	1
REVIEW OF LITERATURE	3
MATERIALS AND METHODS	4
GENERAL MORPHOLOGY AND MEASUREMENTS	5
ABBREVIATIONS AND ACRONYMS	8
SYSTEMATIC LIST	8
SYSTEMATIC ACCOUNT	11
Superfamily PROCTOTRUPOIDEA	11
Family DIAPRIIDAE	12
Notes on subfamilies	13
Subfamily BELYTINAE	13
1. Genus <i>Aclista</i> Foerster	14
1. <i>Aclista globosa</i> Rajmohana and Narendran sp. nov.	15
2. <i>Aclista leana</i> Rajmohana and Narendran sp. nov.	16
3. <i>Aclista specka</i> Rajmohana and Narendran sp. nov.	17
2. Genus <i>Belyta</i> Jurine	17
1. <i>Belyta hirsuta</i> Rajmohana and Narendran sp. nov.	18
3. Genus <i>Cinetus</i> Jurine	19
1. <i>Cinetus travancoricus</i> Rajmohana and Narendran sp. nov.	20
4. Genus <i>Pantoclis</i> Foerster	20
1. <i>Pantoclis keralensis</i> Rajmohana and Narendran sp. nov.	21

Subfamily DIAPRIINAE	22
5. Genus <i>Alareka</i> Rajmohana and Narendran	26
1. <i>Alareka keralensis</i> Rajmohana and Narendran	26
2. Genus <i>Aneuopria</i> Kieffer	27
1. <i>Aneuopria kairali</i> Rajmohana and Narendran	27
7. Genus <i>Basalys</i> Westwood	28
1. <i>Basalys bispinosus</i> Rajmohana and Narendran sp. nov.	30
2. <i>Basalys chotti</i> Rajmohana and Narendran sp. nov.	31
3. <i>Basalys karnatakensis</i> (Sharma) comb. nov.	32
4. <i>Basalys mandibularis</i> Rajmohana and Narendran sp. nov.	33
5. <i>Basalys unicus</i> Rajmohana and Narendran sp. nov.	34
8. Genus <i>Calogalesus</i> Kieffer	36
1. <i>Calogalesus malabaricus</i> Rajmohana and Narendran sp. nov.	36
9. Genus <i>Claudivania</i> Huggert	38
1. <i>Claudivania miranda</i> Huggert	38
10. Genus <i>Coptera</i> Say	39
1. <i>Coptera carinata</i> Rajmohana and Narendran sp. nov.	40
2. <i>Coptera clavata</i> Rajmohana and Narendran sp. nov.	42
3. <i>Coptera curvata</i> Rajmohana and Narendran sp. nov.	43
4. <i>Coptera lobata</i> Rajmohana and Narendran sp. nov.	44
5. <i>Coptera occispinosa</i> Rajmohana and Narendran sp. nov.	45
6. <i>Coptera tibiospinosa</i> Rajmohana and Narendran sp. nov.	47
7. <i>Coptera variegata</i> Rajmohana and Narendran sp. nov.	48
11. Genus <i>Entomacis</i> Foerster	49
1. <i>Entomacis balloonus</i> Rajmohana and Narendran sp. nov.	51
2. <i>Entomacis completus</i> Rajmohana and Narendran sp. nov.	52
3. <i>Entomacis keralensis</i> Rajmohana and Narendran sp. nov.	53
4. <i>Entomacis linealis</i> Rajmohana and Narendran sp. nov.	54
5. <i>Entomacis spinosus</i> Rajmohana and Narendran sp. nov.	56
12. Genus <i>Monelata</i> Foerster	57
1. <i>Monelata completa</i> Rajmohana and Narendran	57
13. Genus <i>Nigropria</i> Rajmohana and Narendran	58
1. <i>Nigropria compressa</i> Rajmohana and Narendran	58

14. Genus <i>Odontopria</i> Kieffer	59
1. <i>Odontopria nilamburensis</i> (Sharma) comb. nov.	60
2. <i>Odontopria spinosa</i> Rajmohana and Narendran sp. nov.	60
15. Genus <i>Oxypria</i> Kieffer	62
1. <i>Oxypria kottooliensis</i> Rajmohana and Narendran	62
2. <i>Oxypria spinosa</i> Rajmohana and Narendran	63
16. Genus <i>Paramesius</i> Westwood	64
1. <i>Paramesius incompletus</i> Kieffer	65
2. <i>Paramesius malabarensis</i> Rajmohana and Narendran	65
3. <i>Paramesius monticola</i> (Kieffer)	66
17. Genus <i>Spilomicrus</i> Westwood	67
1. <i>Spilomicrus chinnarensis</i> Rajmohana and Narendran sp. nov.	68
2. <i>Spilomicrus eraviensis</i> Rajmohana and Narendran sp. nov.	70
3. <i>Spilomicrus keralensis</i> Rajmohana and Narendran sp. nov.	71
4. <i>Spilomicrus parambiensis</i> Rajmohana and Narendran sp. nov.	72
5. <i>Spilomicrus manii</i> nom. nov. Rajmohana and Narendran	74
18. Genus <i>Trichopria</i> Ashmead	74
1. <i>Trichopria arca</i> Rajmohana and Narendran sp. nov.	77
2. <i>Trichopria clavata</i> Rajmohana and Narendran sp. nov.	78
3. <i>Trichopria cristata</i> Rajmohana and Narendran sp. nov.	79
4. <i>Trichopria disulcata</i> Rajmohana and Narendran sp. nov.	81
5. <i>Trichopria fringa</i> Rajmohana and Narendran sp. nov.	82
6. <i>Trichopria gautami</i> Rajmohana and Narendran sp. nov.	83
7. <i>Trichopria gopii</i> sp. nov.	84
8. <i>Trichopria indica</i> Kieffer	85
9. <i>Trichopria khandala</i> Sharma	86
10. <i>Trichopria krishagathra</i> Rajmohana and Narendran sp. nov.	88
11. <i>Trichopria malabarensis</i> Rajmohana and Narendran sp. nov.	89
12. <i>Trichopria minuta</i> Rajmohana and Narendran sp. nov.	90
13. <i>Trichopria petiolata</i> Rajmohana and Narendran sp. nov.	91
14. <i>Trichopria pedicellata</i> Sharma	92
15. <i>Trichopria semicirculara</i> Rajmohana and Narendran sp. nov.	93
16. <i>Trichopria spinosa</i> Rajmohana and Narendran sp. nov.	94
17. <i>Trichopria tetraclavata</i> Rajmohana and Narendran sp. nov.	96

18. <i>Trichopria tibia</i> Rajmohana and Narendran sp. nov.	97
19. <i>Trichopria triclavata</i> Rajmohana and Narendran sp. nov.	98
19. Genus <i>Vadana</i> Rajmohana and Narendran	99
1. <i>Vadana sholayarica</i> Rajmohana and Narendran	100
Family PROCTOTRUPIDAE	101
1. Genus <i>Phaenoserphus</i> Kieffer	101
1. <i>Phaenoserphus keralensis</i> Rajmohana and Narendran	102
2. <i>Phaenoserphus transversus</i> Rajmohana and Narendran	102
3. <i>Phaenoserphus longigena</i> Rajmohana and Narendran	103
4. <i>Phaenoserphus sureshi</i> Rajmohana and Narendran	103
Superfamily PLATYGASTROIDEA	104
Family SCELIONIDAE	104
Subfamily TELENOMINAE	105
21. Genus <i>Psix</i> Kozlov and Le	106
1. <i>P. saccharicola</i> (Mani)	106
22. Genus <i>Telenomus</i> Haliday	107
23. Genus <i>Trissolcus</i> Ashmead	108
Subfamily TELEASINAE	109
24. Genus <i>Trimorus</i> Foerster	109
1. <i>Trimorus (Trimorus) anamalaianus</i> Mukerjee	110
2. <i>Trimorus (Trimorus) appangalus</i> Mukerjee	111
3. <i>Trimorus (Trimorus) dimdicornis</i> Mukerjee	111
4. <i>Trimorus (Trimorus) deccana</i> Mukerjee	111
5. <i>Trimorus (Trimorus) dubarensis</i> Mukerjee	111
6. <i>Trimorus (Trimorus) fasciatus</i> Mukerjee	112
7. <i>Trimorus (Trimorus) nilamburensis</i> Mukerjee	112
8. <i>Trimorus (Trimorus) ponmudiensis</i> Mukerjee	112
Subgenus <i>Trimorus (Neotrimorus)</i> Rajmohana and Narendran	112
1. <i>Trimorus (N). scutellospinosus</i> Rajmohana and Narendran	112
2. <i>Trimorus (Neotrimorus) spinostriatus</i> Rajmohana and Narendran	113
25. Genus <i>Xenomerus</i> Walker	113
1. <i>Xenomerus atomus</i> Rajmohana and Narendran	114

2. <i>Xenomerus indicus</i> Mukerjee	114
Subfamily SCELIONINAE	114
26. Genus <i>Anteromorpha</i> Dodd	117
1. <i>Anteromorpha malabarica</i> Narendran	117
27. Genus <i>Baryconus</i> Foerster	118
1. <i>Baryconus keralensis</i> Narendran	119
2. <i>Baryconus unidentatus</i> Narendran	119
28. Genus <i>Calliscelio</i> Ashmead	119
1. <i>Calliscelio agaliensis</i> Narendran and Ramesh Babu	120
2. <i>Calliscelio carinatus</i> Narendran and Ramesh Babu	121
3. <i>Calliscelio emarginatus</i> Narendran and Ramesh Babu	121
4. <i>Calliscelio indicus</i> Narendran and Ramesh Babu	121
5. <i>Calliscelio longicarinatus</i> Narendran and Ramesh Babu	121
6. <i>Calliscelio malabaricus</i> Narendran and Ramesh Babu	122
29. Genus <i>Calotelea</i> Westwood	122
1. <i>Calotelea tanugatra</i> Narendran	123
30. Genus <i>Dichoteleas</i> Kieffer	123
1. <i>Dichoteleas indica</i> Saraswat	123
31. Genus <i>Gryon</i> Haliday	123
32. Genus <i>Heptascelio</i> Kieffer	124
1. <i>Heptascelio punctisternus</i> Narendran and Ramesh Babu	125
2. <i>Heptascelio striatosternus</i> Narendran and Ramesh Babu	125
33. Genus <i>Macroteleia</i> Westwood	126
1. <i>Macroteleia lamba</i> Saraswat and Sharma	127
34. Genus <i>Opisthacantha</i> Ashmead	127
1. <i>Opisthacantha keralensis</i> Sharma	128
2. <i>Opisthacantha indica</i> Mani	128
35. Genus <i>Platyscelio</i> Kieffer	128
1. <i>Platyscelio abnormis</i> Crawford	128
36. Genus <i>Probaryconus</i> Kieffer	129
1. <i>Scelio bengalensis</i> Mukerjee	130
2. <i>Scelio mallapura</i> Mukerjee	130

3. <i>Scelio munnaricus</i> Mukerjee	130
4. <i>Scelio nilamburensis</i> Mukerjee	130
5. <i>Scelio satpurus</i> Mukerjee	130
6. <i>Scelio spinifera</i> Mukerjee	131
7. <i>Scelio travancoricus</i> Mukerjee	131
38. Genus <i>Sparasion</i> Latreille	131
1. <i>Sparasion travancoricum</i> Mani and Sharma	131
39. Genus <i>Triteleia</i> Kieffer	132
Family PLATYGASTRIDAE	132
I. Subfamily SCELIOTRACHELINAE	133
II. Subfamily PLATYGASTRINAE	133
39. Genus <i>Amblyaspis</i> Foerster	134
1. <i>Amblyaspis dalhousianus</i> (Mukerjee)	134
40. Genus <i>Inostemma</i> Haliday	134
1. <i>Inostemma shencottahensis</i> Mukerjee	135
42. Genus <i>Isostasius</i> Foerster	135
43. Genus <i>Leptacis</i> Foerster	135
44. Genus <i>Platygaster</i> Latreille	136
1. <i>Platygaster coorgensis</i> (Mukerjee)	138
2. <i>Platygaster galbus</i> Ushakumari	138
3. <i>Platygaster interdaadi</i> (Mukerjee)	138
4. <i>Platygaster intermedius</i> Ushakumari	138
5. <i>Platygaster keralicus</i> Ushakumari	138
6. <i>Platygaster malabaricus</i> (Mukerjee)	138
7. <i>Platygaster minimus</i> (Mukerjee)	139
8. <i>Platygaster narendrani</i> Ushakumari	139
9. <i>Platygaster nigrocoxatus</i> Ushakumari	139
10. <i>Platygaster oryzae</i> Cameron	139
11. <i>Platyagster sasii</i> Ushakumari	139
12. <i>Platygaster tanus</i> Ushakumari	139
13. <i>Platygaster zantanus</i> Ushakumari	140

45. Genus *Synopeas* Foerster 140

SUMMARY 141

ACKNOWLEDGMENTS 141

REFERENCES 141

INTRODUCTION

Parasitic Hymenoptera constitutes the most important single group of biocontrol agents, responsible for majority of the economic and environmental benefits arising through biocontrol programmes. Parasitoids comprise approximately 80% of the Hymenoptera developing on or in a wide variety of hosts and are important in regulating their host populations (Gauld and Bolton, 1988). According to Cornell and Hawkins (1993), parasitism is considered to be the most likely cause identifiable for mortality in 30.8% of 123 holometabolous insect host species. Parasitica, the largest group of hymenoptera includes many diverse species, which are either entomophagous or phytophagous. Most members of this group being very small, sometimes even less than 1mm, their existence often remain unnoticed. Many members of Parasitica act as keystone species, as they regulate their host species populations that may otherwise out-compete and eliminate other species, thereby playing a major role in preserving ecological balance and also in maintaining biological diversity in terrestrial ecosystems.

Hymenoptera Parasitica includes 49 families under ten superfamilies. Despite their importance in nature as biocontrol agents, many members of the group still remain little known.

The Proctotrupeoidea and Platygastroidea are two important superfamilies of micro-hymenoptera. They superficially resemble the Chalcidoidea to some extent. They are both ubiquitous and highly diverse as well at the same time less known biologically than taxonomically. All members are egg, larval or pupal parasitoids of other insects belonging to Orthoptera, Heteroptera, Coleoptera, Lepidoptera, Neuroptera, Diptera, or of other arthropods like centipedes and spiders.

As our knowledge about these groups is scanty, a generalised pattern regarding their distribution is yet to be made. As regards their species diversity and richness, the Palearctic Region tops, with

the Neotropical Region close behind it. The Nearctic and the Oriental Regions have approximately equal number of species. The Australian Region is also species rich (Johnson, 1992). Not much is known about their distribution in India.

Since these groups include parasitoids of both agricultural and livestock pests, they have great potential to be used as successful biocontrol agents. But, towards meeting this goal, more data on their biological, ecological and ethological aspects are needed. As all pertinent studies concerning biology, ecology, conservation, genetics etc. rely upon the foundation made by a good systematic study, a detailed systematic study of these groups has become imperative.

The present work, which extended over a period of five years (1994 to 1999), was primarily undertaken to register the diversity in Proctotrupeoidea and Platygastroidea of Kerala. The study area included the whole geographic limits of Kerala. The representative samples of specimens were collected from all the fourteen districts of this state.

The state of Kerala (Fig. 1) lies all along bounded, on one side, with the southern west coast of India and on the other with the Western Ghats, approximately between the latitudes 8°17' and 12°45'N and longitudes 75°11' and 77°20'E. It is bordered by Karnataka in the north, Tamil Nadu in the south and the east, and the Lakshadweep Sea in the west. The land area of the state is about 38,863 sq. km. Physiographically, the state's geographic area can be broadly divided into three provinces namely the highlands (600-2500 m above MSL), the midlands (300-600 m above MSL) and the lowlands (30-300 m above MSL).

The climate of Kerala is of the tropical monsoon type, with abundant rainfall and hot summer. The southwest monsoon pours over the state from June to September, which is the main

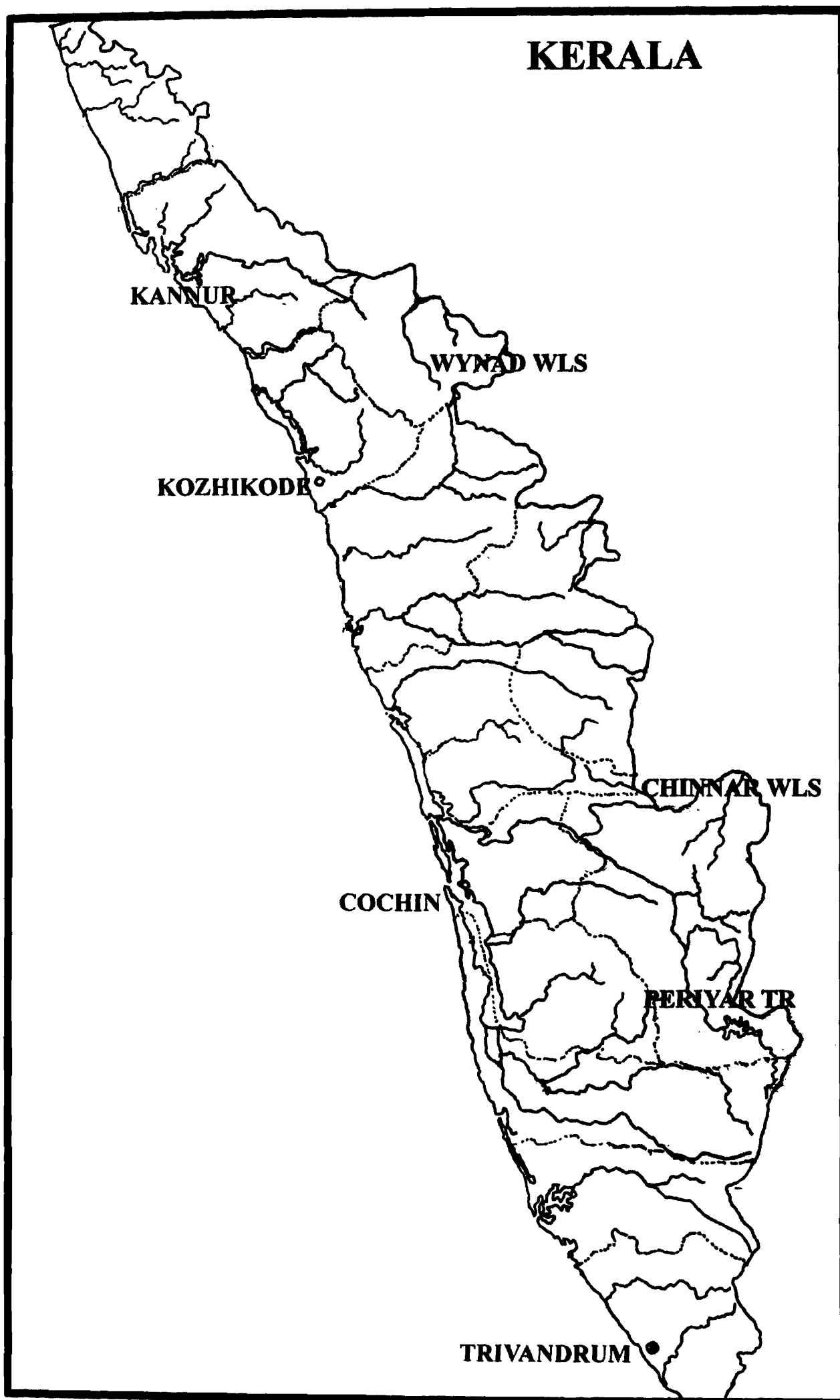


Fig. 1. Map of Kerala

rainy season. Rains also occur during October-December under the influence of the northeast monsoon. March to May is the summer season. The state experiences an annual average rainfall ranging from 180 cm to 380 cm and a mean temperature varying from 19°–33°C.

A detailed taxonomic work on two superfamilies, viz., Proctotrupeoidea and Platygastroidea (Hymenoptera) of Kerala, was originally conceived at the time of initiating the programme of study. But, as the study material of both these groups gradually got built up during the period, the enormity of the species richness of these two superfamilies got revealed, necessitating each group to be studied separately. In the present document, the superfamily Proctotrupeoidea has been dealt-with in detail. As regard the taxonomy of the superfamily Platygastroidea of India, and Kerala in particular, no appreciable work has been done in the past. Although considerable material belonging to this group could be accumulated during the study period, it was practically not possible in the present study to deal with them in detail, mainly because of the extreme diversity exhibited by them. Hence the section under Platygastroidea at present needs to be considered only as a taxonomic account, with an updated compilation of information on the genera and species hitherto known from Kerala.

Most of the species studies undertaken in this work have been based on taxonomy of female specimens only, for two reasons. First, it was not always possible to accurately associate the sexes in each species, for the collections were mostly made from the field, than by rearing hosts. Second, the females showed more consistency in taxonomic characters than the males.

The taxonomic works of Sharma (1979, 1980), Mani (1941a, 1941b), Mani and Sharma (1982) and Mukerjee (1978, 1979, 1981, 1994) give us a glimpse of the species composition and diversity exhibited by both Proctotrupeoidea and Platygastroidea in India. Sharma (1979) in his monograph had mentioned that his types were retained, for the time being, at the School of Entomology, Agra. In spite of having made a couple of personal visits to the institution, the

author was not fortunate enough to locate those holotypes and was unable to trace even the depository. Hence through out this work, all confirmations and assumptions had to be made, based on the original descriptions and illustrations.

The present study has yielded taxonomic information of Proctotrupeoidea pertaining to 65 species under 20 genera, of which 44 species are new to science, and as well that of Platygastroidea comprising 53 species under 25 genera. This forms the first consolidated document dealing with the taxonomy and systematics of the two superfamilies in Kerala, India.

The types of all the new species described here, along with all the specimens studied in this work, are deposited at Zoological Survey of India, Western Ghats Field Research Station, Calicut, Kerala.

REVIEW OF LITERATURE

Some of the prominent early works on Proctotrupeoidea and Platygastroidea include that of Ashmead (1893) and Dallatore (1898). Kieffer dominated the field for a period from 1904 to 1926. Though his keys to world genera (1916a, 1926) were largely of historic value, there exists no other world generic keys even to this day. Nixon's handbooks for the identification of British fauna of Belytinae and Diapriinae (1957, 1980) serve as essential identification aids. Johnson (1992) published a catalogue to the world genera of Proctotrupeoidea and Platygastroidea excluding Platygastriidae while Vlug (1995), brought out a catalogue on Platygastriidae of the world. Other major works in the group include that of Masner (1976b, 1980, 1991, 1993), Masner and Garcia (2002), Masner and Huggert (1989), Galloway and Austin (1984), Kozlov (1971, 1978, 1994).

In India some major works were by Mani (1941a, 1941b), Sharma (1979, 1980), Mani and Sharma (1982) and Mukerjee (1978, 1979, 1981, 1994). Saraswat and Sharma (1978) also described some new Scelionidae from India. The monograph on Indian Diapriidae by Sharma (1979), dealt with 42 species, representing 15 genera. The review of Indian Proctotrupeoidea by Mani and Sharma

(1982) exists as the only critical annotated and illustrated catalogue summarising all the available information on the taxonomy of Proctotrupoidea and Platygastroidea *sensu lato* from India. The work included over 170 species belonging to 69 genera, with synoptic keys to families, subfamilies, tribes, genera and species, along with notes on diagnostic characters and distribution.

MATERIALS AND METHODS

Collection Methodology

Minimum needs : Insect net for collection of flying insects (Fig. 2a). Toxic chemical for the killing of insects.

Supplementary materials : Small containers with 70% alcohol, to preserve insects after killing. Thin Painting Brush to enable easy transfer of specimens without damaging them.

Specialised Equipment : Aspirator (Fig. 2b). Sifters and funnels to separate insects from debris. Malaise trap. Yellow Pan Trap. Light trap.

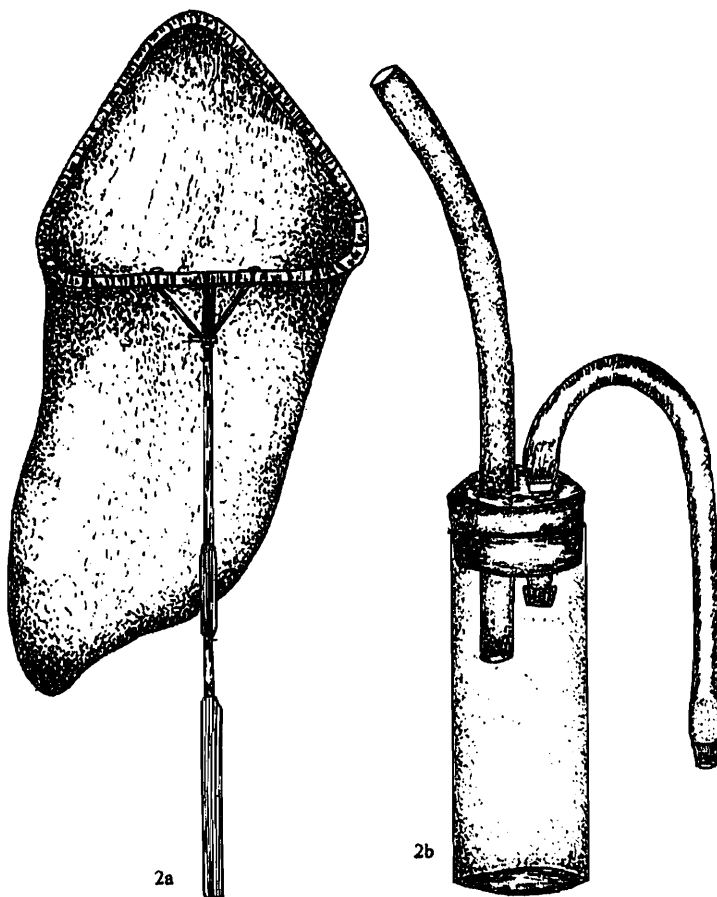


Fig. 2. a. Sweep-net; b. Aspirator

Main collecting technique : By sweeping with an insect net (The net with a triangular frame used in the present study is a modified model designed by Noyes, 1982).

The insect specimens collected were stored in 70% alcohol in small vials and kept in a refrigerator.

Mounting of specimens : Card mounting : The method followed in the present work was that adopted by Boucek and Noyes (Noyes, 1982). The specimens were mounted on a small white rectangular card, tilted slightly on its side (at about 45° to the plane of the card) in such a way that the face and mandibles were clearly visible. Temporary labels were written in the field at the time of collecting specimens. After mounting the specimens, permanent labels indicating the name of the country, state, date of collection etc. were included. Registering was done after the specimens were identified atleast upto generic level. The registering of entries is as follows :

- Collection number
- Scientific name
- Name of locality
- Date of Collection
- Name of the host
- Name of the collector
- Remarks.

Serial numbers were given to each specimen.

The specimens thus mounted were held on entomological pins (Asta Insect pins No. 3. 38 mm x 0.53 mm made by Newy Goodman and Co., England), labelled and stored in insect boxes, for detailed systematic studies. Naphthalene balls were placed in the boxes to protect from insect attacks. Thymol crystals were used as fungicides and 1- 2- Dichlorobenzene to prevent fungal growth.

For detailed studies of certain parts such as antennae, mandibles etc., microslides were prepared.

Specimens were studied and the illustrations were made using M3Z and M6Z LEICA WILD stereozoom microscopes.

GENERAL MORPHOLOGY AND MEASUREMENTS

(Fig. 3. a-g)

Most of the morphological terms followed here are those used by Masner (1980, 1991). Instructions on measurements follow the definition of each term (where applicable). The important terms are defined as follows :

Head

Antennal shelf : Projecting ledge between face and frons, bearing toruli (viewed both dorsally and laterally).

Clypeus : Divided from face by epistomial declivity and in some species by tentorial pits.

Epistomial declivity : Shallow arched depression on upper margin of clypeus, usually rudimentary.

Eye height : Maximum distance between upper and lower eye orbit; measured in lateral view.

Head height : Maximum distance between imaginary line connecting top of ocelli and lower edge of closed mandibles; measured in lateral view.

Head length : Maximum distance between anterior edge of antennal shelf and extreme posterior edge of occipital flange in dorsal view; maximal distance between visible edge of post ocelli or lateral ocelli and extreme posterior edge of mandibles in anterior view.

Head breadth : Maximum distance between outer margins of eye orbits.

Malar sulcus : Sulcus connecting lowermost arc of eye orbit with upper corner of mandibular condyle; viewed from front.

Occipital flange : Step-like rim of occiput.

Postgena : Part of head between posterior margin of eye orbit and occiput, above cheek; viewed from lateral aspect.

Postgenal cushion : Cushion of hairs on postgena; viewed laterally and dorsally.

Temples : Portion of head behind eyes; receding, parallel or bulging according to its shape in dorsal view.

Tentorial pit : Pair of pits marking ventrolateral corner of clypeus on epistomial declivity ; viewed from front.

Antenna

Antennal club (in Females) : Several distal flagellar segments , usually incrassate, club-shaped and sized differently from preceding segments.

Flagellomeres (F1-F12) : Flagellar segments.

Ventral pit (in Females) : Shallow depression on ventral side of terminal club segment: viewed at an angle of 45° for best shadow effect.

Mesosoma

(In dorsal view)

Length : Maximal length measured between anterior margin of pronotum and posterior median margin of propodeum.

Breadth : Maximal width across mesonotum between outer margins of tegula.

Pronotum : Dorsal sclerite of prothorax including sides reaching to forecoxa.

Cervix : Anterior neck-like part of pronotum; view both dorsally and laterally.

Pronotal cushion : Cushion of pilosity in the cervical part of pronotum; view both dorsally and laterally.

Notauli : Pair of longitudinal grooves on mesoscutum.

Humeral sulcus : Longitudinal impression in posterolateral corner of mesonotum, mediad of tegula

Transscutal suture : Suture dividing mesonotum from scutellum.

Scutellum : Sclerite on mesonotum between mesonotum and metanotum.

Scutellar fovea : Pair of pits or grooves on anterior margin of scutellum immediately behind transscutellar suture (TSS).

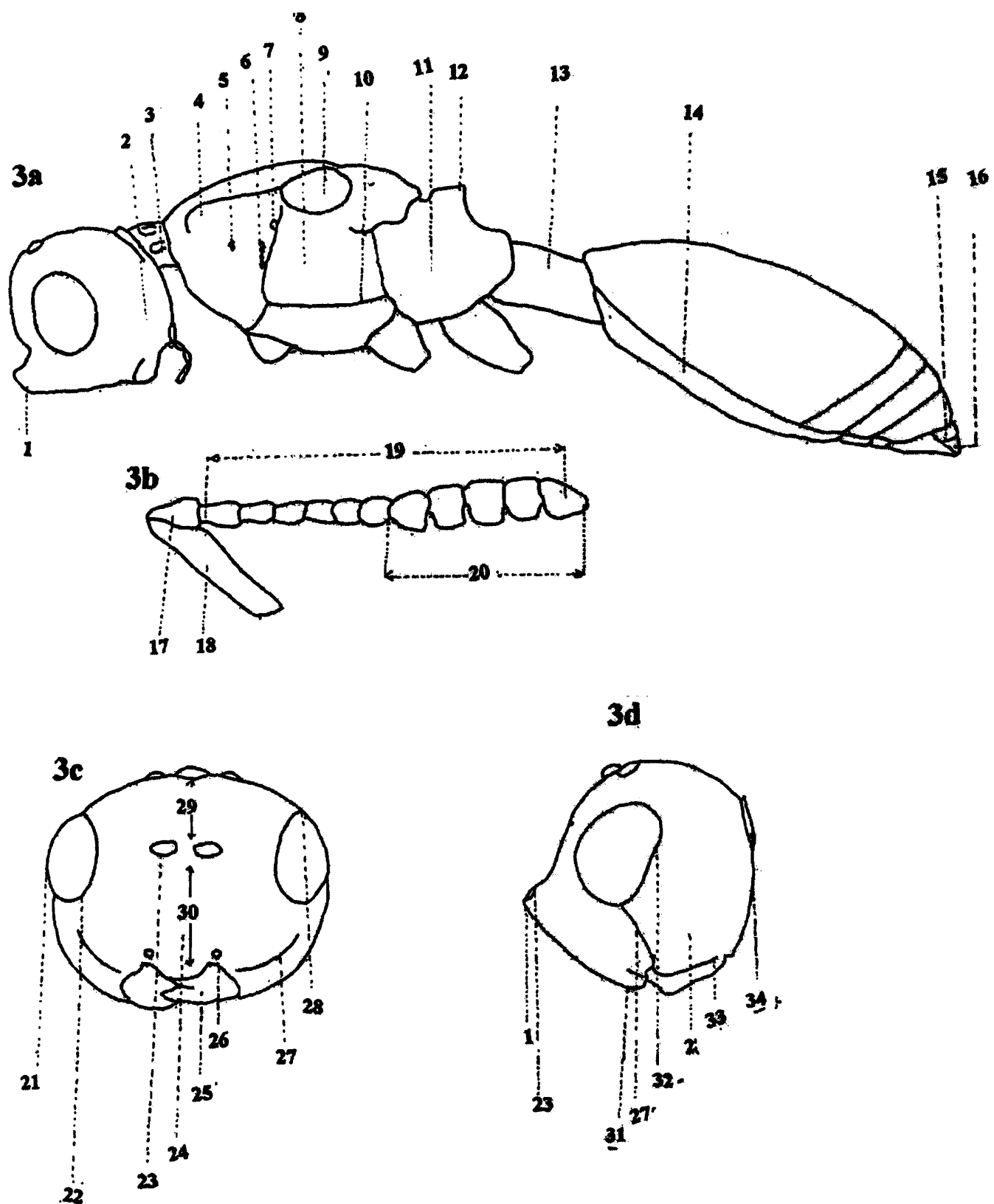


Fig. 3. General Diagrams (a-d) – a. Body (Profile); b. Antenna; c. Head (A.V.); d. Head (Profile)

Body (Profile)

1. Antennal shelf; 2. Postgena; 3. Cervix; 4. Pronotum; 5. Pronotal pit; 6. Pronotal hairy strip; 7. Spiracle; 8. Mesopleuron; 9. Tegula; 10. Sternaulus; 11. Metapleuron; 12. Median propodeal keel; 13. Petiole; 14. Sternite; 15. T8; 16. T9

Antenna

17. Pedicel; 18. Scape; 19. Flagellomeres; 20. Antennal club

Head (A.V.)

21. Outer eye orbit; 22. Lower Eye Orbit; 23. Toruli; 24. Epistomial declivity; 25. Mandible; 26. Tentorial pit; 27. Malar sulcus; 28. Upper Eye orbit; 29. Frons; 30. Face

Head (Profile)

31. Clypeus; 32. Posterior Eye orbit; 33. Mandibular condyle; 34. Occipital flange

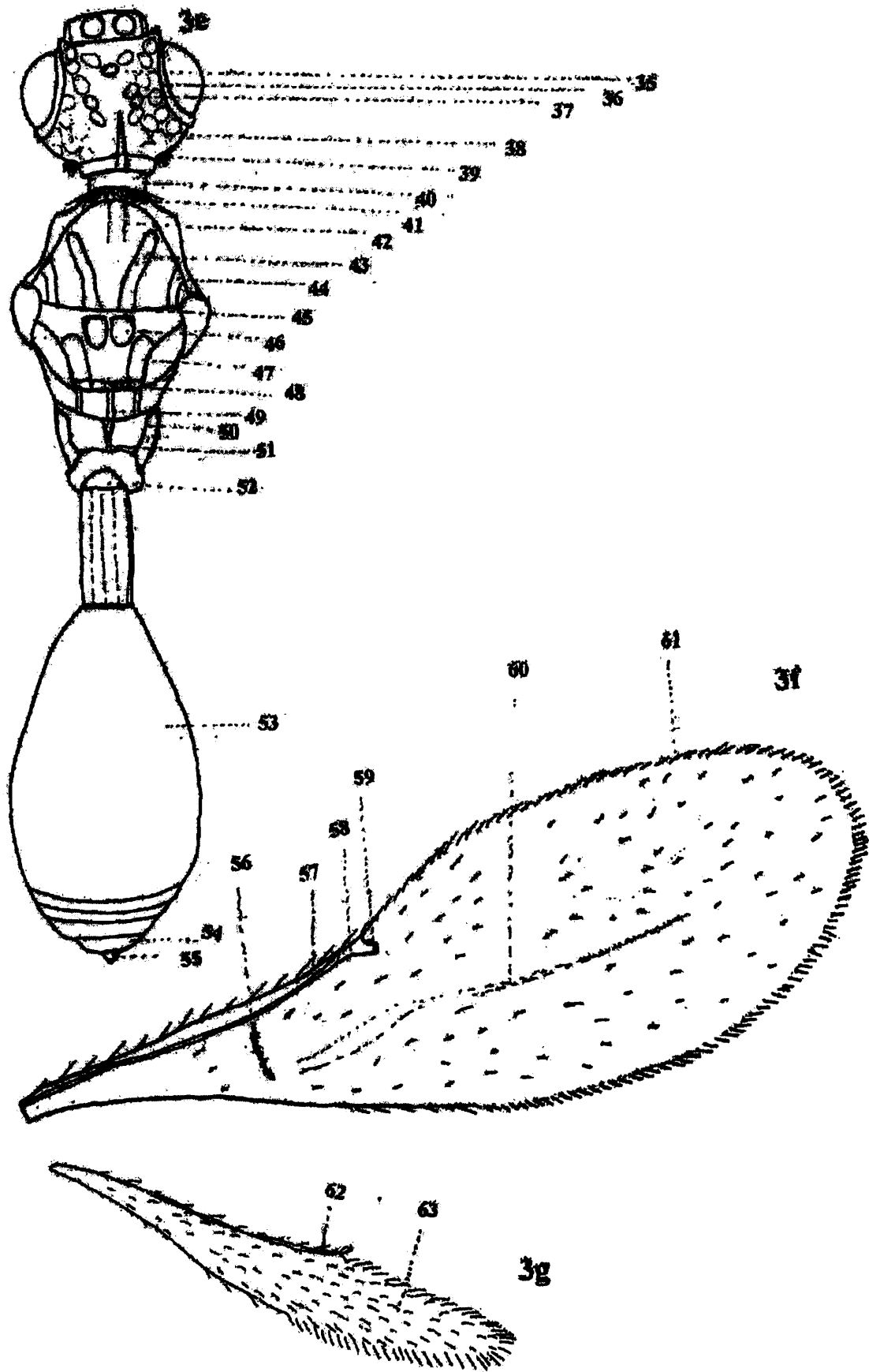


Fig. 3. General Diagrams (e-g) – e. Body (D.V.); f. Forewing; g. Hindwing

Body (Dorsal view)

35. Post ocellus; 36. Adorbital carina; 37. Lateral Ocellus; 38. Temples; 39. Postgenal cushion; 40. Cervix
41. Pronotal cushion; 42. Anterior parallel lines; 43. Notauli; 44. Humeral sulcus; 45. Transscutellar sulcus
46. Anterior scutellar groove; 47. Lateral scutellar groove; 48. Posterior scutellar pits; 49. Metanotal keel
50. Lateral Propodeal carina; 51. Median propodeal keel; 52. Nucha; 53. T2; 54. T8; 55. T9

Forewing

56. Basalis; 57. Submarginal; 58. Marginal; 59. Stigmal; 60. Hairless line; 61. Marginal fringe

Hindwing

62. Submarginal Hairs

Scutellar shield : Part of scutellum between anterior scutellar grooves and posterior scutellar pits.

Lateral scutellar pits : Pair of narrow elongated pits situated along posterior margin of scutellum.

Posterior scutellar pits : Transverse row of minute pits along posterior margin of scutellum.

Metanotum : Dorsal sclerite of metathorax, often armed or modified medially.

Propodeum : Segment of mesosoma posterior to metanotum; originally first abdominal tergite which has fused with thorax. Syn. : 'Mediansegment' of Kieffer 1926; 'metanotum' of Ashmead 1893.

Nucha : Posteromedian projection of propodeum housing articulation with petiolar condyle.

(In lateral view)

Pronotal pit : Small circular pit on pronotum.

Sternaulus : Transverse ridge or keel (rarely sulcus) on lower mesopleuron, between mid coxa and fore coxa.

Forewing

Basalis : Nebulous or tubular transverse vein between submarginal vein (Sc+R) and (N+Cu 1).

Marginal vein : Tubular vein on fore margin of wing.

Postmarginal vein : Tubular apex of marginal vein

Stigmal vein : Tubular projection on lower corner of marginal vein.

Submarginal vein : Tubular vein between tegula and marginal vein.

Metasoma

Abdomen (L : B) : Maximum length from base of T2 to the apex of last tergite : breadth measured across the large tergite (T2).

Petiole : First abdominal segment with fused tergite and sternite 1.

ABBREVIATIONS AND ACRONYMS

A.V.	Anterior view
D.V.	Dorsal view
AF	Antennal formula
F1-F10	Flagellomeres 1-10
L : B	Ratio of length and breadth
OD	Ocellar diameter
OOL	Ocellocular length
POL	Postocellar length
sc	Antennal scape
TSS	Transscutellar suture
FWL,FWB	Forewing length, Forewing breadth
<i>m</i>	Marginal vein
<i>sm</i>	Submarginal vein
<i>stg</i>	Stigmal vein
<i>cu</i>	Cubitus vein
T1,T2,T3...	First, second and third tergites
S1, S2...	First, second metasomal sternites
PWLS	Parambikulam Wild Life Sanctuary

SYSTEMATIC LIST

Superfamily PROCTOTRUPOIDEA

Family DIAPRIIDAE

I. Subfamily BELYTINAE

1. Genus *Aclista* Foerster

1. *Aclista globosa* Rajmohana and Narendran sp. nov.
2. *Aclista leana* Rajmohana and Narendran sp. nov.
3. *Aclista specka* Rajmohana and Narendran sp. nov.

2. Genus *Belyta* Jurine

1. *Belyta hirsuta* Rajmohana and Narendran sp. nov.

3. Genus *Cinetus* Jurine

1. *Cinetus travancoricus* Rajmohana and Narendran sp. nov.

4. Genus *Pantoclis* Foerster

1. *Pantoclis keralensis* Rajmohana and Narendran sp. nov.

II. Subfamily DIAPRIINAE

5. Genus *Alareka* Rajmohana and Narendran

1. *Alareka keralensis* Rajmohana and Narendran

6. Genus *Aneuropria* Kieffer

- 1.
- Aneuropria kairali*
- Rajmohana and Narendran

7. Genus *Basalys* Westwood

1. *Basalys bispinosus* Rajmohana and Narendran
sp. nov.
2. *Basalys chotti* Rajmohana and Narendran sp. nov.
3. *Basalys karnatakensis* (Sharma)
4. *Basalys mandibularis* Rajmohana and
Narendran sp. nov.
5. *Basalys unicus* Rajmohana and Narendran sp. nov.

8. Genus *Calogalesus* Kieffer

- 1.
- Calogalesus malabaricus*
- Rajmohana and
-
- Narendran sp. nov.

9. Genus *Claudivania* Huggert

- 1.
- Claudivania miranda*
- Huggert

10. Genus *Coptera* Say

1. *Coptera carinata* Rajmohana and Narendran
sp. nov.
2. *Coptera clavata* Rajmohana and Narendran
sp. nov.
3. *Coptera curvata* Rajmohana and Narendran
sp. nov.
4. *Coptera lobata* Rajmohana and Narendran
sp. nov.
5. *Coptera occispinosa* Rajmohana and
Narendran sp. nov.
6. *Coptera tibiospinosa* Rajmohana and Narendran
sp. nov.
7. *Coptera variegata* Rajmohana and Narendran
sp. nov.

11. Genus *Entomacis* Foerster

1. *Entomacis balloonus* Rajmohana and
Narendran sp. nov.
2. *Entomacis completus* Rajmohana and Narendran
sp. nov.
3. *Entomacis keralensis* Rajmohana and Narendran
sp. nov.
4. *Entomacis linealis* Rajmohana and Narendran
sp. nov.
5. *Entomacis spinosus* Rajmohana and Narendran
sp. nov.

12. Genus *Monelata* Foerster

- 1.
- Monelata completa*
- Rajmohana and Narendran

13. Genus *Nigropria* Rajmohana and Narendran

- 1.
- Nigropria compressa*
- Rajmohana and Narendran

14. Genus *Odontopria* Kieffer

1. *Odontopria nilamburensis* (Sharma)
2. *Odontopria spinosa* Rajmohana and Narendran
sp. nov.

15. Genus *Oxypria* Kieffer

1. *Oxypria kottooliensis* Rajmohana and Narendran
2. *Oxypria spinosa* Rajmohana and Narendran

16. Genus *Paramesius* Westwood

1. *Paramesius incompletus* Kieffer
2. *Paramesius malabarensis* Rajmohana and
Narendran
3. *Paramesius monticola* Kieffer

17. Genus *Spilomicrus* Westwood

1. *Spilomicrus chinnarensis* Rajmohana and
Narendran sp. nov.
2. *Spilomicrus eraviensis* Rajmohana and
Narendran sp. nov.
3. *Spilomicrus keralensis* Rajmohana and
Narendran sp. nov.
4. *Spilomicrus manii* nomen. nov.
5. *Spilomicrus parambiensis* Rajmohana and
Narendran sp. nov.

18. Genus *Trichopria* Ashmead

1. *Trichopria arca* Rajmohana and Narendran
sp. nov.
2. *Trichopria clavata* Rajmohana and Narendran
sp. nov.
3. *Trichopria cristata* Rajmohana and Narendran
sp. nov.
4. *Trichopria disulcata* Rajmohana and Narendran
sp. nov.
5. *Trichopria fringa* Rajmohana and Narendran
sp. nov.
6. *Trichopria gopii* Rajmohana and Narendran
sp. nov.
7. *Trichopria gautami* Rajmohana and Narendran
sp. nov.
8. *Trichopria indica* Kieffer

9. *Trichopria khandala* Sharma
10. *Trichopria krishagathra* Rajmohana and Narendran sp. nov.
11. *Trichopria minuta* Rajmohana and Narendran sp. nov.
12. *Trichopria malabarensis* Rajmohana and Narendran sp. nov.
13. *Trichopria petiolata* Rajmohana and Narendran sp. nov.
14. *Trichopria pedicellata* Sharma
15. *Trichopria semicirculara* Rajmohana and Narendran sp. nov.
16. *Trichopria spinosa* Rajmohana and Narendran sp. nov.
17. *Trichopria tetravata* Rajmohana and Narendran sp. nov.
18. *Trichopria triclavata* Rajmohana and Narendran sp. nov.
19. *Trichopria tibia* Rajmohana and Narendran sp. nov.

19. Genus *Vadana* Rajmohana and Narendran
1. *Vadana sholayarica* Rajmohana and Narendran

Family PROCTOTRUPIDAE

I. Subfamily PROCTOTRUPINAE

20. Genus *Phaenoserphus* Kieffer
1. *Phaenoserphus keralensis* Rajmohana and Narendran
2. *Phaenoserphus longigena* Rajmohana and Narendran
3. *Phaenoserphus sureshi* Rajmohana and Narendran
4. *Phaenoserphus transversus* Rajmohana and Narendran

Superfamily PLATYGASTROIDEA

Family SCHELIONIDAE

I. Subfamily TELONOMINAE

1. Genus *Psix* Kozlov and Le
1. *Psix saccharicola* (Mani)
2. Genus *Telenomus* Haliday
3. Genus *Trissolcus* Ashmead

II. Subfamily TELEASINAE

4. Genus *Trimorus* Foerster
1. *Trimorus (Trimorus) anamalaianus* Mukerjee

2. *Trimorus (Trimorus) appangalus* Mukerjee
3. *Trimorus (Trimorus) dimdicornis* Mukerjee
4. *Trimorus (Trimorus) deccanus* Mukerjee
5. *Trimorus (Trimorus) dubarensis* Mukerjee
6. *Trimorus (Trimorus) fasciatus* Mukerjee
7. *Trimorus (Trimorus) nilamburensis* Mukerjee
8. *Trimorus (Trimorus) ponmudiensis* Mukerjee

Subgenus *Neotrimorus* of *Trimorus* Foerster

1. *Trimorus (N). scutellospinosus* Rajmohana and Narendran
2. *Trimorus (N). spinostriatus* Rajmohana and Narendran

5. Genus *Xenomerus* Walker

1. *Xenomerus atomus* Rajmohana and Narendran
2. *Xenomerus ponmudiensis* Mukerjee

III. Subfamily SCHELIONINAE

6. Genus *Anteromorpha* Dodd

1. *Anteromorpha malabarica* Narendran

7. Genus *Baryconus* Foerster

1. *Baryconus keralensis* Narendran
2. *Baryconus unidentatus* Narendran

8. Genus *Calliscelio* Ashmead

1. *Calliscelio agaliensis* Narendran and Ramesh Babu
2. *Calliscelio carinatus* Narendran and Ramesh Babu
3. *Calliscelio emarginatus* Narendran and Ramesh Babu
4. *Calliscelio indicus* Narendran and Ramesh Babu
5. *Calliscelio longicarinatus* Narendran and Ramesh Babu
6. *Calliscelio malabaricus* Narendran and Ramesh Babu

9. Genus *Calotelea* Westwood

1. *Calotelea tanugatra* Narendran

10. Genus *Dichoteleas* Kieffer

1. *Dichoteleas indica* Saraswat

11. Genus *Gryon* Haliday

12. Genus *Heptascelio* Kieffer

1. *Heptascelio striatosternus* Narendran and
Ramesh Babu

2. *Heptascelio punctisternus* Narendran and
Ramesh Babu

13. Genus *Macroteleia* Westwood

1. *Macroteleia lamba* Saraswat

14. Genus *Opisthacantha* Ashmead

1. *Opisthacantha keralensis* Sharma

2. *Opisthacantha indica* Mani

15. Genus *Platyscelio* Kieffer

1. *Platyscelio abnormis* Crawford

16. Genus *Probaryconus* Kieffer

17. Genus *Scelio* Latreille

1. *Scelio bengalensis* Mukerjee

2. *Scelio mallappura* Mukerjee

3. *Scelio munnaricus* Mukerjee

4. *Scelio nilamburensis* Mukerjee

5. *Scelio satpurus* Mukerjee

6. *Scelio spinifera* Mukerjee

7. *Scelio travancoricus* Mukerjee

18. Genus *Sparasion* Latreille

1. *Sparasion travancoricum* Mani and Sharma

19. Genus *Triteleia* Kieffer

Family PLATYGASTRIDAE

Subfamily PLATYGASTRINAE

20. Genus *Amblyaspis* Foerster

1. *Amblyaspis dalhousianus* (Mukerjee)

21. Genus *Inostemma* Haliday

1. *Inostemma shencottahensis* Mukerjee

22. Genus *Isostasius* Foerster

23. Genus *Leptacis* Foerster

24. Genus *Platygaster* Latreille

1. *Platygaster coorgensis* (Mukerjee)

2. *Platygaster galbus* Ushakumari

3. *Platygaster interdaasi* (Mukerjee)

4. *Platygaster intermedius* Ushakumari

5. *Platygaster keralicus* Ushakumari

6. *Platygaster malabaricus* (Mukerjee)

7. *Platygaster minimus* (Mukerjee)

8. *Platygaster narendrani* Ushakumari

9. *Platygaster nigrocoxatus* Ushakumari

10. *Platygaster oryzae* Cameron

11. *Platygaster sasii* Ushakumari

12. *Platygaster tanus* Ushakumari

13. *Platygaster zantanus* Ushakumari

25. Genus *Synopeas* Foerster

SYSTEMATIC ACCOUNT

According to the modern classification by Masner (1993), both Proctotrupeoidea and Platygastroidea are two separate superfamilies. Thus Platygastriidae and Scelionidae, two of the Proctotrupoid families under ancient classification now belong to superfamily Platygastroidea.

Key to superfamilies PROCTOTRUPOIDEA and PLATYGASTROIDEA

1. Forewing mostly with reduced or partly rich venation 2

— Forewing without any veins some
..... some PLATYGASTROIDEA

2(1). Antennae generally inserted either in middle of face or on a frontal projection far above clypeus; if inserted low, then hind wings with a closed cell (Ismarinae); abdomen often rounded and not acutely margined at sides; if acutely margined, then antennal segments of both sexes exceeding 12 (Ambositrinae)
..... PROCTOTRUPOIDEA

— Antennae always inserted near clypeus; abdomen acutely margined at sides; antennal segments of both sexes rarely exceeding 12 (Except in *Nixonia*, Scelionidae)
..... PLATYGASTROIDEA

Superfamily PROCTOTRUPOIDEA

This superfamily is highly diverse and hence difficult to define morphologically. About 2500 species are described from the world and the fauna is estimated to contain more than 6000 species (Masner, 1993).

Systematic Diagnosis : The Proctotrupoidea are generally black, brown or sombre coloured; rarely metallic. Majority of them do not exceed a few millimetres in size. The antennae are geniculate and often with a well-defined clava in females. The pronotum is curved behind at the sides to meet the tegulae, while in most other groups tegulae are not contiguous with the pronotum. Wing venation is often much reduced. In those forms with partly rich venation, female antennae possess more than 12 segments. Metasomal sternites are not modified and ovipositor issues from near the anal opening.

Classification : This superfamily included 9 families, viz., Austroniidae, Diapriidae, Heloridae, Monomachidae, Pelecinidae, Peradeniidae, Proctotrupidae, Roproniidae and Vanhorniidae (Masner, 1993). With the addition of Renyxidae of Kozlov (1994) and Maamingidae (Early, Masner *et al.* 2001) now the families are 11 in number. Of these only 3 families namely Diapriidae, Heloridae and Proctotrupidae are known to occur.

Key to families of PROCTOTRUPOIDEA in India (Modified from Masner, 1993)

1. Head in lateral view with a distinct antennal shelf; forewing with stigma, spot-like, if at all present DIAPRIIDAE
- Head without antennal shelf; forewing with elongate or thick stigma 2
- 6(5). Antenna with 13 segments; forewing with medial cell (M) not defined.. PROCTOTRUPIDAE
- Antenna with 16 segments, including annulus; forewing with medial cell sub-triangular HELORIDAE

Family DIAPRIIDAE

1833. Haliday. *Entomol. Mag.*, 1 : 274.

1916a. Kieffer. *Das Tierreich*, 44 : 1-627

Diagnosis : Body mostly 2-4 mm long, exceptionally as small as 1 mm or as large as 8 mm; slender, usually smooth and highly polished. Head generally globose or transverse, rarely elongate, mostly as high as long. Antennae inserted

on a conspicuous, well developed frontal eminence (except in *Ismarus* Haliday), distinctly elbowed, with moderate to strongly elongate scape, inserted high above clypeus. Mesonotum well developed and mostly with notauli. Scutellum usually with grooves anteriorly and laterally. Metanotum much reduced to a narrow transverse sclerite. Wings usually well developed, though brachypterous and apterous forms are also met with. Forewing without stigma, but sometimes with slightly thickened *m* vein. Metasoma distinctly petiolate, with true or apparent T2, being the longest. Ovipositor almost entirely retracted.

Status in India and Kerala : Of the 22 genera of Diapriidae hitherto reported from India, 18 are known to occur in Kerala (Mani and Sharma 1982, Huggert 1982, Rajmohana and Narendran 2000a, 2000b, Rajmohana *et al.*, 2001b). The present work describes from Kerala 44 species of diapriidae, new to science and also reports for the first time an African genus, *Calogalesus* Kieffer.

Classification : Include 4 subfamilies namely Ambositrinae, Belytinae, Diapriinae and Ismarinae (Masner, 1993).

Remarks : Only 2 subfamilies Belytinae and Diapriinae are hitherto reported from India (Mani and Sharma 1982; Johnson, 1992).

Key to the subfamilies of DIAPRIIDAE (Modified from Mani and Sharma, 1982)

1. Abdominal tergites with sharp lateral edges, abruptly flexed underneath; T2 much shorter than T3, the two sclerites separated by arched suture; metasoma in female with five and in males with six tergites; cerci well developed, one segmented, not in depressions; antennae in female 15 segmented, in male 14 segmented AMBOSITRINAE
- Abdominal tergites laterally rounded, not abruptly flexed; T2 much longer than T3, the suture between the two almost straight; metasoma in female usually with more than 5 tergites and in males with more than 6 tergites 2
2. Antennae in female with 15 segments, rarely 14 or 12; male antennae 14-segmented; forewing with radial cell closed or open, rarely *radialis* absent but then *m* unusually long;

hindwing usually with closed basal cell; cerci more or less well-developed 3

— Antennae in female with less than 15 segments, if 12-segmented then *m* almost like a point; male antennae usually 13 or 14 segmented; forewing without a radial cell, rarely *radialis* spurious; hindwing without closed basal cell; cerci not developed DIAPRIINAE

3. Notauli always well developed, percurrent; antennae inserted on special shelf high above clypeus; cerci inserted in depressions; foretibia with only one spur BELYTINAE

— Notauli always wanting, reduced to anterior pits; antennae inserted low on face, right above clypeus; antennal shelf not developed; cerci not in depressions; foretibia with regular spur and 1 false spur ISMARINAE

Notes on subfamilies

Ambositrinae mostly occur in south temperate zones. (Neotropical and Australian Regions). About 20 genera are reported world wide (Masner, 1993). They are not yet recorded from Palearctic and Oriental Regions.

Their hosts include Mycetophilidae and related Nematocera (Diptera).

Belytinae forms the most primitive group among diapiids, on the basis of both morphology and hosts (Masner, 1993). They are seen in greatest diversity and abundance in the cool south temperate zones.

Hosts are Mycetophilidae and Sciaridae (Diptera), (Chambers, 1971).

Diapriinae are the most widely distributed group with remarkable species diversity. Some are known to occur in extreme habitats like subantarctic islands (Early, 1978). Hosts include many economically important dipterans like Ceratopogonidae, Chloropidae, Tachinidae and Tephritidae.

Ismarinae, the smallest and the most aberrant both morphologically and biologically, has just one genus and a few rare, infrequent species. They

are closest to Ambositrinae and not yet recorded from the Oriental Region.

They are unique among Diapriidae in having a peculiar combing apparatus on the forelegs (Masner, 1976). Adults are often hyperparasitoids of Cicadellidae (Homoptera) through larvae of Dryinidae (Hymenoptera), (Chambers, 1955).

Subfamily BELYTINAE

1856. Belytinae Foerster. *Hym. Stud.*, 2 : 127.

1916a. Belytinae Kieffer. *Das Tierreich*, 44 : 347-592.

Diagnosis : Body slender and smooth. Antenna in females often with 15 segments, without an abrupt clava, rarely 12 segmented; male antenna with 14 segments; antennal insertion, on a frontal eminence high above clypeus. Mesonotum with distinct notauli. Forewing with complete venation, either with closed or open radial cell; hindwing with a closed basal cell. Petiole distinct. Metasomal tergites laterally rounded; T2 longer than the rest of tergites.

Distribution : Afrotropical, Oriental, Australian, Palearctic, Nearctic and Neotropical Regions.

Status in India and Kerala : A total of five genera namely *Aclista* Foerster, *Pantoclis* Foerster, *Miota* Foerster, *Belyta* Jurine and *Cinetus* Jurine were hitherto reported from India (Sharma, 1979). With the generic transfer of *Aclista* of Sharma (1979) to *Zygota* Foerster by Buhl (1998) and the transfer of *Cinetus indicus* Sharma to *Belyta sharmai* nomen. nov., through the present work, now 6 genera are known to exist in India.

This subfamily is reported for the first time from Kerala and is represented by 4 genera namely, *Aclista* Foerster, *Belyta* Jurine, *Cinetus* Jurine and *Pantoclis* Foerster.

Discussion : According to Kozlov (1978) *Aclista* auct. nec. Foerster belong to *Zygota*. Consequently *Aclista* of Sharma (1979) is *Zygota* (Buhl, 1998).

Remarks : The present work bases Kozlov (1978) for both generic and species characters.

Only Sharma (1979) had studied the Indian species. His works were mostly based on

specimens confined to the hills of Northern India. Since the terrain as well as the climatic conditions are altogether different in Kerala, the species composition too is found to be entirely different.

Buhl (1998) described, based on males, a new species each, under *Belyta*, *Miota* and *Zygota* from India.

Key to Indian genera of *Belytinae* (Based on females)

1. Median longitudinal carina on propodeum forked *Belyta* Jurine (in part)
- Median longitudinal carina on propodeum not forked 2
- 2.(1). Radial cell much longer than vein *m*..... 4
- Radial cell at the most as long as vein *m* 3
- 3.(2). Flagellar segments long and cylindrical; filiform; basal flagellar segments not transverse *Cinetus* Jurine
- Flagellar segments short and cylindrical; basal flagellar segments other than F1 transverse *Belyta* Jurine (in part)
- 4.(2). *Cu* absent, if present, then always straight and not curved; petiole at the most a little longer than wide *Pantoclis* Foerster
- *Cu* present, straight or curved; petiole more than 1.5x longer than wide 5
- 5.(4). Flagellar segments cylindrical; mandibles short; *cu* always curved towards discoidal *Miota* Foerster
- If flagellar segments short, then mandibles also short and *cu* straight; if flagellar segments long and cylindrical, then mandibles falciform and *cu* curved 6
- 6.(5). Metasomal petiole not longer than wide at apex; radial cell always open *Zygota* Foerster
- Metasomal petiole longer than wide at apex; radial cell open or closed 7
- 7.(6). T2 tubular at base; basal flagellar segments longer than broad *Aclista* Foerster

- T2 often not tubular at base; basal flagellar segments except F1 longer than broad
..... *Belyta* Jurine

1. Genus *Aclista* Foerster (Figs. 4-6)

1856. *Aclista* Foerster. Type : *Acoretus scutellaris* Thomson, *Hym. Stud.*, 2 : 128, 131, 133, 135.
1856. *Aclista* Forster : 128, 131, 133, 135. Type : *Acoretus scutellaris* Thomson; designated by Muesebeck and Walkley (1951).
1856. *Anectata* Foerster : 129, 130, 136. Type : *Anectata hirtifrons* Ashmead, Synonymized by Muesebeck and Walkley (1951).
1856. *Xenotoma* Foerster : 129, 130, 137. Type : *Xenotoma nigricoxis* Foerster, Synonymized by Muesebeck and Walkley (1951).
1857. *Acoretus* Haliday : 169. Type : *Belyta rufopetiolata* Nees ab Esenbeck, by monotype, Synonymized by Muesebeck and Walkley (1951).

Diagnosis : Antennal insertion high on frons. Antenna in male 14 segmented, F2 margined and cylindrical; in female with 15 segments, either filiform or gradually enlarged towards tip. If antenna filiform, then mandibles falciform; if only basal flagellar segments elongate and rest gradually thickened, then mandibles short, cruciate; *cu* either absent or present, if present, then long, straight or curved and directed towards basal vein. Notauli complete. Scutellum in front with a rounded foveae. Metanotum not spined. Propodeum with lateral denticles. Wings reduced or well developed; radial cell always closed; *m* often thick, shorter than radial cell, *cu* straight or curved. Hindwing with a basal cell. Petiole long, 2x or more as long as thick. More than 3 annular segments beyond T2.

Distribution : Afrotropical, Oriental, Australian, Palearctic, Nearctic and Neotropical Regions.

Discussion : Since *Aclista* auct. nec. Foerster is *Zygota* (Kozlov, 1978), *Aclista* species of Sharma (1979) namely, *Aclista ahlaca* Sharma and *Aclista chambaensis* Sharma is *Zygota ahlaca* (Sharma) and *Zygota chambaensis* (Sharma) as per Buhl (1998). Both the species with the radial cell in forewings being open, belong to *Zygota* and not *Aclista*.

Aclista Foerster resembles *Zygota* Foerster, but differs that, forewings in *Aclista* always have a closed radial cell, where as radial cell is open in *Zygota* Foerster. All the three species of *Aclista* described here have their radial cell closed.

In *Aclista* two distinct groups are met with. Those with filiform antenna possessing falciform mandibles and the other possessing short cruciate mandibles and having elongate flagellar segments basally, with the distal ones gradually thickened. The second group is *Anectata* according to Kozlov (1978), but is considered a synonym of *Aclista* by Muesebeck and Walkley (1951).

Status in India and Kerala : 3 new species viz. *Aclista globosa* Rajmohana and Narendran sp. nov., *Aclista leana* Rajmohana and Narendran sp. nov. and *Aclista specka* Rajmohana and Narendran sp. nov. are hereby described as new to science.

This forms the first and the only report of this genus from Kerala as well as from India.

Key to species of *Aclista* Foerster of the Indian Region

1. Antenna filiform and mandibles falciform
.....*A. leana* Rajmohana and Narendran sp. nov.
- Only basal antennal segments elongate, with those towards tip enlarged; mandibles short and cruciate 2
2. The median furrow on basal T2 extending to more than half its length
A. globosa Rajmohana and Narendran sp. nov.
- The median furrow on basal T2 appearing only as a speck
A. specka Rajmohana and Narendran sp. nov.

Species Diagnosis

1. *Aclista globosa* Rajmohana and Narendran sp. nov.
(Fig. 4)

Holotype : Female. Length = 2.85 mm. Head and mesosoma shining black; rest including antennae and legs brownish black. Wings a little infusate; veins deep brown.

Head : Trapezoid in profile. Smooth and shiny; with dense fine and erect pubescence; clypeus bare; vertex gently curved. Frons feebly convex and densely hairy. Ocelli arranged in a close triangle. Occipital flange not step-like. Eyes placed high, large, bulging, with sparse fine pubescence. Mandibles not needle-like, but short and broad. A.F 1.1.7.6. Antenna gradually enlarged towards tip. A3 0.4x as long as thick; 0.45x length of scape; antennal segments preceding A15 roughly globular, A15 pointed terminally, 1.5x as long as A3, almost 3x as long as A14.

Mesosoma : Wider than head. Cervix with crenulae in lower half. Pronotum broad, slightly depressed at sides and with anterolateral corners angular; not densely hairy. Notauli parallel in basal one-fourth and diverging in front, wider at base; humeral sulcus absent. Scutellar fovea large and rounded; scutellum humped in profile, median carina absent. Metanotum with 3 longitudinal carinae; propodeum with a prominent median carina and a pair of lateral carinae; lateral flanges not developed, but represented by lateral denticles. Forewing with a closed radial cell, longer than 1.5x *m*; *cu* straight, distinct and directed towards basal vein. Propleuron and mesopleuron with concavity; hairy only at borders. Metapleuron densely hairy, concealing sculpture beneath.

Metasoma : Smooth and shiny; densely pubescent, widest portion much below mid T2, almost at 0.75 of T2. Petiole 2.4x as long as thick and with parallel longitudinal irregular striae. Basal T2 tubular, not as wide as lower margin of petiole. Median furrow extending to almost its half length; base of T2 with two small furrows on either side of median furrow. 6 tergites visible beyond T2.

Male : Unknown.

Host : Unknown.

Etymology : This species is named '*globosa*' after the roughly globose appearance of antennal segments towards the tip, except the terminal one.

Material examined : Holotype : Female collected from PWLS (Palghat, Kerala) on 5-xi-1995 by P.M. Sureshan.

Discussion : In *A. globosa*, the median furrow on basal T2 extends to more than half its length, while in *A. specka* the median furrow appear only as a speck. The proportions of the antennal segments also differ.

2. *Aclista leana* Rajmohana and Narendran sp. nov.
(Fig. 5)

Holotype : Female. Length of body = 2.66 mm. Head, mesosoma and petiole shining black. Eyes pale black. Scape and pedicel pale brown. Fore and mid coxae except tarsal segments yellowish brown. Basal hind coxae, tibia and tarsal segments brownish black. Metasoma deep brownish black. Wings infusate; veins deep brown.

Head : Trapezoid in profile. Smooth and shiny; with dense fine and erect pubescence; clypeus bare. Frons feebly convex. Ocelli arranged in a close triangle; occipital flange not step-like. Eyes large, bulging, with sparse fine pubescence. Mandibles falciform; post genal cushion well developed. Antenna filiform, with long and cylindrical flagellar segments. A.F. 1.1.13. A3 not longest, 4x as long as wide and 0.6x scape; A15 0.66x A3.

Mesosoma : Cervix much reduced. Pronotum with anterolateral corners angular; not densely hairy. Notauli parallel in basal one-fourth and diverging in front, wider at base; humeral sulcus distinct, long, curved, reaching towards tip of notauli. Scutellar fovea large, sub-rectangular and with convex border; scutellum humped in profile. Metanotum with 3 longitudinal carinae; propodeum with a prominent median carina; lateral carinae not complete. Forewing with a closed radial cell, longer than 2x *m*; *cu* long and curved towards discoidal. Propleuron and mesopleuron hairy only at borders; a longitudinal row of punctae well beneath tegula on mesopleuron. Metapleuron densely hairy, concealing sculpture beneath.

Metasoma : Petiole long and slender, more than 2x as long as thick; articulation with propodeum and T2 forming an inverted 'V' and raising metasoma to plane of propodeum; with fine narrow parallel longitudinal striae; T2 tubular at base and constricted, widest portion almost in

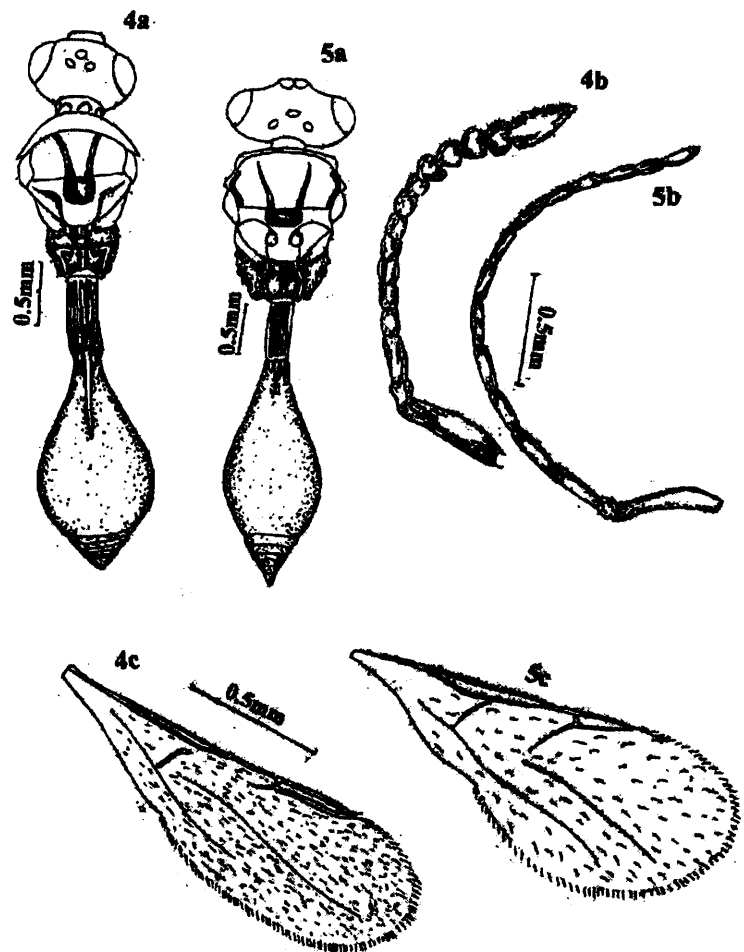


Fig. 4. *Aclista globosa* Rajmohana & Narendran sp. nov.
a. Body (D.V.); b. Antenna; c. Forewing.

Fig. 5. *Aclista leana* Rajmohana & Narendran sp. nov.
a. Body (D.V.); b. Antenna; c. Forewing.

middle; upper and lower part tapering; bare except sparse lateral hairs. Median furrow on T2 extending to almost 0.2 of it; base of T2 with two small furrows on either side of median furrow; metasoma pointed at apex.

Male : Unknown.

Host : Unknown.

Etymology : Species is named '*leana*' after the lean appearance of the metasoma.

Material examined : Holotype : Female : Collected from Sholayar (Trichur, Kerala), on 21-ii-1996, by C. Radhakrishnan and party.

Paratype : 1 female collected on 6-xi-1995 from Muthalakayam (PWLS, Palghat, Kerala) by P.M. Sureshan.

Discussion : This is a distinct species with filiform antenna and falciform mandibles. *A. albohirta* (Dodd) also possess falciform mandibles, but its radial cell is only somewhat longer than *m*,

while in *A. leana*, radial cell is $2x\ m$. The petiole in Dodd's species is almost $4x$ as long as wide where as in this new species, petiole is just $2x$ as long as thick.

A3 only $2.5x$ as long as wide in this new species, while A3 is $4x$ as long as wide in *A. philippensis* (Kieffer). Also m is $0.5x$ length of radial cell in this species while, m is $0.6x$ as long as radial cell in *A. philippensis*.

3. *Aclista specka* Rajmohana and Narendran sp. nov. (Fig. 6)

Holotype : Female. Length = 2.28mm. Head deep brownish black; rest of body pale to dark brown. Scape and upto F8 yellowish brown, rest deep brown; legs concolorous with scape. Wings clear; veins very pale.

Head : Trapezoid in profile. Smooth and shiny; with dense fine and erect pubescence; clypeus bare; vertex gently curved. Frons feebly convex and densely hairy. Ocelli arranged in a close triangle. Occipital flange not step-like. Eyes placed high, large bulging, with sparse fine pubescence; mandibles bidentate, not needle-like, but short and broad. AF 1.1.5.8; A15 almost $2x$ A14.

Mesosoma : Cervix with traces of crenulae in lower half. Pronotum broad, slightly depressed at sides and with angular anterolateral corners; not densely hairy. Notauli parallel in basal one-fourth and diverging in front, wider at base; humeral sulcus absent. Scutellar fovea large, and rounded; scutellum not humped, median carina absent. Metanotum with 3 longitudinal carinae; propodeum with a prominent median carina, and a pair of lateral carinae; lateral flanges not developed, but represented by lateral denticles. Forewing with a closed radial cell, longer than almost $2.5x\ m$; cu feebly curved, directed a bit towards *basalis*. Propleuron with reduced concavity; mesopleuron hairy only at borders; metapleuron densely hairy, concealing sculpture beneath.

Metasoma : Smooth and shiny; densely pubescent, widest portion a little below mid T2, almost at 0.75 of T2. Petiole $2x$ as long as thick and with parallel longitudinal irregular striae.

Basal T2 less tubular, not as wide as lower margin of petiole. Median furrow extending only to 0.32 of T2. 6 tergites visible beyond T2.

Male : Unknown

Host : Unknown

Etymology : The species is named '*specka*' after the speck-like median furrow on basal T2.

Material examined : Holotype : Female collected from Sholayar (Trichur, Kerala) on 22-ii-1996, by C. Radhakrishnan and party.

Discussion : This species is unique in having the median furrow on T2 very short, hardly extending to 0.32 of it. The rest of the characters have been compared and discussed under *A. globosa* sp. nov.

2. Genus *Belyta* Jurine (Fig. 7)

1807. *Belyta* Jurine. Type : *Belyta bicolor* Jurine, Jurine. *Nouv. Meth. Class. Hym. Dipt.*, 311.

1916a. *Belyta* Kieffer. *Das Tierreich*, **44** : 387.

1908c. *Tetrapsilus* Kieffer : 367-397. Type : *Tetrapsilus filicornis* Kieffer, by monotypy. Synonymized by Wall (1971) by transfer of type species to *Belyta* Jurine.

1909. *Paraclista* Kieffer : 476. Type : *Belyta brachyptera* Thomson, designated by Kieffer (1910a). Synonymized by Hellen (1964).

1964. *Neobelyta* Hellen : 50. Type : *Belyta sanguinolenta* Nees ab Esenbeck, by original designation. Proposed as a subgenus of *Belyta* Jurine.

Diagnosis : Antennal insertion high on frons. Antenna in females 15 segmented and in males 14 segmented. Mandibles bidentate, two teeth unequal. Maxillary palpi 5 segmented and labial palpi 3 segmented. Pronotum with anterior angular corners and with lateral inward depression. Notauli complete. Scutellum in front with a fovea. Metanotum unarmed. Propodeum often with a bifurcate median carina; but at times non-bifurcated. Wings reduced or extending beyond tip of metasoma; vein m not longer than radial cell and not shorter than stg ; m mostly $2x$ to $3x$ longer than thick; radial cell open or closed. Petiole about $1.5x$ as long as thick; stg obliquely directed from anterior margin of forewing, stg

and *pm* not forming acute angle; radial cell closed; if *stg* perpendicular to anterior margin of forewing, then radial cell open. Radial cell, if present, extending beyond 0.5 of length of forewing. T2 basally with or without longitudinal grooves, median one being longer, deeper and broader than laterals, but not extending beyond 0.5 of T2; metasoma with a constricted neck; T7 and T8 not laterally compressed.

Distribution : Afrotropical, Australian, Nearctic, Neotropical, Oriental and Palearctic Regions.

Status in India and Kerala : 3 species namely *Belyta indica* Sharma, *Belyta siwalikensis* Sharma and *Belyta heretica* Buhl are hitherto known from India (Sharma 1979, Mani and Sharma 1982, Buhl, 1998).

The present work reports 1 new species namely *Belyta hirsuta* Rajmohana and Narendran, forming the first report of this genus from Kerala. Besides, *Cinetus indicus* Sharma has been redesignated as *Belyta sharmai*. Accordingly, a total of 5 species under this genus are hereby reported from India.

Remarks : Buhl (1998) described a new species from Kashmir, based on males, viz. *B. heretica* Buhl. Having the radial cell open it is different from the species described here.

Key to the species of *Belyta* Foerster of the Indian Region

1. Males 2
- Females 3
2. Third antennal segment strongly excavated ..
..... *B. heretica* Buhl
- Third antennal segment not strongly excavated
..... *B. indica* Sharma
3. Median carina on propodeum bifurcated 4
- Median carina on propodeum simple, non-bifurcate *B. sharmai* nom. nov.
4. Forewing with radial cell closed; petiole not smooth 5
- Forewing with radial cell open; petiole smooth
..... *B. siwalikensis* Sharma

5. Median furrow absent on basal T2
..... *B. indica* Sharma
- Median furrow flanked by two lateral furrows on basal T2
..... *B. hirsuta* Rajmohana and Narendran sp. nov.

1. *Belyta hirsuta* Rajmohana and Narendran sp. nov. (Fig. 7)

Holotype : Female. Length = 2.47mm. Head and body shining black. Antennal scape and all segments except a few apical ones reddish brown. Eyes silvery, mandibles brown. Apical tarsi black. Wings slightly infuscate, veins deep brown. Body pubescence and marginal fringe of wings brown.

Head : Smooth and shiny, but with dense long erect hairs. Deep punctae or carinae absent. In profile, antennal shelf well protruded above vertex for antennal insertion. Frons convex. Eyes oval, bulging laterally with fine and dense hairs. Ocelli arranged in a close triangle. Temples gradually curving towards occiput. Occipital flange step-like and with minute punctae. Antenna 15 segmented, stout and thickened next to scape, A3 longest; A5 to A15 globular.

Mesosoma : Densely hairy. Cervix wider posteriorly, with distinct deep crenulae. Mesonotum with notauli deep, diverging in front, parallel in basal half; TSS distinct. Scutellum with a large rounded groove. Metanotum with equidistant longitudinal carinae. Propodeum with a median carina bifurcating at about 0.8 its length, flanked on either side by a pair of lateral carinae; posterior border emarginate and carinate, with lateral flanges ending in distinct tooth-like structures; area between carinae bare; nucha distinct. Propleuron with hairy margin and a deep concavity. Mesopleuron less hairy and with slanting and longitudinal carinae. Metapleuron with many longitudinal carinae, less concealed by hairs. Foretibial spur bifid at tip. Wings not reduced; *m* not as long as radial or *stg*; radial cell closed; *cu* nebulous.

Metasoma : Petiole broader posteriorly, with fine parallel adjacent striae; base of T2 not as wide as lower margin of petiole and with many

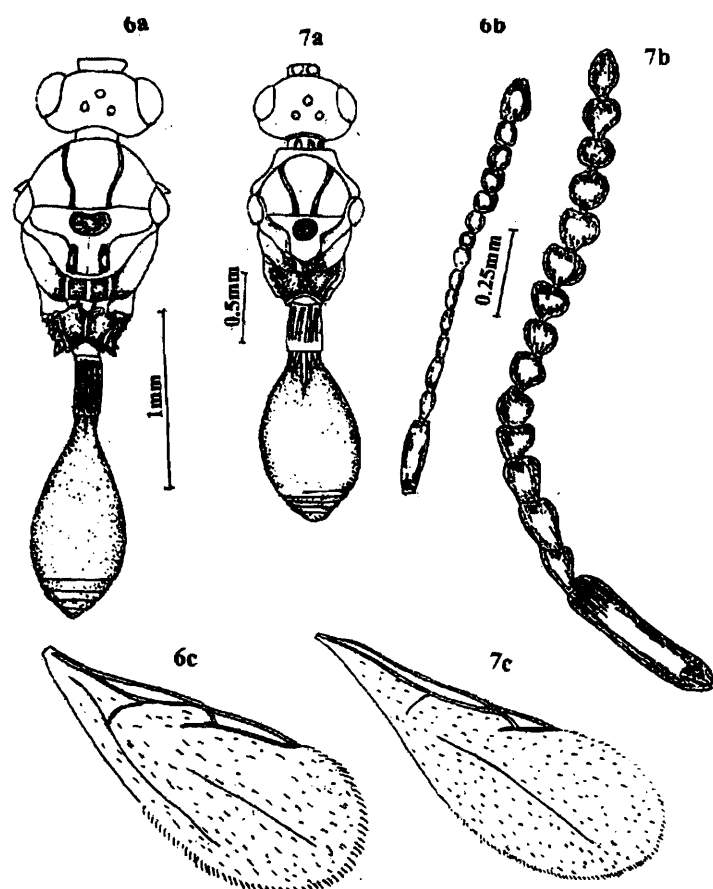


Fig. 6. *Aclista specka* Rajmohana & Narendran sp. nov.
a. Body (D.V.); b. Antenna; c. Forewing.

Fig. 7. *Belyta hirsuta* Rajmohana & Narendran sp. nov.
a. Body (D.V.); b. Antenna; c. Forewing.

longitudinal grooves; median being longest; S2 also with basal striae. 5 tergites visible beneath T2 dorsally.

Male : Unknown.

Host : Unknown.

Material examined : Holotype : Female, collected by P.M. Sureshan on 19-ii-1997 from Pamba (Pathanamthitta, Kerala).

Etymology : Species is named '*hirsuta*', meaning 'hairy', after its character of dense hairs.

Remarks : With the radial cell closed, this species is similar to *B. indica* Sharma, but differs from it in : Median furrow present on basal T2 flanked by lateral furrows. (No median furrow on basal T2 in *B. indica* Sharma).

—This species differs from *B. siwalikensis* Sharma in : Radial cell closed. (Radial cell open in *B. siwalikensis*)

—Petiole striated. (Petiole smooth in *B. siwalikensis*).

3. Genus *Cinetus* Jurine (Fig. 8)

1807. *Cinetus* Jurine : Type species : *Cinetus iridipennis* Le Peletier, Jurine. *Nouv. Meth. Class. Hym. Dipt.*, 310.
1856. *Leptorphatus* Foerster : 129, 131, 137. Type : *Leptorphatus conicus* Ashmead, designated by Muesebeck and Walkley (1951). Synonymized by Masner (1964a).
1897. *Stylidolon* Ashmead : 53. Type : *Stylidolon politum* Ashmead, by monotypy. Synonymized by Masner (1964a).
1967. *Percinetus* Wall : 134, 139. Type : *Cinetus lanceolatus* Thomson, by original designation. Proposed as a subgenus of *Cinetus* Jurine.
1967. *Necitus* Wall : 134, 139. Type : *Cinetus angustatus* Kieffer, by monotypy and original designation. Proposed as a subgenus of *Cinetus* Jurine.
1967. *Xenotomoides* Wall : 135, 140. Type : *Cinetus sequester* Nixon, by original designation. Proposed as a subgenus of *Cinetus* Jurine.

Diagnosis : Head transverse. Antennae inserted on a prolongation of frons; long and filiform; male antenna with 14 segments and female antenna with 15 segments. Notauli present. Scutellum anteriorly with fovea. Propodeum with a simple median longitudinal carina and lateral denticles. Venation complete; in forewing, radial cell closed and almost equal to *m*; *cu* often long and curved towards discoidal; hindwing with a basal cell. Petiole 1.5 to 5x as long as thick; rest of metasoma depressed; T2 with basal striae and furrows, median furrow deep and long; T2 if bulged laterally, then mostly with as few as 2 to 3 annular tergites visible beneath; metasomal tip at times bent upwards; metasoma if not bulged, then annular segments visible.

Distribution : Afrotropical, Australian, Nearctic, Neotropical, Oriental and Palearctic Regions.

Discussion : *Cinetus* Jurine resembles *Miota* Foerster, but differs by the following :

Radial cell at the most as long as vein *m* in *Cinetus*, while radial cell many times longer than *m* in *Miota*.

From India, Sharma (1980) reported one species namely *Cinetus indicus* Sharma. However the characters mentioned in descriptions as well

as seen in the illustrations (short and thick antenna, rather than long and filiform) resemble genus *Belyta* than *Cinetus*. Further in *Cinetus*, *cu* is directed towards discoidal; the illustration shows a straight *cu*, directed towards *basal* vein. Hence *C. indicus* Sharma with a non-bifurcate median carina on propodeum needs to be treated as *Belyta indica* (Sharma). Since the species name is preoccupied, a new name viz., *Belyta sharmai* nom. nov. is hereby suggested.

Status in India and Kerala : With the transfer of *Cinetus indicus* of Sharma to *Belyta*, *Cinetus travancoricus* Rajmohana and Narendran sp. nov. forms the only report of this genus from Kerala as well as India.

1. *Cinetus travancoricus* Rajmohana and
Narendran sp. nov.
(Fig. 8)

Holotype : Female. Length = 2.66 mm. Head and thorax shining black. Metasoma except petiole brownish black. Antennal scape and pedicel pale brown; rest concolorous with metasoma; foreleg and midleg pale brown; metatibia brownish black; coxae black. Wings hyaline; veins deep brown.

Head : Trapezoid in profile. Antennal insertion high above vertex; vertex feebly sloping till front ocellus. Ocelli arranged in a close triangle. Occipital flange, not step-like; without any striae or punctae; with dense decumbent hair; frons feebly convex. Clypeus elevated. Eyes large, oval, bulging and bare. Frons densely hairy. Antenna filiform, segments long and cylindrical. A3 longest, 5.2x as long as wide, 1.3x as long as A14 and a little longer than sc.

Mesosoma : Cervix with striae. Pronotum with anterolateral corners angular; densely hairy. Notauli broader basally, parallel near base. Scutellum with a large fovea, scutellar shield without a median carina. Metanotum with 2 longitudinal carina. Scutellum and propodeum less hairy, compared to mesonotum. Propodeum with a median keel flanked by a pair of lateral carina on either sides, not raised to form a keel or tooth; posterior border emarginate and also carinate; lateral flanges not developed, but represented by lateral denticles. Forewing with a closed radial

cell, almost equal to *m*; *cu* curved and almost extending towards discoidal; *m* not dotted, almost as long as basal vein. Propleuron and mesopleuron densely hairy; sculpture on metapleuron concealed.

Metasoma : Petiole 2x as long as thick; striae on petiole much reduced, with extensive smooth planes; hairs long and sparse laterally. T2 basally constricted and tube-like, basally with longitudinal striae and furrows, median being most prominent; median furrow extending to 0.33 of length of T2. T2 with sparse and long lateral hairs. Other tergites visible only as bands, T3 and T4 narrow, T5 broad, T6-T8 narrow. Metasomal tip T5 onwards distinctly upturned.

Male : Unknown.

Host : Unknown.

Etymology : The species is named '*travancoricus*' after its region of collection, namely Travancore.

Material examined : Holotype : Female. Collected on 25-ii-1995, by P.M. Sureshan, from Eravikulam (Idukki, Kerala).

Discussion : This species differs from *C. melancholicus* Buhl, the only female described from the Oriental region, in having:

Petiole 2x as long as thick (In *C. melancholicus* Buhl, petiole 4x as long as thick).

A3 longer than scape. (In *C. melancholicus* Buhl, scape longer than A3).

Other than these, significant variations in length to width proportions of almost all antennal segments, length of *m* to radial cell etc. distinguish the two species.

4. Genus *Pantoclis* Foerster
(Fig. 9)

1856. *Pantoclis* Foerster. Type : *Pantoclis barycera* Foerster *Hym. Stud.*, 2 : 129, 136.

1856. *Zelotypa* Foerster : 130, 141. Type : *Zelotypa coloradensis* Ashmead. Synonymized by Masne Krombein and Burks (1967).

Diagnosis : Head viewed from above higher than long. Eyes hairy. Mandibles bidentate, teeth

unequal; maxillary palpi 5 segmented and labial palpi 3 segmented. Antennal insertion high, frontal shelf raised above vertex. Antenna in male 14 segmented and in female 15 segmented. A3 longer than A4. In female, A3 not longer than total length of next 2 segments. A4-A14 a little longer than thick. A14 a little elongate. Notauli complete. Scutellum in front with an anterior fovea; scutellar shield usually with a median carina and without a transverse row of pits. Metanotum unarmed. Median longitudinal carina on propodeum not bifurcate. Forewing with a closed radial cell, reaching beyond 0.5 length of forewing; Vein *m* usually very short; *radial* cell many times *m*; *stg* obliquely directed from anterior margin of forewing; *stg* and *pm* not forming an acute angle. Petiole often not longer (at times slightly longer) than width at apex. Rest of metasoma depressed, elongate, elliptic and with a pointed tip in female; median longitudinal furrow on basal T2 longer and deeper than lateral furrows, but not reaching beyond its midpoint; tergites 3-6 nearly equal. Last tergite much reduced.

Distribution : Afrotropical, Australian, Nearctic, Neotropical, Oriental and Palearctic Regions.

Discussion : This genus differs from *Miota* Foerster in having

—A straight *cu*. (*cu* always curved in *Miota*).

—Petiole a little longer than thick. (Petiole more than 1.5x as long as wide in *Miota*).

Status in India and Kerala : 3 species viz., *P. dalhousieanus* Sharma, *P. kodaiensis* Sharma and *P. sulcatus* Sharma are hitherto reported from India (Sharma 1979). *P. keralensis* Rajmohana and Narendran sp. nov. forms the first report of this genus from Kerala.

Key to species of *Pantoclis* Foerster of the Indian Region

1. Males..... 2
- Females 3
2. Base of T2 with striae *P. kodaiensis* Sharma
- Base of T2 without striae *P. sulcatus* Sharma
3. A3 longer than scape; scutellar shield with an incomplete median carina *P. keralensis* Rajmohana and Narendran sp. nov.
- A3 not as long as scape; scutellar shield without any median carina *P. dalhousieanus* Sharma

1. *Pantoclis keralensis* Rajmohana and Narendran sp. nov.

(Fig. 9)

Holotype : Female. Length = 2.20 mm. Head and body shining black; metasoma brownish black. Basal antennal segments pale brown; distally dark brown. Legs and mandibles pale black. Wings a little infusate; veins deep brown.

Head : Smooth and shiny. In profile trapezoid. Antennal shelf raised high above vertex. Frons with dense erect hairs. Eyes large, bulged and with sparse fine hairs. Frons convex, clypeus

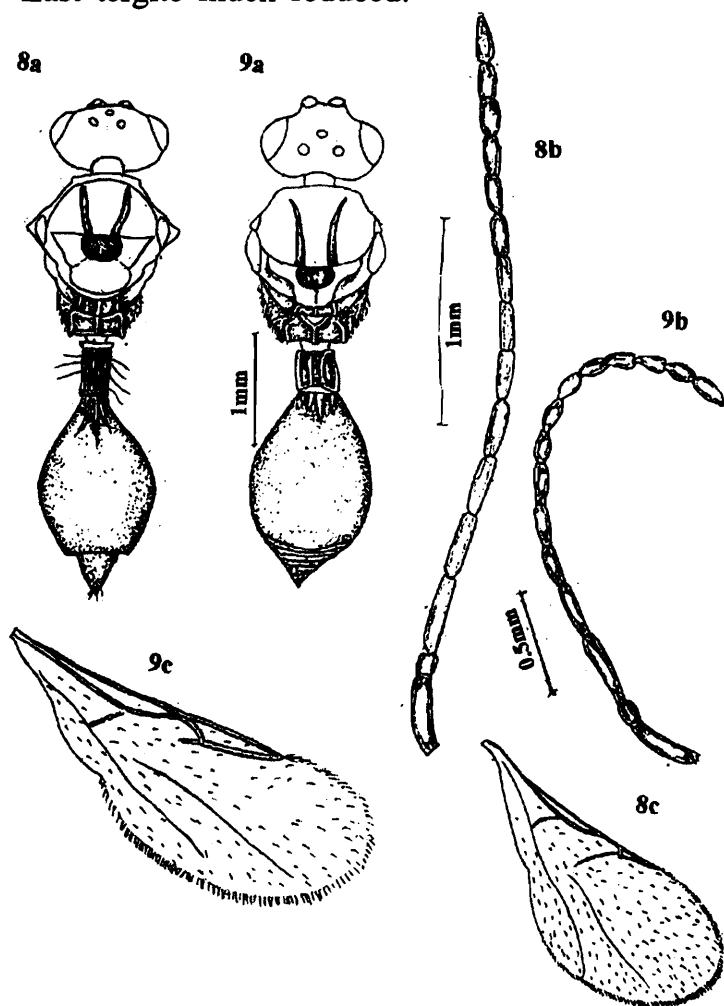


Fig. 8. *Cinetus travancoricus* Rajmohana & Narendran sp.nov. a. Body (D.V.); b. Antenna; c. Forewing.

Fig. 9. *Pantoclis keralensis* Rajmohana & Narendran sp.nov. a. Body (D.V.); b. Antenna; c. Forewing.

elevated. Ocelli arranged in a close triangle. Occipital flange not step like, but bordered by minute striae, with a gentle slope beneath ocelli. Mandibles unequally bidentate. A.F 1.1.4.9. Antenna 15 segmented; A3 to A6 elongated; A3 longest, even longer than scape. A3, 4.6x as long as wide, 1.1x length of scape, 1.7x length of A15; A15, 1.3x as long as A14. A7 onwards a little thickened towards tip.

Mesosoma : Cervix bare in upper half, lower half with deep punctae. Sparsely hairy. Mesonotum with 2 notauli parallel in posterior half; gradually diverging in front. Scutellum with a broad sub rectangular fovea, with convex lateral sides; scutellar shield with an incomplete median carina. 3 metanotal carinae not raised to form keel. Propodeum with a prominent median carina, and a pair of lateral carinae; lateral flanges not developed, but represented by lateral denticles. Forewing with *m* punctiform; radial cell almost 5x *m*; *cu* short and straight, directed towards basal vein. Propleuron with reduced concavity; mesopleuron hairy only at borders. Metapleuron densely hairy, concealing sculpture beneath.

Metasoma : Smooth and shiny; densely pubescent, widest portion at mid T2; petiole a little longer than wide and with parallel longitudinal irregular striae. Basal T2 not tubular, 0.3x as wide as lower margin of petiole; median furrow extending to 0.22 length of T2. 6 tergites visible beyond T2.

Male : Unknown.

Host : Unknown.

Etymology : The species is named '*keralensis*' after the state's name, Kerala.

Material examined : 2 females collected on 6-iv-95 and 21-x-1996, Karinmkappu (Aralam, Kannur, Kerala) by P.M Sureshan and on 22-ii-1996, from Sholayar (Trichur, Kerala) by C. Radhakrishnan and Party.

Discussion : *P. keralensis* sp.nov. is distinct from *P. dalhousieanus* Sharma in having A3 longer than scape and in the presence of an incomplete median carina on scutellar shield.

Subfamily DIAPRIINAE

1856. Diaprioidae, Foerster. *Hym. Stud.*, 2 : 20, 121.

1893. Diaprioidae, Ashmead. *Bull. U.S. Nat. Mus.*, 45 : 384.

1903. Diaprioidae, *J.N.Y. Ent. Soc.*, 11 : 28, 30;

1916a. Diaprioidae, Kieffer. *Das Tierreich*, 44 : 3-347.

Diagnosis : Body usually smooth and shiny. Head mostly globose or transverse, mostly as high as long. Antennae always inserted on a conspicuous well developed frontal eminence; females with 12 to 14 segmented antennae, rarely with eight or eleven segmented, often clavate; males with 13 or 14 segmented antennae. Mandibles mostly normal, opisthognathous forms also met with. Mesonotum mostly with complete, incomplete or abbreviate notauli, while in some genera, notauli absent. Scutellum with or without grooves. Metanotum seen as a narrow sclerite and often carinate. Propodeum smooth, but at times finely granulate. Wings generally with much reduced venation. Forewing often without a radial cell, *radial* rarely spurious as in some species of *Spilomicrus* Westwood. Hindwing without a closed basal cell.

Petiole distinct. Metasomal tergites laterally rounded, not abruptly flexed. Females usually with more than five tergites and males with more than six tergites. Second metasomal tergite longer than the other tergites.

Biology : The relatively few species of diapriinae with known host preferences and relationships, establishes them as primary dipteran endoparasitoids. Their hosts include not only dipteran pests of agriculture, but also of live-stock, like biting flies and filth flies. *Trichopria* Ashmead parasitize members of economically important dipteran families like Calliphoridae (*Lucilia sericata*), Muscidae (*Stomoxys* sp. and *Fannia* sp.), Syrphidae (*Syrpitta pipens*), Agromyzidae (*Melanagromyza obtusa* and *M. phaseoli*), Ephydriidae (*Hydrellia* sp.), Tephritidae (*Ceratitis* sp. and *Dacus* sp.), while *Entomacis* Foerster are known to parasitise many Ceratopogonids (*Forcipomyia* sp.) (Nixon, 1980). Genera like *Basalys* Westwood, *Coptera* Say, *Aneurhyncus* Westwood are also reported to parasitise many of the above said groups. In addition to these,

records of *Trichopria stratiomyiae*, as a pupal parasitoid of *Stratiomyia anubis*, *T. fumipennis* of *Drosophila melanogaster* and *Spilomicrus formosus* of Pipunculidae etc. establish the host diversity of the parasitoids.

Status in India and Kerala : From India, the following 19 genera are reported :

Alareka Rajmohana and Narendran, *Aneuropria* Kieffer, *Aulacopria* Kieffer, *Basalys* Westwood, *Calogalesus* Kieffer, *Claudivania* Huggert, *Coptera* Say, *Cyathopria* Kieffer, *Dolichopria* Kieffer, *Entomacis* Foerster, *Monelata* Foerster, *Nigropria* Rajmohana and Narendran, *Oxyprria* Kieffer, *Odontopria* Kieffer, *Paramesius* Westwood, *Spilomicrus* Westwood, *Trichopria* Ashmead, *Vadana* Rajmohana and Narendran and *Xyalopria* Kieffer. *Odontopria*, *Calogalesus* and *Coptera* are being reported for the first time from India. Of the above, genera namely, *Cyathopria*, *Dolichopria*, *Aulacopria* and *Xyalopria* are not yet documented from Kerala.

Discussion : Basing on original descriptions and illustrations, the present study transfers, *Spilomicrus nilamburensis* Sharma to *Odontopria* Kieffer; *S. karnatakensis* Sharma and *S. nilgiriensis* Sharma to *Basalys* Westwood, the new combinations being *Odontopria nilamburensis* (Sharma), *Basalys karnatakensis* (Sharma) and *Basalys nilgiriensis* (Sharma).

This study also, places through generic transfer, all the five species of *Psilus* Panzer known from India, under *Coptera* Say (see discussion under *Coptera*).

Key to Indian genera of Diapriinae (Based on females)

1. Wings reduced, obsolete or absent..... 2
- Wings normally developed 7
- 2.(1). Antenna 10 or 12- segmented 3
- Antenna 13- segmented 6
- 3.(2). Antenna 10 segmented, tegula and wings almost reduced to scales; petiole broadly transverse, bulging laterally
..... *Claudivania* Huggert

- Antenna 12 segmented, wings not reduced to scales; petiole normal 4
- 4.(3). Scutellum not distinctly separated from mesonotum and without grooves; club with three or four segments; mandibles normal; forewing not incised or notched at the distal end 5
- Scutellum distinctly separated from mesonotum and always with grooves; a distinct club seen rarely; mandibles elongate, beak-like; distal end of forewing mostly incised or notched
..... *Coptera* Say
- 5.(4). Antenna with a sharply differentiated club, the first segment of which is virtually identical with the second and extremely sharply contrasted in size with the segment preceding it; club 3 or 4-segmented
..... *Basalys* Westwood
- Antenna with much less sharply differentiated club, the first segment of which tending to be smaller than the second and less sharply contrasted with the segment preceding it; club 3, 4 or 5-segmented *Trichopria* Ashmead
- 6.(2). Metasoma rounded posteriorly and flattened anteriorly; the anterior margin of T2 at a higher level than petiole
..... *Spilomicrus* Westwood
- Metasoma pointed posteriorly and laterally compressed; T2 in level with petiole
..... *Paramesius* Westwood
- 7.(1). Forewing distally margined or truncated 8
- Forewing rounded distally, not truncated 10
- 8.(7). Antennae with 12 segments; scutellum always with grooves 12
- Antenna with 13 segments; scutellum with or without grooves 9
- 9.(8). Scutellum with one groove, rarely two; notauli either present or absent; terminal antennal segments normal
..... *Entomacis* Foerster
- Scutellum without grooves; notauli absent;

- terminal club segment distinctly largest
..... *Monelata* Foerster
- 10.(7). Antenna 14-segmented; notauli absent;
scutellum without impressions
..... *Dolichopria* Kieffer
- Antenna 12 or 13-segmented; notauli either
present or absent 11
- 11.(10). Antenna 12-segmented, terminal segments
either with or without a club 12
- Antenna 13-segmented, terminal segments
either with or without a club 14
- 12.(11)Mandibles prolonged, beak-like and in the
closed position, forming a backward directed
beak; frons with a conspicuous lamelliform
projection 13
- Mandibles not beak-like; face and frons normal
..... 17
- 13.(12). Forewings with only an incomplete
submarginal, always kept folded when at rest;
petiole normal *Coptera* Say
- Forewings with submarginal, marginal and
stigmal, not kept folded when at rest; petiole
distinctly bent and convex in lateral view, with
distal end at a higher level than basal end
Calogalesus Kieffer
- 14.(11). Head, smooth, without any punctures ..
..... 15
- Head with deep and distinct punctures
..... *Odontopria* Kieffer
- 15.(14). Metasoma flattened dorsoventrally; eyes
with distinct adorbital carina
..... *Nigropria* Rajmohana and Narendran
- Metasoma not flattened dorso ventrally,
adorbital carina absent 16
- 16.(15). Notauli always present; lateral surface of
pronotum in some with a row of foveae
extending to almost to its entire posterior
margin; base of T2 fitting closely to apex of
petiole and seeming an even continuation of
it; *m* 3-4x as long as thick
..... *Paramesius* Westwood
- Notauli either present or absent; *m* only 1-2x
as long as thick; lateral surface of pronotum
without a row of foveae, smooth; base of T2
at a higher level than petiole
..... *Spilomicrus* Westwood
- 17.(12)Propodeum with a long spine; notauli
absent 18
- Propodeum without a spine, at most a pointed
median carina present notauli present or absent
19
- 18.(17). Scape with one or two spines
..... *Xyalopria* Kieffer
- Scape without spines *Oxypria* Kieffer
- 19.(17). Forewings without vein, only submarginal
represented at base *Aneuropria* Kieffer
- Forewing at least with submarginal and
marginal, the former reaching front margin
..... 20
- 20.(19)Petiole hemispherical, one-third narrower
than the second tergite; *basalis* always present
..... *Cyathopria* Kieffer
- Petiole distinctly cylindrical, much thinner than
the second tergite; *basalis* present or absent
..... 21
- 21.(20).Antenna with a sharply differentiated club,
the first segment of which is virtually identical
with the second and extremely sharply
contrasted in size with the segment preceding
it; club 3 or 4 segmented (Rarely 11-segmented
forms also met with); a distinct *basalis* always
present
..... *Basalys* Westwood
- Antenna with much less sharply differentiated
club, the first segment of which tending to be
smaller than the second and less sharply
contrasted with the segment preceding it; club
3, 4 or 5-segmented *Trichopria* Ashmead

Key to the Indian genera of Diapriinae (Based on males)

1. Antenna 14-segmented 2
- Antenna 13-segmented 16

- 2.(1). Wings reduced or absent; notauli absent or faintly indicated 3
- Wings normal; notauli indicated 4
- 3.(2). Scutellum in front without fovea; notauli absent; body moderately hairy *Trichopria* Ashmead
- Scutellum in front without fovea; notauli either present or absent; body profusely hairy *Basalys* Westwood
- 4.(2). Scutellum in front without grooves 5
- Scutellum in front with one or two grooves 6
- 5.(4). Petiole twice as long as thick; body slender *Dolichopria* Kieffer
- Petiole at the most slightly longer than thick; body compact *Trichopria* Ashmead
- 6.(4). Frons produced backwards; mandibles beak-like, concealing prosternum 7
- Frons and mandibles normal 10
- 7.(6). Forewing with only *sm* represented; distal end with or without incision; kept folded along a clear hairless line, when at rest 20
- Forewing with *sm*, *m* and *st*; distal end never incised 8
- 8.(7). Petiole broadly transverse, bulging laterally, neck-like constricted anteriorly; T2 with an anterior concave 'V' shaped depression *Claudivania* Huggert
- Petiole normal T2 without any anterior concavity 9
- 9.(8). Petiole distinctly bent and convex in lateral view, with distal end at a higher level than basal end; vertex with a pair of longitudinal carinae and a pair of small teeth *Calogalesus* Kieffer
- Petiole normal, straight; vertex smooth, without any carinae or teeth *Alareka* Rajmohana and Narendran
- 10.(6). Notauli complete or incomplete; petiole normal 11
- Notauli complete; petiole distinctly bent and convex in lateral view, with distal end at a higher level than basal end *Vadana* Rajmohana and Narendran
- 11.(10). Notauli complete; *basalis* present *Aulacopria* Kieffer
- Notauli mostly absent, in rare cases faintly indicated; *basalis* present or absent 12
- 12.(11). Propodeum with a long spine; flagellum with whorls of hair 13
- Propodeum unarmed or at the most with a pointed median carina 14
- 13.(12). Distal end of scape produced into one or two spines *Xyalopria* Kieffer
- Scape unarmed *Oxypria* Kieffer
- 14.(12). Wings without vein, only *sm* represented at the base *Aneuopria* Kieffer
- Forewings with *sm* and *m* 15
- 15.(14). *Basalis* always present; hairs of flagellar segments always short *Basalys* Westwood
- *Basalis* absent; flagellar hairs mostly elongate *Trichopria* Ashmead
- 16.(15). Forewing distally margined or truncated 17
- Forewing rounded distally, not truncated 18
- 17.(16). Scutellum with one fovea; notauli either present or absent *Entomacis* Foerster
- Scutellum without fovea; notauli absent *Monelata* Foerster
- 18.(16). Head smooth, without any punctures; dorsally without orbital carina and other longitudinal ridges 19
- Head with deep punctures and with distinct orbital carina and other longitudinal ridges *Odontopria* Kieffer
- 19.(18). Notauli always present; marginal 3-4x as

long as thick; base of T2 fitting closely to apex of petiole and forming as even continuation of it.....*Paramesius* Westwood

- Notauli either present or absent; marginal only one to two times as long as thick; lateral surface of pronotum without a row of foveae, smooth; base of T2 at a higher level than petiole
Spilomicrus Westwood

20.(7). Distal margin of forewing never incised distally; occipital carina absent.....
.....*Psilus* Panzer*

- Distal margin of forewing always deeply incised occipital carina though reduced at times, always indicated *Coptera* Say

*Though *Psilus* Panzer is not seen in India, it has been keyed here, to facilitate a clear cut distinction from *Coptera* Say, a closely resembling genus.

5. Genus *Alareka* Rajmohana and Narendran (Fig. 10)

2000a. *Alareka keralensis* Rajmohana and Narendran; Rajmohana and Narendran. *Uttarpradesh J. Zool.*, 20(1) : 21-28.

Diagnosis : Body brownish black, smooth and shiny. Head nasiform; rim of frontal shelf with sharp edges. Eyes with scattered pubescence. Anterior rim of frontal shelf serrate and with a small median prominence. Antenna 14 segmented in males; flagellar segments elongate and with a circlet of long stout bristle-like hairs. Mouthparts opisthognathus, with elongated mandibles. Notauli on mesonotum very faint. Scutellum with a rectangular fovea. Metanotum with three longitudinal carina. Propodeum with an anteriorly raised median keel and indistinct lateral carinae; posterior propodeum emarginated and with two postero-lateral teeth. Forewing rounded distally; *basalis* absent; *sm* reaching almost to anterior 0.3 length of forewing. Petiole erect, with parallel longitudinal striations. Abdomen spindle shaped. Tergites after T2 only feebly visible.

Distribution : Kerala (India).

Discussion : *Alareka* is rather unique and does not show much resemblances to any particular

genus, but for its opisthognathous head as possessed by many Diapriine genera like *Calogalesus* Kieffer, *Coptera* Say and *Aneuropria* Kieffer. Wing venation is much similar to that of *Vadana* Rajmohana and Narendran.

Status in India and Kerala : Presently only one species viz. *Alareka keralensis* Rajmohana and Narendran (Rajmohana and Narendran 2000a) is reported from Kerala as well as India.

Species Diagnosis

1. *Alareka keralensis* Rajmohana and Narendran (Fig.10)

2000a. *Alareka keralensis* Rajmohana and Narendran. *Uttarpradesh J. Zool.*, 20(1) : 21-28

Male. Length = 2.3 mm.

Head and body yellowish brown. Scape and flagellar segments pale yellowish brown basally and darker towards apex. Wings hyaline.

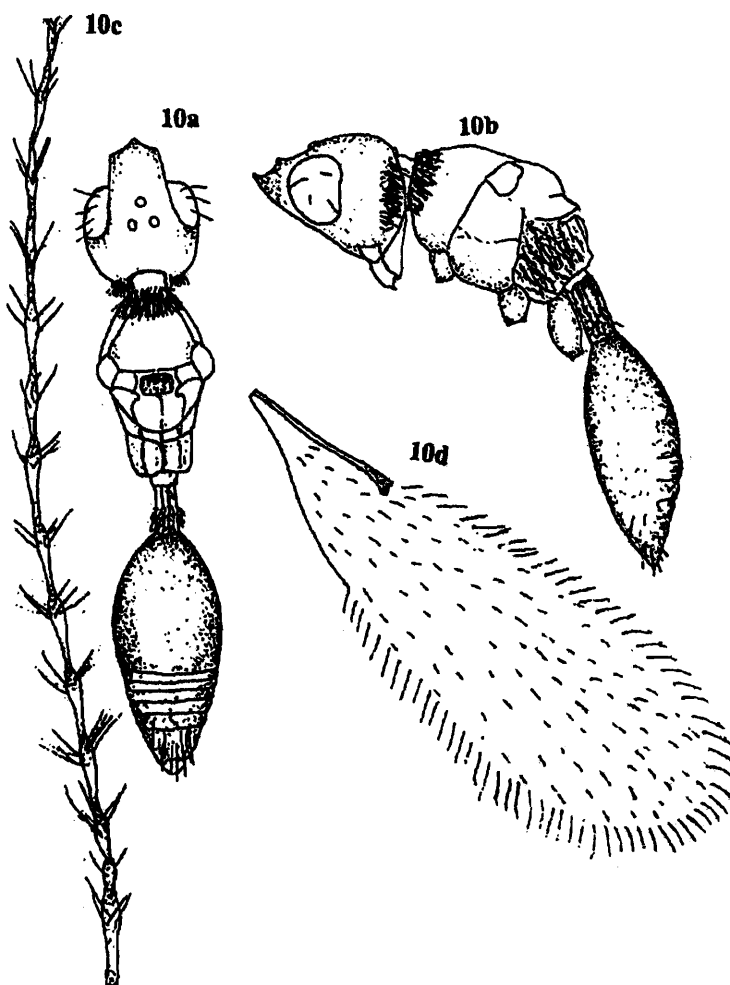


Fig. 10. *Alareka keralensis* Rajmohana & Narendran
a. Body (D.V.); b. Antenna; c. Forewing.

Head nasiform. When viewed from above, length and width of head almost subequal. Anterior rim of frontal shelf serrate and with a small median prominence; frontal shelf with a median longitudinal carina reaching halfway towards clypeus; OOL: OD: POL= 1.9: 0.5: 0.1. Postgenal cushion well developed. In lateral view, frontal shelf rising high above vertex. Eyes sparsely hairy; malar grooves absent. Mandibles beak-like, with serrated tip. Antenna 14 segmented, A.F 1.1.12; basal flagellar segments elongate and with a long tubular base; distal flagellar segments medially bulged; flagellum with long erect setae; scape a bit shorter than length of next two segments, but shorter than F2 and F11. Mesosoma subequal to width of head. Pronotal collar of hair dense. Mesonotum without distinct notauli; humeral sulcus absent. Scutellum with a longitudinally striated rectangular foveae; scutellar sheath with a faint median longitudinal carina. Metanotum and propodeum with a raised median keel. Forewings large, without *basalis*; veins reaching almost to anterior 0.3 length of forewing. Petiole 2.3x as long as broad and with parallel longitudinal striations. T2 extending to 0.6 length of abdomen.

Female : Unknown.

Type locality : Muthukulam (Alleppy, Kerala).

2. Genus *Aneuropria* Kieffer (Fig. 11)

1905. *Aneuropria clavata* Kieffer (*Polypeza foersteri* Kieffer), Kieffer : 35

1911b. *Pezopria* Kieffer : 697, 712, 885. Type : *Pezopria fuscicornis* Kieffer, synonymized by Masner and Sudholm (1959).

Diagnosis : Head and body smooth and shiny. Female antenna 12 segmented (without an abrupt clava) and male antenna 14 segmented. Mouth parts hypognathous; mandibles bidentate. Notauli complete. Scutellum with two adjacent anterior foveae; two longitudinal foveae on scutellar sheath. Forewings without veins, except *sm*. T2 with or without a basal median longitudinal furrow, occupying almost whole of dorsal metasoma.

Distribution : Afrotropical, Palearctic and Oriental Regions.

Discussion : This genus resembles *Coptera* Say in having a stump-like *sm* in forewing. But the mouthparts of *Aneuropria* are hypognathous while that of *Coptera* is opisthognathous. Further *Coptera* is totally different in the general body form, nature of antennal shelf as well as vertex.

Status in India and Kerala : Rajmohana and Narendran (2000b) reported this genus for the first time in Kerala, with description of a new species based on female. Female *Aneuropria* was hitherto not reported from the Oriental Region. Earlier Sharma (1979) had described a male of *A. nilgiriensis* from India.

Species Diagnosis

1. *Aneuropria kairali* Rajmohana and Narendran (Fig. 11)

2000b. Rajmohana and Narendran, 2000b, *Entomon*, 25(3) : 193-200.

Length = 1.48 mm.

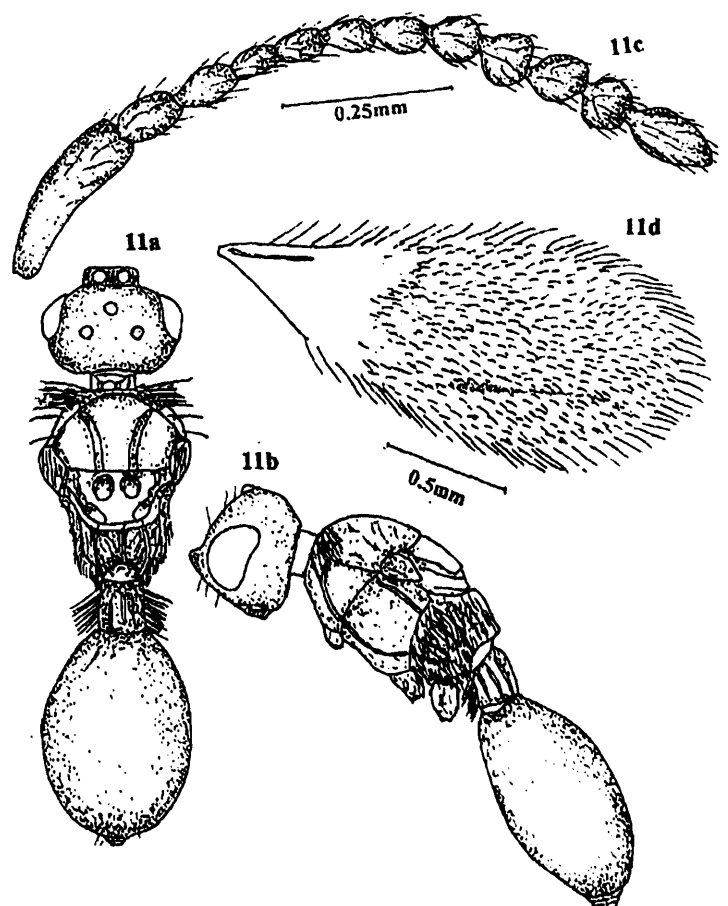


Fig. 11. *Aneuropria kairali* Rajmohana & Narendran
a. Body (D.V.); b. Antenna; c. Forewing.

Female. Head and body shining black. Basal antennal segments including scape reddish brown, terminal 6 segments brownish black. Wings clear.

Head when viewed from above wider than long, with scattered sparse hairs. Eyes with sparse erect hairs, without any orbital carina. OOL:OD:POL= 1:0.5:2; post genal cushion dense, genal carina absent; malar sulcus lacking. Antenna 12 segmented; A.F= 1.1.4.6; terminal six segments gradually enlarged; A12 without a ventral pit. F6 to F9 bead like; sc 3.31x as long as wide, F10 1.7x as long as F9. Mesosoma a little wider than head; anterior pronotum weakly angular. Notauli complete; humeral sulcus absent. Scutellum with two adjacent foveae; scutellar shield bordered laterally by small longitudinal foveae. Metanotum with 3 faint longitudinal carinae. Propodeum with a distinct median carina, flanked on either side by two pairs of lateral longitudinal carinae. Forewings large, *sm* incomplete and reduced to stump reaching only 0.22 of wing length, other veins absent.

Petiole 1.15x as long as wide, hairy and with deep longitudinal striae. T2 extending to almost tip, 0.96 of abdomen; base only a little concave and without a median incision.

Male : Unknown.

Type locality : Malampuzha (Palghat) Kerala.

7. Genus *Basalys* Westwood (Figs. 12-15)

1833b, *Basalys* Westwood, Type : *Basalys fumipennis* Westwood in : *Phil. Mag. J. Sci.* 3 : 343

1838. *Rhacodia* Herrich-Schaffer. Type : *Diapria striolata* Nees ab Esenbeck, designated by Muesebeck and Walkley (1956). Synonymized by transfer of type species by Foerster (1856)

1857. *Diapria* (*Basalys*) Haliday : 170, 171. Description, change to subgeneric status, keyed.

1893. *Tropidopsis* Ashmead : 386, 402. Type: *Tropidopsis clavata* Ashmead, by original designation. Synonymized by Masner, in Krombein and Burks (1967).

1893. *Ceratopria* Ashmead : 407, 428. Type: *Ceratopria longiceps* Ashmead, by Original designation. Synonymized by Masner (1964b)

1913b. *Acidopria* Kieffer : 442. Type : *Acidopria variicornis* Kieffer, designated by Kieffer (1916a). Synonymized by Masner (1964b)

1916a. *Trichopria* (*Ceratopria*) Kieffer : 100. Description, change to subgeneric status, key to species.

1956. *Nesopria* Muesebeck and Walkley : 374. Type: *Tropidopsis clavata* Ashmead, by substitution of *Nesopria* for *Tropsidopsis* Ashmead. Synonymized by Masner in Krombein and Burks (1967).

1979. *Praeloxotropa* Szabo : 274, 276. Type: *Praeloxotropa carinifrons* Szabo, by original designation. Synonymized by Huggert (1982).

Diagnosis : Colour blackish to rust brown; head almost globose; body pubescence dense; eyes finely hairy; antennae 14 segmented in males and 12 segmented in females, rarely 11 segmented; flagellum of male with very little sexual modification, pubescence very short; in females antennae ending in a distinct prominent 3 or 4 segmented club, first segment identical with second but sharply contrasting in size with segments preceding it; vertex smooth or transversely carinate with or without short median or lateral horns; notauli usually absent, but sometimes indicated as faint very shallow depressions; scutellum with one or two grooves in front; propodeum with a median carina, often raised anteriorly to form a keel; wings finely hairy; marginal fringe well-developed; short-winged forms are also met with; forewing with costal, *sm*, *m* and *basalis*; *m* much shorter; metasoma dorsally depressed, last tergite forming a rather narrow triangle, which is slightly concave dorsally.

Distribution : Australian, Afrotropical Nearctic, Neotropical, Palearctic and Oriental Regions.

Host : Nixon (1980) reports *Oscinella frit* L. (Chloropidae, Diptera) as a host of one of the European species namely *Basalys tritoma* Thomson.

Discussion : Sharma (1979) had included all the forms which actually belonged to *Basalys* under *Spilomicrus* Westwood. But authentic works of Kieffer (1916a) and Nixon (1980) placed *Basalys* as a separate entity. Masner (1991) described generic features of *Spilomicrus*, thus clearly attributing a distinct generic status to *Basalys*.

Based on the characters like a 12-segmented antenna with an abruptly distinct 3-segmented club, as per the original description of *Spilomicrus karnatakensis* Sharma and *Spilomicrus nilgiriensis* Sharma (Sharma, 1979), it is judged that these qualify under *Basalys* and not *Spilomicrus*, since all female *Spilomicrus* are to have a 13 segmented antenna. Hence by generic transfer to *Basalys*, both the above mentioned species from now on are *Basalys karnatakensis* (Sharma) and *Basalys nilgiriensis* (Sharma).

Other than the presence of a basal vein in forewings of both *Basalys* and *Spilomicrus*, there exists rarely any characters common to both the genera.

Though in the case of fully winged forms, *Basalys* show resemblances to *Trichopria* Ashmead in general body size, scutellar structure etc., the distinct and abrupt 3 segmented clava and also the peculiar distribution of sparse, but prominent hairs on head, meso and metasoma, particularly on the basal part of the large tergite apply to distinguish *Basalys*.

Status in India and Kerala : 4 species of short-winged forms (Huggert, 1982) as well as 2 normally winged forms, constitute the known species assemblage of *Basalys* in India.

The present work reporting 4 new species namely *B. bispinosus* Rajmohana and Narendran sp. nov., *B. chotti* Rajmohana and Narendran sp. nov., *B. mandibularis* Rajmohana and Narendran sp. nov. and *B. unicus* Rajmohana and Narendran sp. nov. forms the first authentic documentation of this genus in Kerala.

Remarks : Both fully winged as well as brachypetous forms are frequently met with. Though a lot of males were also represented in the present collection, it was not possible to associate the appropriate sexes, except for *Basalys karnatakensis* Sharma.

Key to Indian species of *Basalys* Westwood (Based on females)

1. Wings well developed 2
- Short winged forms 7

- 2.(1). Antennae with 11 segments, ventral pit present on F9, notauli faintly indicated
..... *B. unicus* Rajmohana and Narendran sp. nov.
- Antennae with 12 segments, ventral pit and notauli rarely present 3
- 3.(2). Vertex with a prominent median spine
..... *B. nilgiriensis* (Sharma) comb. nov.
- Vertex not spined, if spined then with more than one spine 4
- 4.(3). Scutellum with a rounded groove, with or without an inward notch distally; pronotal collar of hairs dense, if not dense, then petiole twice as long as thick 5
- Scutellar groove as a convex band or belt, pronotal collar absent; petiole length and width almost subequal
..... *B. chotti* Rajmohana and Narendran sp. nov.
- 5.(4). Scutellar groove with an inward notch distally, vertex with two spines
..... *B. bispinosus* Rajmohana and Narendran sp. nov.
- Scutellar groove rounded distally; vertex without any spines 6
- 6.(5). Thorax wider than head; petiole twice as long as thick; eyes and mandibles anteriorly placed *B. mandibularis* Rajmohana and Narendran sp. nov.
- Thorax subequal to head; petiole not twice as long as thick; eyes and mandibles normal ..
..... *B. karnatakensis* (Sharma) comb. nov.
- 7.(1). Eyes close to anterior margin in lateral view, bristles on body very long, median propodeal keel broad, almost bicarinate 8
- Eyes not placed so far ahead, bristles on body shorter and median propodeal keel narrow 9
- 8.(7). Head with unusually parallel temples
..... *B. geus* Huggert
- Head with less parallel and more converging temples *B. geoides* Huggert

9.(8). Frons straight or slightly convex; forewing with a pigmented *basalis*; scutellar shield a little longer than broad; T1 apically with at most some few setae in a regular row
..... *B. besucheti* Huggert

— Frons concave; forewing without *basalis*; scutellar shield broader than long; T1 apically with many setae in an irregular row
..... *B. lobeli* Huggert

Species Diagnosis

1. *Basalys bispinosus* Rajmohana and Narendran
sp. nov.

(Fig. 12)

Holotype : Female. Length of body = 1.08mm. Body shining black. Eyes brownish black with a small median black patch, ocelli shining black. Antennal scape and funicular segments yellowish brown, terminal three club segments black. Thoracic carinae black. Legs yellowish brown, apical tarsi darker. Wings hyaline, not infuscated, veins dark brown. Antennal pilosity, body pubescence dull white, marginal fringe of wings brown.

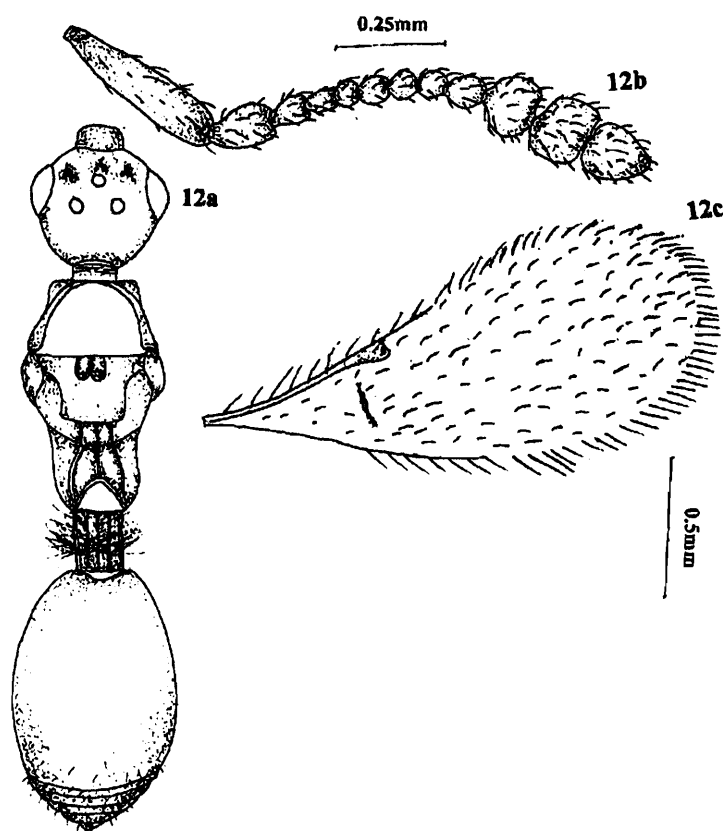


Fig. 12. *Basalys bispinosus* Rajmohana & Narendran sp. nov.
a. Body (D.V.); b. Antenna; c. Forewing.

Head : HL : HB(D.V) = 11:11; HL : HB (AV) = 32 : 32; when viewed from above, length and width almost subequal; vertex with two small widely situated spines, anterolateral in direction, just above ocelli; ocelli arranged in a close triangle a little anteriorly towards vertex ; OOL : OD : POL = 2:1:2.1; scattered long erect stout pubescence present; temples convex, gently curved towards occiput; occipital flange narrow; in lateral view frontal shelf protruding above level of vertex and at an angle of 60° to mandibles; head distinctly higher than long; eyes globose, bulging with sparse fine pubescence; vertex abruptly sloping towards antennal sockets; malar space : eye length = 2.2:5.9; lower margin of gena with hairy border; post genal cushion not distinct ; malar sulcus absent; mandibles with serrated tip; antenna 12 segmented, antennal formula 1.1.7.3.; scape normal, as long as length of next 6 segments together; proportions of length : width of segments from scape to F10 are as follows- 9.8 : 2, 3 : 1.8, 1.8 : 1, 1.2 : 1, 1.2 : 1, 1.2 : 1, 1.2 : 1, 1.5 : 1.2, 1.5 : 1.2, 3 : 4, 3 : 4 and 4 : 3.5; ventral pit absent on F10.

Mesosoma : L : B = 15.5 : 11. Width subequal to head, smooth and shiny; long erect scattered pubescence present. Cervix distinct with horizontal striae in upper anterior half. Pronotum visible only as a streak; pronotal collar of hairs long and sparse dorsally, but denser laterally towards anterior propleura; pronotal pit absent. Mesonotum without any traces of notauli. TSS distinct. Scutellum large, trough shaped with two grooves fused together anteriorly, but remaining as separate entities distally as if an inward notch and extending to 0.33 of scutellum; scutellar shield broad, median keel absent. Metanotum simple with three equidistant longitudinal carinae. Propodeum with a distinct median keel, anteriorly raised to form a teeth and a pair of curved lateral carina, posterior emargination pronounced and carinate; median area between carinae on propodeum smooth. Propleuron smooth with dense hair at anterior margin, rest of area with sparse pubescence; mesopleuron rather bare, sternaulus present only as depression. Metapleuron with long striae, irregular carinae and punctae, often concealed by overlying dense fine appressed pubescence. Legs normal. Forewing with a stout pigmented *basalis*. FWL : FWB = 39 : 16.

Metasoma : L : B = 14.4 : 8.2. Smooth and shiny, elliptical; petiole with dense hairs medially, with five parallel, equidistant, distinct striae. 1.25x as long as wide. Anterior margin of T2 a little concave, with raised lateral ends; much hairy towards distal end; extending to 0.84 length of abdomen; rest of tergites visible as narrow bands.

Male : Unknown.

Host : Unknown.

Material examined : Holotype : Female collected from Tiruvannur (Calicut, Kerala) by Mohana on 17-xi-1996.

Paratypes : 5 females with same data as that of the holotype.

Etymology : The species is named '*bispinosus*' due to its two distinct lateral spines on vertex.

Discussion : This species resembles *B. mandibularis* sp. nov. but differs mainly in the following :

–Anteriorly fused pair of scutellar grooves. (In *B. mandibularis* scutellum with one rounded groove).

–Two small lateral spines on vertex. (In *B. mandibularis* vertex without any spines.)

–Proportions of antennal segments differ in both.

2. *Basalys chotti* Rajmohana and Narendran sp. nov. (Fig. 13)

Holotype : Female. Length of body = 0.8mm. Head and body yellowish brown, tip of abdomen darker. Eyes and ocelli black. Antennal segments upto club concolorous with body, club dark brown. Legs pale yellowish brown, apical tarsi a little darker. Wings clear, veins brown. Antennal pilosity, marginal fringe of wings and body pubescence dull white.

Head : HL : HB (DV) = 10.7 : 10; when viewed from above almost subequal; vertex with an erect backward directed spine and an inverted 'V' shaped faint carina with two small teeth along its arms. Ocelli arranged in a close triangle medially; OOL : OD : POL = 10 : 3 : 10; scattered long

erect stout pubescence present; temples just beneath eyes sharply converging towards occiput; occipital flange narrow. In lateral view, head almost quadrate with frontal shelf protruding above level of vertex, head distinctly higher than long, vertex with slight convex smooth curve, sloping towards ocellus; eyes globose, bulging with sparse fine pubescence and situated high near lateral corners; malar space : eye length = 2.1 : 5.1; lower margin of gena with hairy border; post genal cushion dense; gena bordered by tufts of fine appressed hairs; malar sulcus absent; mandibles with serrated tip; face and frons more hairy; antenna 12 segmented; AF 1.1.7.3; a distinct 3 segmented club present; F10 with a distinct ventral pit; scape distinctly thinner basally and thicker medially; almost equal to next seven segments combined; distinctly larger than F1; F1 and F2 almost subequal; proportions of length : width of segments from scape to F10 being 9 : 2, 3 : 1.4, 1 : 1, 1 : 1, 1 : 1, 1 : 1, 1 : 1, 1.2 : 1.1, 1.2 : 1.1, 3 : 2.5, 3 : 2.5 and 4.5 : 2.2 respectively.

Mesosoma : L : B = 13.5 : 10. As wide as head, smooth and shiny; long erect scattered pubescence present. Cervix distinct and without any striae. Pronotum visible only as a streak;

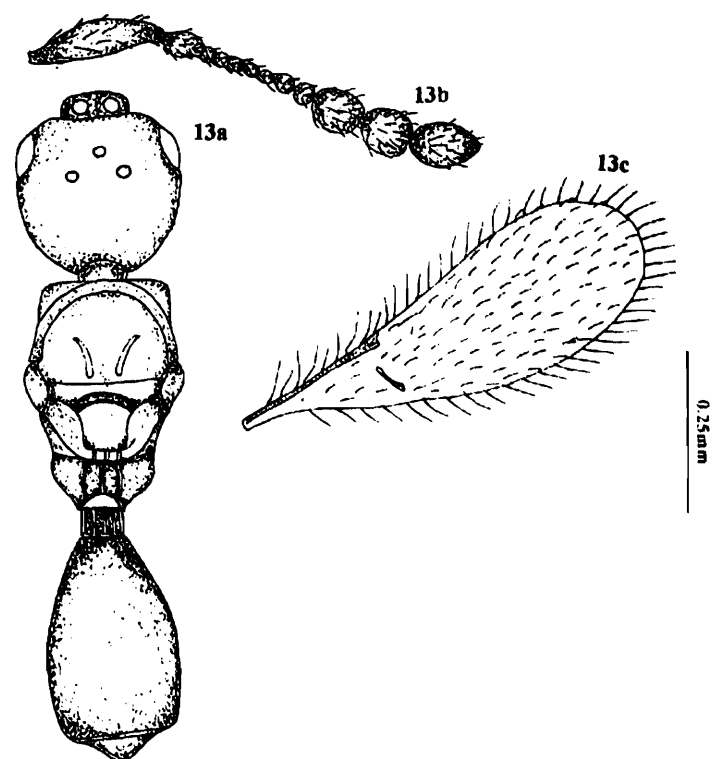


Fig. 13. *Basalys chotti* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

pronotal collar of hairs long and dense; pronotal pit absent. Mesonotum with traces of notauli, when viewed in certain angles. TSS distinct. Scutellum large trough shaped with an inverted 'U' shaped very narrow groove; scutellar shield broad, raised and a little convex anteriorly; median keel absent. Metanotum simple with three equidistant longitudinal carinae. Propodeum with a distinct median keel anteriorly raised a little and a pair of distinct lateral carinae; posterior emargination pronounced, carinate; median region of propodeum between carinae bare. Propleuron smooth with dense hair at anterior margin, rest of area with sparse pubescence; mesopleuron rather bare, sternaulus distinct. Metapleuron with long striae, irregular carinae and punctae, often concealed by overlying dense fine appressed pubescence. Legs normal. Forewing with a heavily pigmented *basalis*. FW L : FW B = 27 : 8.8.

Metasoma : L : B = 18 : 7.5. Smooth and shiny, elliptical; petiole with long decumbent and erect hairs and with faint parallel longitudinal striations; almost as long as wide. Anterior margin of T2 a little concave, with raised lateral ends; much hairy towards distal end; extending to 0.92 length of abdomen; rest of tergites visible as narrow bands; tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female from Tiruvannur (Calicut, Kerala) collected by Mohana on 16-xi-1996.

Paratypes : 2 females with same data as that of the holotype except date being 1-vi-1996 and 16-viii-1996.

Etymology : The species is named 'chotti' (Hindi word) meaning small size

Discussion : This species resembles *B. unicus* sp. nov. in most characters, but differs from it

–In having a 12 segmented antenna. (In *B. unicus*, antenna 11 segmented).

–Ocelli arranged medially on dorsal head. (In *B. unicus* ocelli arranged much nearer to occiput).

–In the shape of temples beneath eyes (viewed dorsally) also differ.

3. *Basalys karnatakensis* (Sharma) comb. nov.

1979. *Spilomicrus karnatakensis* Sharma, Sharma. *Mem. Sch. Ent.*, 7 : 49.

Plesiotype : Female. Length of body = 1.54 mm. Head black, rest of body brownish black, except petiole and distal T2 reddish brown. Eyes brown with a black tinge. Scape, pedicel and funicular segments yellowish brown, club brownish black. Legs yellowish brown. Antennal pilosity, body pubescence and marginal fringe of wings dull white.

Head : HL : HB(D.V) = 7.9 : 7.9; HL : HB (AV) = 11.9 : 7.9 ; when viewed from above length and width almost subequal; vertex elevated mid dorsally and without any spines; ocelli arranged in a close triangle a little anteriorly towards vertex; OOL : OD : POL = 2.1 : 0.6 : 1.5; scattered long erect stout pubescence present; temples sub-parallel, gradually receding towards occiput; occipital flange narrow; in lateral view frontal shelf protruding above level of vertex and at an angle of 90° to mandibles, head distinctly higher than long; vertex gently sloping. Eyes globose, bulging with sparse fine pubescence; malar space : eye length = 1 : 4; lower margin of gena with hairy border; post genal cushion distinct; malar sulcus absent; mandibles with serrated tip; antenna 12 segmented, AF 1.1.7.3; scape slightly thickened in middle and as long as length of next 5.5 segments together; proportions of length : width of segments from scape to F12 as follows- 15.5 : 3, 3 : 2, 3 : 2, 2 : 2, 2 : 2, 2 : 2, 2.2 : 2, 2.5 : 2, 2.8 : 3.5, 5.2 : 5, 5.2 : 5 and 6 : 4.5; ventral pit absent on F10.

Mesosoma : L : B = 11.9 : 7.9. Distinctly wider than head, smooth and shiny; long erect scattered pubescence present. Cervix distinct with horizontal striae in upper anterior half. Pronotum visible only as a streak; pronotal collar of hairs dense and protruding laterally as a distinct zone; pronotal pit absent. Mesonotum without any traces of notauli. TSS distinct. Scutellum large trough shaped with a broad rounded median groove anteriorly extending to 0.3 of it; scutellar shield broad, median keel absent. Metanotum simple with three equidistant longitudinal carinae. Propodeum with a distinct median carina, anteriorly raised to

form a keel, and a pair of curved lateral carina; posterior emargination pronounced and carinate; median area between carinae on propodeum bare. Propleuron smooth with dense hair at anterior margin, rest of area with sparse pubescence; mesopleuron rather bare, sternaulus present only as depression. Metapleuron with long striae, irregular carinae and punctae, often concealed by overlying dense fine appressed pubescence. Legs normal. Forewing with a stout pigmented *basalis*. FWL : FWB = 26.8 : 11.8.

Metasoma : L : B = 13 : 7.1. Smooth and shiny, elliptical; petiole with faint parallel longitudinal striations, lower half and lateral margin clothed with dense, erect, fine long hairs, 1.75x as long as wide. Anterior margin of T2 a little concave, with raised lateral ends; much hairy towards distal end, extending to 0.8 length of abdomen; rest of tergites visible as narrow bands.

Male : Length of body = 0.99 mm.

It resembles the female in almost all characters.

Description of the male antenna is as follows:

Antennae 14 segmented, antennal formula 1.1.11.1; scape as long as next 3.8 segments together; F1 thinner than pedicel and F2; A4 with a ridge, comparative proportions of length and width from scape to F12 being- 9.3 : 2, 3 : 2.2, 3.2 : 1.8, 4 : 2.2, 4 : 2.2, 3.3 : 2.2, 3.5 : 2.2, 3.5 : 2.2, 3.3 : 2.1, 4 : 2.1, 4 : 2.1, 4 : 2.1 and 5 : 2.

Host : Unknown.

Material Examined : Plesiotypes : 3 Females and 1 male collected from Tiruvannur (Calicut, Kerala) by Mohana : on 17-xi-1995, 1 male on 16-xi-1995 and 4 males on 20-xi-1994 from the same locality as above.

Another female from Neendakara (Quilon, Kerala), by T.C Narendran and Party on 22-ii-1989.

Discussion : This species is rather unique with its much smaller scape when compared to other species of the genus. It differs from *B. mandibularis* sp. nov in :

–Head and thorax in width subequal. (In *B. mandibularis* thorax wider than head).

–In shape of head in lateral view, position of eyes and mandibles.

–In proportion of antennal segments.

4. *Basalys mandibularis* Rajmohana and Narendran sp. nov.

(Fig. 14)

Holotype : Female. Length of body = 2.01 mm. Body shining brownish black. Antennae reddish brown except terminal three black club segments. Eyes and ocelli black, with a silver tinge. Legs yellowish brown, apical tarsi darker. Wings clear, veins dark brown. Antennal pilosity and marginal fringe of wings brown, body pubescence dull white.

Head : HL : HB(D.V) = 8:8; HL : HB (AV) = 9:8; when viewed from above distinctly transverse; ocelli arranged in a close triangle, a little anteriorly towards vertex; OOL : OD : POL = 1.7 : 0.8 : 1.3; scattered long, erect, stout pubescence present; vertex elevated mid dorsally and without any spines; temples convex, gently curved towards occiput; occipital flange narrow.

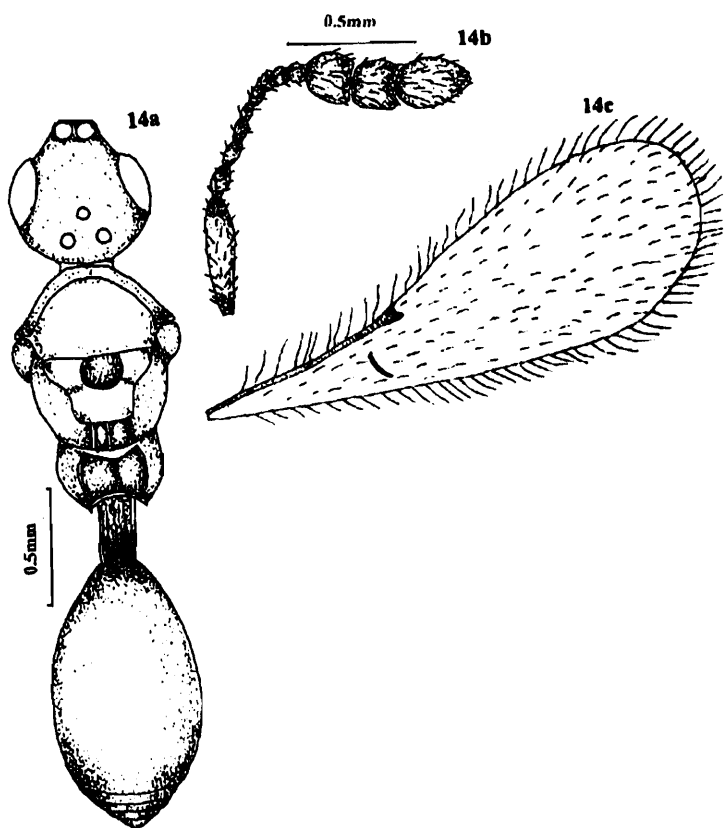


Fig. 14. *Basalys mandibularis* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

In lateral view frontal shelf protruding above level of vertex, head distinctly higher than long and with a peculiar shape, vertex gently sloping downwards and mandibles situated almost in level of median of eyes; eyes globose, bulging with sparse fine pubescence and situated much towards anterior margin of head; malar space: eye length = 5:21.5; lower margin of gena with hairy border; post genal cushion not distinct; malar sulcus absent; mandibles placed a little high (lateral view) and with serrated tip; antenna 12 segmented, AF 1.1.7.3.; scape normal as long as length of next 4.5 segments together; proportions of length : width of segments from scape to F12 are as follows- 10.2 : 2.9, 3 : 1.9, 2.5 : 1.6, 2 : 1.6, 1.7 : 1.6, 1.7 : 1.6, 1.7 : 1.6, 1.8 : 1.6, 2 : 2, 5 : 4.2, 5 : 4.2 and 6 : 4.2.

Mesosoma : L : B = 14 : 9.6. Distinctly wider than head, smooth and shiny; long erect scattered pubescence present. Cervix distinct with horizontal striae in upper anterior half. Pronotum visible only as a streak; pronotal collar of hairs long but sparse; pronotal pit absent. Mesonotum without any traces of notauli. TSS distinct. Scutellum large, trough shaped with a broad semi circular median groove anteriorly extending to 0.5 of it; scutellar shield broad, median keel absent. Metanotum simple with three equidistant longitudinal carinae. Propodeum with a distinct median keel, and a pair of curved lateral carina, posterior emargination pronounced and carinate; median area between carinae on propodeum smooth. Propleuron smooth with dense hair at anterior margin, rest of area with sparse pubescence; mesopleuron rather bare, sternaulus present only as depression. Metapleuron with long striae, irregular carinae and punctae, often concealed by overlying dense fine appressed pubescence. Legs normal. Forewing with a stout pigmented *basalis*. FW L : FW B = 45 : 20.

Metasoma : Abdomen L : B = 14.4 : 8.2. Smooth and shiny, elliptical; petiole without hairs dorsally, feeble erect hairs laterally, anterior median area bare, lateral and posterior three-fourth with five parallel equidistant narrow striae. 2.08x as long as wide. Anterior margin of T2 a little concave, with raised lateral ends; much hairy towards distal end; extending to 0.8 length of abdomen; rest of tergites visible as narrow bands.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female collected from P.W.L.S. (Palghat, Kerala) by P.M Sureshan on 6-xi-1995.

Paratype : One female, collected from Nilambur (Malappuram, Kerala) by T.C. Narendran and Party on 2-xii-1988.

Etymology : The species is named '*mandibularis*' due to its unusual mandibles (placed very high).

Discussion : This species is rather unique with its clypeus-mandibles placed higher level. It differs from *B. karnatakensis* (Sharma) comb. nov. in having

—Thorax wider than head. (In *B. karnatakensis* head and thorax almost subequal).

—In shape of head in lateral view, anteriorly placed eyes and mandibles.

5. *Basalys unicus* Rajmohana and Narendran
sp. nov.

(Fig. 15)

Holotype : Female. Length of body = 0.8 mm. Head and body blackish brown. Apex of head and abdomen a little darker. Antenna uniformly coloured, pale brown; anterior halves of funicular segments, a little darker than posterior halves. Eyes black. Legs much paler compared to antennae. Wings clear, veins brownish black. Antennal pilosity, marginal fringe of wings and body pubescence brown.

Head : HL : HB (DV) = 8 : 8; HL : HB (AV) = 7 : 8; when viewed from above almost subequal; vertex with an erect backward directed spine and an inverted 'V' shaped faint carina with two small teeth along its arms. Ocelli arranged in a close triangle much nearer to occiput; OOL : OD : POL = 2 : 0.5 : 1; scattered long erect stout pubescence present; temples just beneath eyes gently receding towards occiput; occipital flange narrow. In lateral view, head almost quadrate with frontal shelf protruding above level of vertex, head distinctly higher than long, vertex with slight convex smooth

curve, sloping towards ocellus; eyes large, globose, bulging with sparse fine pubescence and situated a bit anteriorly; malar space : eye length = 1.2 : 2; lower margin of gena with hairy border; post genal cushion dense; gena bordered by tufts of fine appressed hairs; malar sulcus absent; mandibles with serrated tip; face and frons more hairy; antenna rather peculiar in having only 11 segments, antennal formula 1.1.6.3; a distinct 3 segmented club present; F9 with a distinct ventral pit; scape distinctly thinner basally and almost equal to next 4.5 segments combined; pedicel larger than F1; F1 and F2 almost subequal; proportions of length : width of segments from scape to F9 being 6.2 : 1.5, 2.3 : 1.2, 1 : 1, 1 : 1, 1 : 1, 1 : 1, 1 : 1, 1.3 : 1.5, 2 : 2.2, 3.5 : 2.2- respectively.

Mesosoma : L : B = 10 : 7.5. As wide as head, smooth and shiny; long erect scattered pubescence present. Cervix distinct and without any striae. Pronotum visible only as a streak; pronotal collar of hairs long and dense; pronotal pit absent. Mesonotum with traces of notauli, when viewed in certain angles. TSS distinct. Scutellum large trough shaped with an inverted 'U' shaped very narrow groove; scutellar shield broad, raised and a little convex anteriorly; median keel absent. Metanotum simple, with three equidistant longitudinal carinae. Propodeum with a distinct median keel anteriorly raised a little, and a pair of distinct lateral carinae; posterior emargination pronounced, carinate; median region on propodeum between carinae bare. Propleuron smooth with dense hair at anterior margin, rest of area with sparse pubescence; mesopleuron rather bare, sternaulus distinct. Metapleuron with long striae, irregular carinae and punctae, often concealed by overlying dense fine appressed pubescence. Legs normal. Forewing with a heavily pigmented *basalis*. FWL : FWB = 25 : 8.

Metasoma : Abdomen L : B = 12 : 6.5. Smooth and shiny, elliptical; petiole with long decumbent and erect hairs and with faint parallel longitudinal striations; almost as long as wide. Anterior margin of T2 a little concave, with raised lateral ends; much hairy towards distal end; extending to 0.7 length of abdomen; rest of tergites visible as narrow bands; tip of abdomen pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female collected from Tiruvannur (Calicut, Kerala) by Mohana on 16-xi-1996.

Paratypes : 5 females with same data as that of the holotype except date of collections being 16-viii-1996, 8-i-1996, 16-xi-1996 and 16-xi-1996.

One female collected from Nilambur (Malappuram, Kerala) by T.C. Narendran and Party on 30-xi-1988.

Etymology : The species name '*unicus*' is an arbitrary combination of letters.

Discussion : This species is rather unique in having a 11 segmented antennae. It resembles *B. chotti* sp. nov. but differs from it mainly in the following characters.

–Antennae 11 segmented. (In *B. chotti* antennae 12 segmented).

–Pronotal collar of hairs well developed. (In *B. chotti* pronotal collar of hairs almost absent).

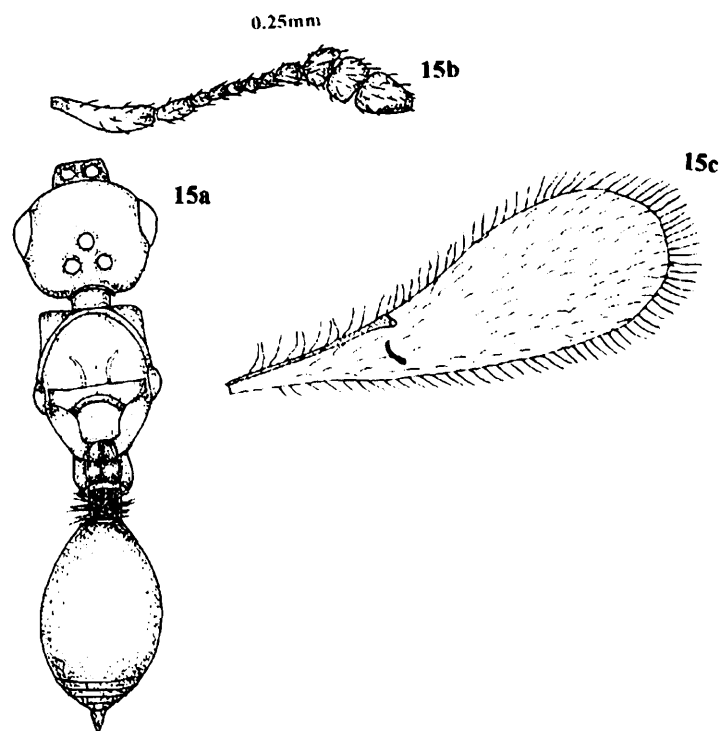


Fig. 15. *Basalys unicus* Rajmohana & Narendran sp. nov.
a. Body (D.V.); b. Antenna; c. Forewing.

8. Genus *Calogalesus* Kieffer (Fig. 16)

1912a. Type species : *Calogalesus parvulus* Kieffer in Kieffer
Genera Insectorum, : 6, 43.

Diagnosis : Head pronouncedly nasiform; antennal sockets forming complex armed shelf. Eyes often large with scattered pubescence. Vertex with a pair of lateral carina and a pair of tiny teeth medially above front ocellus. Frontal lobe excavate medially to form a concave trough with pointed lateral corners, outward corner much prominently pointed. Antenna 12 segmented in females, gradually thickened towards tip and lacking a distinct club; male antenna 14 segmented, flagellar segments not much elongated; with profuse thick setae. Mouth parts distinctly opisthognathous, with elongated beak-like mandibles. Malar grooves absent. Mesonotum with a pair of deep distinct complete notauli, diverging in front; humeral sulcus distinct. TSS prominent. Scutellum T-shaped with two adjacent rounded pits. Metanotum rather narrow with three longitudinal inconspicuous carinae. Propodeum without a distinct median keel, but with two pairs of lateral carinae and granulose sculpture; posterior propodeum descending abruptly and steeply (particularly in lateral view), emarginate, and with two postero-lateral teeth. Legs normal, foretibia without an outward directed spine; tibial spur formula 1.2.2. Forewing large, without *basalis*; medially with a narrow transverse hairless tract; marginal fringe well-developed. Petiole articulation rather peculiar, emerging at an angle 30° from basal steep slope of propodeum, finely striated, convex in lateral view with distal end at a higher level than basal end. Metasoma much narrow, not bulging laterally. T2 with a roughly V-shaped anterior border.

Discussion : With a combination of characters, like, a pronounced convex frons, antennal sockets with complex armed shelf, opisthognathous mouth parts and a convex arched petiole, *Calogalesus* Kieffer is much distinct from any other Diapriine genera. Somewhat similar opisthognathous head is found in *Coptera* Say, *Digalesus* Kieffer (Diapriinae), and also in *Alareka* Rajmohana and Narendran. A convex bent petiole as seen in this genus has been reported in *Vadana* Rajmohana and Narendran.

Remarks : This forms the first report of the genus *Calogalesus* from India. Hitherto one species viz. *C. parvulus* Kieffer, known from Africa, only has been reported under this genus. The present study describes a new species viz. *Calogalesus malabaricus* from Kerala.

This genus was keyed under the name '*Calicuta*' (Rajmohana, 2004 and Rajmohana and Narendran, 2000a). The conclusion that '*Calicuta*' is *Calogalesus*, the known African genus, was reached only recently, but well in time, while this manuscript was being revised.

Kieffer in his original description of *Calogalesus* had wrongly stated that notauli was absent; this aspect was brought to light only by Masner and Gracia (2002) and accordingly based on their redescription only, the material at hand was identified as *Calogalesus* Kieffer.

1. *Calogalesus malabaricus* Rajmohana and Narendran sp. nov. (Fig. 16)

Holotype : Female. Length = 1.41 mm. Head and anterior 0.75 of abdomen black; thorax, petiole and rest of abdomen testaceous; scape, pedicel and F1 pale yellowish brown, rest of antenna and mandibles concolorous with petiole; eyes black, legs pale yellowish brown, apical tarsi darker. Wings clear, veins pale brown. Antennal pilosity and marginal fringe of wings brown; body pubescence whitish.

Head : L : B(D.V) = 1.2 : 1.3; L : B (AV) = 1.9 : 1.5. When viewed from above slightly transverse; almost nasiform, smooth and shiny with reflecting surfaces, pubescence erect, and sparse; vertex with well raised prominent, lateral carina on either side, curving inwards and extending upto lateral ocelli, anterior to front ocellus, two small teeth-like prominence present, separated by diameter of former; ocelli small, arranged in a close triangle; OOL : OD : POL = 5.5 : 2.3 : 7; temples parallel just beneath eyes, but curving gradually towards occiput; latter moderately emarginate, occipital flange distinct, narrow step-like, with a row of long erect setae and faintly punctate border. Genal carina distinct; post genal cushion well developed and with tufts

of scales and fine appressed setae. In lateral view, frons bulged in front of eyes, finely convex; more hairy towards antennal shelf; rising high above vertex, latter abruptly sloping towards ocelli. Eyes high on head, oval with sparse long setae; malar grooves absent; malar space : eye length = 7 : 10. In anterior view anterior rim of frontal lobe anteriorly with a median excavation to form a concave trough and with pointed lateral corners, outward corner with much prominent pointed appearance. Mandibles extended, beak-like and reaching almost till fore coxae ventrally; tip not incised but only with fine serration; anterior serration a little prominent. Clypeus elevated a little, tentorial pits distinct. Antenna 12 segmented, lacking a distinct club, but gradually thickened towards tip; terminal 7 segments with a beaded appearance; antennal formula 1.1.3.7; scape narrow basally and thicker distally; setae on flagellar segments longer towards terminal part, 1.5x as wide as F2; antennal proportions of length and width from scape to F12 being as follows- 38 : 7, 12 : 6, 8 : 4.5, 6.3 : 5, 6.3 : 5, 8 : 6.5, 9 : 9, 10 : 10.5, 10 : 11, 10 : 11, 10 : 11, 15 : 9.

Mesosoma : L : B = 3.8 : 3.5; wider than head. Cervix distinct, with fine longitudinal striations in posterior half. Pronotal collar of setae sparse; anterior margin of pronotum faintly concave dorsomedially. Mesonotum with scattered erect pubescence, smooth and shiny, with a pair of deep distinct complete notauli, diverging in front and separated basally by almost 2x diameter of notauli, humeral sulcus distinct. TSS prominent. Scutellum T-shaped with two adjacent rounded pits separated by a carina medially. Scutellar sheath without a median carina, but bordered by dark convex ridges laterally and wider towards lower margin; latter bordered by a row of tiny pits; metanotum rather narrow with three longitudinal inconspicuous carinae. Propodeum without a distinct median keel, but with two pairs of lateral carinae and granulose sculpture; posterior propodeum descending abruptly and steeply (particularly in lateral view), emarginate, and with two postero-lateral teeth; setae arranged in a transverse pattern; propodeal nucha distinct. Propleura with traces of pits; mesopleura smooth, bare; sternaulus absent; metapleura with a strip of rich sculpture basally; setae much sparse. Legs normal; foretibia without an outwardly directed

spine; tibial spur formula 1.2.2. Forewing large, without *basalis*, medially with a narrow transverse hairless tract; marginal fringe well developed; *st* distinct; *sm* : *m+st* = 3.6 : 1.5; F.W. L : B = 10.4 : 4.1

Metasoma : Petiole articulation rather peculiar, almost bare, but with irregular longitudinal striations; emerging at an angle 30° from basal steep slope of propodeum, convex in lateral view, distal end at a higher level than basal end, sparsely hairy; 2.83x as long as thick, dorsally. T2 with a prominent V-shaped anterior border; anterior basal margin of S2 with a median cup-shaped concavity; T2 extending to 0.75 length of abdomen, hairy towards distal tip. S2 with a tuft of long setae medially. Rest of tergites visible only as narrow bands.

Male. Length = 1.16 mm.

It resembles female in almost all characters except the following :

Head and abdomen deep brownish black. Thorax and petiole brown. Eyes black. Antennae

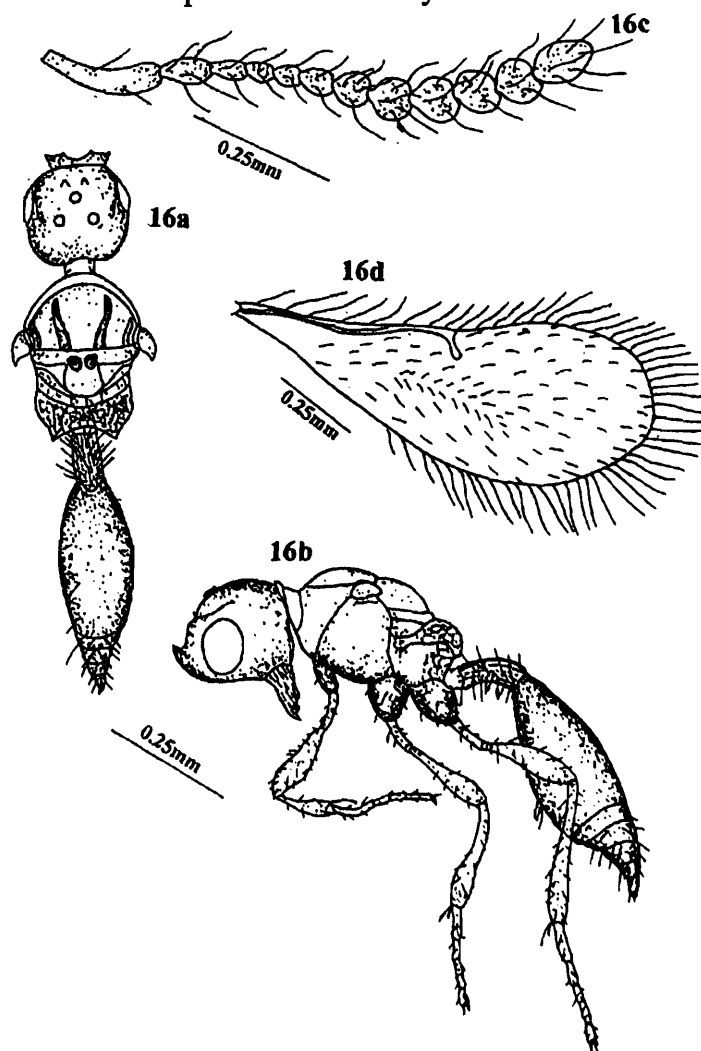


Fig. 16. *Calogalesus malabaricus* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

brown, but with a black tinge. Legs paler than antennae, apical tarsi black. Wings clear; veins with very little pigmentation. Antennal pilosity, body pubescence, marginal fringe of wings brown.

Head : HL : HB(D.V) = 27 : 31; HL : HB (A.V) = 48 : 37. Antennal proportions from scape to F12 being 25 : 7.7, 17.5 : 7, 9.9 : 5.2, 9.9 : 6.5, 9.9 : 7, 10 : 8.8, 11 : 9, 11.5 : 9, 11.5 : 9, 11.5 : 9, 11.5 : 9, 13.5 : 9.

Metasoma : L : B = 40 : 15. Petiole 2.16x as long as thick in dorsal view. T2 extending to almost tip of abdomen.

Material examined : Holotype : 1 Female collected from Tiruvannur (Calicut, Kerala) on 17-xi-1996 by Mohana.

Paratypes : 1 male and female of the same data of the holotype, except date of collection being 22-vii-1997 and another male collected on 20-ix-1997 by P.M. Sureshan from Calicut, Kerala.

Host : Unknown.

Etymology : The species is named 'malabaricus' after its region of collection, namely Malabar.

Discussion : The new species described here differs from *C. parvulus* Kieffer in general colour pattern of the body, length to width proportions of antennal segments and petiole.

9. Genus *Claudivania* Huggert

1982. *Claudivania miranda* Huggert. *Revue Suisse Zool.*, 89(1) : 185-189.

Diagnosis : Body smooth and shiny without sculpture, depressed. Head elongate and opisthognathous. Females without ocelli and reduced eyes. Antenna 10 segmented, with a three-segmented clava. Scutellum absent. Wings and tegulae almost completely reduced. Metasoma slightly elongate, with a blunt apex and anterior margin of large tergite broadly concave.

Male much different from female, head not elongate with large eyes and ocelli. Antennae 14 segmented, filiform, rather bristle-like and A4 slightly emarginate with a tooth. Scutellum present. Forewing very large with veins of *Basalys*

type, not reaching basal third of wing and with a pigmented *basal* vein. Metasoma shorter with a straight basal margin.

Characters common to both sexes : Mesoscutum with deep percurrent notauli. Tarsi 5 segmented and tibial spurs 1.1.1. Petiole very broad, like two cushions placed transversely.

Distribution : Cardamom hills, Kumily (Idukky, Kerala).

Discussion : This is a very interesting genus, showing extreme sexual dimorphism. Female antenna is unusual in having just 10 segments; ocelli and scutellum lacking. Petiole is rather strange, like two cushions placed transversely.

Status in India and Kerala : Only one species viz. *Claudivania miranda* Huggert (Huggert, 1982) is hitherto reported from India and Kerala.

Species Diagnosis

1. *Claudivania miranda* Huggert

1982. *Claudivania miranda* Huggert. *Revue Suisse Zool.* 89(1) : 185-189

Length = 1.1-1.2 mm

Female. Head black with antennal sockets and mandibles yellowish.

Frons slightly hollowed out, sloping towards antennae, vertex laterally with a blunt longitudinal edge separating dorsal and lateral parts of head; malar sulcus distinct. Antenna stout, AF 1.1.5.3; A3 to A6 subequal; clava equal to width of head.

Scutellum reduced under hind margin of mesoscutum; notauli absent. TSS faint. Lateral and posterior margin of propodeum forming a semi-hyaline lamella and medially with a barely indicated carina. Tegula and wings almost reduced to scales. Petiole with dense pilosity, obscuring constrictions. T2 with broadly concave anterior margin; S2 with concave anterior margin covered by dense triangular patch of pilosity.

Male : Length = 1.2-1.5 mm.

Body chestnut brown with head blackish; legs and petiole yellow; wings slightly infumate.

POL : LOL : OOL = 5 : 3 : 4; face straight with short furrows bordering clypeus. Antenna long; A4 with emargination in basal half and with a tooth; A6 to A13 subequal; flagellar segments slightly constricted at both ends, rather bristly. Notauli deep and complete. TSS fine; scutellum with a large fovea; shield without median carina; metanotum and propodeum with three straight keels. Forewings large and broad; veins not reaching basal one third of wing; *stg* long; *basalis* present. T2 with a straight basal margin, but with a shallow V-shaped basal depression; S2 with a basal pilose patch.

Remarks : This genus is not represented in the present collection, diagnosis provided is based on original description by Huggert (1982). The material is known from Cardamom Hills, Idukki (Kerala).

10. Genus *Coptera* Say (Figs. 17-23)

1836. Type species : *Coptera polita* Say. *Boston, J. Nat. Hist.* : 281.

1911b. *Schizogalesus* Kieffer, 1832, 833. Type species : *Galesus (Schizogalesus) punctatus* Kieffer. By designation of Muesebeck and Walkley, 1951 : 675. Synonymized by Muesebeck, (1980).

Diagnosis : The members of this genus range between 2-5mm in length. In dorsal view head either clearly longer than broad, parallel-sided, or broader than long and narrowing strongly behind. Occiput horizontal, convex, with weak irregular carinate posterior margin. Eyes with sparse fine hairs. Antennae of female always 12 segmented and more or less clavate, male with 14 segments, filiform or monoliform antennae; first flagellar segment of male antennae never shorter than second. Scape strongly angularly truncate, rugose, distal end appearing excavate when seen from side; with two or four spines. Notauli complete, strongly impressed, diverging in front. Scutellum with a pair of large fovea and one or two pairs of elongated oval lateral scutellar pits at each side of the disk, apex of scutellum nearly always with a pair of rounded punctures. Propodeum either with simple or with forked carinae, varying accordingly with the species. Forewing of females always distally incised and that of males with or

without such an incision; *sm* always incomplete; basal, medial and radial veins absent or indicated only by lines. Femora and tibia always clavate; petiole of abdomen with longitudinal striae; only T2 broadly visible and with a median longitudinal groove extending to almost half or beyond, at times with short shallow depressions or foveae on either side.

Distribution : Afrotropical, Neotropical, Palearctic, Nearctic and Oriental Region

Host : According to the present available information, species of Tephritidae are the most common hosts of species of *Coptera* Say, but there are records of other dipteran families like Psilidae, Muscidae, Milichidae, Otitidae, Drosophilidae and Lonchaeidae being their hosts (Muesebeck, 1980).

Discussion : This genus is easily distinguishable with its robust body, opisthognathous mouthparts, vertex with teeth and much reduced wing venation.

As per the original descriptions and the illustrations, all the species hitherto described under *Psilus* Panzer from India (Sharma, 1979 and Mukerjee, 1994) inevitably comes under *Coptera* and not *Psilus* and are hereby transferred to *Coptera*.

Quoting Muesebeck (1980), "true *Psilus* seem to be largely confined to higher latitudes and altitudes, whereas those of the other genus, for which the name *Coptera* Say is available, appear to be more numerous and to occur everywhere"

The following characters serve to distinguish *Coptera* from *Psilus*.

–Forewing in females and rarely of males always distally incised. (In *Psilus* distal end of forewing entire and never incised in both males and females).

–Forewing with *sm* incomplete. (In *Psilus* *sm* on forewing always complete).

–F1 of male antenna never shorter than F2. (In *Psilus* F1 of males always much shorter than F2).

Remarks : Sharma (1979) had described 3 species namely *C. taprobanicus* (Sharma), *C. dalhousieanus* (Sharma), *C. saraswati* (Sharma),

based on females and two species namely *C. bharatvarshus* (Sharma) and *C. madraspatna* (Sharma) based on males.

Separate keys to the females and males of *Coptera* Say are given below :

Key to *Coptera* Say of India based on females

1. Antenna with a demarcated club 2
 - Antenna with segments only gradually enlarged towards tip 3
2. Notauli at base separated by its own width at base
 - C. lobata* Rajmohana and Narendran sp. nov.
 - Notauli at base separated by distinctly less than its own width at base *C. curvata* Rajmohana and Narendran sp. nov.
3. Vertex with distinct spines or pointed teeth ... 5
 - Vertex with carinae only, spines or teeth indistinct 4
4. Hyperociput margined with pointed spines *C. occispinosa* Rajmohana and Narendran sp. nov.
 - Hyperociput without any spines, at the most carinate *C. carinata* Rajmohana and Narendran sp. nov.
5. Scutellar sheath with 2 pairs of lateral pits .. *C. clavata* Rajmohana and Narendran sp. nov.
 - Scutellar sheath with only 1 pair of lateral pits 6
6. T2 without lateral impressions or grooves basally on either side of median longitudinal groove absent
 - *C. srinagari* (Mukerjee) comb. nov.
 - T2 with distinct lateral impressions or grooves on either side of median longitudinal groove basally 7
7. Eyes bare *C. dalhousieanus* (Sharma) Rajmohana and Narendran comb. nov.
 - Eyes hairy 8
8. Foretibia with a distinct outwardly directed

spine; A12 less than twice as long as thick and less than twice its penultimate segment *C. tibiospinosa* Rajmohana and Narendran sp. nov.

- Foretibia without an outwardly directed spine; A12 twice as long as thick, twice its penultimate segment *C. saraswati* (Sharma) comb. nov.

Key to *Coptera* Say of India based on males

1. Forewings with variegated patches
 - *C. variegata* Rajmohana and Narendran sp. nov.
 - Forewings without any variegated patches 2
2. Hyperociput margined with distinct spines *C. occispinosa* Rajmohana and Narendran sp. nov.
 - Hyperociput without any distinct spines ... 3
3. Vertex without any conspicuous spines or teeth, at the most carinate
 - *C. carinata* Rajmohana and Narendran sp. nov.
 - Vertex with distinct spines or teeth 4
4. Flagellar segments little longer than thick except the first being twice as long as thick; antennae black; median furrow reaching only one-third of the second tergite
 - *C. madraspatna* (Sharma) comb. nov. Rajmohana and Narendran
 - Flagellar segments atleast twice as long as thick; median furrow at least reaching the middle of second tergite
 - *C. bharatvarshus* (Sharma). comb. nov. Rajmohana and Narendran

1. *Coptera carinata* Rajmohana and Narendran sp. nov.

(Fig. 17)

Holotype : Female. Length of body = 3.64 mm. Head and body shining black with reflecting surfaces. Eyes silvery brown with a narrow black rim. Antennae concolorous with body. Coxae black. Rest of leg deep reddish brown. Wings

slightly infuscated brown. Veins a little darker. Antennal pilosity, body pubescence and marginal fringe of wings, dull white.

Head : HL : HB(D.V) = 14 : 16.6; HL : HB (AV) = 15 : 15.2. When viewed dorsally much transverse; smooth and shiny, sparsely pubescent; vertex rather smooth with an inverted 'V' shaped carina; other teeth on dorsal head not distinct; no transverse carina towards lateral ocelli; two small longitudinal carinae arising from base of inner pair of spines and ending near upper margin of lateral ocelli. Anterior rim of antennal sockets a little elevated; eyes with short, fine, erect hairs and bordered dorsally with adorbital carina curving towards lower margin of eyes, but not fully encircling it and bordered towards its inner margin with distinct punctures; ocelli a little elevated, with two small pits between lateral ocelli; post ocelli distinctly larger than lateral ones; OOL : OD : POL = 1.3 : 1.3; temples weakly arched and sloping towards occiput; occiput feebly emarginate, hyperoccipital carina present with punctated border, but without any median longitudinal carina, a row of fine long hairs present. When viewed laterally, malar region and lower gena with rich pilosity, mandibles beak-like concealing prosternum; frons smooth, produced backwards; toruli distinct; antenna with 12 segments, without a distinct club, terminal segments gradually thickened; antennal formula 1.1.9.1.; scape distinctly angularly truncate, with three lobe like processes anteriorly; scape as long as next 1.8 segments combined together; F1 to F3 a little cylindrical, relatively larger and with short stout hairs; comparative measurements of length : width of antennal segments from scape to F1 being, 6.5 : 3.1, 2.2 : 2, 5 : 2, 4.5 : 2, 4.5 : 2, 4 : 2, 4 : 2, 3.1 : 2.2, 3 : 2.2, 3 : 2.2, 3 : 2.2, 4 : 2.4.

Mesosoma : L : B = 26 : 18.1. Distinctly wider than head; cervix prominent and with conspicuous deep striae; pronotum with a row of rounded setigerous pits on its lower border; pronotal collar sparse, but erect and long; pronotal pit absent; mesonotum with deep impressed notauli, separated at base by its own diameter and gently diverging in front; TSS deep; scutellum rather in shape of a trough and with two U-shaped large, adjacent

deep foveae basally, extending to almost 0.5 of it, lateral scutellar pits large, and distally with a pair of small posterior scutellar pits; metanotum with three equidistant longitudinal carinae; propodeum in upper half with 4 deep foveae formed by 5 distinct carinae and a lower smooth inverted 'U' shaped median area, rather sloping and with moderate non carinated emargination; propleura and mesopleura almost bare except at borders; mesopleura with a longitudinal carina beneath tegula; sternaulus distinct; metapleura with longitudinal keels, but much concealed with fine semi-decumbent hairs; femur and tibia clavate; fore tibia without an outwardly directed spine; forewing with a deep apical incision distally, incision leading to a clear hairless tract; only *sm* represented. F.W L: F.W.B = 63:23; hindwing with a long petiole basally.

Metasoma : Abdomen L : B = 30 : 16. Petiole margins parallel laterally and with fine dense erect

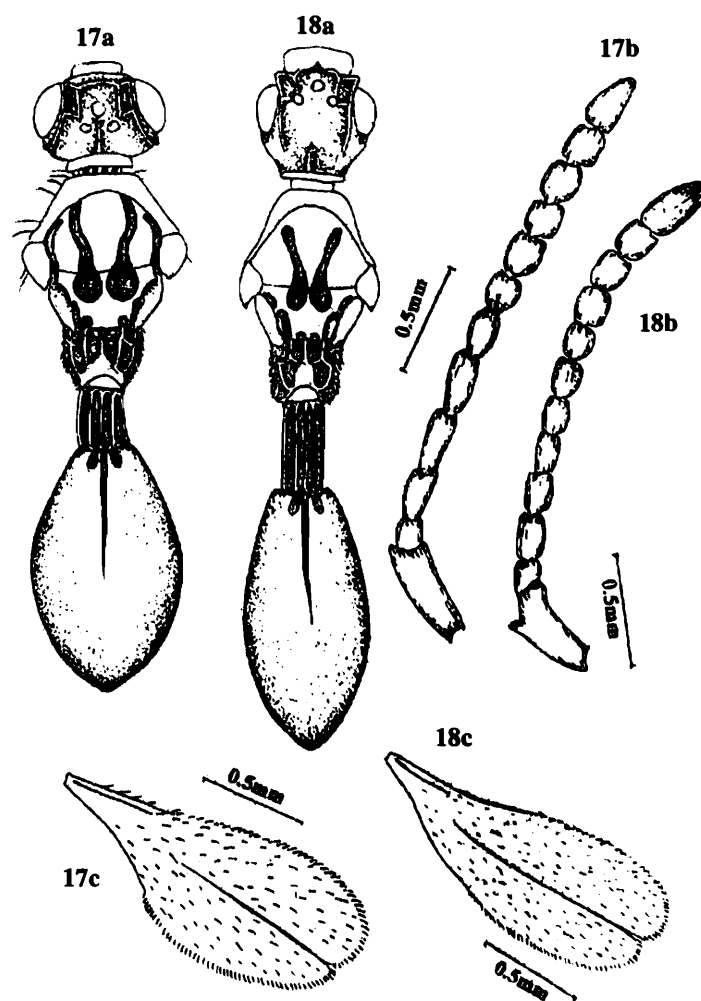


Fig. 17. *Coptera carinata* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

Fig. 18. *Coptera clavata* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

hairs; medially with 5 carinae alternating with deep furrows; petiole length, 1.45x its width; smooth and shiny, sparsely pubescent towards lower half; T2 strongly convex, occupying almost entire dorsal abdomen and with a dorsal longitudinal median furrow extending to more than 0.45 length of T2, on either side of it basally small grain like depressions present; rest of tergites not much visible dorsally.

Allotype : Male. Length of body = 2.94 mm.

In almost all characters it resembles the female.

The description of the antennae (Fig. 173) as follows:

Antennae 14 segmented; F1 to F11 almost subequal; comparative measurements of length and breadth of antennal segments from scape to F12 being- 7 : 2.5, 2.1 : 2, 4.2 : 1.8, 4.2 : 2, 4.2 : 2, 4 : 2, 4 : 2, 4 : 2, 4 : 2, 4 : 2, 4 : 2, 4 : 1.8, 5.5 : 1.5.

Host : Unknown.

Material examined : Holotype : Female from P.W.L.S (Palghat, Kerala) collected by K.C. Gopi on 20-i-1997.

Paratypes : One male with same data as that of the holotype and another male with data, P.W.L.S. (Kerala), collected by P.M. Sureshan on 16-iii-1996.

Etymology : The species is named '*carinata*' due to its developed carinae on vertex.

Discussion : Not having distinct teeth or spines on vertex is a character rather peculiar to this species. The antennal club is not abrupt, but gradually thickened towards apex. This combination of characters make this species distinct from the rest.

Though *C. occispinosa* sp. nov. too has only carinae on vertex, the species is easily distinguishable due to the general size and shape of the body as well as the nature of the vertex; the most striking feature being the spined hyperocciput of *C. occispinosa*.

2. *Coptera clavata* Rajmohana and Narendran sp. nov.

(Fig. 18)

Holotype : Female. Length of body = 4.14 mm. Head and body shining black. Eyes dull black. Antenna concolorous with body. Foreleg reddish brown with anterior three fourth of femur brownish black; midleg reddish brown throughout, except median bulged portion, being deep brownish black. Hindleg deep brownish black except last four tarsal segments being reddish brown. Wings slightly infuscated, vein dark brown. Antennal pilosity and body pubescence dull white, marginal fringe of wings brown.

Head : HL : HB(D.V) = 15 : 14; HL : HB (A.V) = 19 : 14. When viewed dorsally slightly transverse; smooth and shiny, sparsely pubescent; vertex with 5 conspicuous pointed teeth, median one being very small; outermost tooth much prominent than inner ones; 2 longitudinal carinae connecting submedian teeth with lateral ocelli beneath them; a transverse carina extending between lateral ocellus and adorbital carina, its junction not much prominent; occiput virtually horizontal, hyperoccipital carina present, distinctly carinate and without punctate margin, along with a row of fine long hairs; dorsal longitudinal median carina present only as a trace; anterior rim of antennal sockets a little elevated; eyes with short, fine, erect hairs and bordered dorsally with adorbital carina not encircling lower margin of eyes; ocelli a little elevated, with traces of two rounded adjacent pits between lateral ocelli; OOL : OD : POL = 2 : 1 : 3.5; temples not bulging, rather sloping towards occiput; when viewed laterally, lower gena with rich pilosity towards mandibles, latter beak-like concealing prosternum; frons smooth, produced backwards; toruli distinct; antenna with 12 segments, without a distinct club, AF 1.1.9.1.; terminal segments a little larger; scape feebly angularly truncate, unequally lobed; with longitudinal striations ventrally and coarse irregular striae dorsally; F1 distinctly longer than F2; comparative measurements of antennal segments from scape to F10 being 7 : 2.5, 3 : 2, 4 : 2, 3.5 : 2, 3.5 : 2, 3.5 : 2, 3 : 2, 3 : 2, 3 : 2, 3 : 2, 3 : 2.8, 5.5 : 3.8; ventral pit absent on F10.

Mesosoma : L : B = 22 : 17. Distinctly wider than head; cervix prominent and with conspicuous deep striae; pronotum with a row of rounded setigerous pits on its lower border; pronotal collar sparse, but erect and long; pronotal pit absent; mesonotum with deep impressed notauli, separated at base by 0.5 its basal diameter and gently diverging in front; TSS deep; scutellum rather in shape of a trough and with two U-shaped large, adjacent deep foveae basally, two pairs of oval lateral scutellar pits, anterior pair much smaller and distally with a pair of rounded punctae; metanotum with 3 equidistant longitudinal carinae; propodeum with an unusual sculpture, with a deep inverted 'V' shaped depression bounded by carinae and flanked on either sides by both small and large depressions; moderate non-carinated emargination present; propleura and mesopleura almost bare except at borders; sternaulus distinct; metapleura with longitudinal keels, but much concealed with fine semi-decumbent hairs; femur and tibia clavate; fore tibia with a distinct outwardly directed spine; forewing with a deep apical incision distally, incision leading to a clear hairless tract, a small wavy coloured band anteriorly in appearance like a basal vein; only *sm* represented; F.W L: F.W.B = 55.5 : 21; hindwing with a long petiole basally.

Metasoma : Petiole parallel laterally and with fine dense erect hairs; medially with 5 carinae alternating with deep furrows; petiole 2.2x as long as wide; smooth and shiny, sparsely pubescent towards lower half; T2 strongly convex, occupying almost entire dorsal abdomen and with a dorsal longitudinal median furrow extending to more than 0.53 of length of T2, on either side of it basally small grain like depressions present; rest of tergites not much visible dorsally.

Host : Unknown.

Male : Unknown.

Material examined : Holotype : Female collected from Anchupoola (P.W.L.S, Palghat, Kerala) by P.M. Sureshan on 31-x-1995.

Etymology : The species is named 'clavata' due to its distinctly clavate appearance of femur and tibia.

Discussion : This species is unique with its two pairs of lateral fovea on scutellar sheath, while all other species have only one set of lateral fovea.

3. *Coptera curvata* Rajmohana and Narendran sp. nov.

(Fig. 19)

Holotype : Female. Length of body = 3.4 mm. Head and body shining black; antenna black with dull white pilosity; eyes silvery brown, a black rim surrounding eyes; ocelli pale brown; legs deep reddish brown, end tarsi still darker; wings hyaline without any infuscations; veins brown; marginal fringe of wings brown; body pubescence dull white.

Head : HL : HB (D.V) = 13 : 14 ; when viewed dorsally slightly transverse; smooth and shiny, sparsely pubescent; occiput virtually horizontal , hyper occipital carina distinct and an incomplete dorsal longitudinal median carina arising from it; distinctly carinate and with punctate margin, along with a row of fine long hairs; anterior rim of

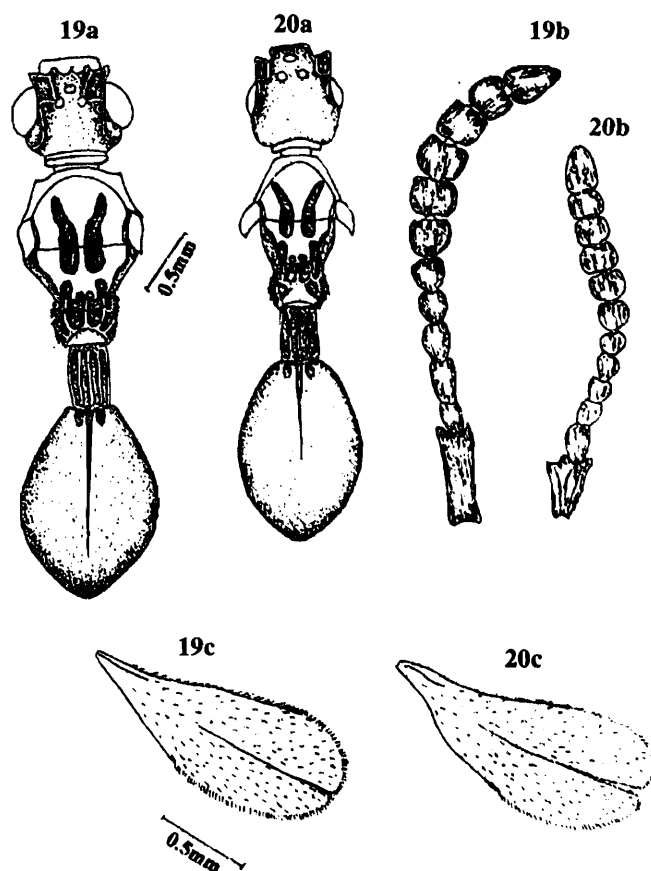


Fig. 19. *Coptera curvata* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

Fig. 20. *Coptera lobata* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

antennal sockets a little elevated; eyes with short, fine, erect hairs and bordered dorsally with adorbital carina encircling almost lower margin of eyes; vertex with 5 conspicuous pointed teeth; lateral tooth most developed and projecting; 2 longitudinal carina connecting submedian teeth with lateral ocelli beneath them; a transverse carina extending between lateral ocellus and adorbital carina, its junction not much prominent, ocelli a little elevated, with traces of two rounded adjacent pits between lateral ocelli; OOL : OD : POL = 1.2 : 1.2 : 3; temples not bulging, rather sloping towards occiput; when viewed laterally, lower gena with rich pilosity towards mandibles, latter beak-like concealing prosternum; frons smooth, produced backwards; toruli distinct; antenna with 12 segments, almost with a distinct club, terminal 6 flagellar segments almost subequal, clavate; scape feebly angularly truncate, distal spines not much prominent and striations as traces only, surface almost smooth, small; comparative measurements of antennal segments from scape to F10 being 20 : 5.5, 6.5 : 5, 9.5 : 5, 6.5 : 5, 6.5 : 5, 7 : 8, 7.5 : 8, 7.5 : 8, 7.5 : 8, 7.5 : 8, 7.5 : 8, 12.5 : 8; ventral pit absent on F10.

Mesosoma : L : B = 23.5:16.3. Distinctly wider than head; cervix prominent and with conspicuous deep striae; pronotum with a row of rounded setigerous pits on its lower border; pronotal collar sparse, but erect and long; pronotal pit absent; mesonotum with deep impressed notauli, separated at base by 0.8 its basal diameter and gently diverging in front; TSS deep; scutellum rather in shape of a trough and with two U-shaped large, adjacent deep foveae basally, two smaller foveae laterally, and distally with a pair of rounded punctae; metanotum with three equidistant longitudinal carinae; propodeum with a short basal median longitudinal carina bifurcating, to which joins lateral carinae; lower median propodeum rather with a smooth slope and with moderate non-carinated emargination; propleura and mesopleura almost bare except at borders; sternaulus distinct; metapleura with longitudinal keels, but much concealed with fine semi-decumbent hairs; femur and tibia clavate; foretibia without an outward directed spine; forewing with a deep apical incision distally incision leading to a clear hairless tract; only *sm* represented; F.W L:

F.W.B = 12.4:4.5; hindwing with a long petiole basally.

Metasoma : Petiole parallel laterally, and with fine dense erect hairs; medially with 3 carinae alternating with deep furrows; petiole length 1.6x its width; smooth and shiny, sparsely pubescent towards lower half; T2 strongly convex, occupying almost entire dorsal abdomen and with a dorsal longitudinal median furrow extending to more than 0.8 of length of T2, with small grain like depressions present on either side of it basally; rest of tergites not much visible dorsally.

Host : Unknown.

Material examined : Holotype : Female collected from Muthalakayam (P.W.L.S, Palghat, Kerala) by P.M. Sureshan on 6-xi-1995.

Paratype : One female from P.W.L.S by K.C. Gopi on 20-1-1997.

Etymology : The species is named '*curvata*' due to its adorbital carina curving and encircling lower margin of orbit.

Discussion : This species come close to *C. clavaticornis* (Kieffer), but differing in:

—median longitudinal furrow extending to 0.8 of T2 in *C. curvatus*. (in *C. clavaticornis* it is hardly one third length of T2)

—the club segments not transverse in *C. curvatus*. (club segments transverse in *C. clavaticornis*.)

Proportions of antennal segments differ among these two species.

4. *Coptera lobata* Rajmohana and Narendran sp. nov.

(Fig. 20)

Holotype : Female. Length of body = 2.25 mm. Head and body shining black; eyes blackish but with a silvery tinge and with reflecting yellow spots; ocelli much paler than eyes; legs honey brown, except black coxae; wings hyaline but with an infuscation throughout; veins pale yellowish brown; pubescence on body dull white.

Head : HL : HB(D.V) = 15 : 14 ; HL : HB (AV) = 18.8 : 14. When viewed dorsally, slightly longer than broad; smooth and shiny, sparsely pubescent; occiput virtually horizontal, weakly carinate and with wavy margin; anterior rim of antennal sockets a little elevated; eyes with short, fine, erect hairs; bordered dorsally with adorbital carina extending to almost to lower margin of eyes; vertex with 4 conspicuous blunt teeth and with trace of a fifth median one; 2 longitudinal carina connecting submedian teeth with lateral ocelli beneath them; a transverse carina extending between lateral ocellus and adorbital carina, a little raised at its junction; ocelli a little elevated, with traces of 2 rounded adjacent pits between lateral ocelli; OOL : OD : POL = 2:1.1:3.8; when viewed laterally, lower gena with rich pilosity towards mandibles, latter beak like concealing prosternum; frons smooth, produced backwards and with a small declivity at its base; antenna with 12 segments, with almost a distinct 6 segmented club; scape distinctly angularly truncate, appearing lobed, distally with 3 to 4 spines and striated throughout, surface not smooth, but with small spine-like pegs; comparative measurements of antennal segments from scape to F10 being 7.5:3.2, 4.8:2.5, 2.6:2, 2.6:2, 2:2.3, 2:2.3, 2:2.5, 2.7:3, 3:3, 3:3, 3:3, 3:3, 4.9:3; ventral pit absent on F10.

Mesosoma : L : B = 22.9 : 15.8. Distinctly wider than head; cervix prominent and with conspicuous deep striae; pronotum with a row of rounded setigerous pits on its lower border; pronotal collar sparse, but erect and long; pronotal pit absent; mesonotum with deep impressed notauli, separated at base by almost by its basal diameter. TSS distinct; scutellum rather in shape of a trough and with two 'U' shaped large, adjacent deep foveae anteriorly, two large lateral foveae, and distally with a pair of rounded punctae; metanotum with 3 equidistant longitudinal carinae; propodeum with a short basal median longitudinal carina bifurcating, to which joins lateral carinae; lower median propodeum rather a smooth slope and with moderate non-carinated emargination; propleura and mesopleura almost bare except at borders; sternaulus distinct; metapleura with longitudinal keels, but much concealed with fine semi-decumbent hairs; femur and tibia clavate; fore tibia without an outwardly directed spine;

forewing with a deep apical incision; distally incision leading to a clear hairless tract; only *sm* represented; F.W L: F.W.B = 54.5 : 23.5; hindwing with a long petiole basally.

Metasoma : Petiole slightly convex; laterally with fine dense erect hairs and medially with 3 carinae alternating with deep furrows; petiole length, 1.45x its width; smooth and shiny, sparsely pubescent towards lower half; T2 strongly convex, occupying almost entire dorsal abdomen and with a dorsal longitudinal median furrow reaching 0.43 length of T2

Male : Unknown.

Host : Unknown.

Material examined : Holotype : One female from Tiruvannur (Calicut, Kerala) collected by Mohana on 11- vi-1995.

Paratypes : 3 females of which 2 with the same data as that of the holotype except collection date being 4-iii-1996 and 20-i-1997 and another from Chindagi (Palghat, Kerala) by T.C. Narendan and Party on 13-x-1989.

Etymology : The species is named 'lobata' due to the lobed appearance of scape.

This species has a scape with a lobed appearance. With club segments 7-11 of the antenna being transverse, it resembles *C. clavaticornis* (Kieffer). Both the species can be differentiated by the general body size, appearance of the scape as well as the proportion of antennal segments.

5. *Coptera occispinosa* Rajmohana and Narendran sp. nov. (Fig. 21)

Holotype : Female. Length of body = 2.31 mm. Head and body shining black. Eyes shining brown with a black tinge. Antennae and mandibles black. Legs deep reddish brown, mid femur and apical tarsi black. Ovipositor sheath pale brown. Wings hyaline, infuscated brown. Antennal pilosity, body pubescence and wing marginal fringe dull white.

Head : HL : HB(D.V) = 8:9.2; HL : HB (A.V) = 11:15. When viewed dorsally distinctly

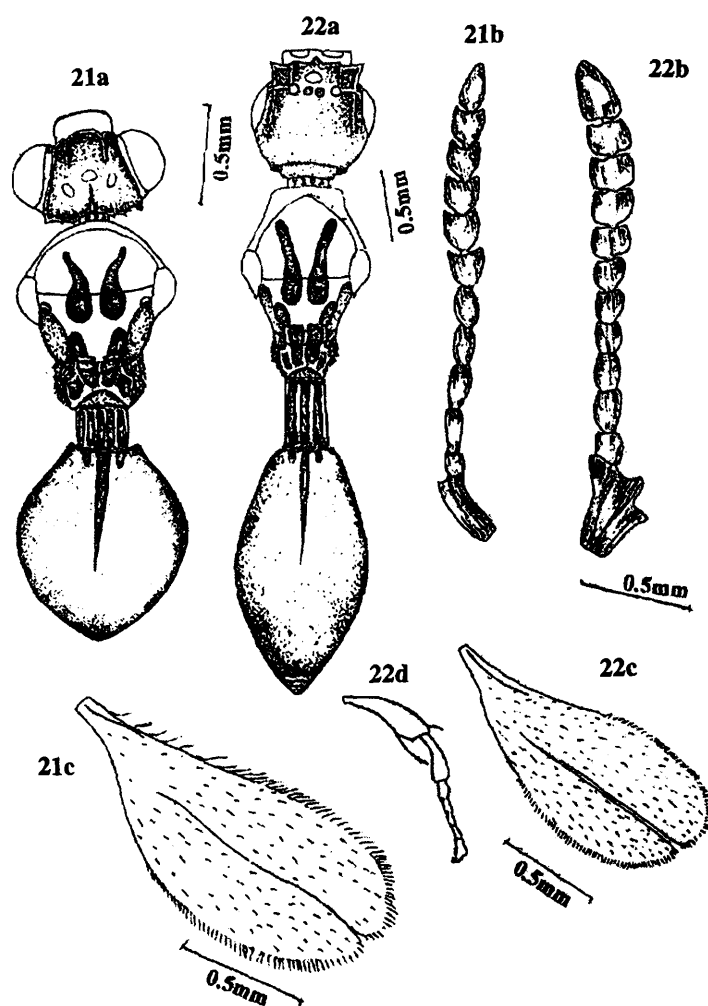


Fig. 21. *Coptera occispinosa* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

Fig. 22. *Coptera tibiospinosa* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

transverse; smooth and shiny, sparsely pubescent; vertex without teeth or spines, but bordered by a horizontal raised carina, an inverted 'V' shaped carina just above ocelli and 2 incomplete transverse carinae running towards lateral ocelli; no transverse carina extending between lateral ocellus and adorbital carina; occiput virtually horizontal, hyperoccipital carina prominent with spine like pointed processes in its serrated border and a dorsal longitudinal median carina arising from it and running towards post ocellus; anterior rim of antennal sockets a little elevated; eyes unusually large with short, fine, erect hairs; bordered dorsally with adorbital carina encircling lower margin of eyes and with fine distinct serrations; ocelli a little elevated, without traces of two rounded adjacent pits between lateral ocelli; OOL : OD : POL = 1.5:1:3; temples much small and pressed inwards, rather concave; when viewed

laterally, lower gena with rich pilosity towards mandibles, latter beak-like, but not much elongated to conceal prosternum; genal carina also distinct; frons smooth, produced backwards; toruli distinct; antenna with 12 segments; AF 1.1.4.6., a distinct 6 segmented club present; scape feebly angularly truncate and longitudinally striated; distal spines not prominent; F1 to F4 rather elongated; comparative measurements of antennal segments from scape to F10 being - 8:2.3, 2:1.5, 4:1.8, 3.8:1.8, 3.8:1.8, 3:2, 3:3, 3:3, 3:3, 3:3, 4:2.6; ventral pit absent on F10.

Mesosoma : L : B = 17 : 8. Distinctly wider than head; cervix prominent and with conspicuous deep striae; pronotum with a row of rounded setigerous pits on its lower border; pronotal collar sparse, but erect and long; pronotal pit absent; mesonotum with deep impressed notauli, wider at base and separated at base by half its own basal diameter and gently diverging in front; TSS deep; scutellum rather in shape of a trough and with two U-shaped large, adjacent deep foveae basally, a pair of oval scutellar pits also present laterally; distally with a pair of rounded punctae; metanotum with 3 equidistant longitudinal carinae; propodeum with a short basal median longitudinal carina bifurcating and to which joins lateral carinae; lower median propodeum rather a smooth slope and with moderate non-carinated emargination; propleura and mesopleura almost bare except at borders; sternaulus distinct; metapleura with longitudinal keels, but much concealed with fine semi-decumbent hairs; femur and tibia clavate; foretibia without an outwardly directed spine; forewing with a deep apical incision distally, continued behind as clear hairless tract; only *sm* represented; F.W L : F.W.B = 45 : 18; hindwing with a long petiole basally.

Metasoma : Petiole parallel laterally, and with fine dense erect hairs; medially with 3 carinae alternating with deep furrows; petiole length, 1.5x its width; smooth and shiny, sparsely pubescent towards lower half; T2 strongly convex, occupying almost entire dorsal side of abdomen, but other segments visible as narrow rings; T2 with a dorsal longitudinal median furrow, wider at base and extending as a hairline to more than 0.66 length of T2, on either side of it basally with small grain

like depressions; rest of tergites not visible much dorsally.

Allotype : Male. Length of body = 2.62mm.

In almost all characters it resembles the female.

Description of the male antenna as follows: Antennae 14 segmented; scape similar to that of female; F1 to F11 almost subequal.

Material examined : Holotype : Female collected from P.W.L.S (Palghat, Kerala) by P.M. Sureshan on 21-2-1997.

Allotype : Male from Idukki (Kerala) collected by P.M. Sureshan on 15-xi-1996.

Host : Unknown.

Etymology : The species is named 'occispinosa' due to distinct spines on the hyperoccipital carina.

Discussion : Rather small sized, and with a vertex totally different from other species of *Coptera*, this species is much distinct. Vertex is smooth, with only carinae but not with any teeth or spines, typical to *Coptera*. Further, no other species of *Coptera* is reported to have distinct spines on the hyperoccipital margin. With very feeble angularly-truncated scape and having the pair of posterior punctae on scutellar sheath as transverse, rather than being rounded, this species qualifies to form a very distinct group under *Coptera* or with such a unique combination of characters, can even be given a separate generic status.

6. *Coptera tibiospinosa* Rajmohana and Narendran sp. nov. (Fig. 22)

Holotype : Female Length of body = 3.74 mm. Head and body shining black. Eyes with a median silvery brown patch surrounded by a narrow black rim. Tip of coxa, basal trochanter, distal femur and distal tarsus deep reddish black, tarsal segments pale reddish brown, apical tarsi darker, remaining part of legs black. Wings hyaline with faint infuscation. Body pubescence, antennal pilosity and marginal fringe of forewings dull white.

Head : HL : HB (D.V) = 13.5:14 ; HL : HB (A.V) = 17:14. When viewed dorsally slightly transverse; smooth and shiny, sparsely pubescent; vertex with four conspicuous broad, blunt teeth; two longitudinal carinae connecting submedian teeth with lateral ocelli beneath them; a transverse carina extending between lateral ocellus and adorbital carina, its junction not much prominent; occiput virtually horizontal, hyper occipital carina present, distinctly carinate and without punctate margin, along with a row of fine long hairs; dorsal longitudinal median carina present only as a trace; anterior rim of antennal sockets a little elevated; eyes with short, fine, erect hairs; bordered dorsally with adorbital carina but not reaching lower margin of eye; ocelli a little elevated, with traces of two rounded adjacent pits between lateral ocelli; OOL : OD : POL = 2:1:3.5; temples not bulging, rather sloping towards occiput; when viewed laterally, lower gena with rich pilosity towards mandibles, latter beak like concealing prosternum; frons smooth, produced backwards; toruli distinct; antenna with 12 segments, without a distinct club, terminal segments gradually becoming larger, antennal formula 1.1.4.6.; scape angularly truncate, with 3 unequal lobes, with longitudinal striations and coarse granules; terminal segment larger than preceding segments; comparative measurements of length and width of antennal segments from scape to F10 being 8:3, 2:2, 3.7:2, 2.8:2, 2.8:2, 2.7:2, 2.7:2.3, 2.7:3, 2.7:3.1, 2.8:3.1, 2.9:3.1, 4.9:3.1; ventral pit absent on F10.

Mesosoma : L : B = 24 : 16. Distinctly wider than head; cervix prominent and with conspicuous deep striae; pronotum with a row of rounded setigerous pits on its lower border; pronotal collar sparse, but erect and long; pronotal pit absent; mesonotum with deep impressed notauli, separated at base by its own basal diameter and gently diverging in front; TSS deep; scutellum rather in shape of a trough and with two U-shaped large, adjacent deep foveae basally, a pair of oval lateral scutellar pits and distally with a pair of rounded punctae; metanotum with three equidistant longitudinal carinae; propodeum with an unusual sculpture, with a row of deep 'U' shaped depressions bounded by carinae; moderate non-carinated emargination present; propleura and mesopleura almost bare except at borders;

sternaulus distinct; metapleura with longitudinal keels, but much concealed with fine semi-decumbent hairs; femur and tibia clavate; foretibia with a distinct small outwardly directed spine; forewing with a deep apical incision distally, incision leading to a clear hairless tract, a small wavy coloured band anteriorly like a basal vein; only *sm* represented; F.W L: F.W.B = 52.5 : 21.

Metasoma : Petiole parallel laterally, and with fine dense erect hairs; medially with 5 carinae alternating with deep furrows; petiole 1.6x as long as wide; smooth and shiny, sparsely pubescent towards lower half; T2 strongly convex, occupying almost entire dorsal side of abdomen and with a dorsal longitudinal median furrow extending to more than 0.53 length of T2, on either side of it basally small grain like depressions present; rest of tergites not much visible dorsally.

Host : Unknown.

Male : Unknown.

Material examined : Holotype : Female, collected on 17-iii-1996 from P.W.L.S (Palghat, Kerala) by P.M. Sureshan. Two paratypes with same data as that of the holotype.

Etymology : The species is named '*tibiospinosa*' after the outwardly directed spine on foretibia.

Discussion : This species differs from *C. saraswati* Sharma in the following characters:

–foretibia with a distinct outwardly directed spine. (In *C. saraswati*, foretibia without an outward directed spine.

–without a row of setigerous punctures, in between notauli, at borders. (Notauli with a row of setigerous punctures, in between them at borders).

–Proportion of antennal segments.

7. *Coptera variegata* Rajmohana and
Narendran sp. nov.
(Fig. 23)

Holotype : Male. Length of body = 3.65 mm. Head and body shining black; eyes shining, silvery

brown, but with a black rim; antennae black; coxa black, while femur, tibia and tarsus black basally and reddish brown distally, apical tarsi pale brown; wings hyaline, forewing with alternate brown and clear irregular patches; veins almost colourless; antennal pilosity and marginal fringe brown; body pubescence dull-white.

Head : HL : HB (D.V) = 9 : 13 ; HL : HB (AV) =14.5: 12.5. Dorsally much transverse; vertex without teeth, but an inverted 'V' shaped carina; OOL : OD : POL=1:1.2:2; without traces of fovea between lateral ocelli; post ocelli distinctly larger than lateral ones; temples slightly bulging and sloping towards occiput, a dorsal longitudinal median carina arising from hyperoccpital carina directed towards post ocellus, eyes hairy and bordered with adorbital carina not reaching lower margin of eyes dorsally, antenna with 14 segments; scape rather simple, feebly angularly truncate, not lobed; scape as long as following one and a half segments combined together; flagellar segments almost cylindrical and subequal with short stout hairs, except terminal 3 segments; comparative measurements of antennal segments from scape to F12 being, 5:2.2, 2:2,

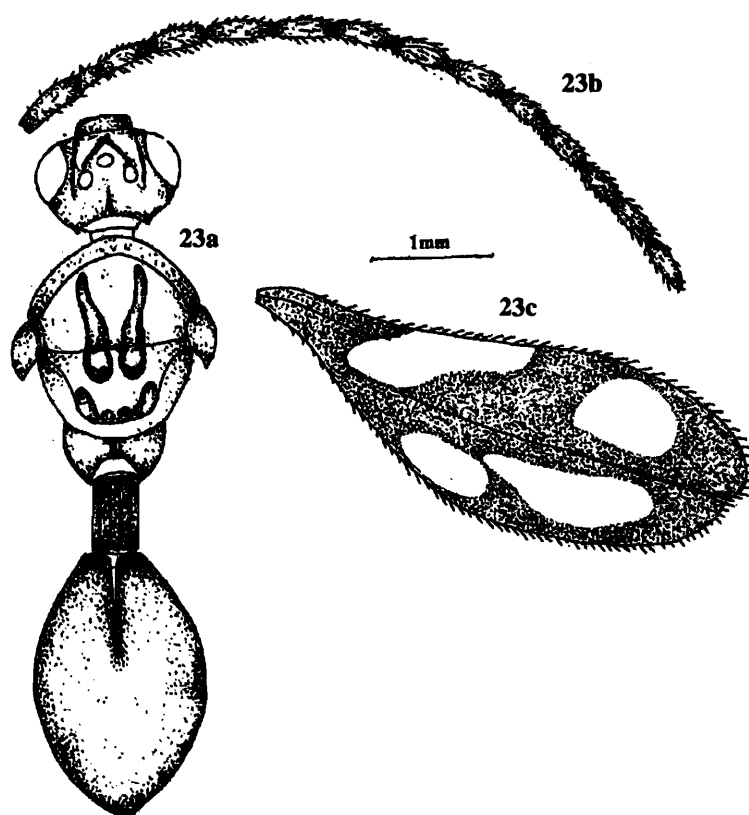


Fig. 23. *Coptera variegata* Rajmohana & Narendran sp. nov.
a. Body (D.V.); b. Antenna; c. Forewing.

5:1.8, F2 to F9 subequal 4.9:1.8, F10 and F11 again subequal, 4.2:1.8, F12 being 5.2:1.8.

Mesosoma : Distinctly wider than head; notauli distinct. Scutellum with 2 deep foveae basally, two smaller lateral foveae on scutellar sheath and distally with a pair of rounded pits; metanotum with 3 equidistant longitudinal carinae, lateral ones often faint; metanotum and propodeum covered with short decumbent fine hairs, latter rather a broad zone with a basal median longitudinal carina bifurcating in shape of an inverted 'V', to which joins lateral carinae; lower median propodeum rather a smooth slope and with moderate non-carinated emargination; propleura and mesopleura almost bare medially, borders with sparse to dense hairs; sternaulus distinct; metapleura with longitudinal keels, but much concealed with fine semi-decumbent hairs; femur and tibia clavate; fore tibia without an outwardly directed spine. Forewing with a deep apical incision distally; shaded irregular patches rather large.

Metasoma : Rather stout and elliptical; petiole parallel laterally, and with fine dense erect hairs; medially with 3 carinae alternating with deep furrows; petiole length, 1.82x its width; smooth and shiny, densely pubescent towards lower half; T2 strongly convex, occupying almost entire dorsal abdomen and with a dorsal longitudinal median furrow extending to a little more than 0.5 of T2, without impressions on either side of it basally; rest of tergites not much visible dorsally.

Female : Unknown.

Host : Unknown.

Material examined : 1 male collected from Vengoli (PWLS, Palghat, Kerala) by P.M. Sureshan.

Etymology : The species is named '*variegata*' due to its variegated patches on forewing.

Discussion : This species is distinct from all other known species due to the variegated patches on forewing. The vertex is rather with carinae only and not with spines or teeth. While in all other species, pedicel is always longer than thick, in this species alone, pedicel is just as long as thick.

11. Genus *Entomacis* Foerster (Figs. 24-28)

1856. Type : *Diapria* (*Glyphidopria*) *platyptera* Haliday, Foerster, *Hym. Stud*, 2 : 121, 123.

1856. *Hemilexis* Foerster, : 122, 123, 127. Type : *Hemilexus mellipetiolata* Ashmead. Synonymized by DallaTore (1898), Muesebeck (1958).

1857. *Glyphidopria* Haliday, : 170, 172. Type : *Diapria* (*Glyphidopria*) *platyptera* Haliday, designated by Muesebeck and Walkley (1951). An objective junior synonym of *Entomacis* Foerster.

1893. *Hemilexodes* Ashmead, : 386, 399. Type : *Hemilexoides floridana* Ashmead, by original designation. Synonymized with *Hemilexis* Foerster by Muesebeck and Walkley (1951).

1902. *Adeliopria* Ashmead, : 15. *Adeliopria longii* Ashmead, by monotypy and original designation. Synonymized by Masner (1964a).

1912a. *Schizopria* Kieffer, : 5, 17. Type : *Schizopria fallax* Kieffer, designated by Kieffer (1916a). Synonymized by Masner (1965).

Diagnosis : Body smooth and shiny. Head globose, eyes bare, mandibles bidentate, maxillary palp 5 segmented, labial palp 3 segmented. Antenna 13 segmented in both male and female; 4th segment in males modified, filiform and with whorls of long hairs. Flagellar segments mostly cylindrical and without a distinct club. Pronotum mostly angular; pronotal collar absent. Notauli either present or absent. Scutellum rounded behind and with a groove in front. Metanotum and propodeum at a lower level than scutellum; propodeum with a median longitudinal ridge, carina or lamella, with or without a median spine. Hind tibia in distal one third abruptly thickened. Distal end of forewing rounded or truncated, either entire or with a notch; *sm* reaching proximal one third or middle; *m* punctiform; *stg* small; *basalis*, *medial* and *anal* weakly indicated at times. Petiole finely striated. Anterior T2 with or without a small basal median longitudinal incision; metasoma depressed from above, T4 to T7 at the hind end forming a narrow short triangular tip.

Distribution : Australian, Afrotropical, Palearctic, Neotropical, Nearctic, and Oriental Regions.

Host : Nixon (1980) reports *Forcipomyia picea* Winnertz of Dipteran family Ceratopogonidae, as

host of a European species, namely *E. perplexa* (Haliday).

Discussion : With a 13 segmented antenna in both sexes, a truncated notched distal margin of forewing and a depressed metasomal tip, *Entomacis* is similar to *Monelata* Foerster.

But both are quite distinct genera with unique characters, as follows :

<i>Entomacis</i>	<i>Monelata</i>
1 Notauli either present or absent.	Notauli always absent.
2 T2 with or without a basal median longitudinal incision.	No such incision on T2.
3 Pronotum without a dense hairy collar and scales.	Pronotum with much denser hairy collar and scales.
4 Scutellum with one or two foveae in front.	Scutellum without a fovea in front.
5 Petiole without a scaly covering	Petiole clothed with dense covering of semi-hyaline scales.
6 Terminal antennal segment in females without any sharp features.	Terminal antennal segment in female, large, ovoid, many times larger in size than the preceding segments.

Characters like presence of notauli and incision on anteromedian of T2 are species related. The proportions of flagellar segments and presence of facial sulci and carinae too are important while identifying the species. Carinae on propodeum and metanotum tend to express a uniform pattern, contributing very little for species delimitation. Though Nixon (1980) remarks distribution of hair on propodeum as a species character, this has been of not much relevance to separate the species found in the Indian region.

Status in India and Kerala : The Oriental Region represents one of the least known areas of the world with regard to genus *Entomacis* Foerster. Of a total of 38 world species, only 1 species viz. *E. indicus* Sharma is so far known from India as well as the Oriental Region. (Johnson, 1992). The present work reports from Kerala 5 new species namely *E. keralensis* Rajmohana and Narendran sp. nov., *E. spinosus* Rajmohana and Narendran sp. nov., *E. completeus* Rajmohana and Narendran sp. nov., *E. linealis*

Rajmohana and Narendran sp. nov. and *E. balloonus* Rajmohana and Narendran sp. nov..

Remarks : As per the genus descriptions by Nixon (1980) and Kieffer (1916a), the scutellum has only one fovea. But *E. indicus* Sharma has two scutellar foveae. Since the depository is unknown, the holotype could not be examined. However this species is included in the following key.

Since the key provided here is based on females, *E. balloonus* sp. nov., described based on male is not included.

Key to *Entomacis* Foerster of India based on females

1. Scutellum with 2 grooves; notauli present
.....*E. indicus* Sharma
- Scutellum with 1 groove; notauli either present or absent 2
2. T2 without a basal median furrow; metanotum and propodeum armed with a distinct spine (Fig. 21).....*E. spinosus* Rajmohana and Narendran sp. nov.
- T2 with a basal median furrow; metanotum sometimes with a spine, propodeum at the most lamellate 3
3. Notauli present; F2 shorter than F3 4

— Notauli absent; F2 longer than F3 (2.3x), or at least subequal *E. linealis* Rajmohana and Narendran sp. nov.

4. Distal margin of forewing with a deep notch; malar sulcus absent *E. keralensis* Rajmohana and Narendran sp. nov.

— Distal margin of forewing entire; malar sulcus present *E. completus* Rajmohana and Narendran sp. nov.

1. *Entomacis balloonus* Rajmohana and Narendran sp. nov.
(Fig. 24)

Holotype : Male. Length of body 1.4mm. Head and body shining black; eyes and ocelli pale black; antenna blackish brown with paler scape; median lamella of metanotum and propodeum, petiole and tip of metasoma honey brown; legs pale brown, apical tarsi deep blackish brown; wings slightly infuscated, veins dark brown; body pubescence dull white; antennal pilosity and marginal fringe brown.

Head : HL : HB(DV) = 10 : 14; HL : HB(AV) = 4.6 : 4.8; when viewed from above distinctly transverse; smooth and shiny; ocelli placed on dorsal median portion; lateral ocelli small; OOL : OD : POL = 2.8 : 1.2 : 8; dorsally with very few erect sparse and stout setae; temples not much bulging, but sub-parallel beneath eyes and with a gradual smooth curve towards occiput; occipital flange narrow, step-like; eyes rather small, roughly rounded, bare, located anteriorly and with a distinct lateral bulge; head almost trapezoid in lateral view; frontal shelf at a higher level of eye-orbit; vertex with an upward slope from antennal shelf; malar sulcus absent; malar space : maximum eye width = 5 : 6; post genal cushion also lacking; genal carina distinct; lower margin of clypeus convex; tentorial pit not distinct, but epistomial sulcus clearly visible; mandibles bidentate, two teeth almost subequal; antenna 13 segmented; AF 1.1.2.9; scape thinner basally, as long as next 2.1 segments combined together; F1 large and 1.66x length of pedicel; F2 bulged like a balloon and 1.2x length of F1; F5 to F10 much globular; terminal segment a little enlarged and with a ventral pit; proportions of length and breadth of

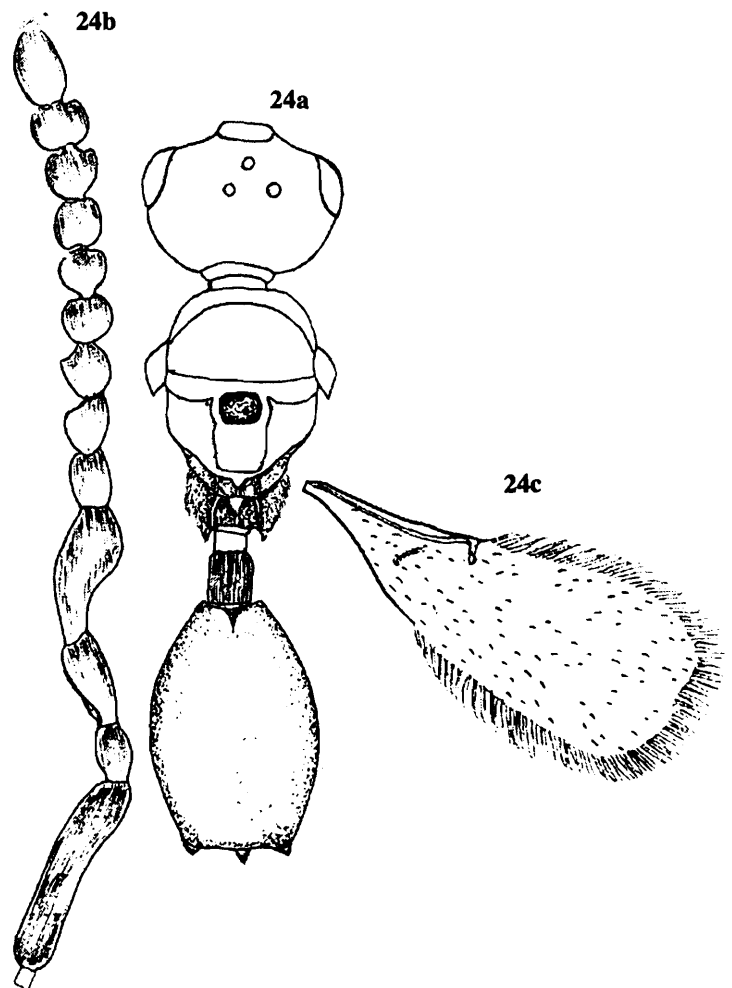


Fig. 24. *Entomacis balloonus* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

antennal segments from scape to F11 is as follows: 25 : 6.5, 1.8 : 1.2, 2.9 : 1.3, 3.5 : 1.8, 1.5 : 1.1, 1.5 : 1.1, 1.4 : 1.3, 1.3 : 1.3, 1.3 : 1.4, 1.2 : 1.4, 1.2 : 1.4, 1.2 : 1.4, 2.1 : 1.4.

Mesosoma : L : B = 18 : 14.5; neck distinct, with traces of longitudinal striae; pronotal collar absent; pronotum barely visible as thin streaks anterior to an abruptly elevated mesonotum, sparse erect fine pubescence present; notauli absent. TSS distinct only medially; humeral sulcus absent; scutellum a bit conical with a wide rectangular fovea anteriorly and with convex lateral borders and slightly concave lower border; scutellar sheath not humped, but with a wavy lateral margin; posterior scutellar border with a row of fine small punctuae; scutellum, metanotum, propodeum etc. all lined by a distinct black carina; in lateral view, metanotum and propodeum seen as separate entities, metanotum a little elevated from normal plain and with a raised prominent median keel, lateral keels much reduced, lateral metanotum with a row of fine punctuations; propodeum with a convex arch shaped carina and a raised median

keel bifurcating posteriorly to form a border of posterior emargination; median propodeum with fine appressed hairs; slanting downwards towards nucha; propleura and mesopleura bare; sternaulus seen as a longitudinal depression; metapleura coarsely granulate and with irregular fine transverse folds, but much concealed by overlying semi-decumbent fine hairs; legs normal; tibia with long hairs; FWL : FWB = 5.3 : 2; distal margin of forewing entire, not notched; lineola faintly visible; hindwing normal; $sm : m : stg = 14.5 : 2 : 2$.

Metasoma : Petiole 1.5x as long as thick with a number of fine parallel longitudinal striations and a few long lateral hairs; metasoma L : B = 20.5 : 11.4; tip of metasoma depressed and angular, T2 with a small basal median longitudinal furrow and extending to 0.93 length of abdomen; T4 to T7 narrow, not clearly visible from above; more hairy posteriorly.

Female : Unknown.

Host : Unknown.

Material examined : Holotype : One Male collected on 3-xi-1988 from Munnar (Idukki, Kerala) by T.C. Narendran and party.

Etymology : The species name '*balloonus*' is only an arbitrary combination of letters.

Discussion : This new species has been erected, based on a male. The solid and definite characters of the antenna can never be stated as a variation by chance. This species is distinct with a peculiar antennae having the 3rd antennal segment conspicuously enlarged.

2. *Entomacis completus* Rajmohana and Narendran sp. nov. (Fig. 25)

Holotype : Female. Length of body = 1.36 mm. Head, anterior thorax and posterior abdomen black; rest of thorax and abdomen blackish brown; petiole pale brown; carinae black; eyes black; antennal scape pale brown, rest of segments blackish brown; legs concolorous with petiole; wings clear, without infuscations, veins deep brown; antennal pilosity, body pubescence and marginal fringe of wings brown.

Head : HL : HB(DV) = 7.3 : 11; HL : HB(AV) = 10.2 : 11; when viewed from above distinctly transverse; smooth and shiny; ocelli placed on dorsal median portion; lateral ocelli small; OOL : OD : POL = 8 : 3.3 : 5; dorsally with very few erect, sparse and stout setae; temples bulging, with a gradual smooth curve towards occiput; occipital flange narrow, step-like; eyes large, roughly rounded, bare, located anteriorly and with a slight lateral bulge; head almost trapezoid in lateral view. Frontal shelf at a higher level of eye-orbit; vertex with an upward slope from antennal shelf; malar sulcus present; malar space : maximum eye width = 4.9:17.5; post-genal cushion also lacking; genal carina distinct; lower margin of clypeus convex; tentorial pit not distinct; mandibles bidentate; antenna 13 segmented, terminal segment much enlarged; AF 1.1.10.1; F11 with a ventral pit; scape thinner basally, as long as length of next 3.1 segments combined together; F1 not as long as pedicel (0.76 length of pedicel) and F2 (0.97 length of F2); F2 not as long as F3 (0.92 length of F3); F3 and F4, F5 to F7 and F8 to F10 almost subequal in length; proportions of length and breadth of antennal segments from scape to F11 is as follows : 29 : 5.5; 10.34 : 5; 7.8 : 3; 8.1 : 4; 8.8 : 4; 8.8 : 4; 8 : 4.7; 8 : 6.5; 7.5 : 6.5; 7.5 : 6.5; 7.5 : 6.5; 12.6 : 6.

Mesosoma : L:B = 14 : 11; neck distinct, with traces of longitudinal striae; pronotal collar absent; pronotum barely visible as thin streak anterior to an abruptly elevated mesoscutum; notauli distinct, diverging in front, with uniform thickness and separated from each other basally by a little more width of scutellar groove; TSS distinct; humeral sulcus absent; scutellum a bit conical, with a pitted border posteriorly; a wide transverse groove present anteriorly with convex lateral borders and slightly concave lower border; scutellar sheath a little humped; scutellum, metanotum, propodeum etc. all lined by a distinct black carina; in lateral view, metanotum and propodeum seen as separate entities, metanotum a little elevated from normal plain and with a median carina raised to form a spine; two pointed denticles replacing lateral carinae on metanotum posteriorly; median carina of propodeum a little lamellate, with a dorsal semi-hyaline zone, lateral carina ending in denticles at posterior carinate emargination; median

propodeum with fine appressed hairs; slanting downwards towards a distinct striated nucha; propleura and mesopleura bare; sternaulus seen as a longitudinal depression; metapleura coarsely and irregularly striate, but much concealed by overlying semi-decumbent hairs; legs normal; tibia with long hairs; FW L : FW B = 11.45 : 4; distal margin of forewing entire, not notched; lineola absent; hindwing normal.

Metasoma : Abdomen L:B = 17.5:10; petiole as long as thick with many parallel longitudinal striations and a few long lateral hairs; metanotal tip depressed and angular, T2 with a small basal median longitudinal furrow and extending to 0.86 length of abdomen; T4 to T7 narrow, not clearly visible from above; more hairy posteriorly.

Male : Unknown.

Host : Unknown.

Material examined : Holotype : Female collected from Idukki (Kerala, India) on 3-v-1988 by T.C. Narendran and party.

Etymology : The species is named 'completus' after its character viz., distal margin of forewing complete, without incision.

Discussion : This species resembles *E. keralensis* sp. nov. in having a pair of distinct notauli and a non-incised margin of fore-wing; but differs from it by possessing the following characters:

—A distinct malar sulcus and metanotal spine. (In *E. keralensis*, a malar sulcus and a metanotal spine absent).

—The proportion of the antennal segments differ in both.

3. *Entomacis keralensis* Rajmohana and Narendran sp. nov. (Fig. 26)

Holotype : Female. Length of body = 1.268 mm. Head, proximal half of thorax, abdomen and flagellar segments deep brownish black; metanotum, propodeum and petiole pale brownish yellow; eyes silvery with a black tinge; legs concolorous with scape; wings hyaline without

any infuscations, veins deep brown; antennal hairs and marginal fringe of wings deep brown; body pubescence dull white.

Head : HL : HB(DV) = 7 : 10; HL : HB(AV) = 7 : 10; when viewed from above distinctly transverse; smooth and shiny; ocelli placed high towards vertex; lateral ocelli small; OOL : OD : POL = 3 : 0.5 : 1.8 ; dorsally with very few erect sparse and stout setae; temples bulging, with a gradual smooth curve towards occiput; occipital flange narrow, step-like; eyes large, roughly rounded, bare and with a slight lateral bulge; head almost trapezoid in lateral view; frontal shelf at a higher level of eye-orbit; vertex with an upward slope from antennal shelf; malar sulcus absent; malar space : maximum eye width = 7 : 19; post genal cushion also lacking; lower margin of clypeus convex; tentorial pit not distinct; antenna

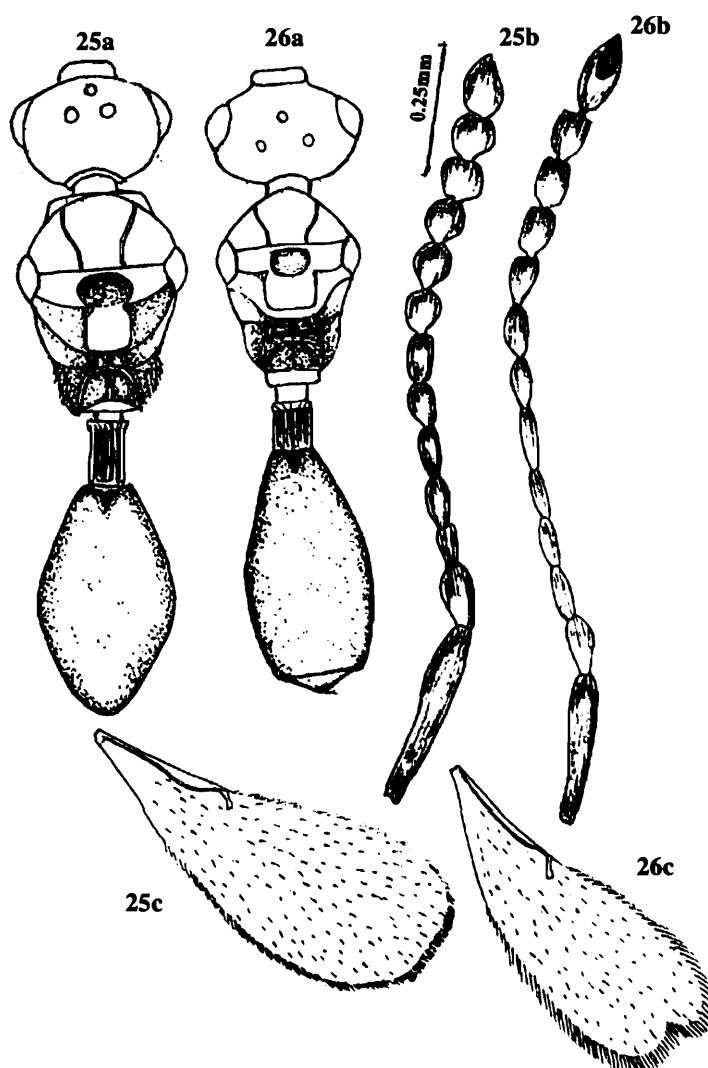


Fig. 25. *Entomacis completus* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

Fig. 26. *Entomacis keralensis* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

13 segmented; AF 1.1.6.5; flagellar segments gradually thickening towards apex; scape equal to next 2.5 segments combined together; F2 distinctly shorter than F1 and F3, 0.89x length of F1 and 0.85x length of F3; F1 and F2 cylindrical and almost filamentous; F3 to F5 thinner distally and thicker proximally; F6 to F10 almost with uniform thickness; ventral pit distinct on F11; proportions of length and breadth of antennal segments from scape to F11 as follows : 9.8 : 2.1, 4 : 1.9, 3.8 : 1.1, 3.4 : 1.1, 4 : 1.4, 3.5 : 1.8, 3.7 : 1.8, 3.7 : 2, 3.7 : 2, 3.5 : 2, 3 : 2, 3 : 2, 5 : 2.

Mesosoma : L : B = 12.3 : 10; neck distinct, coarse; a distinct pronotal hairy collar absent; pronotum barely visible as thin streaks anterior to an abruptly elevated mesonotum; notauli distinct, diverging in front, with uniform thickness and separated from each other basally by a little more width of scutellar groove. TSS distinct; humeral sulcus absent; scutellum a bit conical with a pitted border posteriorly; a wide transverse groove present anteriorly with convex lateral borders and slightly concave lower border; scutellar sheath a little humped; scutellum, metanotum, propodeum etc. all lined by a distinct black carina; in lateral view, metanotum and propodeum seen as separate entities, unarmed ; two pointed denticles replacing lateral carinae on metanotum posteriorly; median carina of propodeum raised a little to form a tooth-like structure; lateral carina of propodeum much convex and with anterior and posterior denticles; median area smooth; posterior emargination also carinate and slanting towards nucha; propleura and mesopleura bare; sternaulus seen as a longitudinal depression; metapleura coarsely and irregularly striate, but much concealed by overlying semi-decumbent hairs; legs normal; tibia with long hairs; FW L : FW B = 10.9 : 3.5; distal margin of forewing with a deep median notch; hindwing normal; lineola absent. A distinct faintly striated nucha present.

Metasoma : Petiole 1.5x as long as thick with five distinct parallel longitudinal striations and a few long lateral hairs; L : B = 15.5 : 9; tip of metanotum depressed and angular, T2 with a small basal median longitudinal furrow and 0.93 length of abdomen; T4 to T7 narrow, forming a short triangular tip; more hairy posteriorly.

Male : Unknown.

Host : Unknown.

Material examined : Holotype : One Female, collected on 15-x-1995 from Tiruvannur (Calicut, Kerala) by Mohana.

Three paratypes, all females one with same data of the holotype but collected on 14-x-1996. Others collected by C. Radhakrishnan and party and P.M. Sureshan on 21-ii-1996 from Sholayar (Trichur, Kerala) and from Ambayathode (Kannur, Kerala) on 2-ii-1995 respectively.

Etymology : The species is named '*keralensis*' after the name of the state, Kerala.

Discussion : This species differs from *E. spinosus* sp. nov. in :

–Having a pair of distinct notauli. (In *E. spinosus* notauli absent).

–Unarmed metanotum and propodeum. (*E. spinosus* possesses an armed metanotum and propodeum).

–Presence of a basal median longitudinal furrow on T2. (*E. spinosus* lacks a median furrow on basal T2).

–Shape and proportions of antennal segments differ in both.

4. *Entomacis linealis* Rajmohana and Narendran sp. nov.

(Fig. 27)

Holotype : Female. Length of body = 1.25mm. Head black; rest of body brownish black, tip of abdomen black; antennal scape pale brown, rest of segments deep brown; eyes dull black; legs concolorous with scape; wings clear without infuscations, lineola pale brown; veins deep brown; antennal pilosity, body pubescence and marginal fringe of wings brown.

Head : HL : HB(DV) = 8 : 11; HL : HB(AV) = 11 : 12; when viewed from above distinctly transverse; smooth and shiny; ocelli placed high towards vertex ; lateral ocelli small; OOL : OD : POL = 2.7 : 1 : 2.3 ; dorsally with very few erect

sparse and stout setae; temples bulging, with a gradual smooth curve towards occiput; occipital flange narrow, step-like; eyes large, roughly rounded, bare, located anteriorly and with a slight lateral bulge; head almost trapezoid in lateral view. Frontal shelf at a higher level of eye-orbit; vertex with an upward slope from antennal shelf; malar sulcus absent; malar space : maximum eye width = 10 : 18; post genal cushion also lacking; genal carina distinct; lower margin of clypeus convex; tentorial pit indistinct; mandibles bidentate; antenna 13 segmented, terminal segments a little enlarged; antennal formula 1.1.10.1; scape thinner basally, but feebly club-shaped; F1 slightly elongate, smaller than pedicel (0.73x length of pedicel), distinctly longer than F2 (1.63x length of F2); F2 almost as long as F3; F6 to F10 much globular; ventral pit distinct on F11; proportions of length and breadth of antennal segments from scape to F11 as follows : 12.8 : 2, 4.9 : 2, 3.6 : 1.1, 2.2 : 1.1, 2.2 : 1.2, 3 : 2, 3 : 2, 3 : 2.3, 2.5 : 2.9, 2.5 : 2.9, 2.5 : 2.9, 2.5 : 2.9, 5.1 : 3.1.

Mesosoma : L : B = 14 : 11; neck distinct, bare; a distinct pronotal collar absent; pronotum barely visible as thin streaks anterior to an abruptly elevated mesoscutum, anteriorly angular; notauli absent. TSS distinct; humeral sulcus absent; scutellum a bit conical with a pitted border posteriorly; a wide transverse groove present anteriorly with convex lateral borders and slightly concave lower border; scutellar sheath demarcated and a little humped; scutellum, metanotum, propodeum etc. all lined by a distinct black carina; metanotum with a distinct median longitudinal carina along with a raised central keel and dorsal semi-hyaline zone; in lateral view, metanotum and propodeum seen as separate entities; unarmed; two pointed denticles replacing lateral carinae on metanotum posteriorly; median carina of propodeum raised to form a keel like that of metanotum; lateral carina of propodeum much convex and with anterior and posterior denticles; median area smooth and bare; posterior emargination feeble but carinate, hairy and slanting downwards towards nucha; propleura and mesopleura bare; sternaulus seen as a longitudinal depression; metapleura coarsely and irregularly striate, but much concealed by overlying semi-decumbent hairs; legs normal; tibia with long

hairs; FWL : FWB = 11.65:3.9; distal margin of forewing entire, not notched; a feeble lineola present beneath *sm*; hindwing normal. A distinct faintly striated nucha present.

Metasoma : Petiole as long as thick with eight distinct parallel longitudinal striations and a few long lateral hairs; abdomen L : B = 13.5 : 10; metasomal tip depressed and angular, T2 with a small basal median longitudinal furrow and 0.96 length of abdomen; T4 to T7 narrow, not clearly visible from above; more hairy posteriorly.

Male : Unknown.

Host : Unknown.

Material examined : Holotype : One female collected from Rajamalai (Idukki, Kerala) on 26-ii-1995 by P.M. Sureshan.

Etymology : The species name '*linealis*' is only an arbitrary combination of letters.

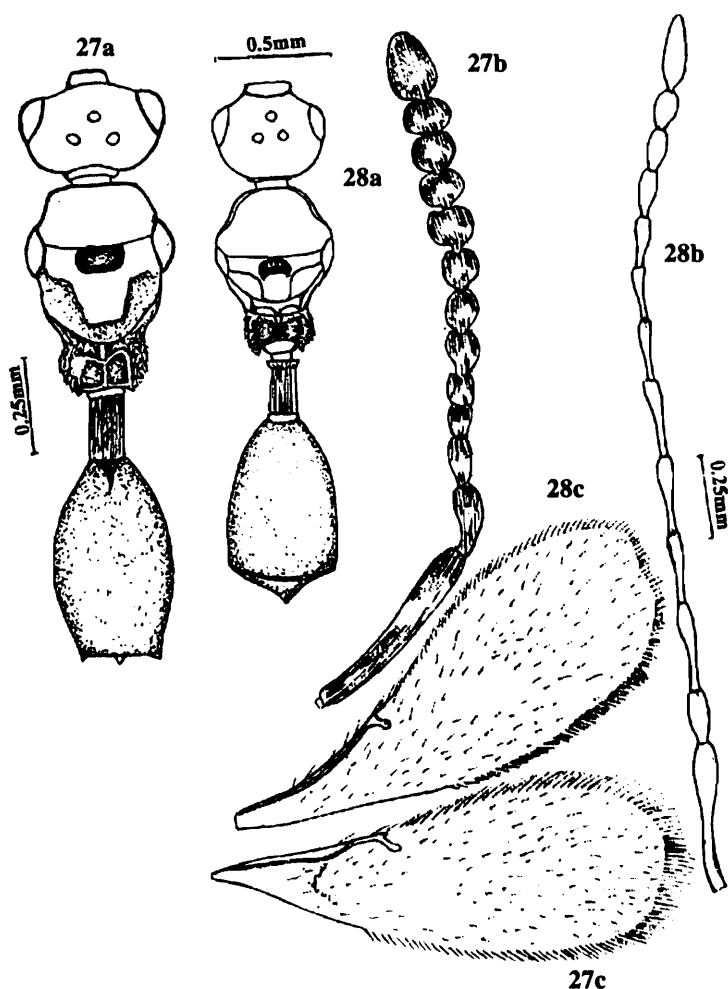


Fig. 27. *Entomacis linealis* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

Fig. 28. *Entomacis spinosus* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

Discussion : This species resembles *E. keralensis* sp. nov. in having a basal median furrow on T2, but differs from it by possessing the following characters:

–Absence of notauli. (*E. keralensis* with a distinct pair of notauli).

–Distal margin of forewing entire and without a notch. (*E. keralensis* with a distally notched forewing).

–The proportions of antennal segments differ in both species.

5. *Entomacis spinosus* Rajmohana and
Narendran sp. nov.
(Fig. 28)

Holotype : Female. Length of the body =1.73mm. Head and posterior half of abdomen black with a brown tinge; eyes and ocelli black; mandibles brown; antenna pale brown distally and darker proximally; rest of body honey brown; legs brownish yellow; wings hyaline; veins concolorous with legs; antennal pilosity, body pubescence and marginal fringe of wings, dull white.

Head : HL : HB(D.V) = 10.5 : 12; HL : HB (AV) = 8 : 7; globose, smooth and shiny; when viewed from above distinctly transverse; ocelli placed high towards vertex ; lateral ocelli small ; OOL : OD : POL = 2.8 : 1 : 1.8; dorsally with very few erect, sparse and stout setae; temples bulging, with a gradual smooth curve towards occiput; occipital flange narrow, step-like; eyes large, roughly rounded, bare and with a slight lateral bulge; head almost trapezoid in lateral view. Frontal shelf at a higher level of eye-orbit; vertex with an upward slope from antennal shelf; malar sulcus absent; malar space : maximum eye width =13:19; post genal cushion lacking; lower margin of clypeus convex; tentorial pit not distinct; antenna 13 segmented and without a distinct club, terminal 6 segments gradually enlarged towards apex and more hairy; antennal formula 1.1.5.6; ventral pit distinct on F11; F1, F2 and F3 with a long cylindrical stem and a swollen tip; scape 3x length of pedicel, a little more than length of next

two segments combined and with longer, stouter hairs, distinctly club-shaped; F1 1.75x length of pedicel and 1.1x length of F2; F2 1.06x length of F3; F11 1.66x length of F10; proportions of length and breadth of antennal segments from scape to F11 as follows : 12 : 2.2, 4 : 2, 7 : 1.1, 6.3 : 1.3, 5.9 : 1.5, 5.3 : 1.7, 4.8 : 1.7, 4.8 : 2, 4 : 2, 3.8 : 2, 3:2, 3:2.3, 5:2.3.

Mesosoma : L : B = 61 : 32. Neck distinct, coarse; a distinct pronotal collar absent; pronotum barely visible as thin streaks anterior to an abruptly elevated mesoscutum; notauli absent. TSS distinct; humeral sulcus absent; scutellum a bit conical with a pitted border posteriorly; a wide transverse groove present with convex lateral borders and slightly concave lower border; scutellar sheath a little humped; scutellum, metanotum, propodeum etc. all lined by a distinct black carina; in lateral view metanotum and propodeum seen as separate entities and each with a median longitudinal carina produced into distinct pointed erect spine with a broad base on a dorsal semi-hyaline lamella; two pointed denticles replacing lateral carinae on metanotum posteriorly; lateral carina of propodeum much convex and with anterior and posterior denticles; median plane of propodeum with slanting appressed long fine hairs; posterior emargination also carinate; propleura and mesopleura bare; sternaulus seen as a longitudinal depression; metapleura coarsely and irregularly striate, but much concealed by overlying semi-decumbent hairs; legs normal; tibia with long hairs; FWL : FWB = 12.4 : 4 ; distal margin of forewing with a shallow median notch; hindwing normal; lineola absent. A distinct faintly striated nucha present.

Metasoma : Petiole twice as long as thick with parallel fine irregular striations and a few long lateral hairs; abdomen L : B = 18.5 : 12.5; tip of abdomen depressed and angular, T2 without a small basal median longitudinal incision, but with a distinct concave ring like carina anteriorly; T4 to T7 narrow, forming a short triangular tip; more hairy posteriorly.

Male : Unknown.

Host : Unknown.

Material examined : Holotype : Female collected from Tiruvannur (Calicut, Kerala) by Mohana on 17-xi-1994.

Paratypes : 2 Females, one with same data as that of the holotype except date 23-xi-1996 and the other collected from Calicut University Campus (Malappuram, Kerala) by Sheela. S, on 3-xii-1993.

Etymology : The species is named '*spinosus*' after its spine on metanotum and propodeum.

Discussion : This species differs from the only known species from the Oriental Region, *E. indicus* Sharma in having:

—One scutellar groove. (*E. indicus* with two scutellar grooves).

—A distinct spine on median metanotum and propodeum. (In *E. indicus* metanotum and propodeum unarmed).

—Distal margin of forewing with a shallow notch. (In *E. indicus* distal margin of forewing without a notch).

—Absence of median incision on basal T2. (In *E. indicus* a small median longitudinal incision on basal T2).

—Antennal proportions differ in both species.

12. Genus *Monelata* Foerster (Fig. 29)

1856. *Monelata* Foerster, *Hym. Stud.*, 2 : 123. Type : *Diapria parvula* Nees ab Esenbeck, designated by Ashmead (1893).

1857. *Corynopria* Haliday, : 170. Type : *Diapria petiolaris* Nees ab Esenbeck, designated by Muesebeck and Walkley (1951). Synonymized by Dalla Torre (1898), Pschorn-Walcher (1956).

1912c. *Entomopria* : Kieffer, : 4, 18. Type : *Corynopria solida* Thomson, by monotypy. Keyed. Synonymized with *Monelata* Foerster by Pschorn-Walcher (1956).

1939. *Streptopria* Maneval, : 168. Type : *Streptopria rozieri* Maneval, by monotypy and original designation. Synonymized with *Monelata* Foerster by Masner and Sudholm (1959).

Diagnosis : Colour deep brown to black; head somewhat conical; eyes bare, big; bidentate;

antenna 13 segmented in both male and female; 4th segment of male ridged; third and fourth subequal; antennae of female with thick, condensed, ovoid end segment; A 11 and A 12 somewhat thicker than preceding segments, but many times thinner than end segment; club at times 3 segmented; temples, prothorax, petiole and anterior part of second sternite with dense fine hairs; cervix distinct, overgrown laterally and basally by thick tufts of hairs and semi-hyaline scales, giving an overall foamy appearance; pronotum only slightly visible; mesonotum without notauli; scutellum in front without grooves; TSS not much distinct; propodeum with a median keel; hindtibia in distal half abruptly swollen; distal margin of forewing entire or incised at tip, well developed marginal fringe; petiole with thick covering of overlapping, semi-hyaline scales, mixed with dense hairs, concealing its lateral margin; metasoma often sub-parallel, depressed when seen from above; T2 without a basal longitudinal furrow.

Male : Unknown.

Distribution : Afrotropical, Palearctic, Nearctic and Oriental Regions.

Discussion : The affinities between *Monelata* and *Entomacis* Foerster is discussed in detail under *Entomacis*.

Status in India and Kerala : Two species namely *Monelata incisipennis* Huggert (Huggert, 1982) and *Monelata completus* Rajmohana and Narendran (Rajmohana and Narendran 2000c) are the only species hitherto reported from India as well as the Oriental.

Key to Indian species of *Monelata* Foerster

1. Forewing with distal margin deeply incised
..... *M. incisipennis* Huggert
- Forewing with no incision on distal margin
..... *M. completa* Rajmohana and Narendran

Species Diagnosis

1. *Monelata completa* Rajmohana and Narendran (Fig. 29)

2000c. *Monelata completa* Rajmohana and Narendran, *Journal Bombay nat. Hist. Soc.*, 97(2) : 260-262.

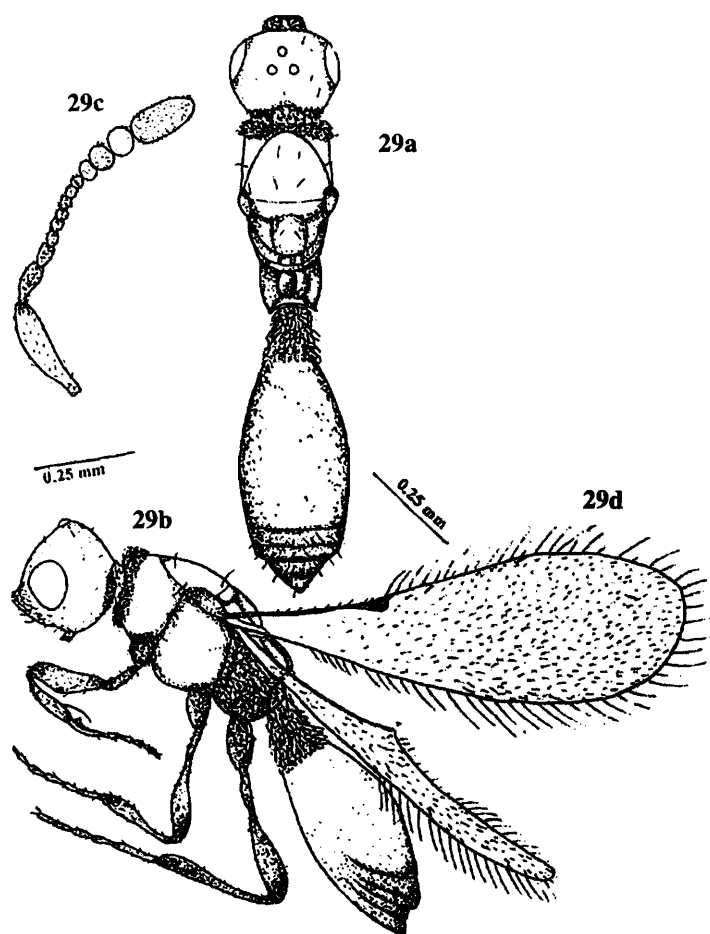


Fig. 29. *Monelata completa* Rajmohana & Narendran
a. Body (D.V.); b. Antenna; c. Forewing.

Length = 1.11 mm

Female. Head black; thorax and metasoma deep blackish brown. Wings hyaline, veins deep brown.

Head transverse. OOL : OD : POL = 8 : 2 : 3; post genal cushion with a lappet-like appearance; eyes bare, located much anteriorly; head when viewed laterally higher than long; malar groove absent; antenna 13 segmented, last 4 segments gradually enlarged, terminal club segment much enlarged, longer than length of 3 preceding segments together; scape a little longer than length of next 4 segments combined. Mesosoma slightly narrower than head; mesonotum without notauli; scutellum without any foveae, median carina and basal fovea; metanotum with a reduced median and two longitudinal keels; propodeum with a raised median longitudinal keel and with dorsal semi-hyaline zone and two lateral ones; forewing distally entire, without an incised tip.

Petiole covered with semi-hyaline, elongate scales, mixed with setae; petiole longer than broad; T2 extending to 0.78 of abdomen.

Male : Unknown.

Type locality : Tiruvannur (Calicut, Kerala).

13. Genus *Nigropria* Rajmohana and Narendran (Fig. 30)

2000b. *Nigropria* Rajmohana and Narendran. Type : *Nigropria compressa*, *Entomon* 25(3) : 193-200.

Diagnosis : Head and body shining black. Orbital carina distinct, encircling lower margin of eyes. Antenna 13 segmented in female, without an abrupt clava; mandibles bidentate. Mesosoma erect in profile; pronotum with pointed angular anterolateral corners. Notauli deep and complete. Scutellum with two small anterior foveae. Propodeum with a deeply excavated posterior margin and with longitudinal rugulae, radiating from basal emargination. *sm* distinct, *m* as well as *stg* seen as a spec; radial spurious; *basalis* distinct, extending upto *cu*; a non-hairy streak a little below median; *sm* not reaching frenum of hindwing. Metasoma dorso-ventrally flattened; T2 with its basal margin, distinctly concave.

Male : Unknown.

Distribution : Kerala (India).

Discussion : The steep or erect mesosoma and a dorso-ventrally-flattened metasoma are rather peculiar for this genus.

This genus resembles *Spilomicrus* Westwood and *Odontopria* Kieffer in possessing a 13 segmented antennae, without an abrupt clava. All the three have very similar wing venation too.

Status in India and Kerala : This genus is hitherto reported only from Kerala, with one species viz. *Nigropria compressa* Rajmohana and Narendran.

Species Diagnosis

1. *Nigropria compressa* Rajmohana and Narendran (Fig. 30)

2000b. *Nigropria compressa* Rajmohana and Narendran. *Entomon* 25(3) : 193-200.

Length = 1.94 mm

Female : Head and body shining black. Antennae brownish black. Wings not infusate, veins deep brown.

Head with a gently arched vertex. Orbital carina distinct encircling lower margin of eyes, OOL : OD : POL = 2 : 1.5 : 3; pubescence scattered and erect. Eyes bare, malar sulcus present; genal carina distinct; mandibles bidentate. Antenna in female with 13 segments, gradually thickened; 1.1.5. 6. F3 to F5 globose; *sc* 3.27x as long as wide; terminal segment 1.8x as long as penultimate. Mesosoma unusually long, 1.44x as long as wide and a little wider than head; in lateral view steep. Pronotum with pointed angular anterolateral corners. Mesonotum with deep and complete notauli; humeral sulcus absent. Scutellum with two small anterior foveae; scutellar shield without carina. Metanotum with three small equidistant buds. Propodeum with a deeply excavated posterior margin and with many longitudinal rugulae radiating from basal emargination; median carina on propodeum not produced into spine or tooth. A longitudinal furrow

extending beneath tegula throughout mesopleuron. Forewing with a distinct *basalis*; *sm* incomplete in hindwing, extending only to a length 0.2 of total length of hindwing.

Petiole robust, with irregular longitudinal striations, 1.67x as long as wide. Abdomen dorsoventrally flattened, 2.6x as wide as high, abdominal width: height = 34 : 13; T2 with its basal margin distinctly concave. T2 extending to 0.78 of dorsal abdomen.

Male : Unknown.

Type locality : Pamba (Pathanamthitta, Kerala).

14. Genus *Odontopria* Kieffer (Fig. 31)

1905. *Odontopria* Kieffer. Type : *Odontopria temporalis* Kieffer, *Ann. Mus. Civ. Stor. Nat. Genova* 2(2) : 9-39.

Diagnosis : Head and body shining black. Wings slightly infuscated; veins deep brown; marginal fringe of wings and body pubescence off-white.

In lateral view head trapezoid. When viewed dorsally often transverse; antenna inserted on vertex. Adorbital carina distinct. Eyes pubescent. Frons, face, gena and dorsal head with dense punctae. Mandibles bidentate, teeth unequal. At least with a trace of longitudinal carina rising from median occiput. Antenna 13 segmented, in females gradually thickened towards apex (1.1.5.6); in males, long and thread-like with cylindrical segments. Anterior margin of pronotum sloping, angular and with lateral inward depression. Anterior margin of mesonotum often bordered by a row of setigerous pits; notauli deep, broad and complete; humeral sulcus present or absent; TSS narrow. Scutellum with two anterior U-shaped foveae; scutellar shield with lateral longitudinal furrows; lower margin of scutellar shield often with a row or a pair of small foveae. Propodeum with a median keel, often anteriorly raised to form a pointed tooth and with two pairs of lateral carinae. Legs normal. Forewings large; veins reaching to its one fourth; *m* dotted ; a clear horizontal hairless line a little lower to median ; *basalis* present or absent.

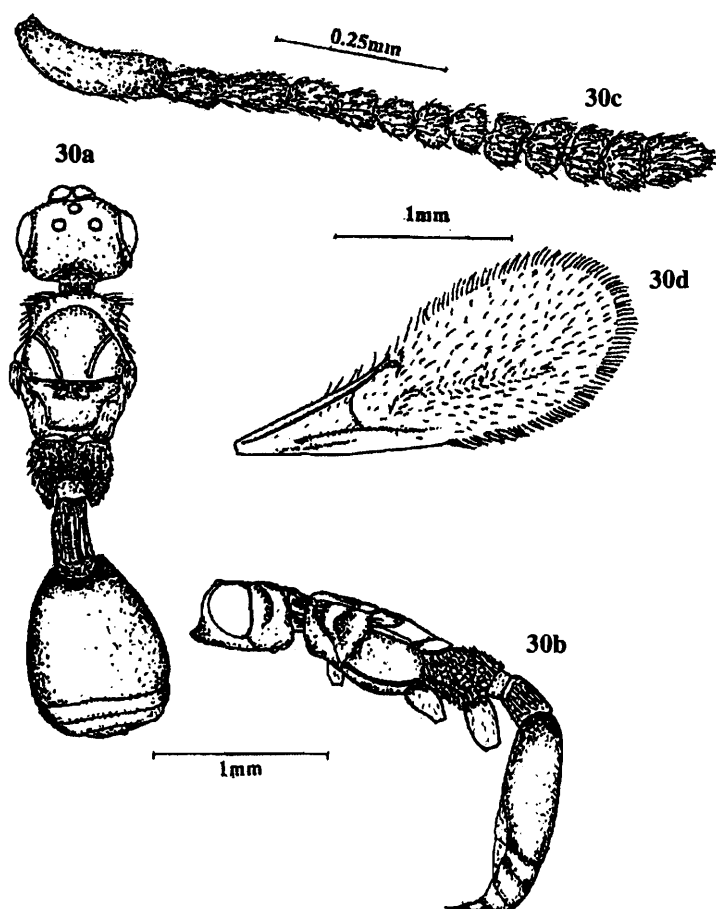


Fig. 30. *Nigropria compressa* Rajmohana & Narendran
a. Body (D.V.); b. Body (Profile); c. Antenna;
d. Forewing.

Petiole longer than thick, longitudinally striate. T2 smooth and bare, extending to almost 0.8 of abdominal length

Distribution : Oriental Region.

Discussion : This genus is quite distinct from other diapiinae in having a highly robust body and a comparatively large body size. They can be easily distinguished by the numerous deep punctae on head region.

Status in India and Kerala : A total of two species namely, *Odontopria nilamburensis* (Sharma) comb. nov. and *O. spinosa* Rajmohana and Narendran sp. nov. are reported from Kerala.

Key to Indian species of *Odontopria* Kieffer

1. OOL 1.6x OD; median carina on propodeum anteriorly raised to form a spine-like process; in females, antennal scape 3.6x as long as thick

.....
O. spinosa Rajmohana and Narendran

- OOL 2x OD; median carina on propodeum not spine like; in females antennal scape 4.3x as long as thick

..... *O. nilamburensis* (Sharma) comb. nov.
Rajmohana and Narendran

1. *Odontopria nilamburensis* (Sharma) comb. nov.

1979. *Spilomicrus nilamburensis* Sharma. *Mem. Sch. Ent.*, 7 : 44, 51

Length = 3.7 mm.

Body black.

Eyes pubescent. OOL 2x OD. Scattered shallow punctae on occiput. Scape 4x as long as thick in males and 4.3x as long as thick in females. Notauli complete. Scutellum with two foveae, metanotum without carina. Propodeum with a median carina and two lateral carina. Petiole longitudinally striated, twice as long as thick in females and 2.3x as long as thick in males. Scutellar shield with a pair of lateral longitudinal grooves, but without pits on basal border. T2 extending to 0.8 of abdomen. *Basalis* absent.

Remarks : This species is not represented in the present collection.

Discussion : *Spilomicrus* Westwood is described to have a smooth and shiny head region where as *Odontopria* Kieffer possess dense punctae on head, though both the genera have a 13 segmented antenna in either sexes.

Spilomicrus nilamburensis described by Sharma (1979) possesses dense punctae on head region. As such this species cannot be treated under *Spilomicrus* Westwood. As per the original description and illustration, its general body form is also different, to be treated under *Spilomicrus*. Hence this species is hereby transferred to *Odontopria* Kieffer, forming *Odontopria nilamburensis* (Sharma) comb. nov.

2. *Odontopria spinosa* Rajmohana and Narendran sp. nov.

(Fig. 31)

Holotype : Female. Length of body = 3.46 mm. Head and body shining black. Antenna uniformly deep brownish black. Eyes silvery, but with a faint brown tinge and bordered by a narrow black ring. Legs deep reddish brown, median bulge of femur and tibia black. Wings clear, but with a little infuscation; veins dark brown. Antennal pilosity and body pubescence dull white, marginal fringe of wings brown.

Head : L : B (DV) = 34 : 39.5; L : B (AV) = 36 : 39.5. Distinctly transverse when viewed dorsally; subglobose, surface with dense deep rounded adjacent punctae, scattered irregularly; pubescence erect and scattered, denser towards, occiput, clypeus and gena. Vertex sloping and convex. Antennal insertion on vertex. Eyes large, transverse and with scattered fine pubescence; adorbital carina distinct, raised on vertex, curving downwards, much closer to and encircling lower orbital margin and with wavy border. OOL : OD : POL = 2.5 : 1.5 : 3. Postgenal cushion dense with fine, long, erect hairs. Occiput not emarginate, occipital flange broad, with an incomplete median longitudinal carina extending only upto its border. In lateral view head trapezoid. Malar sulcus absent; malar space : maximum eye

width = 19 : 9. Lower gena with tufts of dense fine decumbent long hair; frons, face and lower gena with minute dense shallow punctures. Mandibles unequally bidentate. AF 1.1.5.6; gradually thickened towards tip; *sc* as long as next 3.6 segments combined together and 3.6x as long as thick; F1 longest and 1.2x as long as pedicel; F9 and F10 transverse; F11 as long as 1.4x its penultimate segment; proportions of length : width of antennal segments from *sc* to F11 being - 33 : 9, 10 : 7.5, 12 : 6.5, 8.5 : 6.5, 9 : 6.3, 9 : 6.4, 8.5 : 7, 8 : 7.2, 8 : 9.2, 8 : 10.5, 8 : 10.5, 8 : 10.5 and 11.5 : 9 respectively.

Mesosoma : L : B = 54 : 42. Distinctly wider than head, smooth and shiny; long erect scattered pubescence present. Cervix with a longitudinally striated lower half. Pronotum visible only as a streak; anterior lateral corners angular and with lateral inward depression; pronotal collar of hairs long but sparse. Anterior margin of mesonotum bordered by a row of setigerous pits and with a pair of complete notauli widely separated by 2.5x its diameter at its base, diverging distally; humeral

sulcus present. TSS narrow. Scutellum large, trough shaped with two deep and oval anterior grooves, separated by one-third its diameter; scutellar shield broad, median keel absent; shield with a pair of large oval lateral longitudinal grooves and a horizontal row of small pits at its lower border. Metanotum with a keeled median and two widely placed equidistant lateral longitudinal carinae. Propodeum with a distinct median keel, anteriorly raised to form a spine-like process and a pair of lateral carina; propodeal neck with a constriction and flanged; posterior emargination not deep; lateral denticles small; median propodeum bare. Propleuron and mesopleuron smooth, rather bare, except at borders; sternaulus distinct. Metapleuron with long striae, irregular carinae and punctae, not fully concealed by overlying dense fine semi-decumbent pubescence. Legs normal. Forewing normal, extending to tip of abdomen, with a pigmented zone of *basalis* and a bare clear transverse streak medially; not hairy at its basal one third FW L : B = 9.5 : 3.4; *m* dotted, *stg* also short.

Metasoma : Smooth and shiny, elliptical; petiole 2.3x as long as thick with distinct widely separated parallel, longitudinal striations; densely hairy laterally; T2 without any basal depressions or incisions and extending to 0.83 length of abdomen; distally with dense, fine, long, erect hairs; rest of tergites visible as narrow bands.

Male : Length of body = 2.5 to 3.52 mm.

In all major characters it resembles female. Those characters which shows variation being:

Antennal segments rather cylindrical and filamentous, with dense bristle-like thick setae; scape length a little more than next 2 segments combined; proportions of length and width of antennal segments from scape to F11 is as follows- 20 : 5, 5 : 4, 14 : 5, 14 : 5, 13 : 5, 12 : 5, 12 : 5, 11.2 : 4.5, 11.2 : 4.5, 11.2 : 4.5, 11.2 : 4.5, 10 : 4.5, and 14 : 4.5.

Petiole 2.9x as long as thick.

The intensity of pigmentation of *basalis* show great extent of variation. In some cases, *basalis* being very pale, and is not easily detected. The intensity of infuscation on forewings also variable.

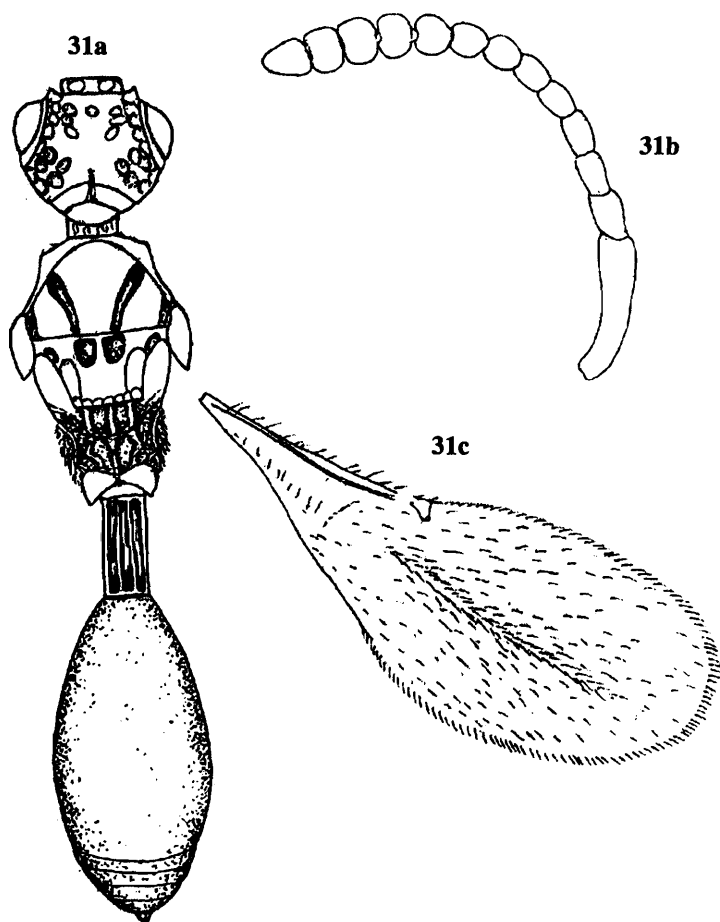


Fig. 31. *Odontopria spinosa* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

Host : Unknown.

Material examined : Holotype : Female, collected from Idukki (Kerala), by P.M. Sureshan on 14-xi-1996.

One female (paratype) collected from Muthukulam (Alleppy, Kerala) by Sheela. S on 31-xii-1997. The collection data of the rest of males are as follows :

Three males collected from Idukki (Kerala) by T.C.Narendran and party on 1-xii-1989; Three males collected one each from Thunakkadavu, Srikarpathi, Vengoli, (PWLS, Palghat, Kerala) on 2-xi-1999, 27-x-1995 and 29-x-1995 by Sureshan and another male from Idukki on 15-xi-1996; 2 males collected one each from Chindagi (Palghat, Kerala) and Sholayar (Trichur, Kerala) by T.C.Narendran and party on 13-xi-1989 and by C. Radhakrishnan and party on 15-xi-1996 respectively.

Etymology : The species is named '*spinosa*' due to its pointed propodeal spine

Remarks : *O. spinosa* sp. nov. differs from *O. nilamburensis* (Sharma) in the following characters :

—In female *O. spinosa* antennal scape 3.6x as long as thick. (In *O. nilamburensis* antennal scape 4.3x as long as thick)

—A median dorsal carina extending on occipital border. (In *O. nilamburensis* occiput without a dorsal carina).

—Lower scutellar shield with a row of small pits. (In *O. nilamburensis* scutellar shield without pits).

—Metanotum keeled. (In *O. nilamburensis* metanotum unarmed).

—Median carina on propodeum anteriorly raised to from a spine. (In *O. nilamburensis* median carina not raised).

15. Genus *Oxypria* Kieffer (Fig. 32-33)

1908a. Type species : *Oxypria thoracica* Kieffer. *Ann. Soc. Sci. Bruxelles*, 32 : 37

Diagnosis : Colour black; head globose; eyes bare or sometimes with fine pubescence; antennae in male 14 segmented, in female 12 segmented; flagellar segments of male a little elongated and with whorls of hair; notauli absent; scutellum with or without foveae in front; propodeum with a distinct median longitudinal carina, anteriorly enlarged into a pointed spine; *sm* towards front margin of wings, not exceeding basal one-third; hind tibia abruptly swollen in distal one-third; petiole long; metasoma somewhat depressed, elliptic in male, posteriorly conical and tapering in female.

Distribution : Palearctic, Neotropical and Oriental Regions.

Discussion : The limits of *Oxypria* have been widened since Kieffer (1916a), including some characters of the hitherto described species.

This genus closely resembles *Xyalopria* Kieffer in having a conspicuous spine on median carina of propodeum. But differs from it in the absence of latero-terminal spines on distal scape.

Key to Indian species of *Oxypria* Kieffer

1. Scutellum with 1 or 2 foveae 2
- Scutellum without any foveae
..... *O. kodaikanalensis* Sharma
2. Foretibia with an outwardly directed spine; petiole more than twice as long as thick; forewing without a lineola
..... *O. spinosa* Rajmohana and Narendran
- Foretibia without an outwardly directed spine; petiole not more than 1.6x as long as thick; forewing with a lineola
.... *O. kottoliensis* Rajmohana & Narendran

Species Diagnosis

1. *Oxypria kottoliensis* Rajmohana and Narendran (Fig. 32)

1999a. *Oxypria kottoliensis* Rajmohana and Narendran. *J. Ecobiol.* 11(3) : 203-211

Length = 1.75 mm.

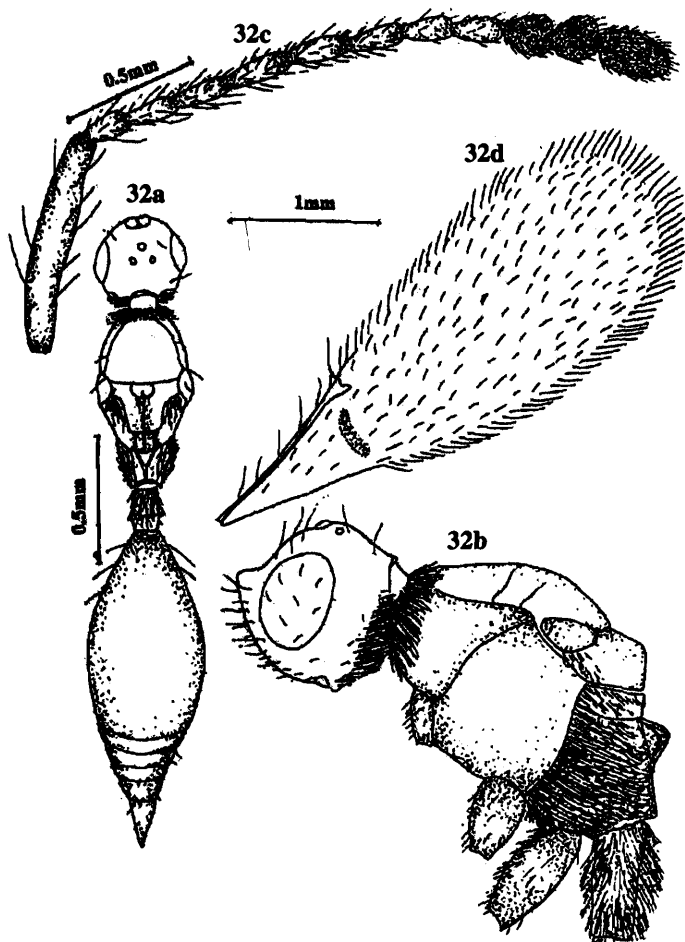


Fig. 32. *Oxypria kottooliensis* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing.

Female. Head and thorax deep blackish brown; anterior and posterior tip of metasoma pale reddish brown, antennal segments reddish brown, except terminal 3 segments being brownish black; wings slightly infuscated, veins deep brown.

Head when seen from above subequal; OOL : OD : POL = 5.5 : 2:4. Eyes large, with erect extremely sparse pubescence; temples evenly sloped towards occiput; post genal cushion also dense; AF 1.1.7.3 ; segments gradually enlarging towards apex; scape a little more than next 4 segments combined; F2 to F4 and F5 to F7 almost sub-equal in length. Scutellum humped, anteriorly with a deep rounded fovea; scutellar shield with a median longitudinal carina slightly dissecting fovea and with lateral longitudinal ridges; metanotum with a distinct median longitudinal and a pair of lateral carina ; median longitudinal carina on propodeum anteriorly raised to form a large spine, but less pointed, with a dorsal semi-hyaline zone , flanked on either side by a lateral carina; foretibia without an outwardly directed spine; forewing with traces of lineola.

Petiole 1.58x as long as thick and densely covered with fine, long, tufts of hairs concealing any sculpture beneath; T2 occupying almost 0.66 length of metasoma.

Male : Unknown.

Type locality : Koottooli (Calicut, Kerala, India).

2. *Oxypria spinosa* Rajmohana and Narendran (Fig. 33)

1999a. *Oxypria spinosa* Rajmohana and Narendran. *J. Ecobiol.* 11(3) : 203-211.

Length = 1.8 mm.

Female. Head and body shining black; tip of metasoma brown; all antennal segments reddish brown, except terminal 3 club segments being black; wings with faint infuscations ; veins brown.

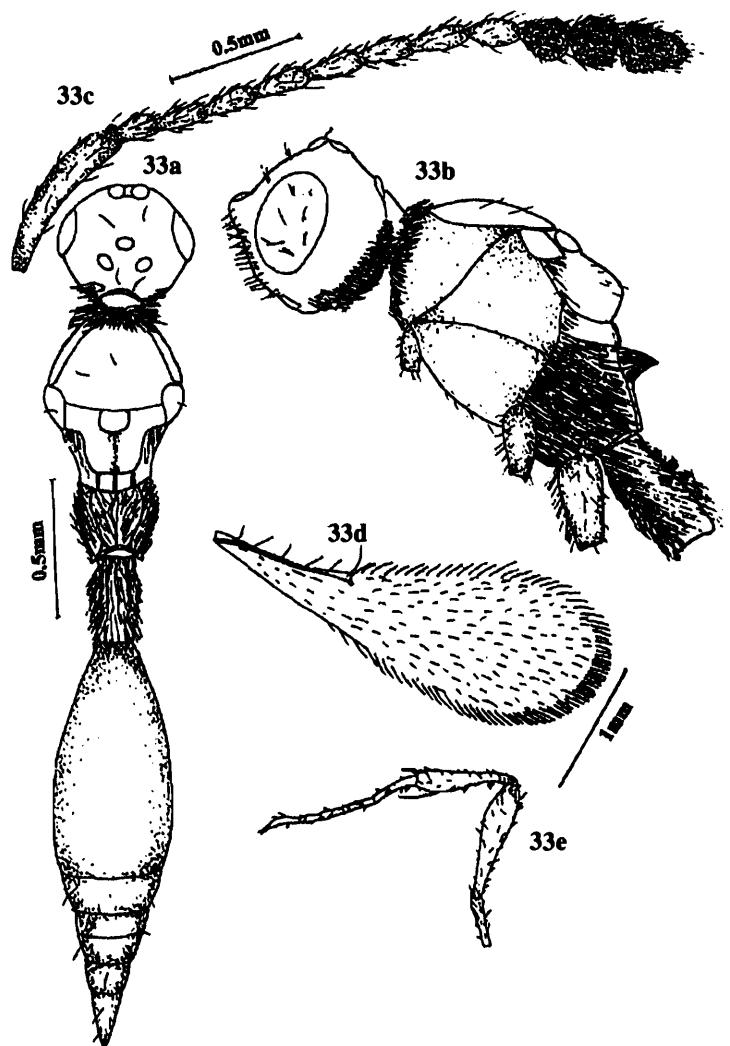


Fig. 33. *Oxypria spinosa* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing; e. Foreleg.

Head transverse. OOL : OD : POL = 4:2 : 3; eyes large with moderate long fine erect pubescence; frontal shelf not much protruded, but raised anteriorly; malar sulcus absent; A.F 1.1.7.3; segments gradually becoming thicker distally; scape 5.5x as long as thick, length of next 3.3 segments combined; F1 2.6x as long as thick; F2 to F9 almost subequal in length; F1 to F4 almost subequal in width, F5 onwards gradually thickened. Notauli absent. Scutellum with a rectangular fovea; scutellar shield humped, with a median longitudinal carina, but not dissecting scutellar fovea; metanotum with parallel median longitudinal and two lateral keels; propodeum with a median, prominent, curved, pointed spine anteriorly; spine with fine striae and continued as a distinct ridge posteriorly, flanked on either side by distinct lateral carina. Foretibia with outwardly directed stout, erect spine, opposite to tibial spur. Forewings without lineola.

Petiole twice as long as thick with longitudinal striations, hairy; T2 occupying 0.58 length of metasoma.

Male : Unknown.

Type locality : Uppinangadi (Kerala-Karnataka border).

16. Genus *Paramesius* Westwood (Figs. 34-36)

1832. *Paramesius* Westwood. *Phil. Mag.*, 3(1) : 129.
 1832. *Paramesius* Westwood : 129. Type : *Paramesius rufipes* Westwood, by Monotypy (= *westwoodi* Fergusson)
 1857. *Diapria* (*Paramesius*) Haliday : 170,171. Description, change to subgeneric status.
 1910. *Lipoglyptus* Crawford : 123. Type : *Lipoglyptus primus* Crawford by monotypy and original designation, synonymized by Masner, in Krombein and Burks (1967).
 1913b. *Aparamesius* Kieffer : 436. Type : *Aparamesius carinatus* Kieffer, by original designation, synonymized by Masner, in Krombein and Burks (1967).

Diagnosis : Large-bodied, robust forms. Head globose, seen from above slightly transverse, higher than long. Eyes large, often with very fine erect hairs. Antennal insertion distinctly on an

elevated area. Antenna 13 segmented in both sexes. In females 3rd antennal segment longer than 4th, scape as long as next 4 or 5 segments combined; the last 5 or 7 segments usually thickened, a distinct club absent. Male antennal segments from 4th onwards greatly elongated and much cylindrical, often longer than body. 4th segment slightly longer than scape or at least equal to 3rd and 4th segments combined, while 2nd and 3rd short, cylindrical and almost subequal. Pronotum much angular anteriorly. Notauli often complete, rarely seen as posterior abbreviations. Scutellum with one or two large anterior fovea and at times with long, longitudinal lateral grooves. Propodeum with a median longitudinal carina often produced into a blunt spinous process anteriorly, sometimes flanked by pairs of lateral carina too. Wings normal, finely hairy and fringed, *sm* near margin extending to almost basal half, *m* 2 to 3x as long as *stg*, *basalis* either present or absent. Femora clavate. Petiole long and cylindrical articulated with T2 to be on level with it, forming a prolongation of petiole and gradually becoming wider behind. In males, petiole weakly clavate, slightly depressed, while in female with a conical pointed and compressed tip.

Distribution : Australian, Australasian, Nearctic, Neotropical, Palearctic, and Oriental Regions.

Discussion : This genus when compared to *Spilomicrus* Westwood differs in the proportion of third and fourth antennal segments in male, the form of articulation of T2 with the petiole, presence of notauli, which even if incomplete indicated atleast in front and the length of *m* being many times *stg*.

Status in India and Kerala : Of the 5 species known from the Indian region, *Paramesius malabarensis* Rajmohana and Narendran, *P. incompletus* Kieffer and *P. monticola* (Kieffer), are reported from Kerala. *P. nilamburensis* Sharma through generic transfer has been placed under *Spilomicrus* Westwood and since the species name *Spilomicrus nilamburensis* has been preoccupied, a new name *S. manii* was suggested (Rajmohana and Narendran 1999b).

Key to Indian species of *Paramesius* Westwood (Based on males)

1. Scutellum with one fovea; notauli complete or abbreviated 2
- Scutellum with two fovea; notauli complete *P. pleuralis* Kieffer
2. Notauli present only in the basal one-third; scape not as long as terminal antennal segment *P. incompletus* Kieffer
- Notauli complete; scape longer or subequal to terminal antennal segment 3.
3. Eyes bare; scutellar fovea with no traces of striations; foretibia with an outward directed spine *P. deccanus* Sharma
- Eyes hairy; scutellar fovea striated or atleast with traces of striations; foretibia without a distinct outward directed spine 4
4. F2 shorter than scape length; scutellar groove with distinct complete striae; humeral sulcus greatly elongate *P. monticola* (Kieffer)
- F2 distinctly longer than scape length; scutellar groove with only traces of striae; humeral sulcus not elongate *P. malabarensis* Rajmohana and Narendran

Species diagnosis

1. *Paramesius incompletus* Kieffer (Fig. 34)

1916a. *Paramesius incompletus* Kieffer. *Das Tierreich*, **44** : 308

Length = 3.65 mm.

Male. Body shining black. Antennae blackish brown except scape being reddish brown. Wings infuscated, veins deep brownish black.

Head transverse when viewed dorsally. Eyes bare; OOL : OD : POL = 3 : 2 : 3. Malar sulcus absent; antenna 13 segmented, almost twice body length; A.F 1.1.11; A4 with a ridge in its lower half; scape as long as 0.76x length of next 3 segments combined; F11 longer than scape, almost 1.25x its length. Mesosoma wider than head. Mesonotum with a pair of incomplete parallel notauli on its posterior one-third, separated by

3.2x its own diameter; humeral sulcus, short, but longer than notauli, not pitted and extending to 0.3 of mesonotum. Scutellum with a large transverse fovea; scutellar shield with a faint median keel and with a pair of lateral longitudinal oval grooves. Propodeum with a distinct median keel anteriorly raised a little and two less prominent lateral carinae. Foretibia without an outward directed spine. Forewing with a pigmented *basalis*. Petiole with distinct longitudinal striae, laterally hairy; 3.33x as long as thick; T2 without a basal patch of striae dorsomedially and extending to 0.84 length of abdomen.

Female : Unknown.

Material examined : One male collected by P.M. Sureshan on 29-x-1995 from Srikarpathi (PWLS, Palghat, Kerala).

2. *Paramesius malabarensis* Rajmohana and Narendran (Fig. 35)

1999b. *Paramesius malabarensis* Rajmohana and Narendran. *Hexapoda*, **11**(1and2) : 75-83.

Length = 3.74 mm

Male. Body shining black. Scape, F1 and F2 reddish brown; rest of antennae brownish black. Wings with slight infuscation; veins deep brown.

Distinctly transverse when viewed dorsally; subglobose. Eyes sparsely pubescent. OOL: OD: POL = 2:2:5. Post genal cushion moderate. Malar sulcus absent. Antenna 13 segmented, almost twice body length. Flagellar segments much cylindrical, filamentous and covered with erect bristle-like setae; scape as long as 0.62x length of following 3 segments combined; F2 with a narrow ridge; F11 1.1x scape. Mesosoma a little wider than head. Mesonotum with complete notauli separated by 3x its own diameter, humeral sulcus pitted, extending to almost half of length of notauli; scutellum with a large transverse fovea; scutellar shield broad, with a faint median keel and with a pair of lateral longitudinal groove. Metanotum with three longitudinal carinae. Propodeum with a distinct median keel, anteriorly raised into stout, blunt tooth-like process and two pairs of lateral carinae; forewings with a distinct pigmented *basalis*.

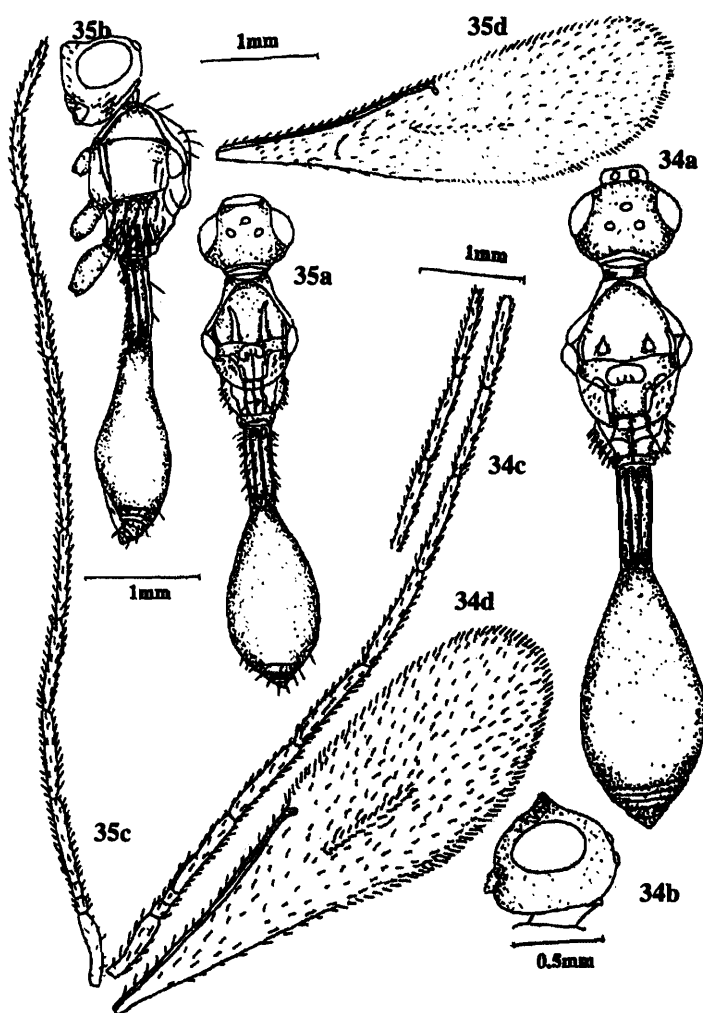


Fig. 34. *Paramesius incompletus* Rajmohana & Narendran
a. Body (D.V.); b. Head (Profile); c. Antenna;
d. Forewing.

Fig. 35. *Paramesius malabarensis* Rajmohana & Narendran
a. Body (D.V.); b. Head (Profile); c. Antenna;
d. Forewing..

Petiole long, cylindrical with distinct longitudinal striations; 1.84x as long as thick and much hairy laterally; T2 extending to 0.86 length of abdomen, without a basal patch of striae dorsomedially.

Female : Unknown.

Type locality : Anchupoola (P.W.L.S, Palghat, Kerala).

3. *Paramesius monticola* (Kieffer) (Fig. 36)

1916a. *Aparamesius monticola* Kieffer. *Das Tierreich*, 44 : 308

Length = 3.53 mm.

Male. Body shining black. Antenna deep brownish black, with scale pale on both ends, pedicel and F1 also a little paler. Wings infuscated.

Head transverse when viewed dorsally. Eyes sparsely pubescent. OOL : OD : POL = 7 : 3 : 5. Malar sulcus absent; antenna 13 segmented, almost twice body length; A.F 1.1.11; Flagellar segments cylindrical and covered with setae; F2 ridged in its basal one-third; scape as long as next 2.5 segments combined; F2 to F6 almost subequal; F11 0.63x scape. Mesosoma wider than head. Mesonotum with a pair of complete notauli, separated by 3.8x its own diameter, humeral sulcus pitted, long extending to more than half of it. Scutellum with a large transverse fovea anteromedially, with 3 distinct longitudinal striae extending throughout fovea; scutellar shield broad, with a faint median keel and with a pair of lateral longitudinal narrow groove and a row of fine striae basally. Propodeum with a distinct median keel, anteriorly raised into a stout blunt teeth-like process and two lateral carinae ending. Forewing with a distinct pigmented *basalis*. Petiole with longitudinal striations; 2.9x as long as thick and much hairy laterally; T2 extending to 0.78 of abdomen, with a basal patch of striae dorsomedially.

Female : Unknown.

Material examined : One male collected on 7-x-1995 from Muthanga (Wyanad, Kerala) by

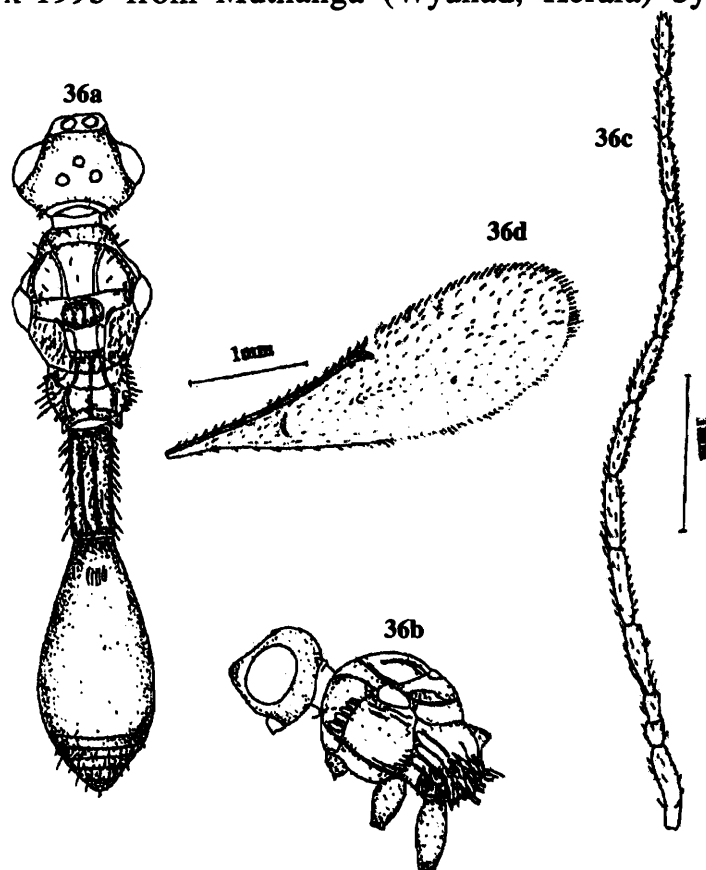


Fig. 36. *Paramesius monticola* Kieffer
a. Body (D.V.); b. Mesosoma (Profile); c. Antenna;
d. Forewing..

17. Genus *Spilomicrus* Westwood
(Figs. 37-40)

1832. *Spilomicrus* Westwood. *Phil. Mag.*, 1(3) : 129; Kieffer, 1916a, *Das Tierreich*, 44 : 283.

1832. *Spilomicrus* Westwood : 129. Type : *Spilomicrus stigmatalis* Westwood, by monotypy.

1838. *Chlidona* Herrich-Schaffer : Heft 157, table 24. Type : *Chlidonia moniliata* Herrich-Schaffer, designated by Viereck (1914).

1856. *Loxotropa* Foerster : 122,123,126. Type : *Psilus antennatus* Jurine, By monotype.

1857. *Diapra* (*Spilomicrus*) Haliday : 170, 171. Description, change to subgeneric status.

1910. *Cologlyptus* Crawford : 123. Type : *Cologlyptus kiefferi* Crawford, by monotypy and original description. Synonymized by Masner, in Krombein and Burks (1961).

1910f. *Eriopria* Kieffer : 693, 144. Type : *Eriopria nigra* Kieffer, designated by Kieffer (1912a). Synonymized by Masner (1964b).

1915. *Polypria* Dodd : 399, 410. Type : *Polypria nigriventris* Dodd, by monotypy and original designation. Synonymized with *Bothriopria* Kieffer by Dodd (1916).

Diagnosis : Mostly medium sized, melanic forms. Head subglobose, smooth and shiny without any deep punctures and longitudinal carinae. Mandibles bidentate with unequal teeth. Malar sulcus either complete, abbreviate distally or totally absent. Antennal shelf moderately to distinctly prominent. Eyes naked or with sparsely fine pubescence. Antennae 13 segmented in both sexes, female antenna thickened towards tip, with a distinct club, but not knobbed; antenna in males thread-like. Pronotal collar distinct, notauli on mesonotum complete, abbreviate or absent. Mesonotum anteriorly often with two parallel lines. Scutellum with two anterior grooves and often with a pair of lateral grooves, bordered posteriorly by a row of fine small punctae. Propodeum with a median longitudinal carina often produced into a keel anteriorly or a sharp

pointed stout spine. Both winged and short winged forms are met with; *sm* tubular in most species, reaching proximal third of wing length, *m* relatively short, *pm* and *stg* rudimentary or almost absent. *Basalis* mostly nebulous or absent. Petiole atleast as long as wide, cylindrical and sometimes elongate, with posterior end over-lapped by anterior margin of T2, latter without a basal cleft or emargination. Metasoma seen from above slightly depressed; T2 occupying almost two-third of dorsum of metasoma.

Distribution : Australian, Afrotropical Neotropical, Palearctic, Nearctic and Oriental Regions.

Host : Nixon 1980 reports a coleopteran *Quedius* sp. or *Philonthus* sp. (Staphilinidae) as a host of one of the European species namely, *Spilomicrus stigmatalis* Westwood.

Discussion : The generic limits followed here are those accepted by Kieffer (1916a), Nixon (1980) and Masner (1991).

Sharma (1979) had broadened the generic limits of this genus, by including in it forms with 12 antennal segments in females and with 14 segments in males. Thus some species which actually belonged to *Basalys* Westwood happened to be described under *Spilomicrus*. As of Nixon (1980) and Masner (1991), only forms with a 13 segmented antenna in both sexes are included in *Spilomicrus*. Those with 12 antennal segments in females and 14 segments in males are treated under *Basalys* Westwood. Accordingly *S. karnatakenis* Sharma and *S. nilgiriensis* Sharma are transferred to *Basalys* as *Basalys karnatakensis* (Sharma) comb. nov. and *Basalys niligiriensis* (Sharma) comb. nov.

When compared with *Paramesius* Westwood, the most striking differences of *Spilomicrus* are as follows :

SPILOMICRUS	PARAMESIUS
Tip of abdomen rounded and flattened from above.	Tip of abdomen pointed and laterally compressed.
T2 at a higher level than petiole.	T2 on level with petiole.
Notauli either present or absent.	Notauli always present.
Marginal vein only 1 or 2x as long as thick.	Marginal vein 3 to 4x as long as thick.

This genus differs from *Odontopria* Kieffer with which it resembles, in the absence of deep punctures on head and in absence of orbital as well as adorbital carinae on the head region.

Status in India and Kerala : Five species namely *Spilomicrus chinnarensis* Rajmohana and Narendran sp. nov., *S. eraviensis* Rajmohana and Narendran sp. nov., *S. parambiensis* Rajmohana and Narendran sp. nov., *S. keralensis* Rajmohana and Narendran sp. nov., *S. manii* nomen nov. are hereby reported from Kerala.

Four species namely *S. anamalaiensis* Sharma, *S. kumaoensis* Sharma, *S. yercaudensis* Sharma, *S. siwalikensis* Sharma are the species known from India, other than those mentioned above from Kerala.

Spilomicrus nilamburensis Sharma through generic transfer is now under *Odontopria* Kieffer as *O. nilamburensis* (Sharma).

Key to Indian species of *Spilomicrus* Westwood

1. Females 2
- Males 8
2. Wings normal; gena as long as or a little longer than eye 3
- Wings brachypterous; length of gena more than twice eye length *S. eraviensis* Rajmohana and Narendran sp. nov.
3. Notauli absent 7
- Notauli present, even though abbreviated at times 4
4. Notauli abbreviated posteriorly only 5
- Notauli complete *S. chinnarensis* Rajmohana and Narendran sp. nov.
5. Eyes pubescent; head wider than mesosoma *S. yercaudensis* Sharma
- Eyes glabrous; head narrower than mesosoma 6

6. *Basalis* absent; notauli extending more than one-third of mesonotum *S. anamalaiensis* Sharma
- *Basalis* present; notauli only as posterior punctation on mesonotum *S. siwalikensis* Sharma
7. Eyes glabrous; T2 with shallow depressions on either side of the front margin *S. kumaonensis* Sharma
- Eyes pubescent; T2 without any depressions at front margin *S. keralensis* Rajmohana and Narendran sp. nov.
8. *Basalis* present, atleast as a trace 9
- *Basalis* absent *S. anamalaiensis* Sharma
9. Notauli complete 10
- Notauli in posterior one-third only *S. manii* nomen nov.
10. Abdomen lean; length twice its breadth *S. parambiensis* Rajmohana and Narendran sp. nov.
- Abdomen bulged laterally; length less than 1.5x its breadth *S. chinnarensis* Rajmohana and Narendran sp. nov.
1. *Spilomicrus chinnarensis* Rajmohana and Narendran sp. nov.

(Fig. 37)

Holotype : Female. Length of body = 2.04mm. Head and body shining black, anterior tip of metasoma testaceous. Antennal scape and flagellar segments reddish brown, club shining black. Eyes black, with a silver tinge. Legs yellowish brown, apical tarsi almost black. Wings hyaline, without any infuscation; veins pale. Antennal pilosity, body pubescence dull white; marginal fringe of wings brown.

Head : HL : HB(D.V) = 7.7 : 10; HL : HB (AV) = 9.8 : 10. Distinctly transverse when viewed dorsally; subglobose, smooth and shiny; pubescence erect and scattered dorsally, but denser

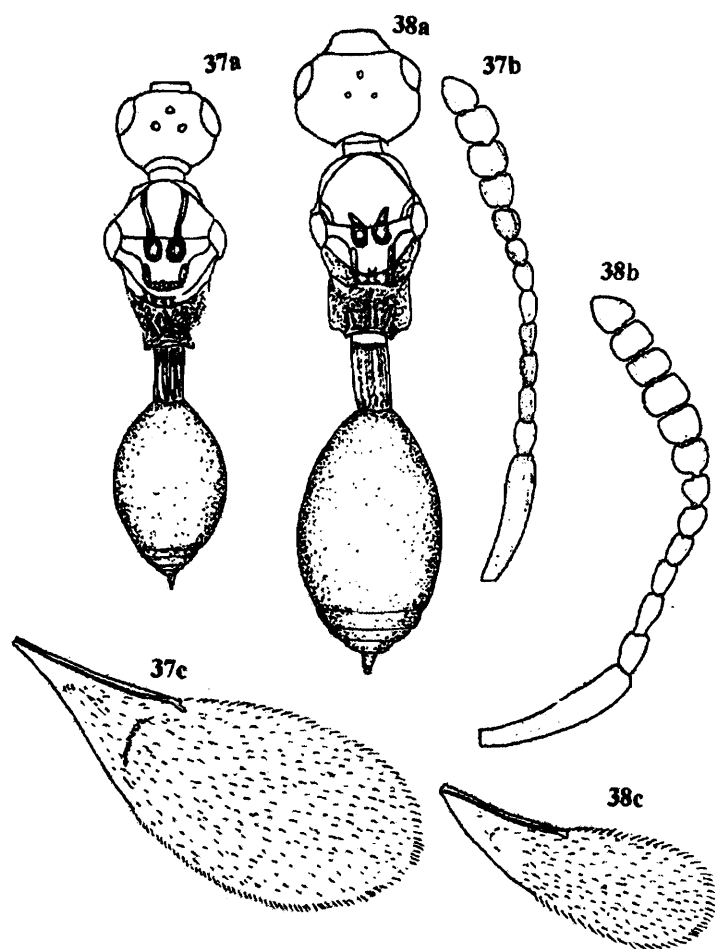


Fig. 37. *Spilomicrus chinnarensis* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

Fig. 38. *Spilomicrus eraviensis* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

towards occiput, clypeus and gena. Vertex sloping and convex. Frontal shelf prominent and towering above vertex. Eyes large pear-shaped, transverse with scattered fine pubescence, orbital carina distinct. Maximum eye width : length of bare temples = 4 : 3.5. Ocelli small and arranged in a close triangle dorsomedially. OOL : OD : POL = 2:2 : 1.5. Temples bulging laterally, a little convex and curving gradually towards occiput. Postgenal cushion dense with fine appressed hairs. Occipital flange, step-like, narrow and bare; posterior margin moderately emarginate. In lateral view head trapezoid. Malar sulcus absent; malar space : maximum eye width = 8.5 : 23. Lower gena with tufts of dense, fine, decumbent, long hair. Mandibles bidentate. Clypeus and epistomial sulcus distinct; tentorial pit large and distinct. Antenna 13 segmented with a distinct 4 segmented club; scattered setose hair present. AF 1.1.6.4; scape as long as next 3.3 segments combined together; pedicel longer than F1; flagellar segments not transverse; proportions of length :

width of antennal segments as follows- 35 : 8, 12 : 6, 11 : 4.8, 9 : 5, 9.5 : 5, 9 : 5, 9 : 5.8, 8.5 : 6.8, 9.8 : 7.2, 11.5 : 11, 10 : 11, 9.6 : 11, 7.2 : 10; ventral pit absent on F10.

Mesosoma : L : B = 14 : 11. A little wider than head, smooth and shiny; long, erect scattered pubescence present. Cervix distinct with transversely striated upper half and ovally punctured lower half. Pronotum visible only as a streak; pronotal collar of hairs long but sparse; pronotal pit distinct. Mesonotum with a pair of complete notauli widely separated by 3x its diameter at its base, diverging a little distally; lateral mesonotum with a little inward depression anterolaterally; humeral sulcus absent. TSS distinct. Scutellum large, trough shaped with two oval deep anterior grooves, extending to 0.5 of it; scutellar shield broad, median keel absent and with a pair of lateral longitudinal grooves and a row of posterior scutellar pits at its lower border. Metanotum simple, rather a wide zone, with a row of small pits; metanotum and propodeum unusually hairy obscuring its sculpture. Propodeum with a distinct median keel, anteriorly raised to form a broad, distinct, backward directed, pointed, spine-like process and a pair of lateral carina; posterior emargination present, followed by a constriction and not with posterolateral teeth or carinae; median bare area between carinae, with irregular incomplete transverse striae. Propleuron and mesopleuron smooth, rather bare, except at borders; sternaulus absent. Metapleuron with long striae, irregular carinae and punctae, but concealed by overlying dense fine appressed pubescence. Legs normal. Forewing normal, extending to tip of metasoma, with a pigmented *basalis* and a bare clear transverse streak medially; FWL : FWB = 40 : 15; costal cell relatively broad, *m* short and thick, *stg* also short. *sm* : *m* : *stg* = 15 : 1.1 : 1.

Metasoma : Abdomen L : B = 17.1 : 10. Smooth and shiny, elliptical; petiole with distinct longitudinal parallel striations and richly hairy towards middle; 1.68x as long as thick; much hairy towards distal end; T2 without any basal depressions or incisions and extending to 0.84 length of abdomen; ovipositor exerted; rest of tergites visible as narrow bands.

Allotype : Male. Length of body = 2.01 mm.

Body coloration and most proportions similar to that of holotype, those differing from it is given below :

Antenna 13 segmented. AF = 1.1.11. Scape as long as length of next 1.75 segments combined; F1 to F7 almost subequal. Proportions of length and width of antennal segments as follows: 5 : 1.3, 1.7 : 1.2, 4.3 : 1.1, 4.3 : 1.1, 4.3 : 1.1, 4.3 : 1.1, 4.3 : 1.1, 4.3 : 1.1, 4.3 : 1.1, 4.1 : 1.1, 4 : 1.1, 3.9 : 1.1, 4.2 : 1.1.

Metasoma L : B = 14.2 : 9.5; T2 extending to 0.84 length of metasoma.

Host : Unknown.

Material examined : Holotype : Female collected from Chinnar (Idukki, Kerala) by P.M. Sureshan on 18-xi-1997.

Allotype : Male : Same data as of the holotype.

Etymology : The species is named 'chinnarensis' after its collection locality, namely Chinnar.

Discussion : Except *S. chinnarensis* sp. nov. and *S. parambiensis* sp. nov. no other Indian species has a complete notauli. The more laterally bulged abdomen of *S. chinnarensis* serve to separate it from *S. parambiensis* having a rather lean abdomen.

2. *Spilomicrus eraviensis* Rajmohana and Narendran sp. nov.

(Fig. 38)

Holotype : Female : Length of body = 2.88 mm. Body shining black with reflecting surfaces. Scape and funicular segments yellowish brown; club brownish black. Eyes shining blackish brown. Legs reddish brown, apical tarsi a little darker. Wings hyaline with very faint infuscation; veins dark brown. Antennal pilosity and body pubescence dull white; marginal fringe of wings brown.

Head : HL : HB(D.V) = 38.8 : 44.8; HL : HB (AV) = 45.2 : 52.2. Distinctly transverse when

viewed dorsally; subglobose, smooth and shiny; pubescence erect and scattered dorsally, but denser towards occiput, clypeus and gena. Vertex sloping and convex. Frontal shelf prominent and towering above vertex. Eyes almost oval, small, transverse with scattered fine pubescence and located much towards anterior upper margin of head. Maximum eye width : length of bare temples = 12.7 : 22. Ocelli small and arranged in a close triangle dorsomedially. OOL : OD : POL = 13 : 3:9. Temples bulging laterally, distinctly parallel beneath eyes, and curving gradually towards occiput. Post genal cushion sparse, but post genal carina distinct. Occipital flange, step-like, narrow; posterior margin moderately emarginate. In lateral view head trapezoid. Malar sulcus present, fading towards eyes; malar space : maximum eye width = 20.3 : 19.06. Lower gena with tufts of dense fine decumbent hair. Frons smooth with hairs arranged in a transverse pattern. Mandibles bidentate. Clypeus elevated a little; subgenal groove very wide, epistomial sulcus also distinct; tentorial pit present. Antenna 13 segmented, densely hairy including scape; AF 1.1.5.6; flagellar segments a little globose; scape thicker distally and thinner basally, as long as next 4 segments combined; pedicel longer than F1; F3 to F6 subequal in length; F7 to F10 distinctly transverse; proportions of length : width of antennal segments as follows- 16 : 3, 4.5 : 2.4, 4 : 2, 3.5 : 2, 3 : 2, 3 : 2.2, 3 : 2.5, 3 : 3, 3.4 : 4, 3.5 : 4, 3.5 : 4, 3.5 : 4, 4.2 : 3.8, ventral pit absent.

Mesosoma : L : B = 65 : 41.5. As wide as head, smooth and shiny; long erect scattered pubescence present. Cervix distinct with fine setigerous pits. Pronotum visible only as a streak; pronotal collar of hairs long but sparse; pronotal pit not distinct. Mesonotum with notauli present as abbreviations basally and widely separated by 2.5x its diameter; humeral sulcus distinct, bare; surface between notauli and humeral sulcus a little depressed. TSS distinct. Scutellum large trough shaped with two closely placed inclined circular grooves extending to 0.5 length of it and separated by 1.5x its own diameter; scutellar shield broad, median keel absent and with a pair of lateral longitudinal narrow groove and a row of small pits at its lower border. Metanotum simple without any conspicuous carinae, but with granulation.

Propodeum with a distinct median keel, anteriorly raised to form a tooth-like process and a pair of curved incomplete lateral carina, posterior emargination present, not carinate; median area of propodeum with sloping appressed hairs; nucha slightly visible along with dorsal transverse striae; Propleuron smooth with dense hair at anterior margin, rest of area with sparse pubescence; mesopleuron rather bare, sternaulus present only as depression. Metapleuron with long striae, irregular carinae and punctae, often concealed by overlying dense fine appressed pubescence. Legs normal. Forewing brachypterous, not extending to tip of metasoma, with a small pigmented *basalis*; a bare hairless transverse streak medially. FWL : FWB = 13.8 : 5.2; costal cell relatively broad, *m* short and thick, *stg* a little elongate. *sm* : *m* : *stg* = 20 : 1.5 : 1.2.

Metasoma : Abdomen L : B = 77 : 45. Smooth and shiny, elliptical; petiole with only traces of fine longitudinal parallel striations; twice as long as thick; much hairy towards distal end; T2 without any basal depressions or incisions and extending to 0.87 length of abdomen; rest of tergites visible as narrow bands.

Male : Unknown.

Host : Unknown.

Material examined : Holotype : Female collected from Eravikulam (Idukky, Kerala) by M.S. Pradhan and Party on 24-ii-1993.

Etymology : The species is named '*eraviensis*' after its collection locality, Eravikulam.

Discussion : This species keys to couplet No. 7 of key to the species of Mani and Sharma (1982). It differs from *S. yercaudensis* Sharma in the following characters :

—Anteriorly placed eyes, genal length more than twice eye length. (In *S. yercaudensis* eyes normally placed, genal length less than twice eye length).

—Brachypterous wings. (In *S. yercaudensis* wings normal).

3. *Spilomicrus keralensis* Rajmohana and Narendran sp. nov. (Fig. 39)

Holotype : Female : Length of body = 2.35 mm. Body shining black. Eyes silvery grey with a black tinge; ocelli black; scape, pedicel, and first 5 flagellar segments reddish brown, terminal six club segments black. Legs brown, apical tarsi a little darker. Wings clear, without any infuscation; veins dark brown; basalis pale brown. Body pubescence and antennal pilosity silvery; marginal fringe of wings brown.

Head : HL : HB(D.V) = 38 : 45; HL : HB (AV) = 40 : 45; distinctly transverse when viewed dorsally; subglobose, smooth and shiny; pubescence erect and scattered dorsally, but denser towards clypeus and gena. Vertex sloping and convex. Frontal shelf prominent and towering above vertex. Eyes almost globular, small, with scattered long pubescence; located much towards anterior upper margin of head. Maximum eye width : length of bare temples = 8 : 9. Ocelli small and arranged in a close triangle dorsomedially. OOL : OD : POL = 3 : 1 : 3. Temples bulging laterally, subparallel beneath eyes and curving gradually towards occiput. Post genal cushion sparse, but post genal carina distinct. Occipital flange, step-like, narrow; posterior margin moderately emarginate. In lateral view head a little trapezoid. Malar sulcus present; malar space : maximum eye width = 1 : 2. Lower gena with tufts of dense appressed hair. Frons smooth. Mandibles bidentate. Clypeus elevated a little; subgenal groove very wide, epistomial sulcus distinct; tentorial pit present. Antenna 13 segmented; AF 1.1.5.6 Flagellar segments a little globose; scape thicker distally and thinner basally, as long as length of next 4.2 segments combined; pedicel longer than F1; F2 to F7 subequal in length; F6 to F10 distinctly transverse; proportions of length : width of antennal segments is as follows-13 : 2.9, 3.9 : 2.2, 3.3 : 2, 2.9 : 2, 2.9 : 2, 2.9 : 2, 2.9 : 2.2, 2.9 : 2.8, 2.9 : 3.2, 3 : 3.5, 3 : 3.7, 3 : 3.7, 3.9 : 3.2; ventral pit absent.

Mesosoma : L : B = 69.8 : 45. As wide as head, smooth and shiny; long erect scattered pubescence present. Cervix distinct with 4 long

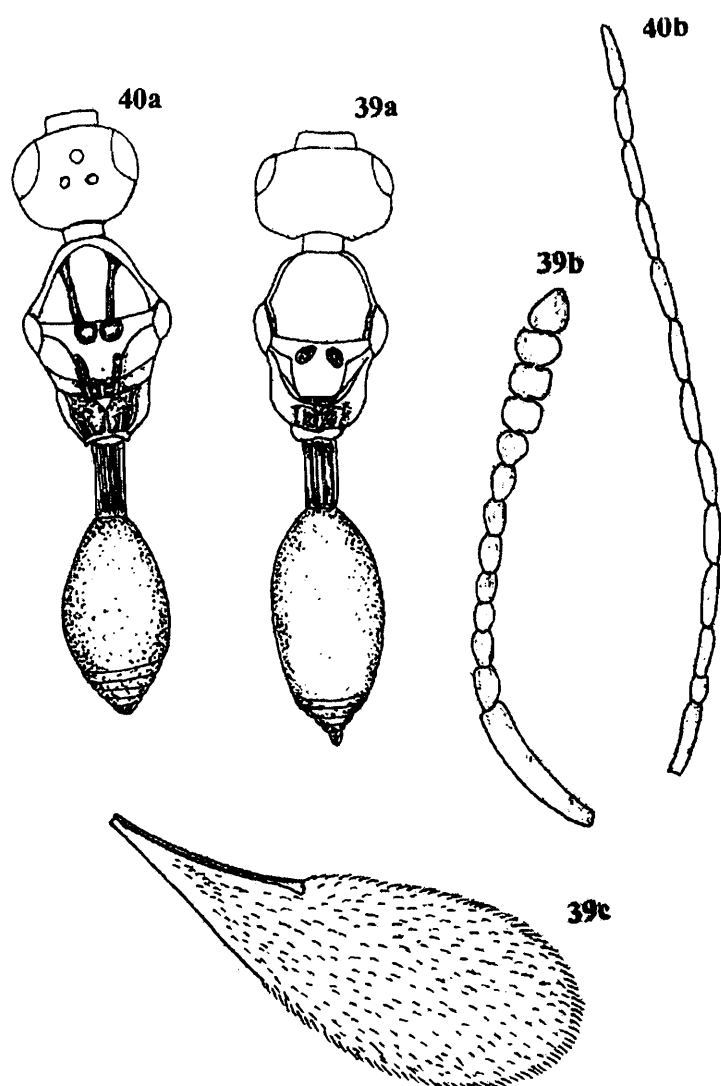


Fig. 39. *Spilomicrus keralensis* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

Fig. 40. *Spilomicrus parambiensis* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Antenna; c. Forewing.

striations distally and sharp punctures anterior to it. Pronotum visible only as a streak; pronotal collar of hairs long but sparse; pronotal pit present. Mesonotum without any traces of notauli; humeral sulcus distinct, bare. TSS distinct. Scutellum large trough shaped with two closely placed inclined circular grooves extending to 0.31 of it and separated by 1.5x its own diameter; scutellar shield broad, median keel absent and with a pair of lateral longitudinal narrow groove. Metanotum simple without any conspicuous carinae. Propodeum with a distinct median keel, anteriorly raised to form a curved spine-like process and a pair of curved lateral carina, posterior emargination not pronounced but carinate; median area with sloping appressed hairs. Propleuron smooth with dense hair at anterior margin, rest of area with sparse pubescence; mesopleuron rather bare, sternaulus present only as depression. Metapleuron with long striae, irregular carinae and punctae, often

concealed by overlying dense fine appressed pubescence. Legs normal. Forewing with a small pigmented *basalis*; a bare hairless transverse streak medially. FWL : FWB = 13.8 : 5.2; costal cell relatively broad, *m* vein short and thick, *stg* a little elongate. *sm* : *s* : *stg* = 14 : 1.5 : 1.

Metasoma : Abdomen L : B = 82 : 38. Smooth and shiny, elliptical; petiole with 5 distinct longitudinal parallel equidistant striations; 2.07x as long as thick; much hairy towards distal end; T2 without any basal depressions or incisions and extending to 0.84 length of abdomen; rest of tergites visible as narrow bands.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Male, collected from Theerthakundu (PWLS, Palghat, Kerala) by K.C. Gopi on 24-ii-1995.

Etymology : The species name '*keralensis*' is after the name of the State, Kerala, the study area.

Discussion : This species keys to couplet No. 5 of key to the species of Mani and Sharma (1982). It differs from *S. kumaonensis* Sharma in the following characters :

–Eyes pubescent. (In *S. kumaonensis* eye glabrous).

–Petiole twice as long as thick. (In *S. kumaonensis* petiole only as long as thick).

–T2 without any basal depressions. (In *S. kumaonensis* T2 with shallow depressions on either side basally).

–Forewing with a bare hairless transverse streak medially. (In *S. kumaonensis* forewing without any bare hairless transverse streak).

4. *Spilomicrus parambiensis* Rajmohana and Narendran sp. nov.

(Fig. 40)

Holotype : Male : Length of body = 2.07 mm. Body shining black, basal petiole much paler. Antenna deep brown. Eyes and ocelli silvery. Legs pale yellowish brown, apical tarsi a little darker.

Wings hyaline, veins deep brown; Body pubescence, antennal pilosity and marginal fringe of wings greyish white.

Head : HL : HB(D.V) = 12.2 : 15; HL : HB (AV) = 14.2 : 15. Distinctly transverse when viewed dorsally; subglobose, smooth and shiny; pubescence erect and scattered dorsally, but denser towards occiput, clypeus and gena. Vertex sloping and convex. Frontal shelf prominent and towering above vertex. Eyes large, pear-shaped, transverse, with scattered fine pubescence. Maximum eye width : length of bare temples = 6 : 6. Ocelli small and arranged in a close triangle dorsomedially. OOL : OD : POL = 1.5 : 1.5 : 2. Temples bulging laterally, a little convex and curving gradually towards occiput. Postgenal cushion dense with fine appressed hairs. Occipital flange, step-like, narrow and bare; posterior margin moderately emarginate. In lateral view head trapezoid. Malar sulcus absent; malar space : maximum eye width = 6 : 22. Lower gena with tufts of dense fine, decumbent hair. Mandibles bidentate. Clypeus elevated a little; subgenal groove very wide, epistomial sulcus also distinct; tentorial pit large and distinct. Antenna 13 segmented with long cylindrical and filamentous segments; AF 1.1.10.1; pilosity setose, short and decumbent; scape thicker distally and thinner basally, as long as next 1.8 segments combined; F1 2.5x longer than pedicel; F3 to F10 subequal; proportions of length : width of antennal segments as follows- 9 : 2.3, 3 : 2.1, 7.5 : 1.5, 7.5 : 1.5, 7 : 1.5, 7 : 1.5, 7 : 1.5, 7.5 : 1.5, 7 : 1.5, 7 : 1.4, 7 : 1.4, 7.5 : 1.4. F11 only 0.83 scape.

Mesosoma : L : B = 23 : 15; as wide as head, smooth and shiny; long erect scattered pubescence present. Cervix with 3 distinct faint transverse striations followed by traces of oval longitudinal punctae. Pronotum visible only as a streak; pronotal collar of hairs long but sparse; pronotal pit not distinct. Mesonotum with a pair of complete notauli widely separated by 3.75x its diameter; humeral sulcus absent; surface between notauli and humeral sulcus a little depressed. TSS distinct. Scutellum large, trough shaped and humped in lateral view; with two 'U' shaped

deep anterior grooves, separated by a carina, grooves extending to 0.42 length of it; scutellar shield broad, median keel absent and with a pair of lateral longitudinal narrow groove and a row of small pits at its lower border. Metanotum simple, rather a wide zone, with a row of small pits along with a median transverse ridge. Propodeum with a distinct median keel, anteriorly raised to form a large curved spine-like process and a pair of lateral carina, posterior emargination present, followed by a constriction and not with posterolateral teeth or carinae; median bare area between carinae with irregular incomplete transverse striae; nucha slightly visible along with dorsal transverse striae. Propleuron and mesopleuron smooth, rather bare, except at borders; a well distinct sternaulus present. Metapleuron with long striae, irregular carinae and punctae, often concealed by overlying dense, fine, semi-decumbent pubescence. Legs normal. Forewing normal, extending to tip of metasoma, with a pigmented *basalis*; FWL: FWB = 12.15: 4.9; costal cell relatively broad, *m* short and thick, *stg* vein also short. *sm*: *m*: *stg* = 20: 1:1.

Metasoma : L:B =23:12. Smooth and shiny, elliptical; petiole with distinct longitudinal parallel striations, richly hairy towards middle; 2.57x as long as thick; much hairy towards distal end; T2 without any basal depressions or incisions and extending to 0.79 length of abdomen; rest of tergites visible as narrow bands.

Female : Unknown.

Host : Unknown.

Material examined : Holotype : Male, collected from Theerthakundu (PWLS, Palghat, Kerala) by K.C. Gopi on 24-ii-1995.

Etymology : The species name '*parambiensis*' is after the collection locality, Parambikulam.

Discussion : While in *S. chinnarensis* sp. nov., mesosoma is wider than head, in *S. parambiensis* sp. nov., mesosoma is only as wide as head. The laterally bulged abdomen of the former too serve to distinguish it from the latter, having much leaner abdomen.

5. *Spilomicrus manii* nom. nov. Rajmohana
and Narendran

1979. *Paramesius nilamburensis* Sharma. *Mem. Sch. Ent.*, 7 : 31-33.

Length of body = 3 mm.

Male : General colour of body, including metasoma black; antennae brownish black; legs brown; wings yellowish, veins brown.

Head as wide as thorax; transverse; OOL about 2x OD, front ocellar space somewhat more than half the ocellar diameter, POL 1.5 x OD. Eyes with long and conspicuous hairs, antenna with 13 segments, AF 1.1.10.1; scape 4.4x longer than thick and 1.1x following 2 segments combined; pedicel 1.6x as long as thick, 0.32 of scape; F1 about 3x as long as thick, a little less than twice pedicel; F2 longest, 3.75x longer than thick, 1.15x F1; segments after fourth becoming gradually slender apically. Mesosoma wider than high, notauli incomplete, present only in posterior one-third, scutellum with two large and deep grooves in front, divided by a strong median longitudinal carina. Two lateral carinae also present. Forewing with a faint *basalis* Petiole long, 2x as long as thick, with longitudinal striations; T2 occupying 0.65 length of abdomen.

Female : Unknown.

Type locality : Nilambur (Malappuram, Kerala).

Remarks : This species is not represented in the present collection. Hence the above description is based on the original description by Sharma (1979). From the description and illustrations it is inferred that the species belongs to *Spilomicrus* and not to *Paramesius*. By generic transfer, since the name *Spilomicrus nilamburensis* is already preoccupied (Sharma, 1979), a new name is proposed here as *Spilomicrus manii* nom. nov.

It may be recalled here that, through this study *S. nilamburensis* Sharma is transferred to *Odontopria* Kieffer and accordingly, *S. nilamburensis* Sharma is treated as *Odontopria nilamburensis* (Sharma).

18. Genus *Trichopria* Ashmead
(Figs. 41-56)

1893. *Trichopria* Ashmead. *Bull. U.S. Nat. Mus.*, 45 : 407, 432; Kieffer 1916a, *Das Tierreich*, 44 : 77
1893. *Trichopria* Ashmead : 407, 431. Type : *Trichopria pentaplasta* Ashmead, by original designation. Keyed, key to species of U.S. and Canada.
1893. *Phaenopria* Ashmead : 407, 436. Type : *Phaenopria minutissima* Ashmead, by original designation. Keyed, key to species of U.S. and Canada. Synonymized by Sudholm (1960).
- 1906a. *Planopria* Kieffer : 19. Type : *Diapria californica* Ashmead, designated by Muesebeck and Walkely (1951). Synonymized with *Trichopria* Ashmead by Kieffer (1912a).
- 1911a. *Orthopria* Kieffer : 983, 984. Type : *Diapria californica* Ashmead, designated by Muesebeck and Walkely (1951). Synonymized with *Trichopria* Ashmead by Kieffer (1912a).
- 1912a. *Ashmeadopria* Kieffer : 8, 10, 59. Type : *Diapria verticillata* Latreille, designated by Mani (1941a). List of species keyed. Synonymized by Muesebeck and Walkely (1951).
- 1912a. *Rhopalopria* : Kieffer : 8, 10, 61. Type : *Rhopalopria vulgaris* Kieffer, by monotypy. Keyed. Synonymized by Masner (1965).
- 1916a. *Neodiapria* Kieffer : 346. Type : *Tropidopria erynniae* Kieffer, by monotypy. Synonymized by Priesner (1953).

Diagnosis : Head in profile almost globose, wider or shorter than thorax; mostly smooth and shiny; antennae inserted on frontal projection, frons without any impressions. Eye oval. Mandibles small and bidentate. Antennae 14 segmented in males and 12 segmented in females; antennal segments in male often setaceous to monoliform; flagellar segments with short, stout, setae or with long fine hairs arranged in whorls. In females a distinct club present. Pronotal collar of hair often dense. Humeral sulcus absent. Notauli absent. Scutellum with much variable structure, with or without a median longitudinal complete or incomplete keel; scutellum with one or two grooves in front, rarely without scutellar grooves. Sternaulus present, absent or indicated as a trace. Propodeum with a median longitudinal carina and a pair of lateral carinae. Legs normal; foreleg often with a false spur present as an outwardly directed spine-like process. Wings finely hairy with short to very long marginal fringe of hairs;

m punctiform; *sm* not exceeding basal one-third; *stg* very short, other veins absent. Petiole cylindrical, mostly clothed with woolly hairs; T2 without a median furrow, practically occupying almost three-fourth of metasoma.

Distribution : Nearctic, Neotropical, Palearctic, Australian and Oriental Regions.

Host : Many dipteran families viz., Tephritidae, Tachinidae, Syrphidae, Ephydriidae, Stratiomyidae, Calliphoridae, Sarcophagidae, Drosophilidae, Glossinidae, Tabanidae, Chloropidae, Agromyzidae and Sciomyzidae are recorded as potential hosts.

Discussion : This genus keys to couplet no. 20 of key to the genera of Mani and Sharma (1982). Though it resembles much to *Diapria* Latreille, it differs from *Diapria*, in basal margin of T2 not being incised.

In resemblance it can be also be compared to genus *Basalys* Westwood (not keyed by Mani and Sharma (1982), but differs from it in the following characters :

TRICHOPRIA	BASALYS
Number of club segments often variable.	Mostly three segmented club
<i>Basalis</i> generally absent	<i>Basalis</i> always distinct.
Hairs on mesoscutum always arranged in pairs	Hairs on mesoscutum not arranged in pairs

Remarks : *Trichopria* is the largest and most common genus among Diapriinae, showing a great degree of speciation.

This study reports 16 species as new to science.

In the present work, only females of this particular genus are described and keyed as it was found difficult to associate most of the males with its appropriate females. Altogether nineteen species are described here from Kerala.

Key to Indian species of *Trichopria* Ashmead
(Based on Females)

1. Scutellum without grooves 2
- Scutellum with one or two grooves 4

2. Scape somewhat longer than the following 3 segments combined; T2 extending to 0.75 of metasoma; club 5 segmented
..... *T. indica* (Kieffer)
- Scape nearly equal to the following 4 segments combined; T2 occupying 0.65 length of metasoma; club 4 segmented 3
3. Body black; ocelli separated by less than their own diameter; metasoma nearly half the length of body; petiole twice as long as thick.....
..... *T. contigua* Sharma
- Body brownish black; ocelli separated by more than their own diameter; metasoma more than half the body; petiole somewhat longer than thick..... *T. pedicellata* Sharma
4. Scutellum with 1 groove 9
- Scutellum with 2 grooves 5
5. Median keel on propodeum distinct; antennal club if demarcated then, three to 5 segmented.
..... 6

- Median keel on propodeum reduced, antennal club 3 segmented *T. krishagathra*
Rajmohana and Narendran sp. nov.
6. A distinct club present or absent..... 7
- Antenna with terminal segments gradually enlarged, a distinct club absent
T. petiolata Rajmohana and Narendran sp. nov.
7. Scape almost equal to or longer than next 4 segments combined; club 3 or 4 segmented
..... 8
- Scape less than next 3 segments combined; club not demarcated
..... *T. disulcata* Rajmohana and
Narendran sp. nov.

8. Scutellar grooves as tiny specs near lateral notch of scutellar shield ; club 3 segmented
T. fringa Rajmohana and Narendran sp. nov.
- Scutellar groove large and medially placed; club 4 segmented *T. atturensis* Sharma
9. Body red; club 5 segmented, terminal 2 club segments black. *T. rufa* (Kieffer)
- Body black; club 3 or 4 segmented, if 5 segmented then uniform in colour..... 10
10. Thorax narrower than head width or at the most as wide as head width..... 11
- Thorax distinctly wider than head width 24
11. Thorax width subequal to head 12
- Thorax width narrower or wider than head 20
12. Scape equal to or more than length of next 3.5 segments combined; club not demarcated or if demarcated then with 3 to 4 segments 14
- Scape at the most as long as length of next 3.5 segments combined; club clearly demarcated with 3 to 5 segments 13
13. Antennal club 5 segmented; petiole 1.5x as long as thick *T. montana* Sharma
- Antennal club 3 segmented; petiole more than twice as long as thick.... *T. lacustris* Sharma
14. Petiole more than thrice as long as thick; antenna without a distinct club.... *T. cristata* Rajmohana and Narendran sp. nov.
- Petiole not thrice as long as thick; antennal club 3 or 4 segmented 15
15. Scape more than length of next 5.5 segments combined; club 3 segmented..... 19
- Scape less than length of next 5 segments combined; flagellar segments preceding club not; transverse; club 3 or 4 segmented....16
16. Antenna with 4 segmented club, club demarcation not much distinct..... *T. tibia* Rajmohana and Narendran sp. nov.
- Antenna with a well demarcated 3 segmented club 17
17. Petiole twice as long as thick; fore tibia without an out directed spine; scape as long as next 3.5 segments combined 18
- Petiole only less than 1.5x as long as thick; fore tibia with an outwardly directed spine though small; scape as long as length of next 4.5 segments combined..... *T. malabarensis* Rajmohana and Narendran sp. nov.
18. Head not transverse in anterior view ; scutellar groove like a convex arc shaped depression with 2 small lateral deep pits ; basal club segment as long as or longer than succeeding ones
T. triclavata Rajmohana and Narendran sp. nov.
- Head distinctly transverse in anterior view; scutellar groove horse-shoe shaped, like a semicircle; basal club segment distinctly shorter than succeeding ones.....
T. semicirculara Rajmohana and Narendran sp. nov.
19. Scutellum with a normal rounded groove; foretibia with a distinct outwardly directed spine *T. minuta* Rajmohana and Narendran sp. nov.
- Scutellum with an inverted arc shaped depression; fore tibia without an out directed spine *T. arca* Rajmohana and Narendran sp. nov.
20. Thorax narrower than head 21
- Thorax wider than head 23
21. Antennal club 4 segmented; scutellar groove as a rounded depression with two adjacent small pits..... *T. tetraclavata* Rajmohana and Narendran sp. nov.
- Antennal club 3 segmented; scutellar groove not as above 22
20. Head widely transverse in anterior view; ocelli situated closer towards occiput; petiole twice as long as thick *T. gopii* Rajmohana and Narendran sp. nov.

- Head feebly transverse in anterior view; ocelli situated on mid dorsal head; petiole less than 1.5x as long as thick 23
23. Frons a little convex in lateral view ; eyes rounded, margin not visible dorsally ; median carina on scutellum incomplete... *T. clavata* Rajmohana and Narendran sp. nov.
- Frons normal eyes transverse, margin visible dorsally; median carina on scutellum complete *T. gautami* Rajmohana and Narendran sp. nov.
24. Antenna bright red; 4 segmented club, black; petiole as long as thick; naked *T. syrphidarum* (Kieffer)
- Antenna black, club 3 or 5 segmented; petiole not naked, distinctly longer than broad... 25
25. Scutellum unarmed; antennal club 5 segmented; foretibia without an out-directed spine *T. khandala* Sharma
- Scutellar shield with a distinct pointed spine; antennal club 3 segmented; foretibia with a long distinct out-directed spine *T. spinosa* Rajmohana and Narendran sp. nov.

Species descriptions

1. *Trichopria arca* Rajmohana and Narendran sp. nov.

(Fig. 41)

Holotype : Female. Length of body = 1.5mm. Body shining black, except metanotum, petiole and posterior 0.25 of metasoma being brownish black. Eyes and ocelli coppery. Antenna reddish brown all along except terminal 3 club segments; legs yellowish brown, apical tarsi darker. Wings clear without any infuscation, veins deep brown. Antennal pilosity and body pubescence dull white, marginal fringe of wings brown.

Head : HL : HB (D.V) = 2 : 2.65. Smooth and shiny. In dorsal view distinctly transverse, with sparse pubescence; almost globose. Eyes small, globose, not bulging situated a little anteriorly and with long fine pubescence. Vertex gently arched towards ocellar region. Ocelli large, not arranged in a close triangle, placed much lower

medially; OOL : OD : POL = 3 : 1 : 2. Temples not bulged, rather sloping beneath eyes towards occiput; post genal cushion of hairs dense, posterolateral lappets distinct. Occipital flange wide, step-like and feebly emarginate. Clypeus horizontal, a little elevated; tentorial pit clearly visible. Head when viewed laterally, as high as long, not conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right on top of vertex, frontal shelf not sloping, at most with a slight curve; AF 1.1.7.3; terminal club segment distinctly longer than preceding ones; flagellar segments not elongated; scape a little thickened towards distal end and equal to length of next 5.8 segments combined; club densely hairy, terminal club segment distinctly longer than preceding ones, 2.3x length of its penultimate; ventral pit present on F10.

Mesosoma : L : B = 4.3:2.7. Subequal to width of head. Cervix prominent. Pronotal collar of hairs fine, decumbent and appearing as a band; pronotum broadly visible outer to fine mesoscutal suture. Mesoscutum wider than long; scutellum with a groove, as if an inverted 'U' shaped arc like depression; scutellar shield with an incomplete median longitudinal ridge; scutellar shield not notched anterolaterally; shield slightly convergent posteriorly but without a hump in lateral view. Metanotum seen as a narrow belt with keels very much reduced and indistinct except median one. Propodeum with a narrow dorsal semi-hyaline zone on an anteriorly raised tooth like median keel; lateral pair of carinae only as a dark granulate ridge; hind propodeal border carinated, feebly excavated and also with conspicuous broad lateral spines on posterior corner; dorsal propodeum granulose and hairy except a median bare patch. Propleura and mesopleura smooth and almost bare; sternaulus present only as a depression; metapleura clothed with fine appressed hairs. Legs normal ; foretibia without an out-directed spine. Forewing densely hairy below *m*; marginal fringe of hairs moderate. FWL: FWB = 35.2:13, veins reaching only 0.38 of fore wing length.

Metasoma : Smooth and robust. Petiole with parallel longitudinal striations concealed by dense tufts of hairs and scales, 1.25x as long as wide. Basal margin of T2 a little concave medially; T2

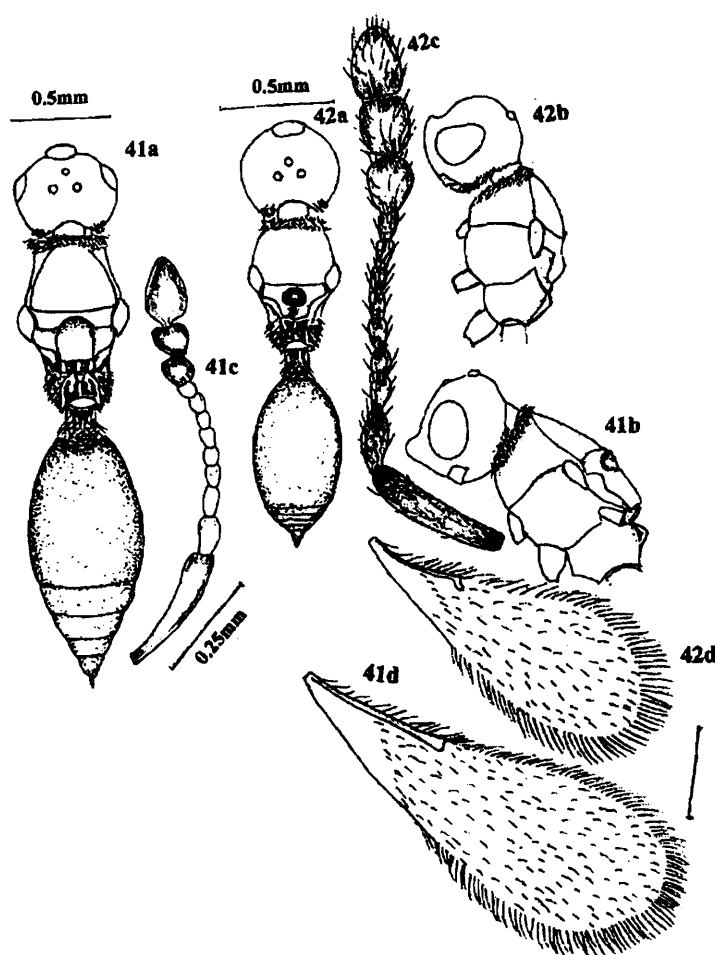


Fig. 41. *Trichopria arca* Rajmohana & Narendran sp. nov.
a. Body (D.V.); b. Mesosoma (Profile); c. Antenna;
d. Forewing.

Fig. 42. *Trichopria clavata* Rajmohana & Narendran sp. nov.
a. Body (D.V.); b. Mesosoma (Profile); c. Antenna;
d. Forewing.

extending to only 0.62 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype: Female collected from Tiruvannur (Calicut, Kerala) by Mohana on 11-vi-1995.

Paratypes : Females. Two with same data as that of the holotype except dates being: 15-x-1995 and 2-ii-1997; three with same data as that of the holotype except dates being 23-vii-1995, 25-v-1996 and 23-xi-1996. One collected from Uppinangadi (Kerala) by T.C. Narendran on 7-xii-1989; one collected by Mohana from Anakkampoyil (Calicut, Kerala) on 7-x-1995; one from Muthanga (Wyanad, Kerala) collected by Mohana on 7-x-1995; Eravikulam (Idukky, Kerala) by M.S. Pradhan on 2-iii-1992 and from Coorg

(Kerala-Karnataka border) collected by P.M. Sureshan on 6-iii-1994.

Etymology : This species is named 'arca' after its arc shaped depression on scutellum.

Discussion : The inverted U shaped inverted arc is also considered as a trace of fovea or groove,

This species keys to couplet no. 7 of the key to species by Mani and Sharma (1982). It resembles *T. lacustris* Sharma, but differs from it mainly in the following characters:

– Scape as long as length of next 5.8 segments combined. (In *T. lacustris* scape as long length of next 3.5 segments combined).

– Scutellar groove only as an inverted arc. (In *T. lacustris* scutellar groove normal, rounded).

– T2 only 0.56 length of metasoma. (In *T. lacustris* T2 extends to 0.8 length of metasoma).

2. *Trichopria clavata* Rajmohana and Narendran sp. nov. (Fig. 42)

Holotype : Female. Length of body = 1.05mm. Head and body shining black with a brown tinge. Eyes black. Scape deep brownish black, pedicel and flagellar segments brown, club concolorous with body. Legs yellowish brown. Wings clear, veins light brown. Antennal pilosity, body pubescence and marginal fringe of wings brown.

Head : L : B (D.V) = 2 : 2.5. Smooth and shiny. In dorsal view transverse, with sparse pubescence; almost globular. Eyes large, globose, not bulging laterally situated much anteriorly and with sparse pubescence; dorsal margin of orbits not visible. Vertex curving, gently towards ocellar region. Ocelli small, arranged in a close triangle on dorsal median of head; OOL= 2.6x OD. Temples feebly bulging beneath eyes but gradually curving towards occiput; postgenal cushion of hairs dense, posterolateral lappets reduced. Occipital flange narrow, step-like and carinate. Mandibles bidentate; clypeus horizontal and a little elevated, tentorial pit distinct; malar groove absent. Head when viewed laterally not as high as long, not conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right almost on top of vertex, frontal shelf not sloping almost vertical; frons smooth and with dense pubescence;

AF 1.1.7.3; a distinct 3 segmented club present; pedicel large and a little bulged; all flagellar segments almost bead like; scattered hairs present; scape a little thickened toward distal end and equal to length of next 5 segments combined; F1 and F2 subequal, about 0.5 of pedicel rest till F7 subequal, a little shorter than F2. ventral pit absent on F10. F10 distinctly longer than its preceding ones and 1.13x longer than its penultimate.

Mesosoma : L : B = 3.3 : 2.3. Head wider than thorax. Cervix prominent, bare and smooth. Pronotal collar of hairs fine dense and appearing as a band; pronotum visible only as a streak outer to fine mesoscutal suture. Mesoscutum wider than long, a little conical anteriorly; scutellum with a large almost rounded groove, divided by an incomplete median longitudinal carina on scutellar shield; scutellar shield with notches anteriorly, border carinate, lateral and lower borders feebly convex and slightly convergent posteriorly, in lateral view scutellar shield with a hump. Metanotum present as a narrow belt with three equidistant keels. Propodeum with a distinct dorsal semi-hyaline zone on a slightly raised tooth-like median keel; lateral pair of carinae distinct; hind propodeal border carinated and emarginate, with distinct lateral spines on posterior corner. Propleura and mesopleura smooth and almost bare; sternaulus present as a trace; metapleura clothed with fine appressed hairs. Legs normal; fore tibia with a distinct outwardly directed spine. Forewing densely hairy below *m*, traces of lineola present; marginal fringe of hairs well developed. FWL: FWB = 35.8 : 17; veins reaching 0.33 of forewing length.

Metasoma : Smooth and robust. Petiole with parallel longitudinal striations much concealed by long decumbent hairs and also scales, denser in lower half, 1.25x as long as wide. Basal margin of T2 not much concave medially; T2 extending to only 0.74 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female,

collected from Tiruvannur (Calicut, Kerala) by Mohana on 2-ii-1997.

Paratype : Female, with same data as of the holotype except date being 16-xi-1996.

Etymology : This species is named '*clavata*' after its well demarcated antennal club.

Discussion : This species keys to couplet no.7 of the key to species by Mani and Sharma (1982). It resembles *T. lacustris* Sharma, but differs from it mainly in the following characters:

– Head wider than thorax. (In *T. lacustris* head and thorax subequal).

– Scape as long as length of next 5 segments combined. (In *T. lacustris* scape as long as next 3.5 segments combined).

– Petiole 1.44x as long as thick. (In *T. lacustris* petiole 2.4x as long as thick).

3. *Trichopria cristata* Rajmohana and

Narendran sp. nov.

(Fig. 43)

Holotype : Female. Length of body = 2.22 mm. Body deep brownish black. Antenna brown with terminal 2 segments black. Eyes and ocelli silvery brown. Legs pale yellowish brown. Wings slightly infuscated, veins dark brown. Antennal pilosity and body pubescence silvery white. Marginal fringe of wings deep brown.

Head : L : B (D.V) = 3 : 3.2. Smooth and shiny. In dorsal view transverse, with sparse pubescence; almost globose. Eyes small with fine pubescence, almost rounded and sub-equal to bare part of temples. Vertex sloping towards occiput. Ocelli very small, arranged in a close triangle; OOL : OD : POL = 8 : 3.5 : 3. Temples strongly arched and with a prominent bulge, gradually curving towards occiput; postgenal cushion of hair dense and seen as posterolateral lappets. Occipital flange narrow, not step like and feebly emarginate. Mandibles bidentate, clypeus horizontal, tentorial pit distinct; malar groove absent. Head when viewed laterally as high as long with thick greyish pilosity on upper gena. Scape insertion on frontal shelf in level with vertex; AF 1.1.7.4; club not

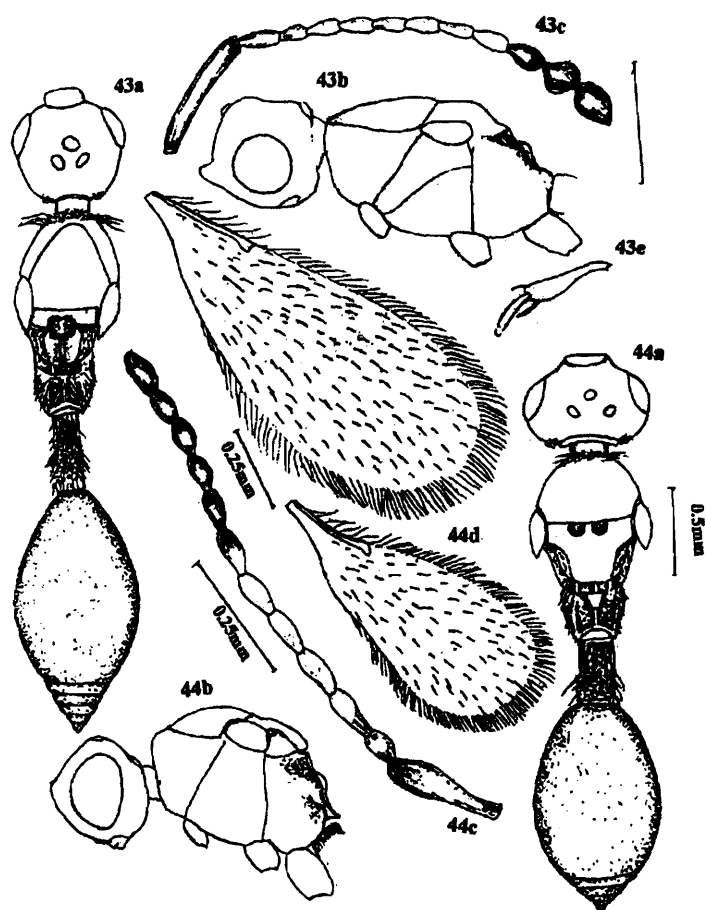


Fig. 43. *Trichopria cristata* Rajmohana & Narendran sp.nov.
a. Body (D.V.); b. Mesosoma (Profile); c. Antenna;
d. Forewing.

Fig. 44. *Trichopria disculata* Rajmohana & Narendran sp.nov.
a. Body (D.V.); b. Mesosoma (Profile); c. Antenna;
d. Forewing.

clearly demarcated; flagellar segments much elongate; scape a little thickened towards distal end and equal to length of next 3.8 segments combined; club densely hairy; F1 0.63 of scape, F2 a little longer than F1 and subequal till F6; F7 to F9 almost subequal; ventral pit absent on F10, F10 length 1.2x its penultimate

Mesosoma : L : B = 5.2 : 3.1. Subequal to width of head. Cervix prominent. Pronotal collar of hairs fine, decumbent and long; pronotum broadly visible outer to fine mesoscutal suture. All thoracic structures bordered by black carinae. Mesoscutum slightly wider than long; scutellum with an anterior rounded groove, incomplete distally, but divided medially by a median longitudinal ridge from scutellar shield, scutellar shield a little notched anterolaterally, notch not connected to posterolateral edges of groove; shield slightly convergent posteriorly, with a slight bulge in lateral view. Metanotum with three equidistant longitudinal carinae, median one a little depressed.

Propodeum with a median keel evenly arched, slightly raised and with a narrow dorsal semi-hyaline zone; lateral pair of carinae not much distinct; hind propodeal border carinated and also excavated; dorsal propodeum granulate and hairy, hairs long appressed and backward directed as if kept combed. Propleura and mesopleura smooth and almost bare; traces of sternaulus present; metapleura clothed with fine semi-decumbent hairs. Legs normal; foretibia with a distinct outwardly directed spine. Forewing densely hairy; marginal fringe of hairs moderate. FWL : FWB = 68.5 : 26; veins reaching 0.28 of forewing length.

Metasoma : Smooth, a little massive and robust. Petiole with parallel longitudinal striations and also long dense tufts of hairs and scales medially, 3.2x as long as wide. Basal margin of T2 not concave medially; T2 extending to 0.8 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female, collected by T.C. Narendran and party on 27-v-1988 from Calicut University Campus (Malappuram, Kerala).

Etymology : This species is named '*cristata*' after the combed pattern of hairs on its propodeum.

Discussion : The scutellar groove is rather peculiar being not complete distally. This character along with its outwardly directed fore tibial spine is unique to this species.

This species keys to couplet no.8 of the key to species by Mani and Sharma (1982). It resembles *T. montana* Sharma, but differs from it mainly in the following characters:

– Antennal club 4 segmented. (In *T. montana* antennal club 5 segmented)

– Petiole 3.33x as long as wide. (In *T. montana* petiole 1.43x as long as wide).

4. *Trichopria disulcata* Rajmohana and
Narendran sp. nov.
(Fig. 44)

Holotype : Female. Length of body = 2.50mm. Body shining black. Antenna rust brown, F6 to F10 deep brownish black. Eyes and ocelli black. Mandibles and legs concolorous with basal antennae, apical tarsi a little darker. Wings clear without any infuscations, veins brown. Antennal pilosity and body pubescence silvery white, marginal fringe deep brown.

Head : L : B(D.V) = 2.4 : 3.4. Smooth and shiny. In dorsal view transverse, with sparse pubescence; almost globose. Eyes large, globose, bulging and with fine pubescence, roughly oval and sub equal to bare part of temples. Vertex sloping towards occiput. Ocelli large, arranged in a close triangle, much lower, nearer towards occiput; OOL : OD : POL = 7 : 3 : 6. Temples strongly arched and with a prominent bulge, gradually curving towards occiput; post genal cushion of hairs sparse, posterolateral lappets lacking. Occipital flange narrow, not step like and feebly emarginate. Mandibles bidentate, clypeus horizontal, tentorial pit not clearly visible; malar groove absent. Head when viewed laterally as high as long with thick greyish pilosity on upper gena. Antennal insertion right on top of vertex, frontal shelf distinctly sloping and curved; AF 1.1.9.1; club not demarcated; terminal segments except F10 not enlarged; flagellar segments F1 to F6 much elongate and with scattered long pubescence; scape a little thickened toward distal end and equal to length of next 2.7 segments combined; club densely hairy ; F1 and F2 subequal, 1.5x longer than pedicel; F3 a little longer than F1 and subequal till F7; F10 1.4x length of its penultimate; ventral pit absent on F10.

Mesosoma : L : B = 5.1 : 3.35. Subequal to width of head. Cervix prominent. Pronotal collar of hairs fine decumbent and long; pronotum broadly visible outer to fine mesoscutal suture. Mesoscutum slightly wider than long; scutellum with two anterior rounded grooves, situated anteriorly; scutellar shield without a median longitudinal ridge; feebly notched anterolaterally and slightly convergent posteriorly, also with a

slight bulge in lateral view. Metanotum as a narrow belt with much reduced and indistinct keels. Propodeum with a median keel evenly arched, slightly raised anteriorly and without a dorsal semi-hyaline zone; lateral pair of carinae not much distinct; hind propodeal border carinated, excavated and also with conspicuous broad lateral spines on posterior corner; dorsal propodeum granulose and hairy. Propleura and mesopleura smooth and almost bare; traces of sternaulus present; metapleura clothed with fine appressed hairs. Legs normal; foretibia without a distinct outwardly directed spine. Forewing densely hairy below *m*; marginal fringe of hairs moderate. FWL : FWB = 47 : 18. Veins reaching to 3.3x length of forewing.

Metasoma : L : B. Smooth, robust and plumpy. Petiole with dense scales and dense tufts of hairs medially, 1.8x as long as wide, also with parallel longitudinal striations. Basal margin of T2 not concave medially; T2 extending to only 0.84 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female. Collected by P.M. Sureshan on 2-ii-1995 from Kannur (Kerala).

Etymology : This species is named '*disulcata*' after its two grooves on scutellum.

Discussion : This species is almost similar to *T. tetracalavata* Rajmohana and Narendran sp. nov., in the structure of scutellum, but the state of antennal club in both the species are entirely different.

This species keys to couplet no.4 of the key to species by Mani and Sharma and (1982). It resembles *T. atturensis* Sharma, but differs from it mainly in the following characters :

– Absence of a distinct club. (In *T. atturensis* a distinct four segmented club present).

– Petiole twice as long as thick. (In *T. atturensis* petiole 1.66x as long as thick).

– Scape equal to length of next 2.7 segments combined. (In *T. atturensis* scape equal to length of next four segments combined).

5. *Trichopria fringa* Rajmohana and Narendran
sp. nov.

(Fig. 45)

Holotype : Female. Length of body = 1.45mm. Body pale yellowish to deep brown. Head and posterior half of metasoma being darker. Eyes brown, but with a black median patch. Antennal segments brownish black, except club segments being yellowish brown. Legs concolorous with antennae, apical tarsi a little darker. Wings clear without any infuscations, veins light brown. Body pubescence, antennal pilosity and marginal fringe of wings dull white.

Head : L : B (D.V) = 2.1 : 2.8. Smooth and shiny. In dorsal view distinctly transverse, with sparse pubescence; almost globose. Eyes small, globose, not bulging, situated a little anteriorly and with long fine pubescence, dorsal margin only feebly visible. Vertex gently arched towards ocellar region. Ocelli small, arranged in a close triangle, medially; OOL : OD : POL = 7 : 2 : 3. Temples not bulged, rather sloping beneath eyes towards occiput, gradually curving towards occiput; post genal cushion of hairs dense, posterolateral lappets distinct. Occipital flange wide, step-like and feebly emarginate. Mandibles bidentate, clypeus horizontal a little elevated, tentorial pit clearly visible; malar groove absent. Head when viewed laterally as high as long, not conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right on top of vertex, frontal shelf not sloping, at most with a slight curve; AF 1.1.7.3; terminal club segment longer than preceding ones; flagellar segments elongated with a constricted basal part; scape a little thickened towards distal end and equal to next 4.5 segments combined. F1 shorter than pedicel (0.57x length), F2 shorter than F1, F2 to F6 almost subequal; F9 1.25x F8; F10 1.2x its F9; ventral pit absent on F10.

Mesosoma : L : B = 4 : 2.5. Subequal to width of head. Cervix prominent. Pronotal collar of hairs fine, decumbent and appearing as a band; pronotum broadly visible outer to fine mesoscutal

suture. Mesoscutum wider than long; scutellum with two deep point-like depressions laterally near anterior margin of scutellar shield; shield with an incomplete median longitudinal ridge and with deep distinct notches towards groove; border carinate, sides almost parallel, while lower border a little convex; shield slightly convergent posteriorly but without a hump in lateral view. Metanotum as a narrow belt with keels very much reduced and indistinct, except median one. Propodeum with a distinct dorsal semi-hyaline zone outer to a slightly depressed but distinct median keel; lateral pair of carinae distinct; hind propodeal border carinated, and feebly excavated, with conspicuous broad lateral spines on posterior corner; dorsal propodeum smooth and hairy with a constricted lower border. Propleura and mesopleura smooth and almost bare; sternaulus present; metapleura clothed with fine appressed hairs. Legs normal; foretibia without an outwardly directed spine. Forewing densely hairy below *m*, but a bare area towards its median; marginal fringe of hairs well developed. FWL : FWB = 37 : 13; veins reaching 0.33 of forewing length.

Metasoma : Smooth and robust. Petiole with five parallel longitudinal striations concealed by dense tufts of hairs and scales medially, 1.14x as long as wide. Basal margin of T2 a little concave medially; T2 extending to only 0.74 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female. Collected by Mohana on 31-x-1994, from Tiruvannur (Calicut, Kerala)

Paratypes : All females, collected from the same locality, dates being different. Two on 7-vi-1995; three on 28-vii-1996 and one each on 29-vii-1995, 3-vii-1996, 16-xii-1996, 25-v-1996 and 16-xi-1996.

Other than these two were collected by P.M. Sureshan, from Madappally (Calicut, Kerala) on 1-viii-1995 and from Meenthotti (Eravikulam, Idukki, Kerala) on 7-ii-1995.

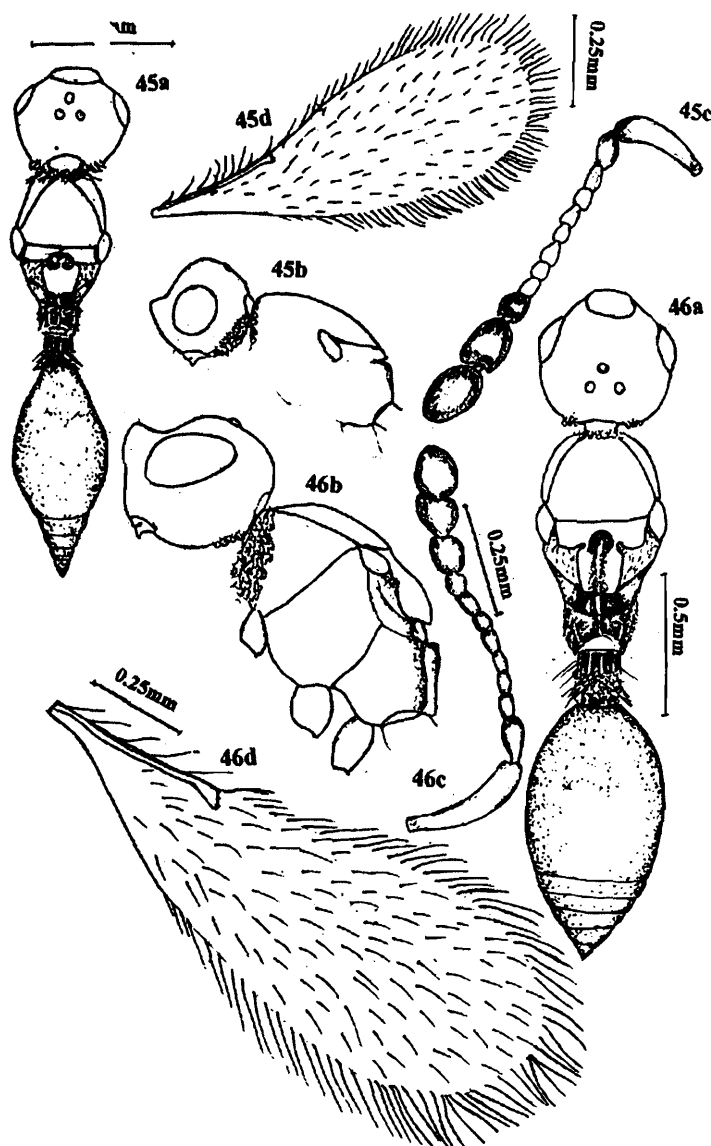


Fig. 45. *Trichopria fringa* Rajmohana & Narendran sp. nov.
a. Body (D.V.); b. Mesosoma (Profile); c. Antenna;
d. Forewing.

Fig. 46. *Trichopria gautami* Rajmohana & Narendran sp. nov.
a. Body (D.V.); b. Mesosoma (Profile); c. Antenna;
d. Forewing.

Etymology : This species is named '*fringa*' after its well developed marginal fringe on forewings.

Discussion : The two scutellar fovea in this species appearing as deep dots, such a scutellum is not met with in any other new species described here.

This species keys to couplet no. 4 of the key to species by Mani and Sharma (1982). It resembles *T. atturensis* Sharma, but differs from it mainly in the following characters:

– Scutellum with a pair of spec-like grooves. (In *T. atturensis* scutellum with two normal rounded grooves).

– Petiole with longitudinal striations. (In *T. atturensis* petiole without longitudinal striations).

6. *Trichopria gautami* Rajmohana and Narendran sp. nov.

(Fig. 46)

Holotype : Female. Length of body = 1.39mm. Head and body brownish black. Antenna with flagellar segments yellowish brown, club segments deep brownish black though basal one a little paler. Eyes silvery with a black tinge. Legs concolorous with antennae, tarsal claws brownish black. Wings hyaline without infuscations, veins brownish. Antennal pilosity and body pubescence whitish, marginal fringe of wings brown.

Head : L : B(D.V) = 3.2:3.4. Smooth and shiny. In dorsal view not transverse, with sparse pubescence; almost angular. Eyes small, globose, not bulging laterally, situated much anteriorly and with sparse pubescence. Vertex gently sloping towards ocellar region. Ocelli small, arranged in a wide triangle, a little lower dorsally ; OOL : OD : POL = 1 : 2.5 : 5 (measured slantingly). Temples not bulging beneath eyes but gradually curving towards occiput; post genal cushion of hairs dense, posterolateral lappets distinct. Occipital flange narrow, step-like and carinate. Mandibles bidentate, placed almost sub-medially, clypeus horizontal, a little elevated, tentorial pit distinct; malar groove absent. Head when viewed laterally as high as long, a bit conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right on top of vertex, frontal shelf not sloping, almost vertical; frons smooth and with denser pubescence; AF 1.1.7.3; basal club segment distinctly shorter than other two; flagellar segments a little elongated, with a constricted basal part, and with scattered hairs; scape a little thickened towards distal end and equal to length of next 5 segments combined. F1 shorter than pedicel (0.63x), but longer than F2 (1.2x); F9 2.4x F8; F10 and F9 almost subequal, ventral pit present on F10.

Mesosoma : L : B = 5.3 : 3.2. Distinctly narrower than head. Cervix prominent, bare. Pronotal collar of hairs fine, decumbent and appearing as a band; pronotum broadly visible outer to fine mesoscutal suture. Mesoscutum wider

than long. Scutellum with a large rounded groove; scutellar shield with a complete median longitudinal ridge dividing scutellar groove; scutellar shield with feeble trace of notches anteriorly, border carinate, sides almost parallel and lower border a little convex. Metanotum present as a narrow belt with three equidistant keels, median one being more prominent. Propodeum with a distinct dorsal semi-hyaline zone on a slightly raised tooth-like median keel; lateral pair of carinae distinct; hind propodeal border carinate and emarginate, with conspicuous broad lateral spines on posterior corner; dorsal propodeum smooth and hairy. Propleura and mesopleura smooth and almost bare; sternaulus present as a trace; metapleura clothed with fine appressed hairs. Legs normal; fore tibia with a small outwardly directed spine. Forewing densely hairy below *m*; marginal fringe of hairs well developed. FWL : FWB = 37.5 : 12.5. Veins reaching 0.33 of forewing length.

Metasoma : Smooth and robust. Petiole with parallel longitudinal striations concealed by dense decumbent, long, hairs and scales, 1.27x as long as wide. Basal margin of T2 not much concave medially; T2 extending to only 0.68 length of abdomen, rest of tergites seen as wide rings; ovipositor extended, distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female, Collected by P.M. Sureshan on 3-xi-1995 from Orukomban (PWLS, Palghat, Kerala).

Etymology : This species is named '*gautami*' after the name of the first author's son, Gautam.

Discussion : The sharp contrast in size between F8 and F9 is peculiar and is unique to this species.

This species keys to couplet no. 7 of the key to species by Mani and Sharma (1982). It resembles *T. lacustris* Sharma, but differs from it mainly in the following characters:

- Eyes hairy. (In *T. lacustris*, eyes bare).
- Petiole distinctly less than twice as long as thick. (In *T. lacustris* petiole twice as long as thick).
- Proportion of antennal segments.

7. *Trichopria gopii* sp. nov. (Fig. 47)

Holotype : Female. Length of body = 1.23mm. Head and lower half of metasoma deep brownish black. Thorax and petiole deep brownish black. Eyes black. Antennal scape and flagellar segments yellowish brown, terminal 3 club segments brownish black. Wings hyaline, clear; veins almost transparent except *stg* being slightly coloured. Antennal pilosity and body pubescence whitish, marginal fringe brown.

Head : L : B(D.V) = 1.9 : 2.9. Smooth and shiny. In dorsal and anterior view distinctly transverse, with sparse pubescence; almost globular. Eyes large, globose, not bulging laterally situated much anteriorly and with sparse pubescence. Vertex not curving, but almost horizontal beyond antennal shelf and gently sloping towards occiput. Ocelli small, arranged in a close triangle outside ocellar zone, nearer to margin of occiput. (Hence OOL is measured in a slanting manner); OOL : OD : POL = 4 : 1 : 2. Temples not at all bulging beneath eyes but smoothly curving towards occiput; post genal cushion of hairs lacking, posterolateral lappets reduced. Occipital flange narrow, step-like and carinate. Mandibles with a serrated tip; clypeus horizontal and a little elevated, tentorial pit distinct; malar groove absent. Head when viewed laterally not as high as long, conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right almost on top of vertex, frontal shelf not sloping, almost vertical; frons smooth and with denser pubescence; antennal formula 1.1.7.3; flagellar segments elongated, with a less constricted basal part, and with scattered hairs; scape a little thickened toward distal end and equal to length of next 3.8 segments combined. F1 and F2 subequal; F10 1.3x F9, F9 1.3x F8; ventral pit absent on F10.

Mesosoma : L : B = 4 : 2.4. Distinctly narrower than head. Cervix prominent and bare, with irregular longitudinal striations. Pronotal collar of hairs fine dense and appearing as a band; pronotum broadly visible outer to fine mesoscutal suture. Mesoscutum wider than long, a little conical anteriorly; scutellum with a large rounded groove;

scutellar shield with a complete median longitudinal ridge dividing scutellar groove; scutellar shield with notches anteriorly, border carinate, lateral borders not convex, lower border slightly convex; in lateral view scutellar shield without a hump. Metanotum present as a narrow belt with three equidistant keels, median one being more prominent. Propodeum with a distinct dorsal semi-hyaline zone on a slightly raised tooth-like median keel; lateral pair of carinae incomplete, extending only half way on it; hind propodeal border carinate and emarginate, without lateral spines on posterior corner; dorsal propodeum smooth and hairy. Propleura and mesopleura smooth and almost bare; sternaulus present as a trace; metapleura clothed with fine appressed hairs. Legs normal; foretibia without an out-wardly directed spine. Forewing rather narrow, densely hairy below *m*; marginal fringe of hairs well developed. FWL : FWB = 39 : 11; veins reaching 0.33 of forewing length.

Metasoma : Smooth and much narrow. Petiole with five parallel longitudinal striations much concealed by decumbent long hairs, denser medially, 1.6x as long as wide. Basal margin of T2 not much concave medially; T2 extending to only 0.72 length of abdomen, rest of tergites seen as wide rings; ovipositor extended distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female. Collected from Tirunelli (Wyanad, Kerala) by K.C. Gopi on 25-iii-1995.

Paratypes, Female, same data as that of the holotype except collection date being 22-iii-1995.

Etymology : This species is named 'gopii' in honour of the person, who collected the specimen.

Discussion : This species is rather unique, regarding the placement of ocelli outside ocellar zone, much closer to occiput.

This species keys to couplet no.7 of the key to species by Mani and Sharma (1982). It resembles *T. lacustris* Sharma, but differs from it mainly in the following characters :

– Ocelli placed much nearer towards occiput.

(In *T. lacustris* ocelli on mid dorsal head).

– In lateral view vertex with an odd shape. (In *T. lacustris* vertex normal).

– Eye pubescent. (In *T. lacustris* eye bare).

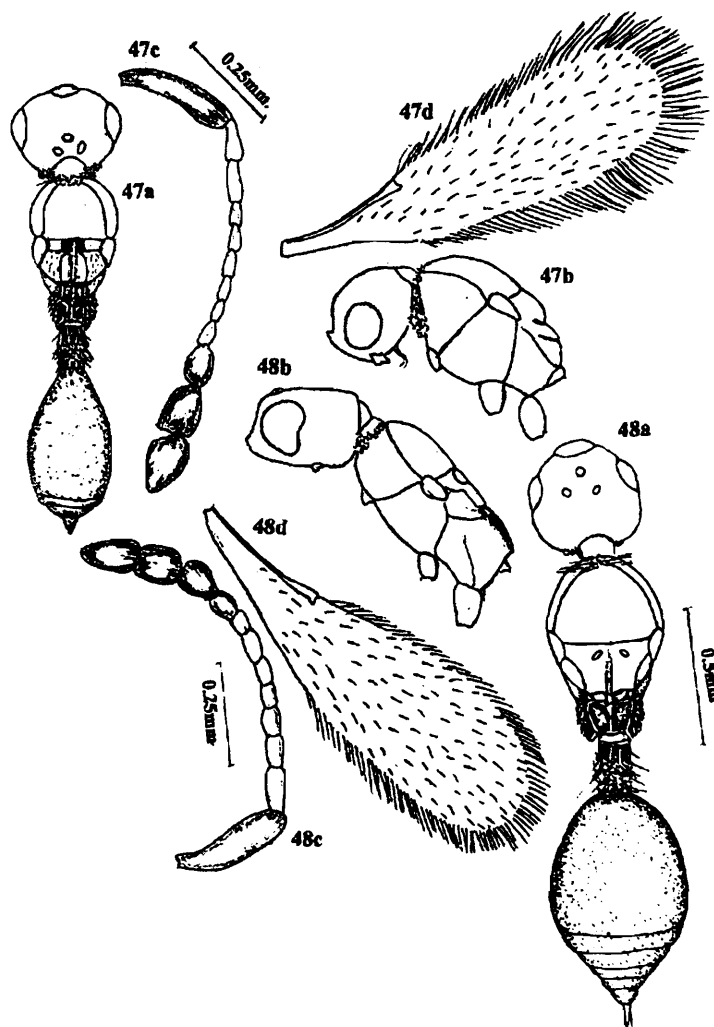


Fig. 47. *Trichopria gopii* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing.

Fig. 48. *Trichopria krishagathra* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing.

8. *Trichopria indica* Kieffer

1916a. *Trichopria indica* Kieffer. *Das Tierreich*, 44 : 91; Sharma, 1979, *Mem. Sch. Ent.*, 7 : 67.

Plesiotype : Female. Length of body = 1.32mm. Head black, rest of body deep brownish black. Antenna brown, scape paler, club segments a little darker. Eyes black with a silver tinge. Legs yellowish brown. Wings with very faint infuscation, veins dark brown. Antennal pilosity and body pubescence dull white, marginal fringe of wings brown.

Head : L : B(D.V) = 8.8:9.3. Smooth and shiny. In dorsal view transverse, with sparse pubescence; almost globular. Eyes large, globose, not bulging laterally situated much anteriorly and with sparse pubescence and visible only as a narrow arc dorsally. Vertex curving, gently towards ocellar region. Ocelli small, arranged in a close triangle on dorsal median of head. OOL : OD : POL = 2 : 1 : 1.2. Temples not bulging beneath eyes but gradually curving towards occiput; post genal cushion of hairs sparse, posterolateral lappets reduced. Occipital flange narrow step-like and carinate. Mandibles bidentate; clypeus horizontal and a little elevated, tentorial pit distinct; malar groove absent. Head when viewed laterally not as high as long, conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right almost on top of vertex, frontal shelf not sloping, almost vertical; frons smooth and with denser pubescence; AF 1.1.5.5; club not much demarcated; terminal antennal segments gradually thickened; all flagellar segments bead like, except F1 being elongated; scattered hairs present; scape a little thickened toward distal end and equal to length of next 4.5 segments combined. Proportions of length : width of antennal segments from scape to F10 being 7 : 1.2, 2.5 : 1.2, 2 : 1, 1 : 1, 1 : 1, 1 : 1, 1 : 1, 1.8 : 1.5, 1.8 : 1.7, 1.8 : 1.2, 2 : 2, 3.5 : 2; ventral pit absent on F10.

Mesosoma : L : B = 14 : 9.5. Almost subequal to head. Cervix prominent, bare and smooth. Pronotal collar of hairs fine, dense and appearing as a band; pronotum broadly visible outer to fine mesoscutal suture. Mesoscutum wider than long, a little conical anteriorly. Scutellum without any grooves; scutellar shield with a complete median longitudinal ridge dividing scutellar groove; scutellar shield with notches anteriorly, border carinate, lateral and lower borders feebly convex, in lateral view scutellar shield not humped. Metanotum present as a narrow belt with three equidistant keels. Propodeum with a distinct dorsal semi-hyaline zone on a slightly raised tooth-like median keel; lateral pair of carinae distinct, extending only half way on it; hind propodeal border carinated and emarginate, with distinct lateral spines on posterior corner. Propleura and mesopleura smooth and almost bare; sternaulus present as a trace; metapleura clothed with fine

appressed hairs. Legs normal; fore tibia with a small outwardly directed spine. Forewing rather narrow densely hairy below *m*; marginal fringe of hairs well developed. FWL : FWB = 35.8 : 17.

Metasoma : Smooth and robust. Petiole with parallel longitudinal striations much concealed by decumbent long hairs and also scales, denser in lower half, 1.75x as long as wide. Basal margin of T2 not much concave medially; T2 extending to only 0.73 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Materials Examined : Plesiotype : Female : Collected by P.M. Sureshan on 5-xi-1995, from PWLS (Palghat, Kerala).

Discussion : This species keys to couplet no.2 of the key to species by Mani and Sharma (1982). It resembles *T. contigua* Sharma, but differs from it mainly in the following characters:

- Scape longer than length of next 3 segments combined. (In *T. contigua* scape longer than length of next 4 segments combined)

- Antennal club 5 segmented. (In *T. contigua* antennal club 4 segmented).

T2 occupying 0.75 length of metasoma. (In *T. contigua* T2 occupying 0.65 length of metasoma).

9. *Trichopria khandala* Sharma

1979. *Trichopria khandalus* Sharma. *Mem. Sch. Ent.*, 7 : 67.

Plesiotype : Female. Length of body = 2.32mm. Head and thorax black; petiole and metasoma reddish brown. Antenna deep brown, except terminal segments being darker. Eyes and ocelli silvery but with a brownish black tinge. Legs yellowish brown, apical tarsi a little darker. Wings slightly infuscated, veins light brown. Antennal pilosity, body pubescence and marginal fringe of wings brown.

Head : L : B (D.V) = 11 : 13. Smooth and shiny. In dorsal view distinctly transverse, with

sparse pubescence; almost globose. Eyes small, globose, bulging and situated a little anteriorly, with sparse pubescence. Vertex gently arched towards ocellar region. Ocelli small, arranged in a close triangle, high dorsally; OOL : OD : POL = 3 : 1.8 : 2. Temples arched beneath eyes and gradually curving towards occiput; postgenal cushion of hairs dense, posterolateral lappets distinct. Occipital flange not step-like or carinate. Mandibles bidentate, clypeus horizontal, a little elevated, tentorial pit clearly visible; malar groove absent. Head when viewed laterally as high as long, not conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right on top of vertex, frontal shelf not sloping, at most with a slight curve; AF 1.1.6.4; terminal club segment longer than preceding ones; flagellar segments a little elongated with a constricted basal part; with long scattered hairs; scape a little thickened towards distal end and equal to length of next 3 segments combined. Proportions of length : width of antennal segments from scape to F10 being 9.8 : 2, 3.1 : 1.8, 3 : 1.2, 2.5 : 1.3, 2 : 1.5, 2 : 1.5, 2 : 1.8, 2 : 1.8, 2.9 : 2, 3 : 2.1, 3 : 2.1, 5.1 : 2.1; ventral pit absent on F10.

Mesosoma : L : B = 21 : 14. Subequal to width of head. Cervix prominent. Pronotal collar of fine, decumbent hairs, appearing as a band; pronotum broadly visible outer to fine mesoscutal suture. Mesoscutum wider than long; scutellum with a large rounded groove-like depression and two deep point-like fovea lying in it; scutellar shield with a complete median longitudinal ridge and with lateral notches, border carinate, sides almost convergent posteriorly and lower border a little convex; shield without a hump in lateral view. Metanotum as a narrow belt with three equidistant keels, median one being more prominent. Propodeum with a distinct dorsal semi-hyaline zone on a slightly raised tooth-like median keel; lateral pair of carinae distinct; hind propodeal border carinate and emarginate, with conspicuous broad lateral spines on posterior corner; dorsal propodeum smooth and hairy with a constricted lower border. Propleura and mesopleura smooth and almost bare; sternaulus present as a depression; metapleura clothed with fine appressed hairs. Legs normal; foretibia without an outwardly directed spine. Forewing densely hairy below *m*,

but a bare area towards its median; marginal fringe of hairs well developed. FWL : FWB = 37 : 13.

Metasoma : Smooth and robust. Petiole with five parallel longitudinal striations concealed by dense tufts of hairs and scales medially, 1.11x as long as wide. Basal margin of T2 a little concave medially; T2 extending to only 0.76 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Plesiotypes : Female : Collected from Kuriarkutty (PWLS, Palghat, Kerala) by T.C.Narendran and party on 6-v.1989.

Two from Tiruvannur (Calicut, Kerala) by Mohana on 25-vi-1996 and 31-x-1994; Two from Pamba (Pathanamthitta, Kerala) by P.M Sureshan on 19-ii-1997 and another with same data as that of the previous one except date being 22-ii-1997; another two from Thiruvangad (Kannur, Kerala) collected by P.M. Sureshan on 4-ii-1995.

From Chattamkara (Trivandrum, Kerala) collected by T.C.Narendran and party on 28-vi-1988 and from Tirunelli (Wyanad, Kerala) collected by K.C. Gopi on 7-iii-1995.

Discussion : This species keys to couplet no.6 of the key to species by Mani and Sharma (1982). It resembles *T. syrphidarum* (Kieffer), but differs from it mainly in the following characters:

– Antenna with a 5 segmented club. (In *T. syrphidarum* antenna with a 4 segmented club).

– Petiole densely hairy, 1.44x as long as thick. (In *T. syrphidarum* petiole naked and only as long as thick).

Remarks : With the described characters of *T. khandala* Sharma, (Sharma, 1979), this species almost resembles it fully. Since the holotype depository is unknown the type could not be studied.

The genus name being in feminine gender, to match with it, the original species name is hereby changed to '*khandala*' to make its gender also feminine.

10. *Trichopria krishagathra* Rajmohana and
Narendran sp. nov.
(Fig. 48)

Holotype : Female. Length of body = 2.34 mm. Head, thorax and petiole shining black with a brown tinge, metasoma brownish black. Eyes black. Antennal scape reddish brown, club segments darker. Legs concolorous with scape, apical tarsi a little darker. Wings clear, hyaline; veins with pale pigments. Antennal pilosity, body pubescence and marginal fringe of wings dull white.

Head : L : B (D.V) = 2.6 : 3. Smooth and shiny. In dorsal and anterior view transverse, with sparse pubescence; almost globular. Eyes large, not bulging laterally and situated anteriorly nearer to upper margin of head, globose and with sparse pubescence. Ocelli small, arranged in a wide triangle on dorsal median of head. OOL : OD : POL = 5 : 2 : 6. Vertex curving, gently towards ocellar region. Temples feebly convex beneath eyes, but gradually curving towards occiput; post genal cushion of hairs dense, posterolateral lappets distinct. Occipital flange narrow, step-like and carinate. Mandibles bidentate; clypeus horizontal and a little elevated, tentorial pit distinct. Head when viewed laterally higher than long, not conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right almost on top of vertex, frontal shelf not sloping, almost vertical; frons smooth and with dense pubescence; AF 1.1.7.3; a distinct 3 segmented club, terminal club segment longer than preceding ones, basal club segments almost subequal; all flagellar segments a little elongated and basally constricted; scattered long hairs present; scape a little thickened towards distal end and equal to length of next 3.2 segments combined. F1 shorter than pedicel (0.7x), but longer than F2 (1.14x); F8 and F9 almost subequal; F10 1.27x F9; ventral pit absent on F10.

Mesosoma : L : B = 5:3. Subequal to width of head. Cervix prominent, bare and smooth. Pronotal collar of hairs fine and sparse; pronotum visible only as a wide band outer to fine mesoscutal suture. Mesoscutum wider than long. Scutellum with two narrow inclined slit-like grooves separated by almost six times their own diameter; a complete median longitudinal carina

present on scutellar shield, shield rather a wide one, not notched anteriorly, lateral and lower borders feebly convex and convergent posteriorly. In lateral view scutellar shield not with a hump. Metanotum present as a narrow belt with three equidistant keels. Median keel of propodeum, not raised and without a distinct dorsal semi-hyaline zone; lateral pair of carinae present; hind propodeal border carinated and emarginate, without lateral spines on posterior corner; dorsal propodeum between carina smooth. Propleura and mesopleura smooth and almost bare, posterolateral border with shallow pit like punctuations; sternaulus present as a trace, visible only in certain angles; metapleura clothed with fine adpressed hairs and with parallel longitudinal striations. Legs normal; foretibia without an outwardly directed spine. Fore wing densely hairy below *m*, unusually long; marginal fringe of hairs reduced. FWL : FWB = 43 : 12.2; veins reaching only 2.6 of forewing length.

Metasoma : Smooth, robust and plump. Petiole with parallel longitudinal striations fully concealed by dense tufts of decumbent hairs laterally and medially, 1.5x as long as wide. Basal margin of T2 not much concave medially; T2 extending to only 0.61 length of abdomen, rest of tergites seen as wide rings; ovipositor exerted; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female, collected from Eravikulam (Idukki, Kerala), by M.S. Pradhan on 2-iii-1993.

Discussion : Mesosoma not at all convex in profile, hence appear to be lean. Scutellar shield unusually wide and scutellar fovea are like slanting slits. Veins reach only 2.6 of forewing length. No other species show this combination of characters.

This species keys to couplet no. 4 of the key to species by Mani and Sharma (1982). From *T. atturensis* Sharma, it differs mainly in the following characters:

– Antennal club 3 segmented. (In *T. atturensis* antenna 4 segmented).

– Scutellar grooves like a pair of inclined narrow pits. (In *T. atturensis* scutellar grooves normal and rounded).

Etymology : This species is named '*krishagathra*' after its rather slim appearance in lateral view; the Sanskrit word '*Krishagathra*' means slim body.

11. *Trichopria malabarensis* Rajmohana and Narendran sp. nov.
(Fig. 49)

Holotype : Female. Length of body = 1.64mm. Body shining black except petiole being brownish black. Eye and ocelli silvery with a brown tinge. Scape and funicular segments blackish brown, club black. Legs deep reddish brown, apical tarsi black. Wings hyaline, veins dark brown. Pubescence on antenna and body dull white. Marginal fringe of wings brown.

Head : L : B(D.V) = 3.2 : 4. Smooth and shiny. In dorsal view transverse, with sparse pubescence; almost globose. Eyes small, with fine pubescence, almost rounded and subequal to bare part of temples. Ocelli very small; OOL : OD : POL = 10:3 : 6.5. Temples strongly arched; postgenal cushion of hair dense and seen as posterolateral lappets. Occipital flange narrow, step-like and feebly emarginate. Mandibles bidentate, clypeus horizontal. Head when viewed laterally as high as long with thick greyish pilosity on upper gena. Antenna 12 segmented; scape insertion on frontal shelf on level with vertex; AF 1.1.7.3; scape a little thickened towards distal end and equal to length of next 4.5 segments combined; club densely hairy; F1 shorter than pedicel (0.8x), subequal till F4; F9 and F8 sub equal (1.6x F1); F10 1.8x F9; ventral pit absent on F10.

Mesosoma : L : B = 6.1 : 4.6. Subequal to width of head. Pronotal collar of hairs fine, decumbent, long and dense. Pronotum visible outer to mesoscutal suture. Mesoscutum slightly wider than long. TSS distinct. Scutellum 'T' shaped; scutellar groove rounded, scutellar shield a little notched anterolaterally, notches connected to posterolateral edges of groove; shield slightly convergent posteriorly; a trace of incomplete,

median longitudinal carina present; shield with a slight hump in lateral view. Metanotum with 3 equidistant longitudinal carinae. Propodeum with a median keel evenly arched, with a reduced dorsal semi-hyaline zone; lateral pair of carinae also present; hind propodeal border carinated and also excavated; dorsal propodeum granulose and hairy, but bare medially. Propleura and mesopleura smooth and almost bare; sternaulus absent; metapleura clothed with fine semi-decumbent hairs. Legs normal; fore tibia with a small outwardly directed spine. Forewing densely hairy below *m*, but a bare area towards its median; marginal fringe of hairs well developed and extending to almost 0.2 of maximal width of forewing. FWL : FWB = 43 : 14; veins reaching 0.34 of forewing length.

Metasoma : Smooth, a little massive and robust. Petiole with long dense scales medially, as long as wide, with longitudinal striations distally, rest being concealed by tufts of hairs. Basal margin of T2 concave medially; T2 extending to 0.8 length of abdomen, rest of tergites seen as rings; distally hairy, tip of metasoma pointed.

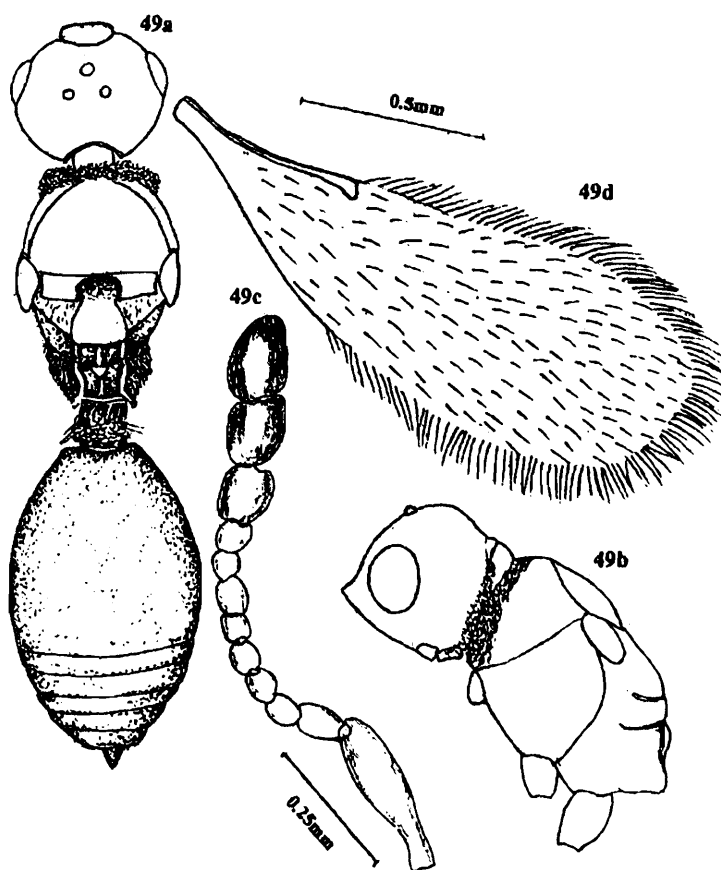


Fig. 49. *Trichopria malabarensis* Rajmohana & Narendran sp.nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female: Collected from Tiruvannur (Calicut, Kerala) by Mohana on 27-xi-1994.

Paratypes : 2 females with same data of the holotype except dates being 15-x-1995 and 25-iv-1996.

Etymology : This species is named '*malabarensis*', after its region of collection, namely Malabar.

Discussion : This species differs mainly from *T. minuta* sp. nov. in the presence of an outwardly directed spine on fore-tibia and in proportion of antennal segments.

This species keys to couplet no.7 of the key to species by Mani and Sharma (1982). It resembles *T. lacustris* Sharma, but differs from it mainly in the following characters:

– Scape equal to length of next 4.5 segments. (In *T. lacustris* scape equal to length of next 3.5 segments).

– Petiole as long as thick. (In *T. lacustris* petiole 2.4x as long as thick).

12. *Trichopria minuta* Rajmohana and Narendran
sp. nov.

(Fig. 50)

Holotype : Female. Length of body = 1.48 mm. Head and thorax shining black, but posterior border of propodeum and metasoma deep reddish brown. Eyes blackish, but with a silver tinge. Antennal segments upto club brown, club segments brownish black. Legs including coxa pale brown. Antennal pilosity and body pubescence dull white, marginal fringe of wings brown.

Head : L : B(D.V) = 10.5 : 9.2. Smooth and shiny. In dorsal view not transverse, with sparse pubescence; almost angular. Eyes small, globose, bulging situated much anteriorly and with sparse pubescence. Vertex abruptly sloping towards ocellar region. Ocelli small, arranged in a close

triangle, but situated much lower nearer to occiput. (Hence OOL is measured in a slanting manner); OOL : OD : POL = 2 : 1 : 1. Temples almost parallel beneath eyes and gradually curving towards occiput; postgenal cushion of hairs dense, posterolateral lappets distinct. Occipital flange narrow step-like and carinate. Mandibles bidentate placed almost sub medially, clypeus horizontal, a little elevated, tentorial pit indistinct; malar groove absent. Head when viewed laterally as high as long, a bit conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right on top of vertex, frontal shelf not sloping, almost vertical; frons not smooth but with irregular transverse wrinkles; AF 1.1.7.3; terminal club segment longer than preceding ones; only F1 and F2 a little elongated with a constricted basal part, rest almost bead-like and with scattered hairs; scape a little thickened toward distal end and equal to length of next 5.9 segments combined. F1 distinctly shorter than pedicel (0.45x), but longer than F2 (1.1x); F9 and F8 subequal; F10 1.8x longer than F9; ventral pit absent on F10.

Mesosoma : L : B = 3.9 : 2.5. Subequal to width of head. Cervix prominent and bare but with transverse striae. Pronotal collar of hairs fine, decumbent and appearing as a band; pronotum broadly visible outer to fine mesoscutal suture. Mesoscutum wider than long; scutellum with a large rounded groove; scutellar shield with an incomplete median longitudinal ridge and without notches, border carinate, sides almost parallel and lower border a little convex. Metanotum as a narrow belt with three equidistant keels, median one being more prominent. Propodeum with a distinct dorsal semi-hyaline zone on a slightly raised tooth-like median keel; lateral pair of carinae distinct; hind propodeal border carinate and emarginate, with conspicuous broad lateral spines on posterior corner; dorsal propodeum smooth and hairy. Propleura and mesopleura smooth and almost bare; sternaulus absent; metapleura clothed with fine adpressed hairs. Legs normal; foretibia without an outwardly directed spine. Forewing densely hairy below *m*; marginal fringe of hairs moderate. FWL : FWB = 37.5 : 12.5; veins reaching almost 0.4 of length of forewing.

Metasoma : Smooth and robust. Petiole with parallel longitudinal striations concealed by dense tufts of hairs and scales, 1.1x as long as wide. Basal margin of T2 not much concave medially; T2 extending to only 0.81 length of abdomen, rest of tergites seen as wide rings; ovipositor extended distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female, collected Munnar (Idukki, Kerala), by T.C. Narendran and party on 3-xii-1988.

Etymology : This species is named after its small size.

Discussion : This species differs from *T. gautami* sp. nov., *T. gopii* sp. nov., particularly in proportion and nature of antenna, position of ocelli and length of veins in forewings.

This species keys to couplet no.7 of the key to species by Mani and Sharma (1982). It resembles *T. lacustris* Sharma, but differs from it mainly in the following characters:

– Scape as long as length of next 5.9 segments combined. (*In T. lacustris* scape only as long as length of next 3.5 segments combined).

– Petiole only 1.1x as long as thick. (*In T. lacustris* petiole more than twice as long as thick).

13. *Trichopria petiolata* Rajmohana and Narendran sp. nov. (Fig. 51)

Holotype : Female. Length of body = 2.10 mm. Body shining black, with mid ventral area slightly brownish black. Antennal segments from A1 to A5 brownish yellow; A6 to A12 deep reddish brown. Eyes and ocelli silvery with a black tinge. Legs brown, apical tarsi black. Wings clear, veins deep brown. Antennal pilosity, body pubescence and marginal fringe of wings brown.

Head : L : B(D.V.) = 1.8:3.2. Smooth and shiny. In dorsal view transverse, with sparse pubescence; almost globose. Eyes large, globose, bulging and with fine pubescence, roughly oval and sub equal

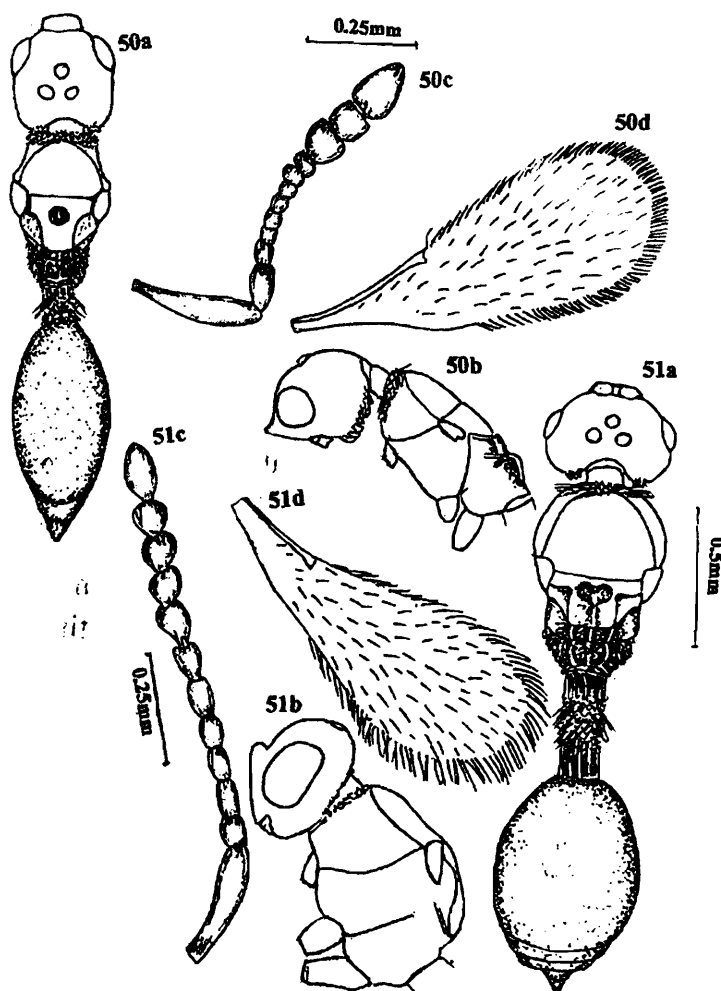


Fig. 50. *Trichopria minuta* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing.

Fig. 51. *Trichopria petiolata* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing.

to bare part of temples. Vertex sloping towards ocellar region. Ocelli large, not arranged in a close triangle, much lower, nearer towards occiput; OOL : OD : POL = 7.5 : 4:4. Temples strongly arched and with a prominent bulge, gradually curving towards occiput; post genal cushion of hairs sparse, posterolateral lappets lacking. Occipital flange wide, step-like and feebly emarginate. Mandibles bidentate, clypeus horizontal, tentorial pit clearly visible. Head when viewed laterally as high as long with thick greyish pilosity on upper gena. Antennal insertion right on top of vertex, frontal shelf distinctly sloping and curved; AF 1.1.3.7; club not demarcated; terminal seven segments gradually enlarged towards tip, bead-like, F10 being largest; F1 to F4 elongated and with scattered long pubescence; scape a little thickened toward distal end and equal to next 3 segments combined; club densely hairy; F1 longer

than pedicel and F2 (0.8x); F7, F8 and F9 subequal; F10 1.6x F9; ventral pit absent on F10.

Mesosoma : L : B = 4.7 : 3.2. Subequal to width of head. Cervix prominent. Pronotal collar of hairs fine, decumbent and long, though scanty; pronotum broadly visible outer to fine mesoscutal suture. Mesoscutum slightly wider than long; scutellum with two anterior rounded grooves, situated anteriorly; scutellar shield with an incomplete median longitudinal ridge, extending upto its grooves, shield notched anterolaterally, slightly convergent posteriorly and with a small hump in lateral view. Metanotum as a narrow belt with keels very much reduced and indistinct except median one. Propodeum with a median keel evenly arched, but depressed and without a dorsal semi-hyaline zone; lateral pair of carinae distinct; hind propodeal border carinated and also excavated and also with conspicuous broad lateral spines on posterior corner; dorsal propodeum granulose and hairy. Propleura and mesopleura smooth and almost bare; traces of sternaulus present; metapleura clothed with fine appressed hairs. Legs normal; foretibia without a distinct outwardly directed spine. Forewing densely hairy below *m*, marginal fringe of hairs moderate. FWL : FWB = 33 : 11.4; veins reaching only till 0.27 of forewing length.

Metasoma : Smooth and robust. Petiole with parallel longitudinal striations and medially with dense tufts of hairs scales, 2.7x as long as wide. Basal margin of T2 feebly concave medially; T2 extending to 0.81 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female, collected by P.M. Sureshan on 6-iii-1994, from Coorg (Kerala- Karnataka border).

Etymology : This species is named after its long petiole.

Discussion : Absence of a well defined club and an extremely long petiole are unique to this

species and serves to differentiate from all other species having two scutellar grooves.

This species keys to couplet no.4 of the key to species by Mani and Sharma (1982). It resembles *T. atturensis* Sharma, but differs from it mainly in the following characters :

– Absence of a distinct club, only terminal seven segments enlarged. (In *T. atturensis* a distinct four segmented club present).

– Petiole 2.3x as long as thick. (In *T. atturensis* petiole 1.66x as long as thick).

– Scape equal to length of next 3 segments combined. (In *T. atturensis* scape equal to length of next 4 segments combined).

14. *Trichopria pedicellata* Sharma

1979. *Trichopria pedicellatus* Sharma. *Mem. Sch. Ent.*, 7 : 67.

Female : Length of body = 1.90mm. General colour of body brownish black; antennae brown except brownish black club; legs brown; wings faintly brown, veins brown; petiole dark brown, rest of metasoma brownish black.

Head : Smooth and shiny, with white pubescence at antennal sockets, clypeal region and below eyes; frons protruded forward for antennal insertion; viewed from above length to width 78 : 100; viewed laterally subglobose, length to height 90 : 100; ocelli arranged in a wide triangle, ocellular space twice ocellar diameter, front ocellar space somewhat more than ocellar diameter, inter-ocellar space 1.5x ocellar diameter, eyes naked, eye to head length 6 : 15, in lateral view slightly more than half. Antenna to body 70 : 100; 12 segmented, AF 1.1.6.4; scape gradually thicker apically, 5x as long as thick, slightly shorter than next four segments combined; pedicel 2.2x as long as thick, 0.31 of scape; funicular segments first to fourth subequal, twice as long as thick, 0.80 of pedicel; fifth segment slightly stouter but subequal to preceding segment; sixth segment stouter, about 1.54x as long as thick, 1.2x length of preceding segment; club almost equal to preceding 5 segments combined; segments first, second and third subequal, slightly longer than

wide, equal to preceding segment; terminal segment oval, 1.78x as long as thick, 1.6x preceding segment.

Mesosoma : As wide as head; seen laterally higher than wide; pronotum with a broad white hairy ring; notauli absent; mesonotum to scutellum 12 : 10, smooth and shiny; scutellum unarmed; rounded behind and without fovea; metanotum unarmed; propodeum with a conspicuous median carina and with long white pubescence. Forewing length to width 100 : 35; surpassing metasoma; *sm* not exceeding beyond basal one-third; *sc* : *m* 24 : 2; *m* punctiform; *st* very short; other veins absent; marginal fringe very long; 0.25 of maximum wing width.

Metasoma : Slightly longer than rest of body; petiole cylindrical, short, longer than wide, with longitudinal grooves and white long pubescence; rest of metasoma fusiform, twice as long as wide, smooth and shiny; second tergite occupying 0.65 length of abdomen, without median furrow, 1.4x as long as wide; third and fourth tergites subequal; fifth tergite nearly equal to third and fourth tergites combined; sixth tergite forming a short tip; ovipositor short and exserted.

Male : Unknown.

Host : Unknown.

Discussion : This species keys to couplet no. 3 of the key to species by Mani and Sharma (1982). It resembles *T. contigua* Sharma, but differs from it mainly in the following characters

– Metasoma more than half the body (In *T. contigua* metasoma nearly half the body).

– Petiole only somewhat longer than thick. (In *T. contigua* petiole twice as long as thick).

Remarks : This species is not represented in the present collection. Hence description and illustration is adapted from Sharma (1979).

15. *Trichopria semicirculara* Rajmohana and Narendran sp. nov.
(Fig. 52)

Holotype : Female. Length of body = 1.54 mm. Head black, rest of body brownish black. Eyes

and ocelli silvery with a black tinge. Antenna reddish brown, except terminal three club segments being brownish black. Legs yellowish brown. Antennal pilosity, body pubescence and marginal fringe of wings dull white. Wings with very slight infuscation, veins light brown.

Head : L : B(D.V) = 2.2 : 3.2. Smooth and shiny. In dorsal and anterior view distinctly transverse, with sparse pubescence; almost globose. Eyes small, bulging and with long fine pubescence and rounded. Vertex sloping towards ocellus. Ocelli large, not arranged in a close triangle, much lower, medially; OOL : OD : POL = 7 : 3 : 6. Temples not bulged, rather sloping beneath eyes towards occiput, gradually curving towards occiput; post genal cushion of hairs dense, posterolateral lappets lacking. Occipital flange wide, step like and feebly emarginate. Mandibles bidentate, clypeus horizontal, a little elevated, tentorial pit clearly visible. Head when viewed

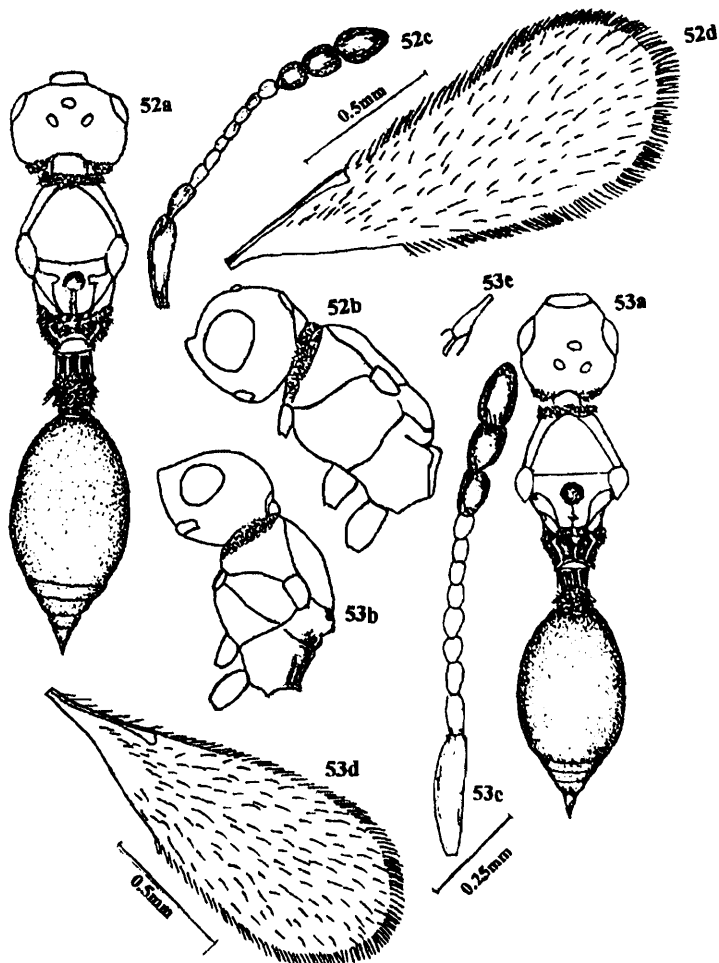


Fig. 52. *Trichopria semicirculara* Rajmohana & Narendran sp.nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing.

Fig. 53. *Trichopria spinosa* Rajmohana & Narendran sp.nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing.

laterally as high as long, not conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right on top of vertex, frontal shelf not sloping, at most with a slight curve; AF 1.1.7.3; terminal club segment distinctly longer than preceding ones; flagellar segments not elongated; scape a little thickened toward distal end and equal to length of next 3.5 segments combined; club densely hairy; F1 shorter than pedicel (0.7x), but longer than F2 (1.16x); F9 1.38x as long as F8; F10 1.55x as long as F9; ventral pit present on F10.

Mesosoma : L : B = 4.6 : 3.2. Subequal to width of head. Cervix prominent. Pronotal collar of hairs fine, decumbent and appearing as a band; pronotum broadly visible outer to fine mesoscutal suture. Mesoscutum wider than long. Scutellum with a groove as if an inverted semicircle, but incomplete at its base; scutellar shield with a complete median longitudinal ridge, extending amidst anterior groove; scutellar shield notched anterolaterally; shield slightly convergent posteriorly but without a hump in lateral view. Metanotum as a narrow belt with keels very much reduced and indistinct, except median one. Propodeum with a median keel evenly arched, but depressed and without a narrow dorsal semi-hyaline zone; lateral pair of carinae distinct; hind propodeal border carinated, feebly excavated and also with conspicuous broad lateral spines on posterior corner; dorsal propodeum granulose and hairy except for a median bare patch. Propleura and mesopleura smooth and almost bare; traces of sternaulus present; metapleura clothed with fine appressed hairs. Legs normal; fore tibia without an outwardly directed spine. Forewing densely hairy below *m*; marginal fringe of hairs moderate. FWL : FWB = 42 : 15; veins reaching 0.32 of length of forewing.

Metasoma : Smooth and robust. Petiole with 5 parallel longitudinal striations and medially with dense tufts of hairs and scales, petiole 1.7x as long as wide. Basal margin of T2 a little concave medially; T2 extending to 0.70 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female : Collected by T.C. Narendran and party from Ranni (Pathanamthitta, Kerala) on 28-vi-1988.

Paratypes : Female, collected from Chindagi (Palghat, Kerala) by T.C. Narendran and Party on 13-x-1989; another female collected from Punnerimala (Quilon, Kerala) by P.M. Sureshan on 13-x-1989 and also from Rajamalai (Idukki, Kerala) on 26-i-1995.

Etymology : This species is named 'semicirculara' after its semicircular (almost horse-shoe shaped) scutellar groove.

Discussion : The horse-shoe shaped scutellar groove is unique to this species. This character along with differing proportions of antennal segments separates this species from all other species having 3 segmented antenna.

This species keys to couplet no. 7 of the key to species by Mani and Sharma (1982). From *T. lacustris* Sharma, it mainly differs in the following characters:

- Antennal club uniform in colour. (In *T. lacustris*, terminal two club segments black, rest brown).
- Scutellar groove as if an inverted semicircle. (In *T. lacustris*, scutellar groove normal, rounded).
- Petiole 1.7x as long as thick. (In *T. lacustris*, petiole 2.4x as long as thick).

16. *Trichopria spinosa* Rajmohana and
Narendran sp. nov.
(Fig. 53)

Holotype : Female. Length of body = 1.54 mm. Head and body generally shining black, but cervix, propodeum, petiole and tip of metasoma brownish black. Antennae with flagellar segments deep brown, club segments black. Eyes black with a silver tinge. Legs concolorous with antennae. Wings very clear, veins light brown. Antennal pilosity and body pubescence dull white, marginal fringe of wings brown.

Head : L : B (D.V) = 2.6 : 2.7; Smooth and shiny. In dorsal view feebly transverse and with

sparse pubescence; almost globular. Eyes small, globose; not bulging, laterally situated much anteriorly and with sparse pubescence. Vertex not curving but gently sloping towards occiput. Ocelli small, arranged in a close triangle a little downwards (slightly outside ocellar zone). (Hence OOL is measured in a slanting manner); OOL : OD : POL = 7 : 3 : 4. Temples bulging a little beneath eyes and gradually curving towards occiput; post genal cushion of hairs dense, posterolateral lappets reduced. Occipital flange narrow step-like and carinate. Mandibles bidentate placed almost submedially, clypeus horizontal, a little elevated, tentorial pit distinct. Head when viewed laterally as not as high as long, conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right almost on top of vertex, frontal shelf not sloping almost vertical; frons smooth and with denser pubescence; AF 1.1.7.3; terminal club segment distinctly longer than preceding ones; flagellar segments elongated, with a less constricted basal part, and with scattered hairs; scape a little thickened toward distal end and equal to length of next 4.5 segments combined. F1 shorter than pedicel (0.9x) and longer than F2 (1.5x); F9 1.08x F8 and F10 1.3x F9; ventral pit absent on F10.

Mesosoma : L : B = 4.4 : 2.95. Distinctly wider than head. Cervix prominent and bare. Pronotal collar of hairs fine, dense and appearing as a band; pronotum broadly visible outer to fine mesoscutal suture. Mesoscutum wider than long, a little conical anteriorly; scutellum with a large rounded groove; scutellar shield with a complete median longitudinal ridge dividing scutellar groove and with notches anteriorly, border carinate, lateral and lower borders convex, in lateral view scutellar shield with a hump and a prominent broad and pointed small spine. Metanotum as a narrow belt with three equidistant keels, median one being more prominent. Propodeum with a distinct dorsal semi-hyaline zone on a slightly raised tooth-like median keel; lateral pair of carinae distinct; hind propodeal border carinated and emarginate, with conspicuous broad lateral spines on posterior corner; dorsal propodeum smooth and hairy. Propleura and mesopleura smooth and almost bare; sternaulus present as a trace; metapleura clothed

with fine appressed hairs. Legs normal ; foretibia with a small outwardly directed spine. Forewing densely hairy below *m*; a very faint lineola present; marginal fringe of hairs well developed. FWL : FWB = 40 : 15; veins reaching 0.30 length of forewing.

Metasoma : Smooth and robust. Petiole with parallel longitudinal striations much concealed by decumbent long hairs, denser medially, 1.33x as long as wide. Basal margin of T2 not much concave medially; T2 extending to only 0.70 length of abdomen, rest of tergites seen as wide rings; ovipositor extended; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female, collected from Tiruvannur (Calicut, Kerala) by Mohana on 7-vi-1995.

Paratype : One female, collected from Chindagi (Palghat, Kerala) by T.C. Narendran and Party on 13-xi-1995.

Etymology : This species is named '*spinosa*' after its prominent spine on scutellar shield.

Discussion : This is the only record of a *Trichopria* with a spine on scutellum. Though ocelli are a little below, ocellar zone, the general shape of head (in profile) , its transverse nature in dorsal view along with a little bulged temples make it much different from *T. gopii*. sp. nov.

This species keys to couplet no. 6 of the key to species by Mani and Sharma (1982). It resembles *T. khandala* Sharma, but differs from it mainly in the following characters :

- Scutellar shield with a distinct spine. (In *T. khandala* scutellar shield unarmed).

- Antennal club 3 segmented. (In *T. khandala* antennal club five segmented).

- Ocelli placed a little below normal ocellar zone. (In *T. khandala*, ocelli seen on usual ocellar zone itself).

17. *Trichopria tetraclavata* Rajmohana and
Narendran sp. nov.
(Fig. 54)

Holotype : Female. Length of body = 1.73mm. Head and body brownish black. Medial posterior metasoma darker. Antennal scape, pedicel and flagellar segments yellowish brown, club brownish black, terminal 3 club segments darker. Eyes faded black, with a silvery tinge. Legs concolorous with scape. Wings slightly infuscated, veins deep brown. Antennal pilosity, marginal fringe of wings and body pubescence dull white.

Head : L : B(D.V) = 2 : 3.7. Smooth and shiny. In dorsal view transverse, with sparse pubescence; almost globular. Eyes large, bulging laterally, globose and with sparse pubescence. Ocelli small, arranged in a close triangle on dorsal median of head. OOL : OD : POL = 3 : 1 : 2. Vertex curving, gently towards ocellar region. Temples just below eyes not parallel, but rather sloping towards occiput; post genal cushion of hairs dense, posterolateral lappets distinct. Occipital flange narrow, step-like and carinate. Mandibles bidentate; clypeus horizontal and a little elevated, tentorial pit distinct. Head when viewed laterally not as high as long, not conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right almost on top of vertex, frontal shelf not sloping almost vertical; frons smooth but with sparse pubescence; AF 1.1.6.4; a distinct 4 segmented club; all flagellar segments much elongated with a basal constricted region; scattered long hairs present; scape a little thickened toward distal end and equal to length of next 4 segments combined; basal club segments almost subequal. F1 shorter than pedicel (0.6x), but subequal to F2; F7, F8 and F9 subequal, F10 1.35x F9; ventral pit absent on F10.

Mesosoma : L : B = 5.1 : 3.4. Head wider than thorax. Cervix prominent, bare and with one or two transverse striations anteriorly. Pronotal collar of hairs, fine, dense and appearing as a band; pronotum visible only as a streak outer to fine mesoscutal suture. Mesoscutum wider than long; scutellum with a large almost rounded groove and with a pair of deep adjacent pits; an incomplete median longitudinal carina present on scutellar shield, also with notches anteriorly, thoracic

structures with a carinated border, lateral and lower borders feebly convex and convergent posteriorly. In lateral view scutellar shield with a small median hump. Metanotum as a narrow belt with three equidistant keels, median one much pronounced. Propodeum with a distinct dorsal semi-hyaline zone on a well elevated tooth-like median keel; lateral pair of carinae absent; hind propodeal border carinated and emarginate, with distinct lateral spines on posterior corner; dorsal propodeum between carina. Propleura and mesopleura smooth and almost bare, posterolateral border with shallow pit like punctae; sternaulus present as a trace, visible only in certain angles; metapleura clothed with fine appressed hairs and with parallel longitudinal striations. Legs normal; foretibia without an outwardly directed spine. Forewing densely hairy below *m*, unusually long; marginal fringe of hairs well developed. FWL : FWB = 45 : 14; veins reaching 0.29 of length of forewing.

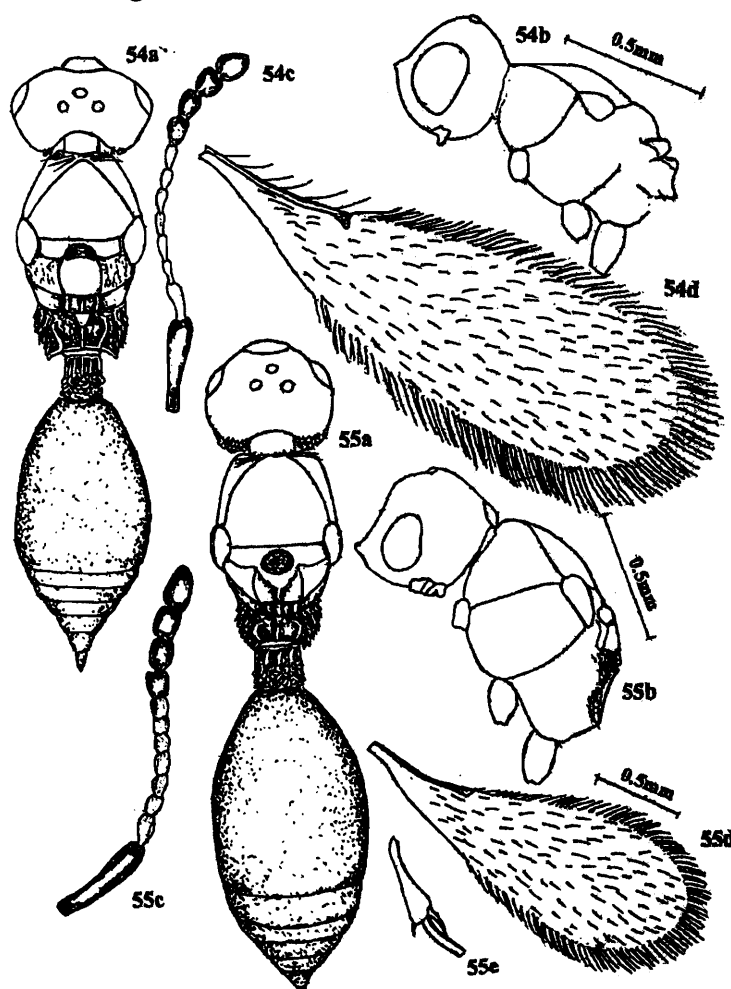


Fig. 54. *Trichopria tetraclavata* Rajmohana & Narendran sp.nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing.

Fig. 55. *Trichopria tibia* Rajmohana & Narendran sp.nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing.

Metasoma : Smooth, robust and plump. Petiole with parallel longitudinal striations, almost bare, except for a ring of erect hairs medially; 1.26x as long as wide. Basal margin of T2 not much concave medially; T2 extending to only 0.63 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female, collected by Mohana from Tiruvannur (Calicut, Kerala) on 26-i-1996.

Paratype : One female with same data as that of the holotype except date being 16-xi-1996

Etymology : This species is named '*tetraclavata*' after its distinct four segmented antennal club.

Discussion : The shape of head dorsally is peculiar that, the temples just below eyes are not parallel, but rather sloping towards occiput. Scutellar groove is peculiar in having two deep pits laterally, one on each side.

This species keys to couplet no. 7 of the key to species by Mani and Sharma (1982). It resembles *T. lacustris* Sharma, but differs from it mainly in the following characters:

– Antennal club 4 segmented. (In *T. lacustris* antennal club 3 segmented).

– Head wider than thorax. (In *T. lacustris* thorax and head subequal in width).

– Petiole 1.26x as long as wide. (In *T. lacustris* petiole 2.4x as long as wide).

18. *Trichopria tibia* Rajmohana and Narendran
sp. nov.

(Fig. 55)

Holotype : Female. Length of body = 1.95 mm. Head and body shining black. Eyes and ocelli black with a brown tinge. Antenna yellowish brown except club being black. Legs yellowish brown. Wings clear without any infuscations. Antennal pilosity and body pubescence dull white. Marginal fringe of wings deep brown.

Head : L : B(D.V) = 2.4 : 3.2. Smooth and shiny. In dorsal view distinctly transverse, with sparse pubescence. Eyes small, globose, bulging and with long fine pubescence. Vertex sloping towards ocellar region. Ocelli large, arranged in a close triangle, much lower, medially; OOL : OD : POL = 7 : 3 : 4. Temples strongly arched, convex and with a prominent bulge, gradually curving towards occiput; postgenal cushion of hairs dense, posterolateral lappets lacking. Occipital flange wide, step-like and feebly emarginate. Mandibles bidentate, clypeus horizontal, a little elevated, tentorial pit clearly visible. Head when viewed laterally as high as long, not conical at vertex, forming a large area before curving towards ocellar region; thick greyish pilosity on lower gena. Antennal insertion right on top of vertex, frontal shelf not sloping; AF 1.1.6.4; club with 4 segments; flagellar segments a little elongated with basal part a little narrower than distal; scape a little thickened towards distal end and equal to a little more than length of next 3.5 segments combined; club densely hairy; F1 shorter than pedicel (0.66x), but longer than F2; F8 1.14x F7; F9 1.1x F8; F10 1.36x F9; ventral pit absent on F10.

Mesosoma : L : B = 5 : 3.2. Subequal to width of head. Cervix prominent. Pronotal collar of hairs fine, decumbent and appearing as a band; pronotum broadly visible outer to fine mesoscutal suture. Mesoscutum slightly wider than long; scutellum 'T' shaped and with a rounded groove, but incomplete at its base; deep lateral arches present; scutellar shield with an incomplete median longitudinal ridge, extending to its 0.33; scutellar shield notched anterolaterally; shield slightly convergent posteriorly but without a hump in lateral view. Metanotum as a narrow belt with keels very much reduced and indistinct, except median one. Propodeum with a median keel evenly arched, but depressed and without a narrow dorsal semi-hyaline zone; lateral pair of carinae distinct; hind propodeal border carinated, feebly excavated and also with conspicuous broad lateral spines on posterior corner; dorsal propodeum granulose and hairy except a median bare patch. Propleura and mesopleura smooth and almost bare; traces of sternaulus present; metapleura clothed with fine appressed hairs. Legs normal; foretibia with a

distinct outwardly directed spine. Forewing densely hairy below *m*, but a bare area towards its median; marginal fringe of hairs moderate. FWL : FWB = 53.2 : 20; veins reaching 3.15 length of forewing.

Metasoma : Smooth and robust. Petiole with parallel longitudinal striations and medially with dense tufts of hairs and scales; as long as wide. Basal margin of T2 feebly concave medially; T2 extending to 0.68 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female, collected from Tiruvannur (Calicut, Kerala) by Mohana on 31-x-1994.

Paratype : One female, collected from Kuriarkutty (PWLS, Palghat, Kerala), by T.C. Narendran and Party on 6-iii-1989.

Etymology : This species is named '*tibia*' after its distinct outdirected spine on foretibia.

Discussion : *T. tibia* has a 4 segmented club, a foretibial spine and a short petiole – such a combination of characters is not seen in any other *Trichopria* species.

This species keys to couplet no. 7 of the key to species by Mani and Sharma (1982). From *T. lacustris* Sharma, it differs mainly in the following characters:

– Antenna with a four segmented club. (In *T. lacustris* antennal club 3-segmented.)

– Petiole only as long as thick. (In *T. lacustris* petiole 2.42x as long as thick.)

19. *Trichopria triclavata* Rajmohana and
Narendran sp. nov.
(Fig. 56)

Holotype : Female. Length of body = 1.85 mm. Head and body brownish black; cervix, propodeum, petiole and tip of metasoma a little paler. Eyes brownish black, with an oval median

patch. Antennal scape, pedicel and flagellar segments brown, terminal 3 club segments darker. Legs brown. Antennal pilosity and marginal fringe of wings brown, body pubescence dull white.

Head : L : B (D.V) = 2.5 : 3.1; Smooth and shiny. In dorsal view transverse, with sparse pubescence; almost globular. Eyes large, not bulging, globose, laterally situated much anteriorly and with sparse pubescence; dorsal margin not visible. Ocelli small, arranged in a close triangle on dorsal median of head. OOL : OD : POL = 2 : 1 : 1. Vertex curving, gently towards ocellar region. Temples not convex beneath eyes, but sloping towards occiput; postgenal cushion of hairs dense, posterolateral lappets distinct. Occipital flange narrow, step-like and carinate. Mandibles bidentate; clypeus horizontal and a little elevated, tentorial pit distinct. Head when viewed laterally not as high as long, not conical at vertex; thick greyish pilosity on lower gena. Antennal insertion right almost on top of vertex, frontal shelf not sloping, almost vertical; frons smooth, but with sparse pubescence; AF 1.1.7.3; a distinct 3 segmented club; all flagellar segments much elongated and with a basal constriction; scattered hairs present; scape a little thickened toward distal end and equal to length of next 3.5 segments combined. F1 0.88x pedicel, but longer than F2 (1.06x); F8 and F9 subequal; F10 1.5x length of F9. Proportions of length : width of antennal segments from scape to F10 being 33 : 6, 11.5 : 5, 9.5 : 4, 8.5 : 4, 8 : 4, 8 : 4, 7.8 : 4, 7 : 4, 7.5 : 4, 12 : 8, 11.5 : 9, 12 : 8; ventral pit absent on F10.

Mesosoma : L : B = 5.1 : 2.8. Head and thorax almost subequal in width. Cervix prominent, bare and smooth. Pronotal collar of hairs fine, dense and appearing as a band; pronotum visible only as a streak outer to fine mesoscutal suture. Mesoscutum wider than long, a little conical anteriorly. Scutellum with a large almost rounded groove and with a pair of deep pits; median longitudinal carina lacking on scutellar shield, but with notches anteriorly, thoracic structures with a carinate border, lateral and lower borders feebly convex and not convergent posteriorly. In lateral view scutellar shield without a hump. Metanotum present as a narrow belt with 3 equidistant keels.

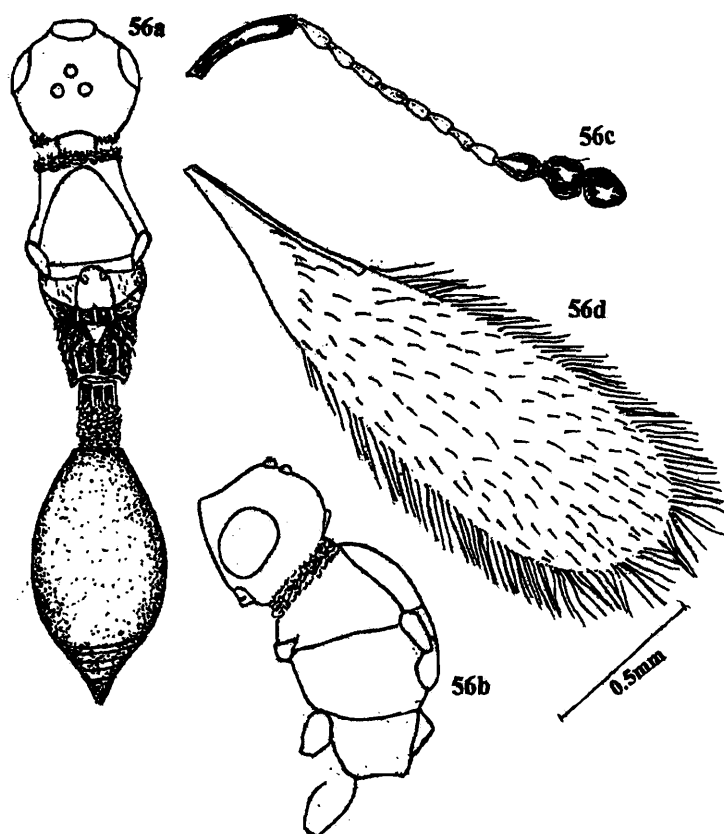


Fig. 56. *Trichopria triclavata* Rajmohana & Narendran sp. nov. a. Body (D.V.); b. Mesosoma (Profile); c. Antenna; d. Forewing.

Propodeum with a distinct dorsal semi-hyaline zone on a slightly raised tooth-like median keel; lateral pair of carinae distinct; hind propodeal border carinated and emarginate, with distinct lateral spines on posterior corner; dorsal propodeum between carina smooth. Propleura and mesopleura smooth and almost bare; sternaulus present as a trace, visible only in certain angles; metapleura clothed with fine appressed hairs. Legs normal; fore tibia without an outwardly directed spine. Forewing densely hairy below *m*; marginal fringe of hairs well developed. FWL : FWB = 50.5 : 16; veins reaching 0.34 of length of forewing.

Metasoma : Smooth and robust. Petiole with parallel longitudinal striations, not much concealed by decumbent long hairs and scales, denser towards middle, 1.6x as long as wide. Basal margin of T2 not much concave medially; T2 extending to only 0.70 length of abdomen, rest of tergites seen as wide rings; distally hairy, tip of metasoma pointed.

Male : Unknown.

Host : Unknown.

Material Examined : Holotype : Female, collected from Tiruvannur (Calicut, Kerala) by Mohana on 16-xi-1996.

Paratype : Two females with same data as that of the holotype except dates being 26-i-1996 and 17-xi-1996.

Etymology : This species is named '*triclavata*', after its distinct three segmented antennal club.

Discussion : This species differs from *T. tetravata* sp. nov., in head not being transverse as that of *tetravata* and in proportion of antennal segments and the number of club segments.

This species keys to couplet no. 7 of the key to species by Mani and Sharma (1982). It resembles *T. lacustris* Sharma, but differs from it mainly in the following characters:

- Club segments with uniform colour. (In *T. lacustris* terminal two club segments black, while rest brown).
- Scutellar groove with a pair of small pits. (In *T. lacustris*, scutellum only with a rounded groove).
- Eyes finely pubescent. (In *T. lacustris* eyes bare).

19. Genus *Vadana* Rajmohana and Narendran (Fig. 57)

Type species : *Vadana sholayarica* Rajmohana and Narendran; Rajmohana and Narendran, 2000a, *Uttar Pradesh J. Zool.*, 20(1) : 21-28.

Diagnosis : Head and body brownish black, smooth and shiny. Head globose dorsally. Vertex not carinate; frontal shelf with a concavity medially. Eyes with sparse hairs; mandibles bidentate. Antenna 14 segmented in males; AF 1.1.12; flagellar segments not much cylindrical, long setae. Mesonotum with a pair of complete notauli. TSS prominent. Scutellum with two semi-circular pits. Metanotum without conspicuous carinae. Propodeum with a distinct raised median keel and two pairs of lateral carinae; posterior propodeum descending abruptly and steeply. Forewings large, without *basalis*, but with two

distinct tracts of hairless clear zone. Petiole emerging at an angle 30° from basal steep slope of propodeum, distal end at a higher level than basal end. T2 extending to almost tip of metasoma.

Distribution : Kerala (India).

Discussion : *Vadana* resembles *Calogalesus* Kieffer in having a peculiar bent petiole and scutellum with two grooves. The characters which separates the two being :

<i>Vadana</i>	<i>Calogalesus</i>
Mandibles normal.	Mandibles distinctly beak-like.
Vertex smooth without carinae or teeth.	Vertex with a pair of lateral carina and a pair of small teeth.
Anterior rim of frontal shelf not towering above vertex	Anterior rim of frontal shelf distinctly rising above vertex, nasiform.

1. *Vadana sholayarica* Rajmohana and Narendran (Fig. 57)

2000a. *Vadana sholayarica* Rajmohana and Narendran. *Uttar Pradesh J. Zool.*, 20(1) : 21-28

Length = 1.7 mm.

Male : Head and body, deep brownish black. Antennal segments yellowish to brownish black. Wings without any infuscations.

Head transverse dorsally, globular; OOL : OD : POL = 2.5 : 0.7 : 1.3. Genal carina distinct; anterior rim of frontal shelf with a concavity medially. Eyes with sparse long hairs, malar grooves absent; mandibles normal, not beak-like. Antenna 14 segmented. AF 1.1.12; flagellar segments cylindrical; flagellum with long erect scattered setae, scape a little more than length of next 2 segments combined. Mesosoma almost as wide as head. Mesonotum with a pair of deep complete notauli, separated basally by 2x its diameter, humeral sulcus distinct. Scutellum with two semi-circular pits; scutellar shield without a carina medially. Metanotum without conspicuous carinae. Propodeum with an anteriorly raised median keel and two pairs of lateral carinae, median keel flanked by two rows of small longitudinal punctures, posterior propodeum

carinate and emarginate, descending abruptly. Forewings large, without *basalis*, but with two distinct tracts of hairless clear zone, one above other.

Petiole articulation emerging at an angle 30° from basal steep slope of propodeum, sparsely hairy, 2.77x as long as thick, with fine longitudinal striations. T2 extending to almost tip of metasoma, with a little concave upper margin.

Female : Unknown.
Type locality : Sholayar (Trichur, Kerala).

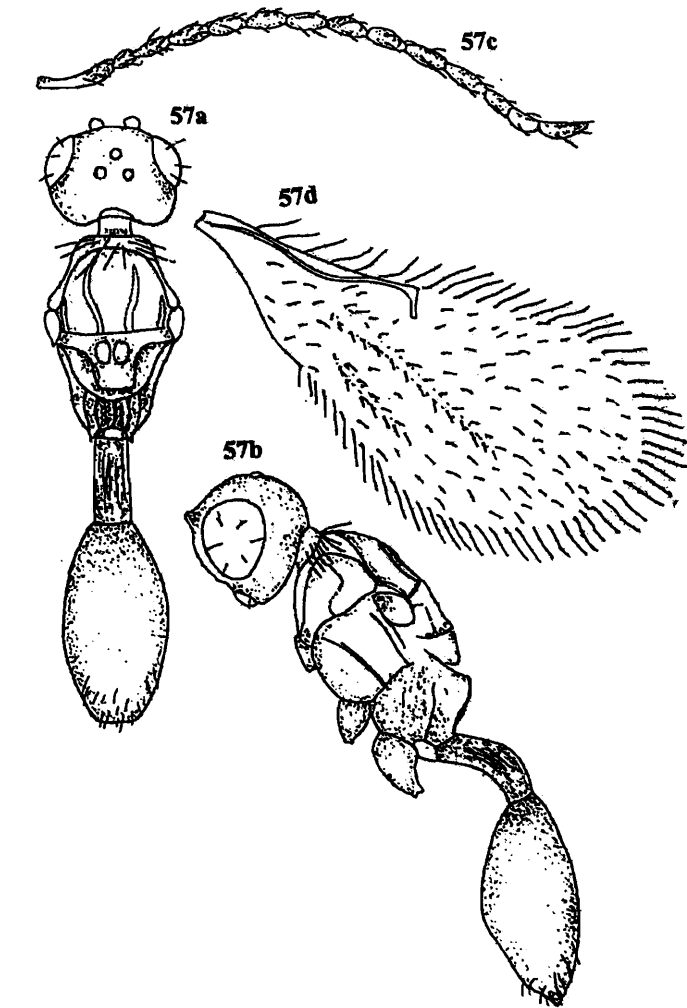


Fig. 57. *Vadana sholayarica* Rajmohana & Narendran
a. Body (D.V.); b. Mesosoma (Profile);
c. Antenna; d. Forewing.

Family PROCTOTRUPIDAE

Proctotrupes Haliday, 1833 : 273; Serphidae : Kieffer, 1909 : 1.

Diagnosis : Body 3-10 mm long. Black, robust, smooth and shiny. Sculpture on propodeum showing great variation. Antenna 13 segmented in both sexes. Transscutellar suture very pale or absent. Forewing with a distinct stigma and a wide costal cell and without discoidal and cubital cells. Claws simple, bifid or trifid, never pectinate. Metasoma in lateral view more or less curved, in females with a down-curved apex.

Classification : The family is well documented from the Oriental Region and is classified into two subfamilies, viz., Austroserphinae and Proctotrupinae. The latter is a large subfamily with 21 genera. Austroserphinae includes only 3 genera and is not yet documented from the Oriental Region (Johnson, 1992).

Status in India and Kerala : Rajmohana and Narendran (1996) reported this family for the first time from Kerala, through genus *Phaenoserphus*. This family is known from India by 6 genera namely *Phaenoserphus* Kieffer, *Nothoserphus* Brues, *Codrus* Panzer *Cryptoserphus* Kieffer, *Exallonyx* Kieffer and *Proctotrupes* Latreille (Mani and Sharma, 1980 ; Townes, 1981; Narasimham *et al.*, 1997).

Remarks : Though any published data supporting the presence of *Proctotrupes* Latreille in India was not found, the author has come across this genus in entomological collections preserved at various institutes in India. Hence this genus is also included in the key presented here.

Key to genera of Proctotrupinae from India (Modified from Mani and Sharma, 1982)

1. Head dorsally, extremely transverse; vertex above lateral ocelli, with two thin horn like projections..... *Nothoserphus* Brues
- Head of normal shape, moderately transverse; vertex without any projections 2
2. Claws simple, fifth tarsal segment of foreleg not swollen 3

- Claws of fore and mid leg forked, bifid or trifid; fifth tarsal segment of foreleg swollen 5
3. Propleura striate; abdomen largely red *Proctotrupes* Latreille
- Propleura without any sculpture; abdomen black or brownish black 4
4. Petiole visible in dorsal view, as long as thick, notauli faintly indicated; tergites 3 to 5 transverse *Phaenoserphus* Kieffer
- Petiole not visible dorsally; notauli often faintly indicated; tergites 3 to 5 elongate *Cryptoserphus* Kieffer
5. Frons with distinct carina between antennal sockets *Codrus* Panzer
- Frons without carina between antennal sockets, atmost with almost imperceptible longitudinal elevation *Exallonyx* Kieffer

Generic Diagnosis

1. Genus *Phaenoserphus* Kieffer (Figs. 58-61)

1951. *Proctotrupes curtispennis* Haliday, designated by Muesebeck and Walkley, Kieffer 1908c, *Andre. Librarie Scietifique* : 289, 298.
1931. *Carabiphagus* Morley : 14. Type : *Proctotrupes laevifrons* Foerster. Synonymized by Nixon (1938b).

Diagnosis : Body black. Antenna 13 segmented in both sexes; flagellar segments elongated in males, thicker in females. Mandibles simple. Propleura smooth and partly rugolosopunctate anterioventrally, also with a median sublongitudinal depression near inner margin. Notauli absent. Propodeum reticulately punctate with a long median dorsal longitudinal ridge. Forewing with well distinct pterostigma and radial cell. Petiole distinct and striated. T2 largest and often reaching to over half of metasomal length. Ovipositor curved, compressed and less than half the abdomen.

Distribution : Palearctic, Nearctic and Oriental Regions.

Status in India and Kerala : Rajmohana and Narendran (1996) reported this genus through 4 species, for the first time in India as well as Kerala.

Key to Indian species of *Phaenoserphus* Kieffer

1. Males 2
- Females 3
2. Median dorsal ridge on propodeum extending to its tip
... *P. transversus* Rajmohana and Narendran
- Median dorsal ridge on propodeum reaching only 0.7 part of it
..... *P. keralensis* Rajmohana and Narendran
3. Petiole longitudinally striate; pterostigma 2.2x length of radial cell; gena short, 0.53 maximum length of eye
..... *P. sureshi* Rajmohana and Narendran
- Striae on petiole irregular; pterostigma 3.75x length of radial cell; gena long, 0.65x maximum length of eye in AV
..... *P. longigena* Rajmohana and Narendran.

Species Diagnosis

1. *Phaenoserphus keralensis* Rajmohana and Narendran
(Fig. 58)

1996. *Phaenoserphus keralensis* Rajmohana and Narendran.
J. Ent. Res., 20(1) : 43-51.

Length = 2.91 mm.

Male : Head and body shining black. Antennae blackish brown. Wings a little infuscate, veins blackish brown. Head not transverse in anterior view. Frons without any striations and punctures. Eyes hairy. Genal carina distinct. OOL = 2xOD. Length of gena = 0.2x eye length. Antenna 13 segmented; scape 2x as long as thick; F1 2.6x as long as thick; F2 2.9x as long as thick, 1.1 of F1; F3 to F10 almost subequal; F11 1.32x F1. Propleura smooth and shiny. Notauli absent. Scutellum with a transverse fovea. Propodeum with mid longitudinal ridge reaching till 0.71 of it; deep distinct punctuations laterally and with indistinct wrinkles dorsally. Pterostigma 4.16x length of radial cell. Petiole as long as thick and

longitudinally striate. T2 basally with abbreviate striations and reaching to 0.68 of abdominal length.

Female : Unknown.

Type locality : Eravikulam (Idukki, Kerala).

2. *Phaenoserphus transversus* Rajmohana and Narendran
(Fig. 59)

1996. Rajmohana and Narendran. *J. Ent. Res.*, 20(1) : 43-51.

Length = 2.8 mm

Male : Head and body shining black. Antennae blackish brown. Wings a little infuscate, veins blackish brown.

Head transverse in anterior view. Frons without any striations and punctures. Eyes hairy. Genal

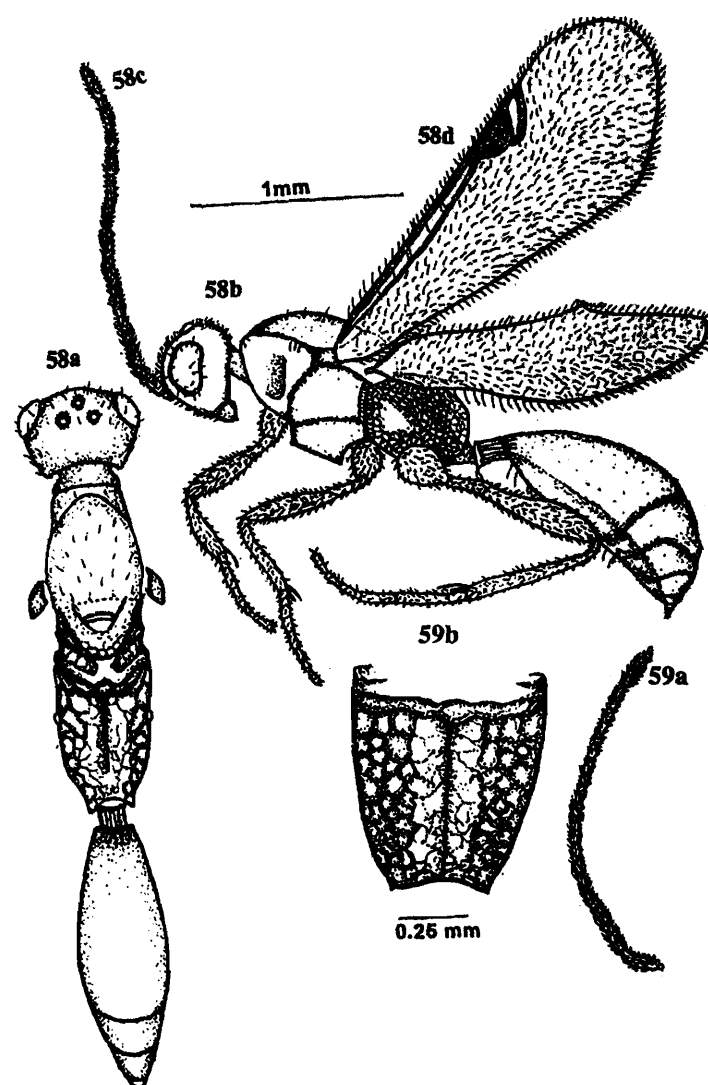


Fig. 58. *Phaenoserphus keralensis* Rajmohana & Narendran sp.nov. a. Body (D.V.); b. Body (Profile); c. Antenna; d. Forewing.

Fig. 59. *Phaenoserphus transversus* Rajmohana & Narendran sp.nov. a. Antenna; b. Propodeum.

carina distinct. Length of gena = $0.29 \times$ eye length. OOL = $1.6 \times$ OD. Scape $1.9 \times$ as long as thick, F1 $2.63 \times$ as long as thick, 1.31 of scape; F2 0.91 of F1; F3 to F10 subequal. F11 $1.24 \times$ F1. Propleura smooth. Notauli absent. Median longitudinal ridge on propodeum extending throughout. Pterostigma $4.58 \times$ length of radial cell. Petiole as long as thick and longitudinally striate. T2 basally with abbreviate striations. T2 reaching to 0.7 of abdominal length.

Female : Unknown.

Type locality : Munnar (Idukki, Kerala).

3. *Phaenoserphus longigena* Rajmohana and Narendran (Fig. 60)

1996. *Phaenoserphus longigena* Rajmohana and Narendran. *J. Ent. Res.*, **20**(1) : 43-51.

Length = 2.78 mm.

Female : Head and body shining black. Antennae blackish brown. Wings infuscate, veins blackish brown.

Head transverse. Frons smooth. Eyes hairy. Gena very long, $0.65 \times$ eye length in anterior view. OOL = $2.7 \times$ OD. Scape $1.6 \times$ as long as thick, $0.89 \times$ F1; F1 $2.25 \times$ as long as thick and $1.13 \times$ scape; F1 to F10 sub equal; F11 $2.3 \times$ as long as thick; $1.3 \times$ F1. Propleura smooth. Notauli absent. Scutellum having a transverse fovea with pits. Petiole with irregular striations. Length of pterostigma $3.75 \times$ length of radial cell. T2 only basally striate; T2 reaching 0.73 of abdominal length.

Male : Unknown

Type locality : Munnar (Idukki, Kerala).

4. *Phaenoserphus sureshi* Rajmohana and Narendran (Fig. 61)

1996. *Phaenoserphus sureshi* Rajmohana and Narendran. *J. Ent. Res.*, **20**(1) : 43-51

Length = 2.35 mm.

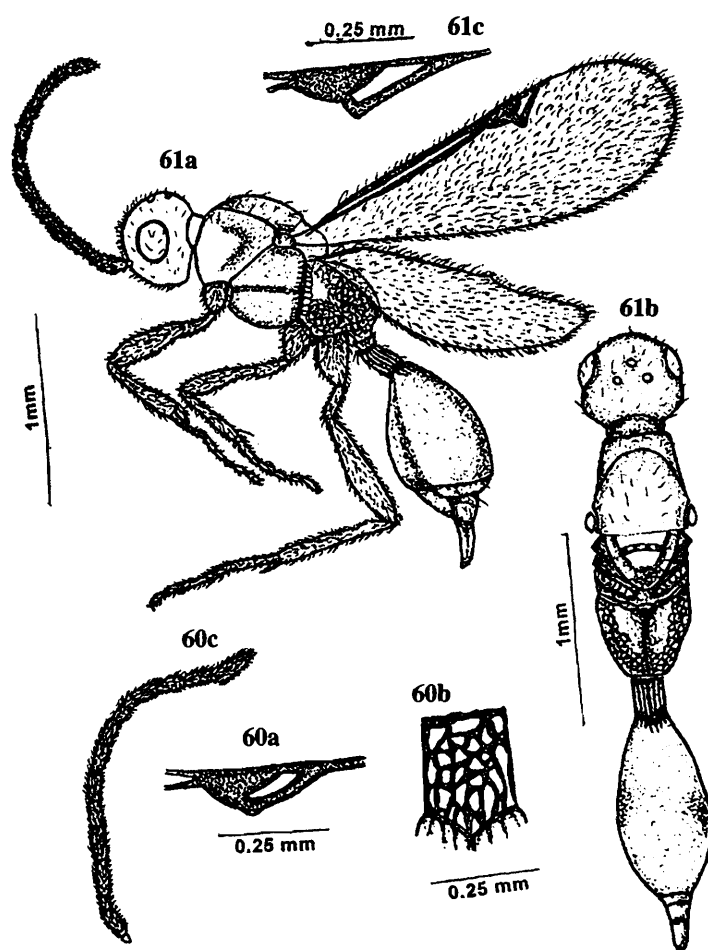


Fig. 60. *Phaenoserphus longigena* Rajmohana & Narendran
a. Pterostigma; b. Petiole; c. Antenna.

Fig. 61. *Phaenoserphus sureshi* Rajmohana & Narendran
a. Body (Profile); b. Body (D.V.); c. Pterostigma.

Female : Head and body shining black. Antennae blackish brown. Wings infuscate, veins blackish brown.

Head transverse. Frons smooth. Eyes hairy. Length of gena $0.53 \times$ length of eye in anterior view. OOL = $2 \times$ as long as thick, $1.45 \times$ F1; F1 $1.83 \times$ as long as thick and $0.69 \times$ scape; F2 $1.42 \times$ F1; F11 $2.29 \times$ as long as thick and $1.45 \times$ F1 and equal to length of scape. Propleura smooth. Notauli absent. Scutellum having a transverse fovea with 3 impressions. Median ridge of propodeum extending to its tip; dorsal median area with pale wrinkles. Length of pterostigma $2.29 \times$ length of radial cell. Petiole $1.5 \times$ as long as thick and longitudinally striate. T2 only basally striate and reaching 0.8 of abdominal length.

Male : Unknown.

Type locality : Munnar (Idukki, Kerala).

Superfamily PLATYGASTROIDEA

Superfamily Platygastroidea was erected by Masner (1993). The members of this superfamily were until then under Proctotrupeoidea.

The most important attribute of this superfamily is the unique structure of metasoma and the operating mechanism of the ovipositor. The weakly sclerotised ovipositor when not in use, is entirely retracted and housed in a tube of soft tissue inside the metasoma (Austin, 1983). Joint action of muscles and turgour pressure of body fluids extrudes the tubes with the ovipositor from the metasoma, during oviposition. All metasomal tergites and sternites are connected at the sides with simple tissues or are connected by laterotergites or laterosternites. In order to achieve maximum pumping-pressure and ovipositor extension and for bellow-like functioning, the metasoma lacks functional spiracles. The female metasoma of Scelionidae has only 6 or 7 metasomal terga. In Platygastriidae, the metasomal tergum 7 is invaginated beneath tergum 6 and not extruded with the ovipositor tube, while it is extruded out in some scelionids during oviposition.

The second important attribute of Platygastroidea is the presence and function of basiconic sensilla on the clavomeres of the female antenna. According to Bin and Vinson (1986), these structures are more secretory than receptory in function. About 4000 species have been described, but the world fauna is estimated to be about 10000 species.

Diagnosis : Morphologically, Platygastroids closely resemble the Proctotrupoids. Antennae are always inserted near clypeus and antennal segments of both sexes rarely exceed 12 (except in *Nixonia*, Scelionidae). In most cases, metasoma is acutely margined at sides. In general, wing venation is very much reduced or even absent in some forms. The only veins present in the forewings being, *sm*, *m*, *cu*, *stg* and *pm*.

Biology : *Telenomus* spp. of family Scelionidae are promising biocontrol agents that can be employed against many lepidopteran borers of paddy and sugarcane like, *Scirpophaga*, *Chilo*, *Diatraea*, *Malacosoma*, *Spodoptera*, *Tryporyza*,

Achaea, *Euproctis*, *Oxydia* etc. In Java, West Indies, Formosa, Philippines, Japan, Hawaii and India, *Scelio* spp. are known to attack *Oxya chinensis* and *Hieroglyphus banian* (Orthoptera). The Scelionid egg parasitoid, *Trissolcus* spp. has been successfully controlling pentatomid bugs like *Nezara viridula*.

The Platygastriidae are parasitoids of Cecidomyiidae (Diptera), Homoptera, Coleoptera, larvae of Pseudococcidae etc.

Classification : Includes only two families, namely Platygastriidae and Scelionidae (Masner, 1993). Both the families are species rich and ubiquitous.

Key to families of PLATYGASTROIDEA

1. T2 many times as long as T3, usually as long as, or longer than subsequent terga combined 2
- T2 atmost slightly longer than T3, mostly distinctly shorter than subsequent terga combined most SCELIONIDAE
2. Forewing with *stg* and usually *pm*, veins rarely indistinct or absent. Antenna usually with 9-10 flagellomeres, very rarely with 8 or fewer flagellomeres; male F3 modified some SCELIONIDAE
- Forewing without *stg* and *pm*, usually veinless; antenna often with 8 flagellomeres; male F2 or rarely F1 modified PLATYGASTRIDAE

Family SCELIONIDAE

1836. Teleadidae Walker. *Entomol. Mag.*, 3 : 341. Kieffer 1926, *Das Tierreich*, 48 : 1-557.

Diagnosis : Body 0.5-10mm. Mostly black, yellow or multicoloured; metallic forms rarely met with. Antenna usually with 11 or 12 segments, at times with as few as 6 and as many as 14. Fourth antennal segment modified in male. Forewings with *sm* and *m*; often with *stg* and *pm* also. If T2 longest, then *sm* reaching wing margin to continue as *m*, *stg* and *pm*. Tergum 7 with cerci or internal plates.

Most of them are solitary endoparasitoids in insect eggs and spider (*Araena*) eggs. They prefer sunny habitats, like grasslands, but are also found in marshes and near water. The family contains 150 genera. About 3000 species have been described, the total is estimated upto 7000 (Masner, 1993).

Classification : Includes three subfamilies viz., Scelioninae, Teleasinae and Telenominae (Masner, 1993).

Key to Subfamilies of Scelionidae {Modified from Mani and Sharma (1982)}

1. T2 distinctly longest; laterotergites wide, loosely attached to sternites without submarginal groove; antennae in female with 11, rarely with 10 segments, in male with 12 segments TELENOMINAE
- T2 not distinctly longest or if longer than T3, then laterotergites very narrow, closely attached to sternites, submarginal groove present; antennae in female with 14 or 12, rarely with 6 to 11 segments, in male with 12, rarely with 8 to 12 segments 2
2. Lateral ocelli much closer to front ocellus than to orbits; T3 always largest; *m* several times longer than *stg*, *pm* absent ... TELEASINAE
- Lateral ocelli usually closer to orbits than to front ocellus, if closer to ocellus, then, either T3 not largest or *m* shorter than *stg* and *pm* long or wing veinless SCELIONINAE

Subfamily TELENOMINAE

1861. Telenomini Thomson. *Ofv. Vet. Akad. Forh.*, 17 : 69.

Diagnosis : Usually minute forms; body often black and shiny. Frons usually without depression. Lateral ocelli very close to orbits. Males often with 12 antennal segments and females with 11, rarely with 10 segments. Prepectus and skaphion absent. Notauli usually lacking, but at times indicated behind. Metasoma with T2 longest. Laterosternites absent; laterotergites overlapping sterna. In females, metasoma with 7 tergites and 7 sternites; in males with 8 tergites and 8 sternites.

Status in India and Kerala : The 6 genera reported from India are *Eumicrosoma* Gahan, *Trissolcus* Ashmead, *Mudigere* Johnson, *Psix* Kozlov and Le, *Telenomus* Haliday and *Paratelenomus* Dodd. The last three of the above listed genera have been reported from Kerala (Johnson, 1996; Johnson and Masner, 1985, 1988a).

Remarks : Genera like *Telenomus* are extremely species rich, with remarkable species diversity. Hosts include Pentatomid bugs (Heteroptera), Lepidoptera, Neuroptera, Diptera and Homoptera. No other Telenomine genera is as diverse as *Telenomus*. Other genera like *Trissolcus* and *Psix* are less speciose and rare, compared to *Telenomus*.

Key to genera of TELENOMINAE of India

1. Body distinctly flattened dorsoventrally; forewing narrow *Eumicrosoma* Gahan
- Body perfectly cylindrical, as high as wide, forewing not narrow 2
- 2(1). Cheeks with striae radiating fan-like from mandibles 4
- Cheeks without fan-like radiating striae ... 3
- 3(2). Body robust; frons between toruli and front ocellus always sculptured *Trissolcus* Ashmead
- Body gracile and slender; frons between toruli and front ocellus usually smooth and shiny; hardly with any surface microsculpture *Telenomus* Haliday
- 4(2). Orbital carinae absent; genal carina absent; scutellum without surface microsculpture *Mudigere* Johnson
- Orbital carinae well-developed, extending from mandibles along inner orbits to lateral ocelli; genal carina present; scutellar surface sculpture present 5
- 5.(4). Mandibles unidentate, apex acute; radicle and scape always concolorous; intercoxal space distinct; notauli usually long and distinct *Paratelenomus* Dodd

—Mandibles atleast bidentate, apex usually broad, more or less truncate; radicle and scape contrasting in colour; intercoxal space often occluded, fore and mid coxae contiguous; notauli rarely present.. ..

..... *Psix* Kozlov and Le

Generic Diagnosis

21. Genus *Psix* Kozlov and Le (Fig. 62)

1976. *Psix* Kozlov and Le : 143. by monotypy and original designation; Johnson and Masner 1985, *Syst. Entomol.*, 10 : 33-58.

Diagnosis : Body black, robust and plump. Lateral ocelli not contiguous with eyes and not connected to orbits by furrow. Eyes bare. Antennae in male with 12 segments; in female with 11 segments and a 6-segmented club. Frons predominantly sculptured throughout; central keel usually bifurcating above antennal insertions. Gena and cheeks with fan-like radiating carinae; occiput aerolate-rugose. Mesonotum also aerolate-rugose; notauli usually absent; scutellum with same structure as mesonotum and not humped. Fore and mid coxae usually contiguous; intercoxal space often absent. Metanotum, propodeum, propleuron, mesopleuron and metapleuron with crenulae of varying size and shape, along with carina. Vein *m* short; *stg* and *pm* long. Metasoma broadly rounded and ovate. T2 distinctly longest; T1 and T2 with longitudinal striae; setal field on S2 well developed.

Distribution : Australian, Ethiopian and Oriental Regions.

Discussion : With a bifurcate central keel and fan-like radiating carinae on face, this genus resembles *Paratelenomus* Dodd. But the black T1, well developed setal fields on S2, along with contiguous fore and mid coxae can distinguish *Psix* from *Paratelenomus*.

Status in India and Kerala : From India 5 species viz., *Psix striaticeps* Dodd, *P. abnormis* Kozlov and Le, *P. saccharicola* (Mani), *P. viriosus* Johnson and Masner, *P. lacunatus* Johnson and Masner have been reported so far and one species

viz. *P. saccharicola* (Mani) has been reported from Kerala (Johnson and Masner, 1985).

This study could also document another species of *Psix* coming very close to a Malaysian species namely *Psix sulcifer* Johnson and Masner collected from Eravikulam, by M. S. Pradhan on 27-ii-1993.

Remarks : Members of this genus are egg parasitoids of Pentatomidae, Scutellaridae and Coreidae.

1. *P. saccharicola* (Mani)

1941. *Telenomus saccharicola* Mani, *Ind. J. Entomol.*, : 26.

Diagnosis : Length = 0.6-0.7 mm. Female. Antennal radicle black; scape yellow to yellowish brown; coxae dark brown. Frons without distinct submedian carinae, other than some lateral lines. Ventral lip smooth. Acetabular field glabrous. T1 with one pair of sublateral setae, T2 striated in basal half. Sulci on S2 continuous.

This species is not represented in the present collection. The above diagnosis is based on the description by Johnson and Masner (1985).

Key to Indian species of *Psix* Kozlov and Le (Modified from Johnson and Masner, 1985)

1. Radicle black; usually in sharp contrast colour of scape 2
- Radicle yellow or light brown, concolorous with scape 4
- 2.(1). Frons with distinct submedian carina; ventral lip of dorsellum punctate
..... *P. lacunatus* Johnson and Masner
- Frons without submedian carina, ventral lip smooth or punctulate 3
- 3.(2). Ventral lip of dorsellum and apex of T2 smooth *P. saccharicola* (Mani)
- Ventral lip of dorsellum and apex of T2 punctulate *P. striaticeps* (Dodd)
- 4.(1). Ventral lip of dorsellum smooth; anterior declivous portion of mesosutum smooth ..
..... *P. abnormis* Kozlov and Le

— Ventral lip of dorsellum coarsely punctate;
mesoscutum sculptured throughout.....
..... *P. viriosus* Johnson and Masner

22. Genus *Telenomus* Haliday (Fig. 63)

1833. *Telenomus* Haliday. *Ent. Mag.*, 1 : 271.
- 1833a. *Hemisius* Westwood : 554. Type : *Hemisius minutus* Westwood, by monotypy. Synonymized by Masner (1961).
1861. *Phanurus* Thomson : 169, 172. Type : *Phanurus angustatus* Thomson, designated by Ashmead (1893). Synonymized by Mayr (1879), Nixon (1937).
1893. *Dissolcus* Ashmead : 138, 164. Type : *Dissolcus nidicornis* Ashmead, by monotypy and original designation. Synonymized by Johnson (1981).
1909. *Neonecremnus* Brethes : 57. Type : *Neonecremnus hyelosiae* Brethes, by monotypy. Synonymized by Blanchard, in De Santis (1950).
- 1912b. *Allophanurus* Kieffer : 8, 11. Type : *Telenomus vibius* Walker, designated by Kieffer (1926). Synonymized by Fergusson (1983).
- 1912b. *Homophanurus* Kieffer : 9, 36. Type : *Telenomus hofmanni* Mayr, by monotypy. Synonymized by Kieffer (1926).
- 1912b. *Prophanurus* Kieffer : 9, 37. Type : *Teleas phalaenarum* Nees ab Esenbeck, by original designation. Synonymized by Kieffer (1926).
- 1912b. *Liophanurus* Kieffer : 9, 61. Type : *Telenomus spilosomatis* Ashmead, by original designation. Synonymized by Nixon (1937).
- 1913a. *Neotelenomus* Dodd : 158, 171. Type : *Neotelenomus anthereae* Dodd, by original designation. Synonymized by Nixon (1937).
- 1913a. *Aholcus* Kieffer : 4. Type : *Aholcus monticola* Kieffer, by monotypy and original designation. Synonymized by Nixon (1935).
- 1913a. *Nanopria* Kieffer : 26. Type : *Nanopria fuscipes* Kieffer, by monotypy and original designation. Synonymized by Huggert (1983).
- 1913b. *Neoteleia* Dodd : 169. Type : *Neoteleia punctata* Dodd, by monotypy and original designation. Synonymized by Johnson (1988b).
- 1913b. *Dissolcoides* Dodd : 179. Type : *Dissolcoides exsertus* Dodd, by monotypy and original designation. Synonymized by Johnson (1988b).
- 1914a. *Platytenomus* Dodd : 126. Type : *Platytenomus planus* Dodd, by monotypy and original designation. Synonymized by Johnson (1988b).
1917. *Paridris* Brethes : 27. Type : *Paridris chilensis* Brethes, by monotypy. Synonymized by Muesebeck and Walkley (1951).
1928. *Pseudotelenomus* Costa Lima : 881. Type : *Pseudotelenomus pachycoris* Costa Lima, by monotypy and original designation. Synonymized by Johnson (1984).
1950. *Micromymar* Risbec : 622. Type : *Micromymar etielliphaga* Risbec, by monotypy. Synonymized by Polaszek and Kimani (1990).
1970. *Aporophlebus* Kozlov : 216. Type : *Aporophlebus aporus* Kozlov, by original designation. Synonymized by Kozlov and Le (1977).
1975. *Pseudophanurus* Szabo : 265, 269. Type : *Pseudophanurus quadriclavatus* Szabo by original designation. Synonymized by Huggert (1983).
1975. *Pseudotelenomoides* Szabo : 266, 276. Type : *Pseudotelenomoides stratiomydarum* Szabo, by monotypy and original designation. Synonymized by Huggert (1983).
1975. *Verrucosicephalia* Szabo : 266, 274. Type : *Verrucosicephalia depressa* Szabo, by monotypy and original designation. Synonymized by Huggert (1983), Kozlov and Kononova (1983).
1975. *Issidotelenomus* Pelov : 89. Type : *Issidotelenomus obscuripes* Pelov, by original designation. Synonymized by Kozlov and Kononova (1983).

Diagnosis : Body black; short and plump; smooth and shiny. Head without striae or rugulae and hardly any microsculpture on frons and cheeks. Eyes with very fine pubescence. Antenna in female 11 segmented, ending in 4-5 segmented club; in male 12 segmented, flagellar segments longitudinal, bead-like, thick and with dense fine pubescence; antennal insertions just above clypeus. Lateral ocelli nearly contiguous with orbits. Pronotum barely visible dorsally; notauli absent. Forewings with *sm*, *m*, *stg* and *pm*; *stg* often oblique and longer than *m*; *pm* also long. T2 largest, many times T1 and T3. Anterior tergites with atleast traces of longitudinal striae.

Distribution : Afrotropical, Australian, Neotropical, Nearctic, Palearctic and Oriental Regions.

Discussion : This genus is distinguished from the next common genus *Trissolcus* Ashmead by the following characters:

— Body slender and gracile. (In *Trissolcus*, body, stout and plump).

– Smooth unsculptured frons (In *Trissolcus*, frons with rich sculpture).

– Eyes usually pubescent. (In *Trissolcus*, eyes usually bare).

Status in India and Kerala : About 25 species are hitherto known from India. Though the genus has been reported from Kerala, from certain host eggs, species identifications are yet to be made.

The present collection comprise of a very rich assemblage of species; species analysis and characterization lie far from complete.

Remarks : Most of them are egg parasitoids of Lepidopteran pests, though some are reported from the eggs of Heteroptera and Neuroptera.

23. Genus *Trissolcus* Ashmead (Fig. 64)

1893. *Trissolcus* Ashmead. Type : *Telenomus brochymenae clavata* Ashmead, by original designation, *Bull. US. Nat. Mus.*, 45 : 138, 161; Kieffer, 1926, *Das Tierreich*, 48 : 126.
1900. *Asolcus* Nakagawa : 17. Type *Asolcus nigripedius* Nakagawa, by monotypy Synonymized by Masner (1964a).
- 1912b. *Aphanurus* Kieffer : 10, 69. Type : *Teleas semistriatus* Nees ab Esenbeck, by original designation.
- 1912b. *Immsia* Cameron : 104. Type *Immsia carinifrons* Cameron, by monotypy. Synonymized by Nixon (1938a).
1926. *Microphanurus* Kieffer, : 16, 91. Type : *Teleas semistriatus* Nees ab Esenbeck, by substitution of *Microphanurus* for *Aphanurus*. Synonymized with *Asolcus* Nakagawa by Watanabe (1951).

Diagnosis : Body black, robust and plump. Lateral ocelli contiguous with eyes. Eyes bare. Antennae in male with 12 segments and in female with 11 segments, often with a 6-segmented club. Frons predominantly sculptured throughout; central keel distinct. Gena and cheeks never with fan-like radiating carinae. Genal carina if distinct, mostly with longitudinal striations extending between lower margin of orbits and genal carina; occiput aerolate-rugose. Mesoscutum also aerolate-rugose; notauli present or absent; scutellum with same structure as mesoscutum. Scutellum at times humped; fore and mid coxae never contiguous; intercoxal space distinct.

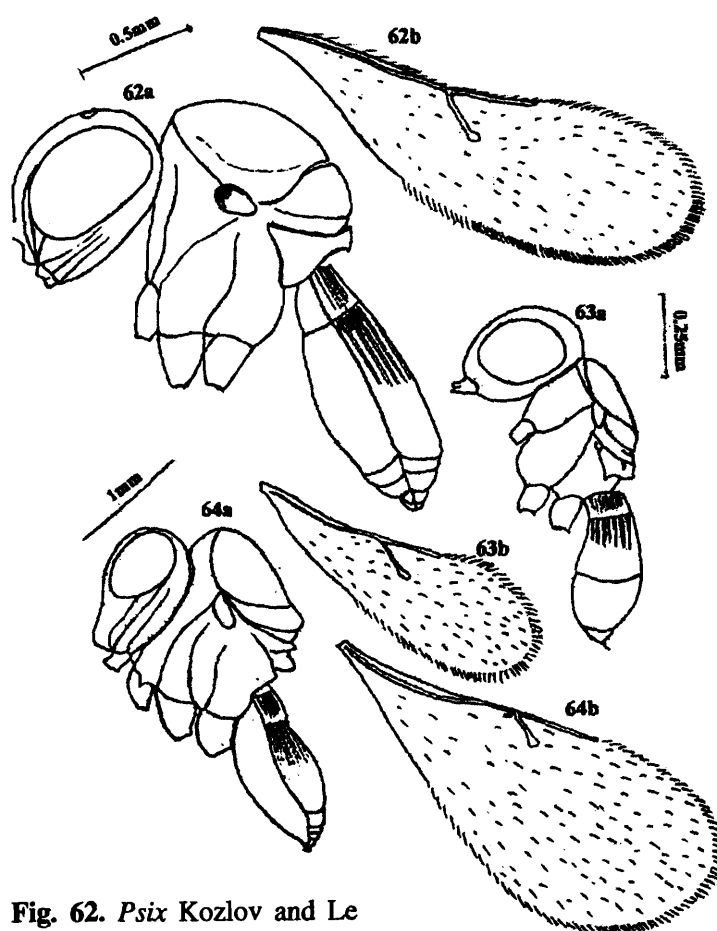


Fig. 62. *Psix* Kozlov and Le
a. Body (D.V.); b. Forewing.

Fig. 63. *Telenomus* Haliday
a. Body (D.V.); b. Forewing.

Fig. 63. *Trissolcus* Ashmead

Metanotum, propodeum, propleuron, mesopleuron and metapleuron, with crenulae, along with carinae. Forewing with *m* short, *stg* long, and *pm* long. Metasoma broadly rounded and ovate; T2 distinctly longest; T1 and T2 with longitudinal striae.

Distribution : Afrotropical, Australian, Neotropical, Nearctic, Palearctic and Oriental Regions.

Discussion : Different attributes of carinae or striae on head region, crenulae on meso and metapleuron, sculpture on dorsellum etc. form some of the important characters in defining the species.

Status in India and Kerala : 5 species are hitherto reported from India. (Mani and Sharma 1982). The species composition in Kerala is yet to be studied. The present collection from Kerala includes two undescribed species. The collection locality included Calicut and Malappuram districts of Kerala.

Remarks : Most of them are egg parasitoids of pentatomid bugs under Heteroptera.

Subfamily TELEASINAE

1893. *Teleasini* Ashmead. *Bull. U.S. Nat. Mus.* 45:137, 180; Kieffer, 1926, *Das Tierreich*, 48 : 173.

Includes only a limited number of genera. Of the 12 world genera, only 4 genera namely, *Gryonoides* Dodd, *Phlosteins* Kozlov and Le, *Trimorus* Foerster and *Xenomerus* Foerster have been reported from the Oriental Region (Johnson, 1992)

Females mostly parasitize eggs of Carabidae (Coleoptera).

Diagnosis : Female antenna often with 12 segments and male with 14 segments. Flagellar segments in male cylindrical or bottle-shaped, hairs not arranged in whorls. Mandibles bidentate, tridentate or sub-tridentate. (Middle tooth tiny). Head and thorax matt or with rugose sculpture, often not smooth and shiny. In some genera like *Teleas* Latreille, hind femora swollen, tibia with numerous minute spines and hind basitarsi incrassate. T1 rarely with a horn or hump in female. Forewing with a long *m*; T3 longest.

Status in India and Kerala : Only two genera viz. *Trimorus* Foerster and *Xenomerus* Walker are hitherto reported from Kerala (Mani and Sharma, 1982) as well as from India.

Both *Trimorus* Foerster and *Xenomerus* Walker are reported from Kerala. (Rajmohana and Narendran 1997, 2001a).

Key to genera of TELEASINAE of India

1. Scutellum with a tooth mid dorsally
.....*Trimorus* Foerster (in part) (Sub genus *Neotrimorus* Rajmohana and Narendran
- Scutellum unarmed 2
2. Mandibles tridentate, all teeth nearly equally long; abdomen in female rounded, mostly smooth and shiny, flagellar segments in male bottle-shaped with long bristles
.....*Xenomerus* Walker

— Mandibles bidentate, if rarely tridentate, all teeth not equal; abdomen in female never circular, usually well sculptured, flagellar segments in male bottle-shaped and with only short setae

..... (*Trimorus* Foerster (in part) (sub genus *Trimorus* Foerster)

24. Genus *Trimorus* Foerster

1956. *Trimorus* Foerster. *Hym. Stud.*, 2 : 101, 104; Kieffer, 1926, *Das Tierreich*, 48 : 1-76.
1887. *Trichasius* Provancher : 209. Type : *Trichasius clavatus* Provancher, by monotypy. Synonymized by Masner (1965).
1888. *Pentacantha* Ashmead : 51. Type : *Pentacantha canadensis* Ashmead, by monotypy. Synonymized by Masner in Sarazin (1986).
1893. *Hoplogryon* Ashmead : 181, 200. Type : *Proscantha minutissima* Ashmead, by original designation. Synonymized by Dodd (1930).
- 1908b. *Paragryon* Kieffer : 189, 199. Type *Paragryon pedestris* Kieffer, designated by Kieffer (1926). Synonymized with *Trichasius* Provancher by Muesebeck (1956), with *Trimorus* Foerster by Masner (1965).
- 1910d. *Allogryon* Kieffer : 95. Type *Prosacantha caraborum* Riley, designated by Muesebeck and Walkley (1951).
- 1912a. *Hemimorus* Cameron : 77. Type : *Hemimorus clavicornis* Cameron, by monotypy. Synonymized by Dodd (1920).
1926. *Propentacantha* Kieffer : 173, 241. Type : *Pentacantha canadensis* Ashmead. Synonymized by Masner in Sarazin (1986).
1950. *Brachyscelio* Risbec : 585, 614. *Brachyscelio jeanneli* Risbec, by monotypy. Synonymized by Masner (1976b).
1954. *Pachyscelio* Risbec : 552. Type : *Brachyscelio jeanneli* Risbec by substitution of *Pachyscelio* for *Brachyscelio* Risbec. Synonymized by Masner (1976b).
- 1966a. *Scutelligryon* Szabo : 18, 83. Type : *Paragryon baloghi* Szabo, by monotypy and original designation. Synonymized by Kozlov (1978).

Diagnosis : Body generally black, in some species metanotum pale yellowish to reddish brown. Head and mesosoma matt or with rugose sculpture. Eyes pubescent. Cheeks and frons usually with fan-like radiating rugulae. Mandibles bidentate. Lateral ocelli much close to front ocellus than to orbits. Antenna 12 segmented in both sexes, in female with a 6-segmented clava; male

flagellar segments long and cylindrical. OOL always more than front ocellar space. Metanotum often with a spine, if tridentate, then lateral teeth smaller than middle one. Forewing with *m* many times longer than *stg*; *pm* always absent. Metasomal tergite 2 longest, basal tergites with complete or traces of longitudinal striations.

Distribution : Afrotropical, Australian, Palearctic, Nearctic, Neotropical and Oriental Regions.

Discussion : This genus is distinguished from *Xenomerus* Walker in having bidentate mandibles, if tridentate, then all teeth never equal. Lower border of metasoma never circular. *Xenomerus* has tridentate mandibles (all teeth being equal) and a circular metasoma.

Status in India and Kerala : This is a widely distributed genus. 15 species have been reported from India (Mani and Sharma, 1982).

Out of the total of 8 species reported from Kerala (Mukerjee, 1981), 7 species are recorded in this study, namely, *T. appangalus* Mukerjee, *T. deccana* Mukerjee, *T. dimdicornis* Mukerjee, *T. dubarensis* Mukerjee, *T. fasciatus* Mukerjee, *T. nilamburensis* Mukerjee and *T. ponmudiensis* Mukerjee. *T. anamalaianus* Mukerjee is not represented in this collection.

Remarks : With the erection of a new subgenus namely *Trimorus* (*Neotrimorus*) Rajmohana and Narendran, the original *Trimorus* Foerster is now a nominal subgenus namely *Trimorus* (*Trimorus*) Foerster.

Key to species of *Trimorus* (*Trimorus*) Foerster of Kerala

1. Males 1
- Females 4
- 2.(1). Notauli present; F3 with a pointed projection
..... *T. (T) nilamburensis* Mukerjee
- Notauli absent; F3 without a pointed projection
..... 3
- 3.(2). Metanotum with 3 spines, median longest;
F1 and F2 distinctly shorter than rest of

flagellar segments
..... *T. (T) deccana* Mukerjee

- Metasoma without a spine; F1 and F2 distinctly longer than rest of flagellar segments
..... *T. (T) ponmudiensis* Mukerjee

4.(1). Striations on petiole and T2 only 5

— Striations on petiole, T2 and T3 6

5.(4). T2 only striate anteriorly; head closely umbilicately punctate; gena and face above clypeus longitudinally striate; forewing with 3 dark bands *T. (T) fasciatus* Mukerjee

— Striations on T2 reaching posterior margin and receding to sides; head smooth and shiny; gena longitudinally striate; forewing uniformly infuscated very light brown
..... *T. (T) dubarensis* Mukerjee

6.(4). T3 striate completely; F1 elongated and distinctly longer than pedicel; notauli absent
..... *T. (T) dimdicornis* Mukerjee

— T3 striate only at base; F1 not greatly elongated and subequal to pedicel; notauli present ...7

7.(6). Scape about 5.8x longer than thick; F1 subequal to pedicel; F2 longest, a little longer than F1 *T. (T) anamalaianus* Mukerjee

— Scape 6.8x as long as thick; F1 0.85x pedicel; F2 shorter than F1
..... *T. (T) appangalus* Mukerjee

Species Diagnosis

1. *Trimorus* (*Trimorus*) *anamalaianus* Mukerjee

1981. Mukerjee, *Rec. zool. Surv. India, Occ. Paper No.*, 27 : 5, 27.

Length = 1.4 mm

Female : Body brownish black. Antenna dark brown. Wings infuscated. Face and vertex smooth. OOL 3x OD. AF 1.1.4.6 scape, 5.7x as long as thick; pedicel 0.25 length of scape; F1 0.85 of pedicel; F2 longest, a little longer than F1. Mesosoma finely punctate. Notauli present. Metanotum with a short median spine. Petiole and T2 fully striated, T3 striated only basally.

Male : Unknown.

Type locality : Munnar-Kodaikanal Road.

Remarks : Not represented in the collection.

2. *Trimorus (Trimorus) appangalus* Mukerjee

1981. *Trimorus appangalus* Mukerjee, *Rec. zool. Surv. India*
Occ. Paper No., 27 : 6-8

Length = 1.14 mm

Female : Body dark brown to black. Antenna deep brown, radicle yellowish brown. Wings hyaline. Gena longitudinally striate. OOL 1.6x OD. AF 1.1.4.6. Scape 6.8x longer than thick; pedicel 0.23 of scape length; F1 subequal to pedicel; F2 a little shorter than F1. Mesosoma with dense punctae. Notauli complete. Metanotum with a short median spine. Petiole and T2 completely striated; only basal T3 with striations.

Male : Unknown.

Type locality : Appangala (Karnataka).

Material examined : One female collected from Ambayathode (Kannur, Kerala) by P.M. Sureshan on 2-ii-1995.

3. *Trimorus (Trimorus) dimdicornis* Mukerjee

1981. *Trimorus dimdicornis* Mukerjee, *Rec. zool. Surv. India*
Occ. Paper No., 27 : 12-14.

Length = 1.86 mm

Female. Body black. Antenna dark brown, except yellowish radicle, scape and pedicel. Wings hyaline. Vertex and frons longitudinally rugose. OOL = OD. Scape 7.4x as long as thick; pedicel 0.19 of scape length. F1 longest, 2.53x pedicel; F2 0.91 length of F1. Mesosoma rugosely punctate. Notauli absent. Metanotum with a slender spine. Petiole, T2 and T3 almost completely striated.

Male : Unknown.

Type locality : Neyyar Wild life sanctuary (Trichur, Kerala).

Material examined : Five females collected from Coorg (Kerala- Karnataka border) on 5-iii-1994 and two females from Tirunelli (Kerala) on

9-iii-1994 by P.M. Sureshan and two females collected by Mohana on 11-x-1994 from Malappuram (Kerala).

4. *Trimorus (Trimorus) deccana* Mukerjee

1981. *Trimorus deccana* Mukerjee, *Rec. zool. Surv. India*
Occ. Paper No., 27 : 10-12.

Length = 1.04 mm.

Male : Body dark brown to black. Antenna dark brown, scale yellowish brown. Wings infuscated. Gena and clypeus longitudinally striated. OOL 2xOD. Scape 3.5x as long as thick; pedicel 0.28 of scape length; F1 shortest, 1.61x pedicel length; F2 a little longer than F1, but distinctly shorter than remaining flagellar segments. Mesonotum in front with minute punctae. Notauli absent. Metanotum with three spines (median spine longest). Petiole and T2 completely striate at its base.

Female : Unknown.

Type locality : Mahabaleshwar (Tamilnadu).

Material examined : Two males collected by Mohana and T.C. Narendran and party from Calicut (Kerala) on 13-xi-1994 and Vayalar (Alleppy, Kerala) on 2-ii-1989 respectively.

5. *Trimorus (Trimorus) dubarensis* Mukerjee

1981. *Trimorus dubarensis* Mukerjee, *Rec. zool. Surv. India*
Occ. Paper No., 27 : 13-15.

Length = 1.04 mm

Female : Body black. Antenna black, except yellowish brown radicle. Forewings infusate. Gena longitudinally striate. OOL 2.5x OD. AF 1.1.4.6; scape 5.5x as long as thick; pedicel 0.26 of scape length; F1 0.60 of pedicel length; F2 a little shorter than F1. Notauli absent. Metanotum with a short median spine. Petiole and T2 almost completely striate.

Male : Unknown.

Type locality : Dubare (Karnataka).

Material examined : Two females collected by T.C.Narendran and party from Ochira and Vayalar (Alleppy, Kerala) on 26-ii-1989 and 27-ii-1989 respectively.

6. *Trimorus (Trimorus) fasciatus* Mukerjee

1981. *Trimorus fasciatus* Mukerjee, *Rec. zool. Surv. India*
Occ. Paper No., 27 : 15-17.

Length = 2.28 mm.

Female : Body black. Antenna black, except dark brown pedicel, F1 and F2. Forewings with three dark bands. Gena and face longitudinally striate. OOL 0.7xOD. A.F 1.1.4.6. Scape 6.4x as long as thick; pedicel 0.3 of scape; F1 longest, a little longer than pedicel; F2 0.8 of F1. Mesosoma rugoso-punctate. Notauli absent. Metanotum with a short spine. Petiole completely and T2 only basally striate.

Male : Unknown.

Type locality : Maldare (Karnataka).

Material examined : Two females collected from Nilambur (Malappuram, Kerala) on 9-ii-1993 by P.M. Sureshan.

7. *Trimorus (Trimorus) nilamburensis* Mukerjee

1981. *Trimorus nilamburensis* Mukerjee *Rec. zool. Surv. India*
Occ. Paper No., 27 : 22-24.

Length = 1.58 mm

Male : Body black. Antenna black, except yellowish-brown scape and radicle. Wings hyaline. Gena and clypeus longitudinally striate. OOL 3x OD. Scape 4x as long as thick; pedicel 0.18 of scape length; F1 3x pedicel length; F2 1.18x F1; F3 with a pointed projection. Mesonotum with minute punctae. Notauli present. Metanotum with 3 short spines. Petiole and T2 striated completely, T3 striate only basally.

Female : Unknown.

Type locality : Nilambur (Malappuram, Kerala).

Material examined : Two males collected from Malappuram (Kerala, India) on 9-ii-1993 by P.M. Sureshan.

8. *Trimorus (Trimorus) ponmudiensis* Mukerjee

1981. *Trimorus ponmudiensis* Mukerjee, *Rec. zool. Surv. India*
Occ. Paper No., 27 : 24-26.

Length = 1.56 mm.

Male : Body black. Antenna black, except dark brown scape and yellowish-brown radicle. Wings infusate. Gena and clypeus longitudinally striate. OOL 2x OD. Scape 6x as long as thick; pedicel 0.24 of scape length; F1 0.3 of scape length; F2 longest, a little longer than F1. Mesosoma finely punctate. Notauli absent, metanotum unarmed. Petiole and T2 striated completely; T3 only basally striate.

Female : Unknown.

Type locality : Ponmudi (Trivandrum, Kerala).

Material examined : Two males collected by Mohana from Calicut University Campus (Malappuram : Kerala) on 22-iv-1997.

Subgenus *Trimorus (Neotrimorus)* Rajmohana
and Narendran
(Figs. 65-66)

1997. *Trimorus (Neotrimorus)* Rajmohana and Narendran, *J. Adv. Zool.*, 18(1) : 32-37.

Diagnosis : Resembles *Trimorus* in key characters like face rugulae, body punctae, number and nature of flagellar segments, metanotal spine, wing venation etc. But presence of a median, stout and blunt, dorsal spine on scutellum justifies a separate sub-genus status to this group.

Two species are recorded under this subgenus *Trimorus (N). scutellospinosus* Rajmohana and Narendran and *Trimorus (N). spinostriatus* Rajmohana and Narendran.

1. *Trimorus (N). scutellospinosus* Rajmohana and
Narendran
(Fig. 65)

1997. *Trimorus (N) scutellospinosus* Rajmohana and
Narendran, *J. Adv. Zool.*, 18(1) : 33-35.

Length = 2.07 mm.

Male : Head and body shining black. Antenna basally yellowish brown and distally deep reddish brown.

Frons with longitudinal carinae or rugulae radiating fan-like from lateral clypeal border. A dorsal median ridge extending to front ocellus

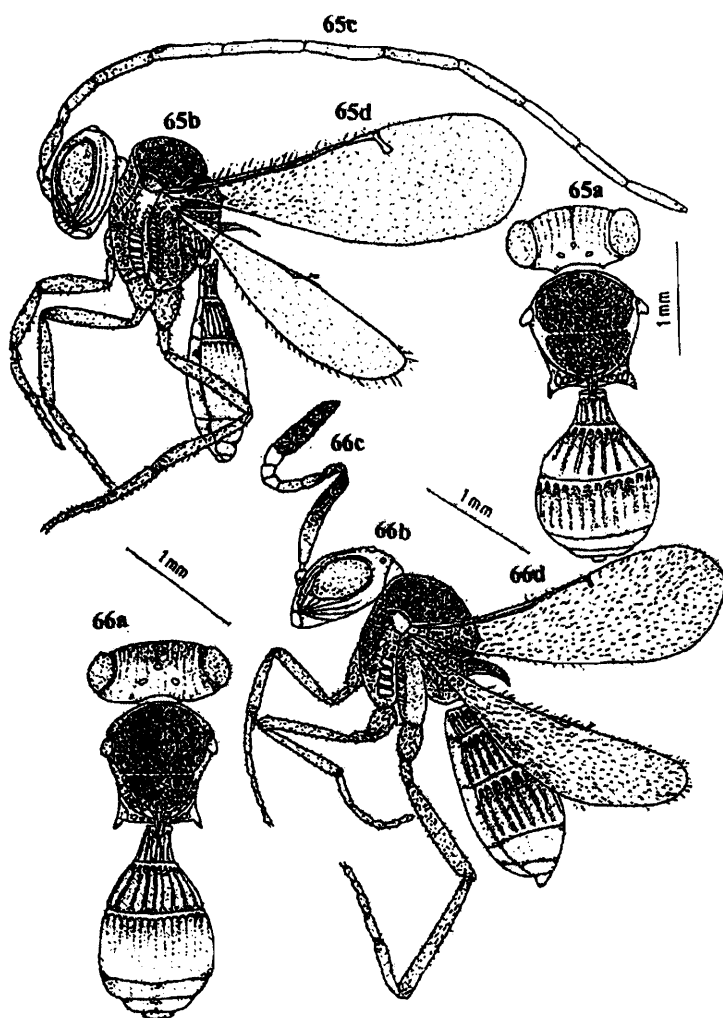


Fig. 65. *Trimorus (Neotrimorus) acutellospinosus* Rajmohana & Narendran. a. Body (D.V.); b. Body (Profile); c. Antenna; d. Forewing.

Fig. 66. *Trimorus (Neotrimorus) spinostriatus* Rajmohana & Narendran. a. Body (D.V.); b. Body (Profile); c. Antenna; d. Forewing.

from top mid margin of antennal scrobe. Antenna 14-segmented; scape 4x as long as thick and equal to next two segments combined together. Notauli absent; scutellum armed with a stout blunt median spine. Metanotum produced into a stout, long curved longitudinally striated dorsal median spine at an angle 70°. Propodeum with pointed lateral spines and simple sculpture. Forewings with *sm*, *m* and *stg*; *pm* absent; *m* many times *stg*. T1 and T2 with longitudinal striations extending throughout. T3 with only traces of striae on its upper margin.

Female : Unknown.

Type locality : Muthanga (Wyanad, Kerala).

2. *Trimorus (Neotrimorus) spinostriatus*

Rajmohana and Narendran
(Fig. 66)

1997. *Trimorus (N) spinostriatus* Rajmohana and Narendran, *J. Adv. Zool.*, 18(1) : 35-36.

Length = 2.23 mm

Female : Head and body black; antenna with distal pedicel and 5 terminal club segments brownish black; F1 and F2 yellowish brown; F4 and F5 pale whitish brown; wings infusate; basal metasoma reddish brown. Frons with longitudinal carinae or rugulae radiating fan-like from lateral clypeal border. A dorsal median ridge extending to front ocellus from top mid margin of antennal scrobe. Antenna 12-segmented. AF 1.1.4.6; a distinct club present. Scape a little more than next 5 segments combined. Notauli absent. Scutellum with a dorsal blunt median spine. Metanotal spine at an angle 60°. Propodeum with a median carina, lateral spines posteriorly and also with complex sculpture. Longitudinal striations on T1, T2 and T3 almost extending throughout.

Male : Unknown.

Type locality : Anamudi (Idukki, Kerala).

25. Genus *Xenomerus* Walker (Fig. 67)

1836. *Xenomerus* Walker. *Ent. Mag.*, 3 : 342; Kieffer, 1926, *Das Tierreich*, 48 : 174.

1966a. *Niteogryon* Szabo, : 18, 85. Type : *Teleas medon* Walker, by original designation. Synonymized by Hellen (1971).

Diagnosis : Mandibles tridentate, all teeth equal in length. Flagellar segments in male bottle-shaped. Eyes naked. Body generally smooth. Metasoma with a rounded lower border and T1 without a hump in female.

Distribution : Australian, Oriental and Palearctic Regions.

Discussion : This genus is distinguished from *Trimorus* Foerster in having tridentate mandibles, all teeth being equal and a circular lower border of metasoma.

Status in India and Kerala : Two species viz. *X. indicus* Mukerjee (1981) and *X. atomus* Rajmohana and Narendran (2001a), have been reported from India as well as Kerala.

1. *Xenomerus atomus* Rajmohana and Narendran
(Fig. 67)

2001a. *Xenomerus atomus* Rajmohana and Narendran.
Geobios, **28** : 253-255

Length = 1.03 mm.

Female : Head and body shining black. Ocelli arranged in a wide triangle, OOL : OD : POL = 2.1 : 1.5 : 7. Eyes bare. Fine adjacent rugulae radiating fan-like from base of mandibles and clypeus, rugulae gradually becoming faint towards upper frons and vertex. Thorax wider than long; mesonotum with a distinct convex bulge; posterior rim bordered by a row of adjacent small deep pits. Mesonotum with a matt surface. Notauli distinct, parallel, incomplete in distal half, reaching only till 0.43 of mesonotum, separated basally by 5x its diameter. Metanotum with a small pointed teeth medially. Propodeum rather simple without any carinae. Longitudinal striae on T1 and T2, extending to more than its three-fourth length, T3 with striae reaching only to atmost one-fourth its length.

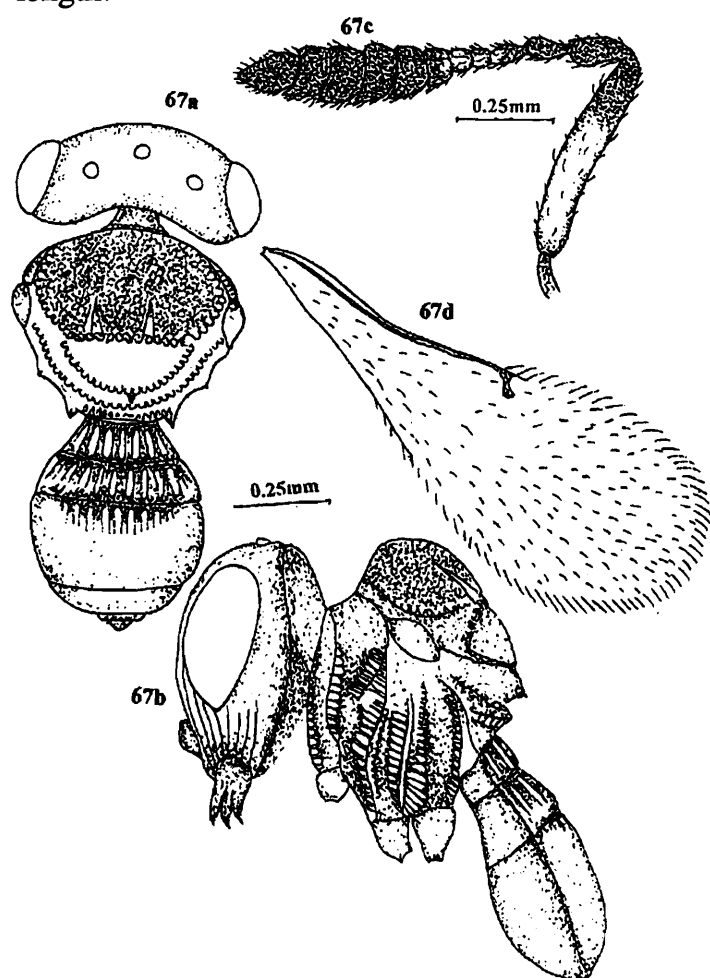


Fig. 60. *Xenomerus atomus* Rajmohana & Narendran
a. Body (D.V.); b. Body (Profile);
c. Antenna; d. Forewing.

Male : Unknown.

Type locality : Calicut (Kerala).

2. *Xenomerus indicus* Mukerjee

1981. *Xenomerus indicus* Mukerjee, *Rec. zool. Surv. India*
Occ. Paper No., **27** : 28-30.

Length = 0.86 mm.

Female : Body brownish black. Antenna yellowish except dark brown, 2-6 club segments. Wings hyaline. Eyes with fine sparse pubescence. OOL 2.6x OD. Thorax as long as its maximum width. Mesosoma smooth and shiny. Notauli complete and diverging in front. Metanotum without a median tooth. T3 only finely striated in front.

Male : Unknown.

Type Locality : Ponmudi (Trivandrum, Kerala).

Remarks : This species is not represented in the present collection; the diagnosis is based on the original description.

Subfamily SCELIONINAE

1893. *Scelioninae* Ashmead. *Bull. U.S. Nat. Mus.*, **45** : 136:
Kieffer, 1926, *Das Tierreich*, **48** : 264.

Scelioninae forms the largest and most polytypic subfamily, constituting more than 90% of scelionid genera. They are abundant in the tropics.

Females parasitize eggs of Orthoptera, Embioptera, Dictyoptera, Heteroptera, Hemiptera etc and even eggs of spiders.

Diagnosis : Frons with or without depression. Antenna with varied number of antennal segments, 6-14 in females and 11-12 segments in males. Lateral ocelli mostly closer to orbits than to front ocellus, in case not closer, then third tergite is not largest or vein *m* usually shorter than *stg*, if longer, never more than three times. Metasoma with acute lateral margin. In elongate forms, third tergite usually longest, if metasoma short and plump then, second tergite longest.

Status in India and Kerala : Of the 32 genera reported from India, (Masner, 1978; Mukerjee, 1994, Mani and Sharma, 1982) the present work reports from Kerala, 14 genera under Scelioninae,

namely *Anteromorpha* Dodd, *Sparasion* Latreille, *Heptascelio* Kieffer, *Scelio* Latreille, *Gryon* Haliday, *Baryconus* Foerster, *Probaryconus* Kieffer, *Calliscelio* Ashmead, *Calotelea* Westwood, *Platyscelio* Kieffer, *Macroteleia* Westwood, *Opisthacantha* Ashmead, *Triteleia* Kieffer and *Dichoteleas* Kieffer.

Key to Indian genera of SCELIONINAE
(Modified from Masner, 1976b)

1. Antenna 14 segmented in both sexes.....
.....*Nixonia* Masner
- Antenna either 12 segmented in both sexes or
12 segmented in females and 10 in males ..
..... 2
- 2.(1). Hindwing with *sm* almost complete 8
- Hindwing with only a short stem of *sm* 3
- 3.(2). Frons mostly with one or more transverse
ledges 4
- Frons without any ledges 5
- 4.(3). Usually small, 1mm or smaller, metasoma
plumpy, T2 largest of all metasomatic tergites;
apterous, brachypterous or fully winged.....
..... *Encyrtoscelio* Dodd
- Distinctly more than 1mm.; metasoma elongate
and cylindrical; almost equally segmented ..
.....*Sparasion* Latreille
- 5.(3). Suture between T2 and T3 arched, upcurved;
prepectus absent *Doddiella* Kieffer
- Suture between T2 and T3 almost straight;
prepectus well developed 6
- 6.(5). Metanotum medially armed; frons often with
carinate depression, even if faint.....
..... *Heptascelio* Kieffer
- Metanotum medially unarmed, if somewhat
produced, then frons without
depression 7
- 7.(6). Mandibles completely concealed under
clypeus; head extended snout-like; occipital
carina with a sharp tooth at level of lower eye
margins *Sceliocerdo* Muesebeck

- Mandibles not concealed under clypeus; head
not particularly snout-like protruded; occipital
carinae without tooth
..... *Scelio* Latreille
- 8.(2). T2 distinctly longer than T3; metasoma short
and plump 9
- T2 almost as long as T3 or shorter or metasoma
distinctly elongate 12
- 9.(8). Metasoma extremely thin, almost foliaceous,
submarginal ridge absent; forewings heavily
banded*Aradophagus* Ashmead
- Metasoma moderately flattened; not foliaceous,
submarginal ridge present; forewing not
banded; rarely infusate 10
- 10.(9). Lateral ocelli far from inner orbits as from
the median ocellus... *Dyscritobaeus* Perkins
- Lateral ocelli very close or almost contiguous
with inner orbits 11
- 11.(10). Laterotergites very narrow; submarginal
ridge well impressed; forewings without
basalis, not narrow *Gryon* Haliday
- Laterotergites very wide; submarginal ridge
not well developed; forewings narrow and with
basalis *Baeus* Haliday
- 12.(8). Female antenna 7 segmented; A7 forming
a big unsegmented club 13,
- Female antenna usually 12 segmented, rarely
11 or 9 segmented (In *Microthoron*, only 6
segmented) 14
- 13.(12). In females, T1 with a cylindrical horn or
atleast with a moderate hump; in males T1
with slight protuberance medially
..... *Ceratobaeus* Ashmead
- T1 in males and females without protuberance
or horn, flat *Idris* Foerster
- 14.(12). Frons with more or less deep depression,
margined atleast in upper arc by sharp carina
..... 15
- Frons flat or convex, rarely shallow unmargined
declivity 17

- 15.(14). A2-A4 serrate dorsally; A3 and A4 confluent, separated only by oblique suture; female antenna with abrupt and compact 4 segmented clava *Cremastobaeus* Ashmead
- A2-A4 not serrate. A3 well separated from A4 by constriction; female antenna with clava 5 or 6 segmented and less abrupt 16
- 16.(15). Vertex cut off posteriorly; *pm* always present and longer than *stg* *Baryconus* Foerster
- Vertex not cut off; sloping to occiput roundly; *pm* absent or shorter than *stg* *Oxyscelio* Kieffer
- 17.(14). Metanotum or propodeum medially armed, with spine, bispinose or produced into transverse lamella or foliaceous plate 18
- Metanotum or propodeum unarmed, appearing as two simple strips, not enlarged or produced medially 27
- 18.(17). Propodeum armed or produced medially; metanotum unarmed 19
- Propodeum unarmed, simple; metanotum armed or produced medially 20
- 19.(18). *m* vein as long as *stg*, if shorter then, body over 5mm; T1 usually very wide, not elongate and petiolate *Triteleia* Kieffer
- *m* vein shorter than *stg*; if almost same length, body distinctly less than 3mm. T1 usually slender and petiolate. *Probaryconus* Kieffer
- 20.(18). Metanotum with two widely separated teeth or spurs 21
- Metanotum with 1 (rarely) 3 spines or produced medially into transverse lamella or foliaceous plate 22
- 21.(18). Skaphion developed; sometimes posterior rim of skaphion weak and visible only in lateral view; *m* as long as or longer than *stg*; eyes bare *Calotelea* Westwood
- Skaphion absent; *m* very shorter than *stg*; eyes with very long hairs *Paridris* Kieffer
- 22.(20). Scutellum bispinose, the two teeth situated laterally 23
- Scutellum unarmed 24
- 23.(22). Eyes glabrous; *pm* well developed *Dichoteleas* Kieffer
- Eyes with long scattered hairs; *pm* absent ... *Neoscelio* Dodd
- 24.(22). *Pm* longer than *m* or *stg* 25
- *Pm* absent or reduced to a stump *Psilanteris* Kieffer
- 25.(24). Metanotum medially expanded into a lamella, plate or a flat; rarely with a transparent and vertical squama 26
- Metanotum with single median spine or dent *Opisthacantha* Ashmead
- 26.(25). Metanotum medially with transverse lamella, which is medially almost as wide as at corners; notauli present or absent *Calliscelio* Ashmead
- Metanotum medially expanded into a foliaceous semicircular or sharply triangular plate; notauli absent *Anteromorpha* Dodd
- 27.(17). Antenna with fewer than 12 segments. 28
- Antenna with 12 segments 29
- 28.(27). Skaphion well developed; antenna 6 segmented; clava unsegmented *Microthoron* Masner
- Skaphion absent; antenna 11 segmented; clava 4 segmented *Embidobia* Ashmead
- 29.(27). Skaphion well developed 30
- Skaphion absent 31
- 30.(29). Female antennal clava compact and 4 segmented; laterotergites very wide; submarginal ridge not well impressed *Tiphodytes* Bradley
- Female antenna with well segmented clava, with 6 segments *Duta* Nixon

31.(30). *pm* absent or much shorter than *m*; body foliaceous; flat, depressed dorsoventrally
..... ***Platyscelio*** Kieffer

— *pm* as long as *m* or much longer; body not foliaceous and flat or depressed dorsoventrally 32

32.(31). *m* shorter than *stg*; metasoma not elongate; cheeks between lower orbits and base of mandibles with convex white blisters
..... ***Palpoteleia*** Kieffer

— *m* elongate, as long as *stg* or longer; metasoma elongate; cheeks without any blisters
..... ***Macroteleia*** Westwood

Generic Descriptions

26. Genus *Anteromorpha* Dodd

1913a. *Anteromorpha* Dodd, : 131, 145. Type : *Anteromorpha australica* Dodd, by original designation.

1933. *Govinda* Nixon : 292, 465. Type : *Govinda mila* Nixon, by original designation. Synonymized by Kozlov (1971).

1951. *Aegyptoscelio* Priesner : 133. Type : *Aegyptoscelio frequens* Priesner, by monotypy and original designation. Synonymized with *Govinda* Nixon by Sudholm (1970).

1956b. *Afroscelio* Risbec : 827. *Afroscelio poussi* Risbec, by monotypy. Synonymized with *Aegyptoscelio* Priesner by Masner (1958).

Diagnosis : Head tranverse and quadrate. Frons without a depression. Mandibles, large and bidentate. Skaphion absent. Prepectus present. Antennae with 12 segments. Notauli absent or abbreviate posteriorly. Metanotum medially expanded to form a sub triangular plate, a spine or lamella. Propodeum unarmed. Tibial spur formula 1-1-1. *Stg* forming a narrow angle with *pm*. T1 without a hump or horn.

Distribution : Widely distributed in almost all realms.

Status in India and Kerala : A total of 4 species are known from India (Mani and Sharma, 1982, Narendran *etal.* 2001a), of which one species namely *A. malabarica* Narendran is known from Kerala.

Remarks : Since this genus is not represented in the present collection, the diagnosis given here is based on the original description.

Key to species of *Anteromorpha* Dodd of India (Adapted from Narendran *et al.*, 2001a)

1. Metanotum produced medially into a transverse lamella; hind ocelli contiguous with eyes; *pm* and *stg* equal; eyes pubescent.....
..... ***A. glabra*** Sharma

—Metanotum produced medially into subtriangular plate; other characters may or may not be the same combination 2

2. Mandibles tridentate; T3 irregularly striate...
..... ***A. tuberculata*** Sharma

—Mandibles bidentate; T3 different from above 3

3. Lateral ocelli distinctly separated from eye border; T1 without hump
..... ***A. malabarica*** Narendran

—Lateral ocelli contiguous with eye border; T1 with hump or nodule in middle base
..... ***A. deccanensis*** Sharma

Species Diagnosis

1. *Anteromorpha malabarica* Narendran

2001a. *A. malabarica*. *J. Ecobiol.*, 13(4) : 293-296.

Length = 1.85 mm.

Female : Head black. Body liver brown. Eyes hairy. Malar sulcus distinct. Mandibles bidentate. Lateral ocelli not contiguous with eyes. Notauli absent. Prepectus distinct. Metanotum produced medially into a subtriangular plate with subhexagonal reticulations. *pm* a little longer than *stg*. T1 without a hump medially; T3 longest and distinctly striate, T4, T5 and T6 smooth medially and matty laterally.

Male : Unknown.

Type locality : Calicut University Campus (Malappuram, Kerala).

27. Genus ***Baryconus*** Foerster
(Fig. 68)

1856. *Baryconus* Foerster, Type : *Baryconus floridanus* Ashmead Hym., Stud., 2 : 10 Kieffer, 1926, *Das Tierreich*, 48 : 480.

Hoplotelia Ashmead, 1893 : 210, 211, 227. Type : *Baryconus floridanus* Ashmead, by original designation.

Rhacotelia Cameron, 1906 : 72. Type : *Rhacotelia pilosa* Cameron, by monotypy. Synonymized by Dodd (1920).

1910b. *Trichanteris* Kieffer. Type : *Prosanteris foveatifrons* Kieffer, by monotypy. Synonymized by Masner (1976b).

1912a. *Apegusoneura* Cameron : 69. Type : *Apegusoneura striolatus* Cameron, designated by Muesebeck and Walkley (1951). Synonymized by Dodd (1920).

1956a. *Ivondrella* Risbec : 257. Type : *Ivondrella seyrigi* Risbec, by monotypy. Synonymized by Masner (1976b).

Diagnosis : Black and robust body; heavily sculptured throughout. Frons with a deep depression, margined with a keel. Vertex flat, posterior margin acute. Antenna with 12 segments in males and females. Eyes bare. Mesonotum often with notauli, only rarely absent; median furrow at times replaced by a longitudinal keel or indicated by a row of small punctae or absent. Metanotum often with two spines, rarely with one spine or blunt bulge. Vein *m* dotted, *stg* many times longer than *m*. Hindwing with *sm* complete. Females with 6 tergites and males with 7 tergites, metasomal tip often bispinose.

Distribution : Afrotropical, Nearctic, Australian, Neotropical, Oriental and Palearctic Regions.

Discussion : This genus closely resemble *Apegus* Foerster and *Oxyscelio* Kieffer (*Campotelia* Kieffer) but differs in shape of vertex and occiput and also in metasomal tip being mostly bispinose.

Status in India and Kerala : A total of 7 species have hitherto been reported from India (Mani and Sharma, 1982; Narendran *et al.*, 2001) of which two are from Kerala, namely, *B. unidentatus* Narendran and *B. dunensis* Narendran.

Remarks : The diagnosis given here is based on the original descriptions.

Key to species of *Baryconus* Foerster of India
(Adapted from Narendran *et al.*, 2001b)

1. Metanotum posteriorly unarmed 2
 - Metanotum posteriorly armed with a median tooth or with two submedian teeth 3
2. Gena, vertex and frons smooth; eyes densely pubescent; ocellocular space equal to ocellar diameter ***B. marattus*** Mani
 - Gena, vertex and frons punctate; eyes bare; lateralocellus nearly touching eye border
..... ***B. gravelyi*** (Mani)
3. Metanotum with two submedian tooth posteriorly 4
 - Metanotum with a single tooth posteriorly (in *B. bharatus* the tip of tooth slightly bilobed)
..... 5
4. Frons with a median carina in front of front ocellus, diverging and joining either side of scrobe margin; posterolateral corners of T6 not produced into spines
..... ***B. keralensis*** Narendran
 - Frons in front of front ocellus with 3 or 4 carinae medially; posterolateral corners of T6 produced into very short spines
..... ***B. diversus*** Saraswat
5. Mesonotum medially with a median longitudinal ridge; the single median tooth of metanotum slightly bilobed at apex
..... ***B. bharatus*** Saraswat
 - Mesonotum medially with a median longitudinal row of pits; median tooth of metanotum not bilobed at apex 6
2. Antennal scape black; coxae black; eyes bare; prepectus distinct; posterior margin of T6 with two spines ***B. dunensis*** Mukerjee
 - Antennal scape yellowish brown; coxae yellowish brown; eyes sparsely pubescent; prepectus indistinct; posterior margin of T6 with two lateral and one median spine
..... ***B. unidentatus*** Narendran

Species Diagnosis

1. *Baryconus keralensis* Narendran

2001b. *Baryconus keralensis* Narendran, *J. Ecobiol.*, 13(4) : 264-268.

Length = 3 mm.

Female : Head black. Body liver-brownish black. Wings hyaline.

Eyes bare. Malar sulcus distinct. OOL 0.6x OD. Frons with a median carina in front of ocellus diverging and joining either side of scrobe margin; median carina of frontal scrobe without a distinct inverted Y shaped carina. Notauli present, not very deep. Metanotum with two large stout submedian teeth and a row of deep close pits. *m* almost subequal to *stg*; *pm* more than 2.5x *stg*. Posterolateral corners of T6 not produced into spines.

Male : Unknown.

Type locality : Attappady (Palghat, Kerala)

2. *Baryconus unidentatus* Narendran

2001b. *Baryconus unidentatus* Narendran, *J. Ecobiol.*, 13(4) : 261-268.

Length = 2.57 mm.

Female : Head and body black. Wings hyaline. Eyes sparsely pubescent. OOL 0.4x OD. Frons in front of front ocellus with a few faint carinae; median carina of frontal scrobe with an inverted Y shaped carina; notauli distinct; skaphion absent; prepectus indistinct. Metanotum armed posteriorly with a pointed tooth, not bilobed at apex, but with a row of deep close pits. *stg* longer than *m*, *pm* more than 3x *stg*. T6 produced into two lateral and a median spine.

Male : Unknown.

Type locality : Calicut University Campus (Malappuram, Kerala).

28. Genus *Calliscelio* Ashmead (Fig. 69)

1893. *Calliscelio iaticintus* Ashmead *Bull U.S. Nat. Mus.*, 45 : 209, 218.

1908b. *Ceratotelia* Kieffer : 121, 136. Type : *Anteris nigriceps* Ashmead, designated by Kieffer (1926). Keyed. Synonymized by Masner (1976b).

1908b. *Prosanteris* Kieffer : 121, 136. Type : *Anteris nigriceps* Ashmead, designated by Kieffer (1910b). Synonymized with *Ceratoteleia* Muesebeck (1958).

1914a. *Uroscelio* Kieffer : 291. Type : *Uroscelio luteipes* Kieffer, by Monotypy and original designation. Synonymized by Masner (1976b).

1917a. *Mesoteleia* Kieffer : 51. Type : *Mesoteleia pallida* Kieffer, by monotypy and original designation. Synonymized by Masner (1976b).

1926. *Glyptoteleia* Kieffer : 272, 487. Type : *Baryconus bisulcatus* Kieffer, by monotypy. Synonymized by Masner (1976b).

1926. *Baryteleia* Kieffer : 273, 544. Type : *Macroteleia nigriceps* Kieffer, by original designation. Synonymized by Masner (1976b).

Diagnosis : Body black to pale blackish brown. Head transverse and globose. Frons with a weakly indicated scrobe. Eyes bare. Antenna in males and females 12 segmented, in females with often a distinct 6 segmented club. Skaphion absent. Notauli distinct. Metanotum never pointed,

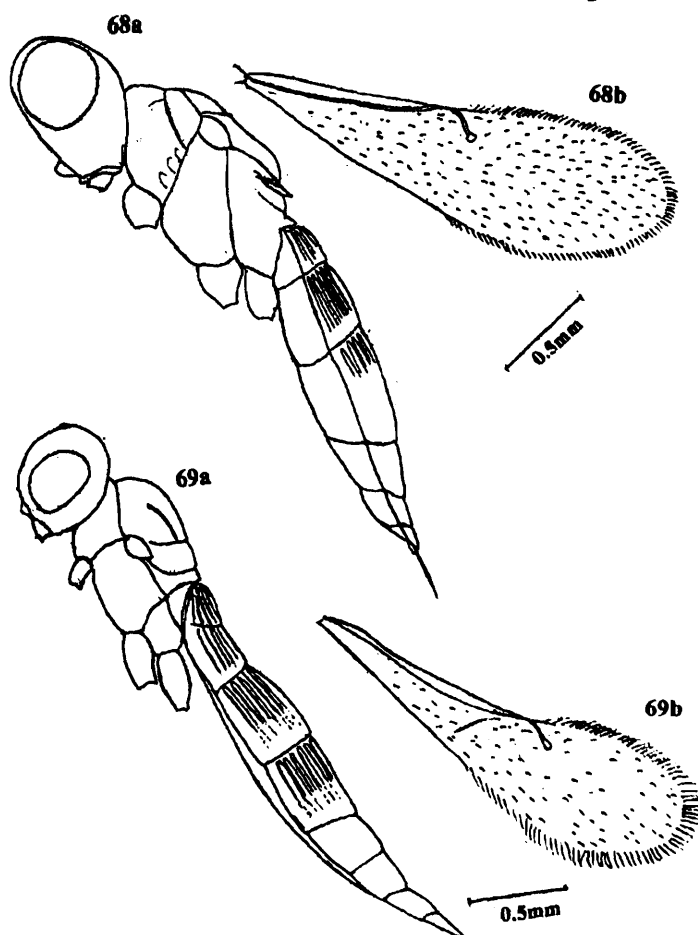


Fig. 68. *Baryconus* Foerster
a. Body (Profile); b. Forewing.

Fig. 69. *Calliscelio* Ashmead
a. Body (Profile); b. Forewing.

bispinose, at the most with a lamella. Propodeum unarmed. Vein *m* punctiform, or even as long as *stg*. *Basalis* often faint. Metasoma fusiform; basal metasomal tergites with longitudinal striations; T2 in female humped, fitting in lower emargination of propodeum.

Distribution : Afrotropical , Oriental, Australian, Neotropical, Nearctic and Palearctic Regions.

Discussion : This genus resembles *Calotelea* Westwood and *Probaryconus* Kieffer. It differs from *Calotelea* in the absence of a skaphion and from *Probaryconus* in having an unarmed propodeum.

Status in India and Kerala : A total of 9 species is reported from India (Mani and Sharma, 1982) of which, Narendran and Ramesh Babu (1996-1997) reports 6 species from Kerala.

Remarks : The collection at hand comprises of a species complex of atleast 3 species. Detailed species analyses are yet to be made.

Collection locality included Calicut, Malappuram (Nilambur and Chungathara), Trichur (Peechi) and Kannur (Kannavam and Thiruvangad) districts of Kerala.

Key to Indian species of *Calliscelio* Ashmead (Adapted from Narendran and Ramesh Babu 1996-97)

1. Metanotum bidentate 2
— Metanotum not as above 3
2. Mesoscutum closely punctuate; forewing with *basalis* absent; *pm* length less than 1.5x length of *stg*
..... *C. coromandelensis* Sharma
— Mesoscutum smooth; forewing with *basalis* indicated; *pm* 2x or a little more than 2x longer than *stg* *C. orientalis* Sharma
3. T2 completely striate, striations reaching or almost reaching posterior of T2 4
— T2 not completely striate as above, striations mostly confined to basal half of T2, not at all reaching posterior border 5

4. Hind ocelli contiguous with eye margin; head black; eyes bare; dorsal length of metanotal lamina subequal to maximum dorsal length of scutellum
C. malabaricus Narendran and Rameshbabu
— Hind ocelli distinctly separated from eye border; head honey brown; eyes pubescent; maximum dorsal length of metanotal lamina much less than the maximum dorsal length of scutellum
C. emarginatus Narendran and Rameshbabu
5. Upper frons with a transverse carina ; head and thorax black; abdomen liver-brownish black
C. carinatus Narendran and Rameshbabu
— Upper frons without transverse carina, head and body colour may or may not be as above 6
6. Female: striae of T2 not of equal length 7
— Male : striae of T2 subequal in length
..... *C. coorgensis* Sharma
7. Eyes sparsely pubescent; head and thorax black; abdomen liver brownish black
..... *C. indicus* Narendran and Rameshbabu
— Eyes bare; colour not exactly as above, partly or completely different 8
8. T1 with a raised median triangular, jet black area, metanotum narrow, produced posteriorly into a transparent lamina containing six longitudinal carinae; head pale brownish yellow
C. agaliensis Narendran and Rameshbabu
— T1 without such triangular area as above; metanotum produced posteriorly into a blackish brown lamina containing pits; head black *C. longicarinatus* Narendran and Rameshbabu

Species Diagnosis

1. *Calliscelio agaliensis* Narendran and Ramesh Babu

1996-97. *Calliscelio agaliensis* Narendran and Ramesh Babu.
J. Zool. Soc. Kerala, : 2-4 : 1-10.

Length = 3.03 mm.

Female : Head and body pale brownish yellow. Wings hyaline.

Scrobe indistinct. OOL : POL = 1 : 12.5. Maximum diameter of eye 2x length of malar groove. Notauli faintly indicated. Metanotum produced posteriorly into a transparent lamella, with 6 longitudinal carinae. Proportions of forewing veins being $sm : m : pm : stg = 58 : 5 : 7 : 5.6$; *basalis* absent. T1 with a basal triangular median raised area, projecting onto propodeum. T1 and T2 fully striated, T3 only striated laterodorsally.

Male : Unknown.

Type locality : Agali (Palghat, Kerala).

2. *Calliscelio carinatus* Narendran and Ramesh Babu

1996-97. *Calliscelio carinatus* Narendran and Ramesh Babu. *J. Zool. Soc. Kerala*, 4-5 : 1-10.

Length = 2.6 mm

Female : Head and body brownish black. Wings hyaline.

Vertex and frons with granulate sculpture. Scrobal area with fine striae on either side.

OOL : POL = 1 : 1.4. Maximum diameter of eye 3x length of malar groove. Notauli distinct. Metanotum produced posteriorly into a transverse plate. Proportions of forewing veins being $sm : m : pm : stg = 53 : 3 : 7.5 : 8$. *Basalis* absent. T1 with a median horn fitting onto propodeum. T1 and only T2 striate, rest smooth.

Male : Unknown.

Type locality : Calicut University Campus (Malappuram, Kerala).

3. *Calliscelio emarginatus* Narendran and Ramesh Babu

1996-97. *Calliscelio emarginatus* Narendran and Ramesh Babu. *J. Zool. Soc. Kerala*, 5-6 : 1-10.

Length = 2.35 mm.

Female : Head and body pale black to honey brown. Wings hyaline.

Scrobal area with faint cross striae. OOL : POL = 1.6 : 5. Maximum diameter of eye 2.2x length of malar groove. Notauli faintly indicated. Metanotum produced into a median cross lamina. Proportions of forewing veins being $sm : m : pm : stg = 42 : 3 : 10.5 : 7.5$. *Basalis* absent. T1 with a median horn fitting onto propodeum. T1, T2, T3 striate, T4 and T5 laterally striate, rest smooth.

Male : Unknown.

Type locality : Calicut University Campus (Malappuram, Kerala).

4. *Calliscelio indicus* Narendran and Ramesh Babu

1996-97. *Calliscelio indicus* Narendran and Ramesh Babu. *J. Zool. Soc. Kerala*, 6-7 : 1-10.

Length = 2.63 mm.

Female : Head and body blackish brown. Wings hyaline.

Scrobe smooth medially. OOL negligible; POL = 13.5. Maximum diameter of eye 2.5x length of malar groove. Notauli distinct. Metanotum produced into a transverse plate medially. Proportions of forewing veins being $sm : m : pm : stg = 60 : 5 : 13 : 9$. *Basalis* absent. T1 with a median horn fitting onto propodeum. Posterior T1 smooth and not striate. T2 striate basally.

Male : Unknown.

Type locality : Calicut University Campus (Malappuram, Kerala).

5. *Calliscelio longicarinatus* Narendran and Ramesh Babu

1996-97. *Calliscelio longicarinatus* Narendran and Ramesh Babu. *J. Zool. Soc. Kerala*, 7-8 : 1-10.

Length = 2.17 mm.

Female : Head and body, black to pale brown. Wings hyaline. Scrobe not distinct. OOL: POL = 1:1.4. Maximum diameter of eye 2x length of malar groove. Notauli distinct. Metanotum

produced into a lamina with pits. Proportions of forewing veins being $sm : m : pm : stg = 55 : 7 : 11 : 9$. *Basalis* absent. T1 not forming a tubercle, only a bit raised. T1 fully and T2 basally striate; rest smooth.

Male : Unknown.

Type locality : Chandakunnu (Malappuram, Kerala).

6. *Calliscelio malabaricus* Narendran and Ramesh Babu

1996-97. *Calliscelio malabaricus* Narendran and Ramesh Babu. *J. Zool. Soc. Kerala*, 8-9 : 1-10.

Length = 2.35 mm.

Female : Head and body pale black to yellowish brown.

Scrobe indistinct. OOL negligible; POL=16. Maximum diameter of eye 2.5x length of malar groove. Notauli distinct. Metanotum produced into a lamella posteriorly. Proportions of forewing veins being $sm : m : pm : stg = 42 : 4 : 6 : 6$. T1 with a short horn fitting onto median propodeum. *Basalis* absent. T1 not forming a tubercle, only a bit raised; T2 and T3 striate; T5-T6 rugoso-punctate.

Male : Unknown.

Type locality : Chandakunnu (Malappuram, Kerala).

29. Genus *Calotelea* Westwood

1837. *Calotelea aurantia* Hope in Hope : 55.

1910c. *Lamproteleia* Kieffer : 293. Type : *Lamproteleia fasciatipennis* Kieffer, by original designation. Synonymized by Masner (1965).

1926. *Pegoteleia* Kieffer : 272, 510. *Baryconus calopterus* Kieffer, by original designation. Synonymized by Masner (1976b).

Diagnosis : Body black; slender, with coriaceous sculpture. Frons without scrobe. Eyes finely hairy. Mandibles tridentate. Antenna in both sexes 12 segmented; in females with 5 or 6

segmented club. Skaphion often distinct. Notauli generally absent. Metanotum unarmed or lamellate or bidentate. Forewings banded at times, *m* as long as *stg*. Metasoma fusiform. T2 often with a tubercle.

Distribution : Afrotropical, Oriental, Australian, Neotropical, Nearctic and Palearctic Regions.

Discussion : This genus is related to *Opisthacantha* Ashmead but differs in metasoma without a median spine as well as slender body. From *Stylotelia* Kieffer, it differs in propodeum being unarmed in males and in notauli being rarely present.

Status in India and Kerala : From India 3 species and from Kerala, one species namely *C. tanugatra* Narendran has been reported so far. (Mani and Sharma, 1982; Narendran, 1998)

Remarks : Species level studies are yet to be made.

Key to Indian species of *Calotelea* Westwood (Modified from Narendran, 1998)

1. Forewing with one or two blackish bands .. 2
— Forewing without any band 3
2. Eyes naked; gena longitudinally striate; hind ocelli contiguous with eyes; forewing with obscurely brown transverse band extending from a little before *m* to hind margin; head blackish brown *C. auriventria* Sharma
- Eyes with minute hairs; gena with rugose sculpture; hind ocelli distinctly separated from eye margin; forewing with a median blackish brown band surrounded basally and apically by hyaline patches, apical and basal part infumate; head pale brownish yellow
..... *C. tanugatra* Narendran
3. Vertex smooth and shiny; gena longitudinally striate; metanotum and propodeum unarmed; general body colour yellowish brown except for the black head; abdomen yellowish brown with tubercle, T6 and T7 blackish brown ...
..... *C. immaculata* Sharma

— Vertex coarsely and umbilicately punctuate; gena closely punctuate; metanotum bidentate behind; general body colour reddish brown including scape; head somewhat dark on ocellar area; abdomen somewhat darkened especially at tip *C. indica* Mani

Species diagnosis

1. *Calotelea tanugatra* Narendran

1998. *Calotelea tanugatra* Narendran. *Proc. Zool. Soc. Calcutta*. 51(1) : 70-74.

Length = 2.32 mm.

Female : Head and body pale brown to brownish black. Eyes with minute hairs. Scrobe not distinct. OD 2x OOL. AF 1.1.4.6. F1 longest, next to scape. Notauli distinct. Propodeum medially excavate to hold dorsal horn on T1. Forewing with a median blackish brown band with basal and apical hyaline patches; basal part infumate; T1 and its horn striated, T2 striate only basally.

Male : Unknown.

Type locality : Calicut University Campus (Malappuram, Kerala).

30. Genus *Dichoteleas* Kieffer

1907. *Dichoteleas* Kieffer, *Berl. Ent. Z.*, 51 : 297; Kieffer, 1926, *Das Tierreich*, 48 : 885.

Diagnosis : Body robust, sometimes with a metallic tinge. Eyes large and naked. Mandibles subtridentate. Frons without depression, strongly concave. A3 in female very long, club semi-abrupt 7 segmented. Prepectus present. Skaphion absent. Scutellum with two strong teeth laterally. Metanotum tooth pointed, smaller than scutellum. Vein *m* punctiform, *pm* very long. Metasoma spatulate, without apical teeth or points.

Distribution : Afrotropical, Australian and Oriental Regions.

Status in India and Kerala : Only one species of this genus namely *Dichoteleas indica* Saraswat (Saraswat, 1982) is hitherto described from India.

Species Diagnosis

1. *Dichoteleas indica* Saraswat

1982. *Dichoteleas indica* Saraswat. *Rec. zool. Surv. India*, 79 : 343-358.

Male : Eyes not completely naked; head with three strong carinae starting from ocelli and extending in front to entire length; OOL 0.25x OD. Notauli complete. Median longitudinal carinae along with other carinae, present between notauli; scutellum with 4 spines and 1 short tooth; *pm* 4x *stg*; hind metatarsus shorter than rest of tarsi; T1-T4 longitudinally striate. T2 longest.

Type locality : Moozhiyar (Idukki, Kerala).

Remarks : This genus is not represented in the present collection; diagnosis is based on the original description.

31. Genus *Gryon* Haliday (Fig. 70)

1833. *Gryon* Haliday. Type : *Gryon misellum* in *Ent. Mag.*, 1 : 271.

1856. *Acolus* Foertser : 100, 102. Type : *Acolus opacus* Thomson, designated by Ashmead (1903). Synonymized by Masner (1961).

1856. *Hadronotus* Foerster : 101, 105. Type : *Hadronotus exscultus* Foerster. Synonymized by Nixon (1936), Masner (1961).

1863. *Muscidea* Motschoulsky. Type : *Muscidea pubescens* Motschoulsky, by monotypy. Synonymized by Masner (1976b).

1908b. *Plastogryon* Kieffer : 119, 141. Type : *Plastogryon* Forester Kieffer, designated by Brues (1908). Synonymized by Maneval (1940).

1908b. *Psilacolus* Kieffer : 179, 180. Type : *Acolus xanthogaster* Ashmead, designated by Kieffer (1926), Synonymized by Masner, in Krombein and Burks (1967).

1912b. *Holacolus* Kieffer : 89, 106, Type : *Acolus opacus* Thomson, designated by Muesbeck and Walkley (1956). Synonymized by Masner (1961).

1913a. *Platytelia* Dodd : 131, 153. Type : *Platytelia latipennis* Dodd by original designation. Synonymized by Galloway, in Galloway and Austin (1984).

1913a. *Telenomoides* Dodd : 158, 168. Type : *Telenomoides flavipes* Dodd by original designation. Synonymized by Dodd (1914d).

1913. *Notilena* Brethes : 84. Type : *Notilena galladoi* Brethes, by Monotypy and original designation. Synonymized

implicitly by DeSantis in DeSantis and Easquivel (1966).

- 1913e. *Plesiobaesus* Kieffer : 229, 282. Type : *Plesiobaesus hospes* Kieffer, by monotypy. Synonymized by Mineo (1979).
- 1914b. *Austroscelio* Dodd : 93. Type : *Sparasion nigricoxa* Dodd, by original designation. Synonymized by Galloway, in Galloway and Austin (1984).
- 1917b. *Hadronotellus* Kieffer : 341. Type : *Hadronotellus pedester* Kieffer, by monotypy and original designation. Synonymized by Kieffer (1926).
1926. *Hadrophanurus* Kieffer : 15, 130. Type : *Telenomus pennsylvanicus* Ashmead, by monotypy. Synonymized by Masner (1961).
1926. *Heterogryon* Kieffer : 271, 446, 448. Type : *Plastogryon sagax* Kieffer, designated by Muesebeck and Walkley (1956). Synonymized by Masner (1961).
1927. *Syntelesia* Fouts : 128. Type : *Syntelesia coracina* Fouts, by monotypy and original designation. Synonymized by Masner, in Krombein and Burks (1967).
- 1966b. *Pannogryon* Szabo : 422, 435. Type : *Pannogryon szelenyii* Szabo, by original designation. Synonymized by Masner (1976b).
- 1966b. *Sundholmia* Szabo : 422, 438. Type : *Sundholmia nitens* Szabo, by monotypy and original designation. Synonymized by Mineo (1980b).
- 1966b. *Masneria* Szabo : 422, 442. Type : *Hadronotus lymantriae* Masner, by monotypy and original designation. Synonymized by Masner (1976b).
1980. *Exon* Masner : 12, 22. Type : *Exon caliciformicum* Masner, by original designation. Synonymized by Mineo (1980a).

Diagnosis : Body black, short, robust and plump. Head and body with minute sculpture. Head transverse. Antenna 12 segmented in both

sexes, in females with 6-7 segmented club. Scrobe, orbital carina and genal carina distinct. Skaphion, prepectus and notauli absent. Scutellum unarmed; metanotum and propodeum with or without tubercles. Vein *m* often longer than *stg*. Metasoma usually rounded. T2 often largest, T3 never as long as T2.

Distribution : Afrotropical, Oriental, Australian, Neotropical, Nearctic and Palearctic Regions.

Discussion : Being one of the largest genera of Scelioninae, this genus forms a natural transition between Teleasinae and Scelioninae.

Status in India and Kerala : Three species are hitherto reported from India.

Since ubiquitous, *Gryon* could be collected in plenty from all districts of Kerala.

Studies at the species level are yet to be made. Preliminary studies find many species being represented in the collection.

32. Genus *Heptascelio* Kieffer (Fig. 71)

- 1916b. *Heptascelio* Kieffer : 58. Type : *Heptascelio ligens* Kieffer by monotypy and original designation.

Diagnosis : Body black and robust with rich sculpture. Frons with a deep scrobe, with carinate upper margin. Frons and vertex deeply pitted. Antenna 12 segmented in both sexes, interantennal projection prominent; prepectus well developed; Skaphion absent; notauli absent. Scutellum with a bidentate appearance; metanotum with a sharp median spine; propleuron with deep anterior depression. *m* not touching front margin of forewing; hindwings with no veins, but short stem basally. Metasomal tergites with deep longitudinal striae.

Distribution : Oriental, Australian and Ethiopian Regions.

Discussion : This genus is related to *Oreiscelio* Kieffer and to *Scelio* Latreille, but differs mainly in having an apically bidentate metanotal projection.

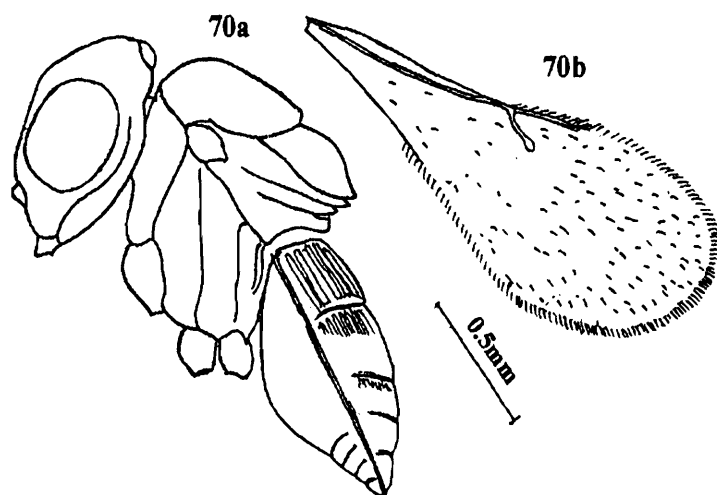


Fig. 70. *Gryon* Haliday
a. Body (Profile); b. Forewing.

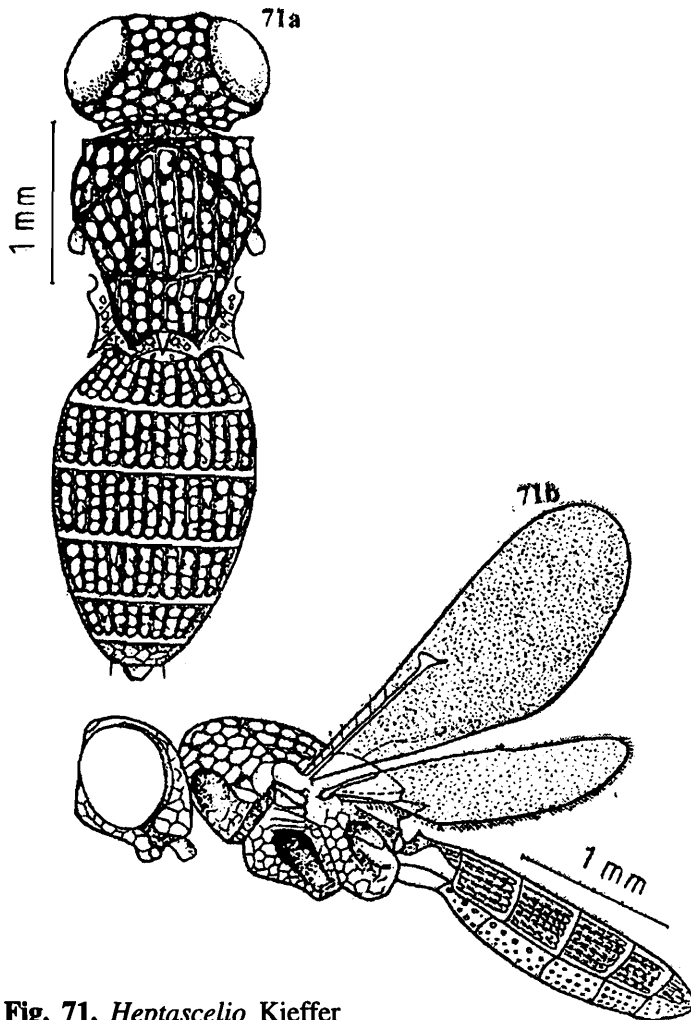


Fig. 71. *Heptascelio* Kieffer
a. Body (D.V.); b. Body (Profile);

Status in India and Kerala : Of the three species hitherto known from the world, two species namely *H. punctisternus* Narendran and Ramesh Babu and *H. striatosternus* Narendran and Ramesh Babu are recorded from Kerala.

Key to Indian species of *Heptascelio* Kieffer
(Modified from Narendran and Ramesh Babu, 1996)

1. Mesonotal sternites distinctly striate; longest hair on distal end of pedicel less than 0.2x length of F1; scape 3.5x as long as pedicel; distance between front ocellus and scrobe a little more than 1.3x distance between front ocellus and eye margin..... *H. striatosternus*
Narendran and Ramesh Babu
- Metasomal sternites with distinct small setigerous pits, not distinctly striate; longest hair on pedicel 0.75x length of F1; scape 3.2x as long as pedicel; distance between front ocellus and scrobe 1.06x distance from front ocellus and eye margin.....
..... *H. punctisternus* Narendran and Ramesh Babu

Species Diagnosis

1. *Heptascelio punctisternus* Narendran and Ramesh Babu

1996. *Heltascelio punctisternus* Narendran and Ramesh Babu
Uttar Pradesh J. Zool., 16(2) : 89-93.

Length = 3.4 mm

Female : Head and body black. Antenna brown. Wings hyaline. Vertex and occiput with deep, close setigerous pits; POL 4.6x OOL; OD 2.5x OOL. Scrobe smooth and shiny without punctures and striations. Antenna uniformly thick only from F5 to F8; F9 and F10 tapering. Mesoscutum with deep close pits, interstices not distinctly carinate in most parts. Metanotum with a median sharp spine. Posterolateral corners of propodeum prominent and acute. Metasomal sternites with distinct small setigerous pits without striations, interstices smooth and broader than diameter of a pit, striate, interstices smooth.

Male : Unknown.

Type locality : Calicut University Campus.
(Malappuram, Kerala)

Remarks : This species is not represented in the present collection, so diagnosis is based on the original description.

2. *Heptascelio striatosternus* Narendran and Ramesh Babu

1996. *Heltascelio striatosternus* Narendran and Ramesh Babu.
Uttar Pradesh J. Zool., 16(2) : 89-93.

Length = 3.4 mm.

Female : Body black, antenna brown to blackish brown. Wings hyaline with a brown tinge. Vertex and occiput with deep close setigerous pits. POL 4.6x OOL; OD a little more than 1.5x OOL. Scrobe only partly smooth and shiny, basal and median region irregularly cross striate. Antenna uniformly thick from F3 to F9; only F10 tapering. Mesoscutum with deep close pits, interstices narrow and smooth; distinctly carinate in most parts. Metanotum with a median sharp spine. Posterolateral corners of propodeum more pointed and acute than *H. punctisternus*. Metasomal

sternites with distinct striations, interstices smooth, but with rounded pits between striae.

Male : Unknown.

Type locality : Kuriarkutty (PWLS, Palghat, Kerala).

Material examined : One female collected from Vayalar (Alleppy, Kerala), by T. C. Narendran and party, on 4-vi-1987.

33. Genus *Macroteleia* Westwood (Fig. 72)

1835. *Macroteleia* Westwood. *Proc. Zool. Soc. London*, 3 : 70. Kieffer, 1926, *Das Tierreich*, 48 : 520.

1856. *Baeneura* Foerster : 11, 102. Type : *Baeneura floridana* Ashmead, designated by Muesebeck and Walkley (1956). Synonymized by Muesebeck and Walkley (1956)

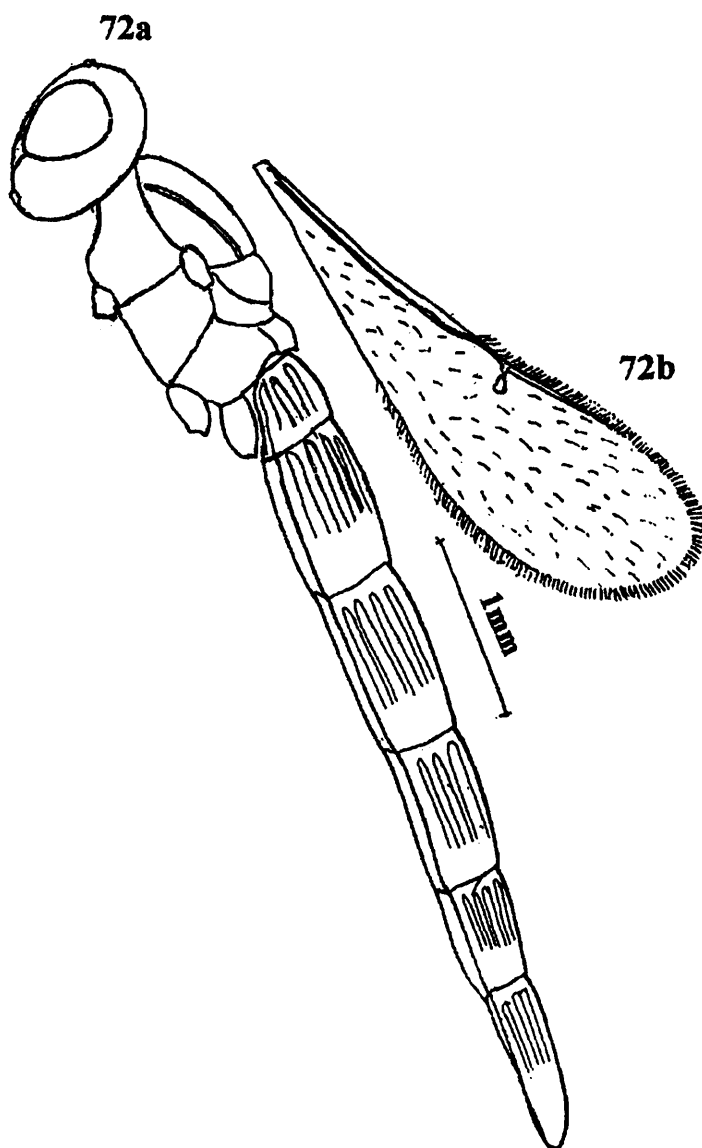


Fig. 72. *Macroteleia* Westwood
a. Body (D.V.); b. Forewing.

1908b. *Prosapegus* Kieffer : 121, 147. Type : *Anteris elongate* Ashmead, by monotypy and original designation. Synonymized by Masner (1964).

1926. *Stictoteleia* Kieffer : 272, 546. Type : *Macroteleia virginensis* Ashmead, by original designation. Synonymized by Masner (1964).

Diagnosis : One of the longest and largest Scelionids, (3mm to nearly 9mm). Body pale brown to black. Slender and gracile forms. Head globose. Eyes bare; scrobe absent. Antenna with 12 segments in both sexes. In females with a 6-7 segmented clava, in males filiform. Mandibles bidentate. Pronotum well visible. Notauli present. Scutellum, metanotum and propodeum unarmed, atmost a carina present. Metasoma long, distinctly longer than mesosoma, tapering towards lower tip; tergites with distinct longitudinal striae. Forewing with *sm*, *m*, *stg*, and a long *pm*. T2 and T3 often largest. Females with 6 tergites.

Distribution : Afrotropical, Australian, Nearctic, Neotropical, Oriental and Palearctic Regions.

Discussion : Often parasitic in tettigonid eggs.

This genus closely resembles *Triteleia* Kieffer, but differs mainly in the following, other than many metasomal characters:

— Body slender and often spindle-shaped. (In *Triteleia* body strongly built and robust).

— Propodeum unarmed. (In *Triteleia*, propodeum often armed, with teeth or protruberances).

— Wings reach only till two third metasomal length. (In *Triteleia* wings reach the tip of metasoma).

— Vein *m* elongate or atleast as long as *stg*. (In *Triteleia*, *m* at times even shorter than *stg*).

Status in India and Kerala : 4 species are altogether reported from India (Mani and Sharma) and one species from Kerala. Studies at the species level are yet to be made.

Collection localities included Alleppy, Trichur, Malappuram, Calicut and Kannur districts of Kerala.

Species Diagnosis

1. *Macroteleia lamba* Saraswat and Sharma

1978. *Macroteleia lamba* Saraswat and Sharma. *Mem. Sch. Ent.*, 5 : 13.

Length = 5.2-6.1 mm.

Female : Body black, metasomal tergite often brownish black. Head with deep and close punctae; frons slightly impressed and longitudinally carinate in the median. Mesonotum with a median shallow depression and complete notauli; propodeum with a pair of median plate-like projection; *pm* long, $2xm$, *m* more than $2x$ *stg*, T1-T4 with long longitudinal striations, T5-T6 weakly striate.

Male : Unknown.

Type locality : Kasargod, Kerala.

Remarks : This species is not represented in the present collection, the diagnosis provided is based on the original description.

34. Genus *Opisthacantha* Ashmead (Fig. 73)

1893. *Opisthacantha* Ashmead, Type : *Opisthacantha mellipes* : *Bull.*, U.S. Nat. Mus., 45 : 209, 211, 221.

1893 *Raia* Ashmead : 221. Type : *Opisthacantha mellipes* Ashmead, by citation as a synonym of *Opisthacantha* Ashmead.

1893. *Lapitha* Ashmead : 209, 211, 222. Type : *Lapitha spinosa* Ashmead, by monotypy and original designation. Synonymized by Masner (1976b).

1908b. *Protrimorus* Kieffer : 146. Type : *Trimorus americanus* Ashmead, by monotypy and original designation. Synonymized by Masner (1964a).

1908b. *Prolapitha* Kieffer : 117. Type : *Lapitha nigriceps* Kieffer, by monotypy and original designation. Synonymized by Masner (1976b).

1910e. *Acanthoteleia* Kieffer : 311. Type : *Acanthoteleia nigriclavis* Kieffer, by monotypy. Synonymized by Masner (1976b).

1912a. *Acantholapitha* Cameron : 70. Type : *Acantholapitha nigricollis* Cameron, first included species. Synonymized by Masner (1976b).

1917a. *Trissoscelio* Kieffer : 52. Type : *Trissoscelio nigriceps* Kieffer, by original designation. Synonymized by Masner (1976b).

1933. *Gita* Nixon : 291, 309. Type : *Gita infortunata* Nixon, by monotypy and original designation. Synonymized by Masner (1976b).

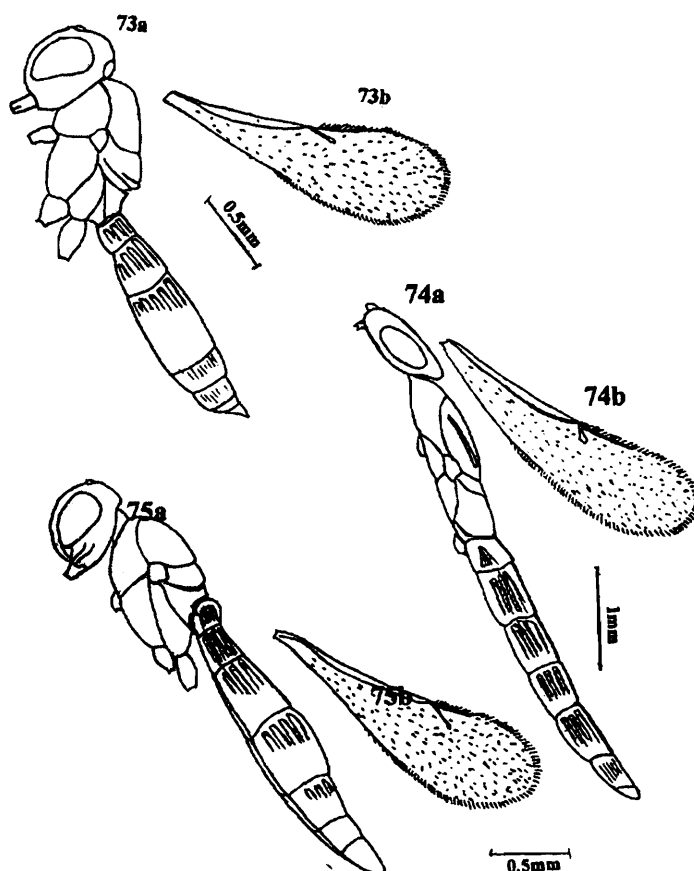


Fig. 73. *Opisthacantha* Ashmead
a. Body (D.V.); b. Forewing.

Fig. 74. *Platyscelio* Kieffer
a. Antenna; b. Forewing.

Fig. 75. *Probaryconus* Kieffer
a. Antenna; b. Forewing.

Diagnosis : Body pale black to brown. Frons rarely with depression. Mandibles tridentate. Eyes finely hairy. Skaphion well developed; notauli present or absent. Vertex without carina. Scutellum unarmed. Metanotum produced into thin foliaceous plate or spine. Propodeum unarmed. Vein *m* shorter than *stg*; *pm* longer than *stg*. Metasoma flattened, spatulate, elongate, pointed apically in females. T1 usually unarmed, but in some species with a moderate hump.

Distribution : Afrotropical, Australasian, Oriental, Neotropical, Nearctic and Palearctic Regions.

Discussion : This genus is related to *Duta* Nixon, *Calotelea* Westwood, *Stylotelia* Kieffer and also to *Anteris* Foerster, *Psilanteris* Kieffer and partly to *Calliscelio* Ashmead.

Status in India and Kerala : 4 species are reported from India and 2 species namely *Opisthacantha keralensis* Sharma and *O. indica* Mani, from Kerala.

Species Diagnosis

1. *Opisthacantha keralensis* Sharma

1978. *Opisthacantha keralensis* Saraswat and Sharma. *Mem. Sch. Ent.*, 5 : 44.

Length = 1.95-2.25 mm

Female : Body black. Vertex finely reticulate, not carinate; scrobe absent, frons with fine punctae, gena longitudinally striate; mesosoma matt; notauli complete; metanotum with 1 median spine; vein *m* punctiform; *pm* 2.7x *stg*, T1 without tubercle; T1 and T2 longitudinally striate; T3 longest and with faint striae.

Type locality : Kerala.

Remarks : This species is not represented in the present collection. The diagnosis given is based on the original description.

2. *Opisthacantha indica* Mani

1975. *Opisthacantha indicus* Mani. *Mem. Sch. Ent.*, 4 : 66.

Length = 2 mm

Male and female : Body deep brown. Head finely punctuate. In females, scape 5x as long as thick; club subequal to scape. Metanotum with a distinct club; T1 and T2 longitudinally striate. Vein *pm* longer than *stg*.

Type locality : Mahabaleswar.

Material examined : Two males and two females collected from Calicut University Campus (Malappuram, Kerala) by T.C. Narendran and party on 5-vi-1991.

35. Genus *Platyscelio* Kieffer (Fig. 74)

Platyscelio Kieffer, 1905 : Type : *Platyscelio pulchricornis* in *Ann. Mus. Civ. Stor. Nar. Geneova* 2(2) : 11; Kieffer, 1926, *Das Tierreich*, 48 : 555.

Diagnosis : Body black. Smooth and shiny; extremely flattened. Mandibles sub-tridentate; OOL large, ocelli situated at top of vertex. Scape expanded into an almost triangular piece, more pronounced in females. Antennal club often 5

segmented; prepectus and skaphion absent; metanotum often with notauli, though faint or incomplete at times; scutellum narrow and short. Metanotum unarmed. Hindwings with *sm* complete. Metasoma strongly compressed dorsoventrally and elongate.

Distribution : Widely distributed in Afrotropical, Australian and Oriental Regions.

Discussion : This genus is unique among Scelioninae due to a dorsoventral flattened body, absence of prepectus and presence of a triangular scape in female. In males, antenna without a club and scape not expanded into a triangular plate.

Kozlov (1970) reports these as parasitic in Tettigonid eggs.

Status in India and Kerala : Two species viz. *Platyscelio punctatus* Kieffer and *P. abnormis* Crawford are known from India.

Species Diagnosis

1. *Platyscelio abnormis* Crawford

1910. *Platyscelio abnormis* Crawford, *Proc. U.S. Nat. Mus.* 38 : 119-133

Length = 3.3 mm.

Female : Head and mesosoma black; metasoma deep brown to black. Antenna brown to brownish yellow. Wings hyaline.

Head depressed and transverse; occiput and vertex with striations medially; frons with a median longitudinal groove extending throughout from toruli to front ocellus. OOL : OD : POL = 8 : 1 : 7. Mesosoma and metasoma strongly flattened dorsoventrally. Mesonotum with deep and distinct notauli. Propodeum with a posterior notch. Forewing without *pm*. T1-T5 with faint longitudinal striae.

Material examined : Two females collected from Calicut University Campus (Malappuram, Kerala) by T.C. Narendran and party, on 1-iii-1988.

One male collected from Peruvannamuzhi (Calicut, Kerala), by T.C. Narendran and party, on 15-ii-1989.

36. Genus *Probaryconus* Kieffer (Fig. 75)

- 1908b. Kieffer. Type : *Baryconus (Probaryconus) spinosus* Kieffer, in *Ann. Soc. Sci. Bruxelles Mem.*, 32 : 118, 165, 168.
- 1910b. *Procacus* Kieffer : 319. Type : *Procacus striatigena* Kieffer, by monotypy. Synonymized by Masner (1976b).
- 1913b. *Neurocacus* Kieffer : 428. Type : *Neurocacus philippinnensis* Kieffer, by monotypy and original description. Synonymized by Kieffer (1926).
- 1913e. *Amblyconus* Kieffer Type : *Amblyconus quadridens* Kieffer, Synonymized by Masner (1965).

Diagnosis : Body pale black to pale brown and yellowish brown. Head transverse and globose. Antenna with 12 segments in both sexes; a club distinct in females. Scrobe at times weakly indicated on frons; smooth and shiny. Skaphion and notauli absent. Metanotum often with a spine and as wide dorsally as laterally. Propodeum with spines on border of emargination. Vein *m* dotted, *stg* long, *sm* complete in hindwings. Metasoma fusiform. T2 with a horn or protruberance in male fitting into deep emargination of propodeum.

Distribution : Palearctic, Oriental, Australian, Neotropical and Afrotropical Regions.

Discussion : This genus with a world wide distribution, closely resemble *Calliscelio* Ashmead, but is distinct in having spines on propodeum. (*Calliscelio* has an unarmed propodeum).

Status in India and Kerala : A total of 4 species have been reported from India (Mani and Sharma, 1982). Though quite some material could be accumulated through this study, species analysis are yet to be made.

The collection locality included Calicut, Malappuram, Trichur (Peechi) and Kannur (Thiruvangad) districts of Kerala.

37. Genus *Scelio* Latreille (Fig. 76)

1805. *Scelio* Latreille : 226. Type : *Scelio rugosulus* Latreille in *Hist. Nat. Crust. Ins.*, 13 : 236; Kieffer, 1926, *Das Tierreich*, 48 : 308

1874. *Aleria* Marshall : 208. Type : *Aleria flavibarbis* Marshall, by monotypy. Synonymized by Kieffer (1908b).

1878. *Caloptenobia* Riley in Riley *et al.* : 306. Type: *Caloptenobia ovivora* Riley, by monotypy. Synonymized by Riley, in Riley *et al.* (1880).

- 1910c. *Enneascelio* Kieffer : 293. Type : *Enneascelio exaratus* Kieffer, by monotypy and original designation. Synonymized by Nixon (1958).

Diagnosis : Body black and robust. Frons with a smooth field replacing scrobe. Mandibles bidentate. Eyes bare. Antenna in females with 12 and in male with 10 segments; often clubbed in females. Prepectus usually present; skaphion absent; notauli often present. Scutellum unarmed. Metanotum at times sub-bidentate medially. Vein *sm* never reaching forewing margin, *m* thickened like a pseudostigma; *stg* long; *pm* absent; *sm* incomplete in hind wing. Metasoma spindle-like and flattened.

Distribution : Afrotropical, Oriental, Australian, Neotropical, Nearctic and Palearctic Regions.

Discussion : This genus resembles genera like *Oreiscelio* Kieffer, *Heptascelio* Kieffer. From *Oreiscelio* this can readily be distinguished by the following:

- Frons without a margined depression.
- Antennal club not too abrupt.
- Scutellum rounded posteriorly.
- 10 segmented antenna in males.
- *sm* incomplete in hindwing.

Status in India and Kerala : 11 species are reported from India (Mani and Sharma, 1982) and 7 species from Kerala, namely *S. bengalensis* Mukerjee, *S. mallappura* Mukerjee, *S. munnaricus* Mukerjee, *S. nilamburensis* Mukerjee, *S. satpurus* Mukerjee, *S. spinifera* Mukerjee and *S. travancoricus* Mukerjee.

The material collected for this study included from localities at Calicut, Malappuram, Trichur, Palghat, Ernakulam, Pathanamthitta, Idukki, Kannur and Trivandrum (Kerala) and comprises a species complex consisting of many species. Detailed species analyses are yet to be made.

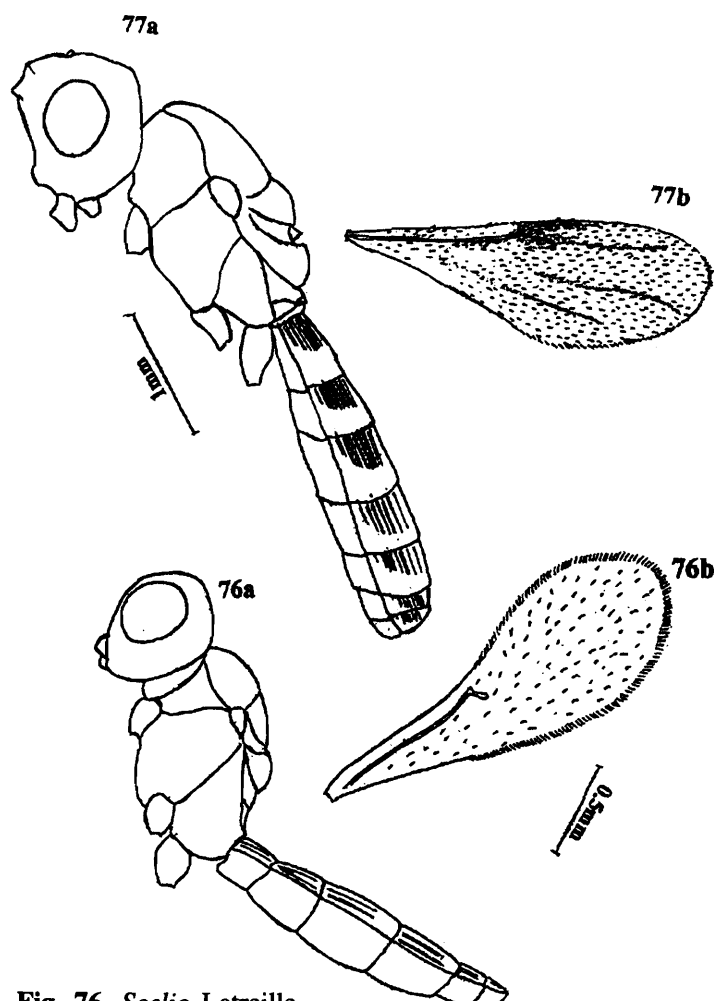


Fig. 76. *Scelio* Latreille
a. Body (Profile); b. Forewing.

Fig. 77. *Sparasion* Latreille
a. Body (Profile); b. Forewing.

Remarks : The following species diagnosis are based on original descriptions.

Species Diagnosis

1. *Scelio bengalensis* Mukerjee

1979. *Scelio bengalensis* Mukerjee. *Mem. Sch. Ent.*, 7 : 92.

Length = 3.75 mm

Male : Body black. Frons with a smooth area, rest coarsely reticulate; gena and temples with four longitudinal carinae; OOL = OD. F1 subequal to pedicel. Notauli absent. Finely punctate mesopleura and metapleura. Propodeum with a posterolateral tooth. Forewing with *stg* longer than *m*.

Female : Unknown.

Type Locality : Poro North (North Bengal).

Remarks : Reported also from Nilambur (Kerala).

2. *Scelio mallapura* Mukerjee

1979. *Scelio mallapura* Mukerjee. *Mem. Sch. Ent.*, 7 : 87.

Length = 3.66 mm

Female : Body black. Forewing hyaline. Vertex coarsely reticulate. Gena with reticulate striations and 4 carinae; temples reticulately rugose. Notauli absent. Mesopleura finely rugose, but with a few punctae in front.

Male : Unknown.

Type locality : Malappuarm (Kerala).

3. *Scelio munnaricus* Mukerjee

1979. *Scelio munnaricus* Mukerjee. *Mem. Sch. Ent.*, 7 : 103.

Length = 4.42 mm.

Male : Body black. Forewing pale brown basally. Frons reticulate; smooth and shiny above antennal sockets; gena with 4 carinae; temples longitudinally rugose with 4 carinae. Notauli absent. Propleura transversely rugose. Mesopleura longitudinally striate. OOL=OD. T1 as long as its basal width.

Female : Unknown.

Type locality : Munnar (Idukki, Kerala).

4. *Scelio nilamburensis* Mukerjee

1979. *Scelio nilamburensis* Mukerjee. *Mem. Sch. Ent.*, 7 : 103.

Length = 4.87 mm.

Male : Body black. Forewing hyaline. Frons and vertex reticulate; gena with very distinct fan-like carinae, frons in middle smooth and shiny and slightly impressed; OD = 2xOOL. Notauli absent; propleura with reticulate punctae; mesopleura finely reticulate in front; metapleura reticulate coarsely in front and finely behind.

Female : Unknown.

Type locality : Nilambur (Malappuram, Kerala).

5. *Scelio satpurus* Mukerjee

1979. *Scelio satpurus* Mukerjee. *Mem. Sch. Ent.*, 7 : 106

Length = 3.72 mm (female) and 4.22 mm (male).

Male and female : Body black. Forewing infuscated. Frons reticulate on lower regions. OD = 2x OOL. Notauli absent; propleura reticulate; mesopleural impression finely striate, otherwise reticulate; metapleura reticulately striate.

Type locality : Pachmari.

Remarks : Also collected from Nilambur (Malappuram, Kerala).

6. *Scelio spinifera* Mukerjee

1979. *Scelio spinifera* Mukerjee. *Mem. Sch. Ent.*, 7 : 111

Length = 3.87 mm

Body black. Fore wings infumated. Gena obscure with fan shaped striations; temple with 4 carinae; OOL 0.65x OD. Propleura rugose; mesopleura with shallow punctae in front, the impression transversely striate; metapleura longitudinally rugose.

Female : Unknown.

Type locality : Muzhiyar-Thekkady road (Cardamom Hills, Kerala).

7. *Scelio travancoricus* Mukerjee

1979. *Scelio travancoricus* Mukerjee. *Mem. Sch. Ent.*, 7 : 114.

Length = 4.8 mm

Male : Body black. Forewing faintly infusate anteriorly. Head reticulate. Gena with 3 longitudinal strae. Frons basally with 3 conspicuous carinae. OOL 1.25x OD. Notauli absent. Mesopleural impression and metapleura rugose; propleura punctate.

Female : Unknown.

Type Locality : Ponmudi (Trivandrum).

Remarks : Also reported from Moozhiyar (Cardamom hills, Kerala).

38. Genus *Sparasion* Latreille (Fig. 77)

1802. *Sparasion* Latreille : 316, Type : *Sparasion cephalotes* Latreille, *Hist. Nat. Crust. Ins.*, 3 : 315; Kieffer, 1926, *Das Tierreich* 48 : 282-299.

1817. *Oxyurus* Lamarck : 128. Type : *Sparasion frontalis* Latreille, designated by Muesebeck and Walkley (1951).

1848. *Bebelus* Gistel. Type : *Sparasion frontalis* Latreille, by substitution of *Bebelus* for *Oxyurus*.

1913d. *Prosparasion* Kieffer : 190. Type : *Prosparasion coeruleum* Kieffer, by monotypy and original designation. Synonymized by Masner (1976b).

Diagnosis : Black, stout and robust species. Head and body deeply sculptured and with fine dense hairs. Frons without scrobal depression; between eyes at times with 1 or rarely 2 or 3 transverse ledges. Eyes usually bare. Mandibles bidentate. Vertex raised well above eye margins. Antenna 12 segmented in both sexes. Pronotum a wide zone. Prepectus and skaphion absent. Mesonotum without notauli. Tibial spur formula 1.2.2. Vein *m* in forewing developed as pseudostigma. *pm* distinct; *stg* long. *sm* incomplete in hindwing. All metasomal tergites almost subequal in length.

Distribution : Palearctic and Oriental Regions.

Discussion : This genus is unique among Scelioninae with robust, pubescent body and distinct wing-venation; tibial spur formula 1.2.2., while in most others it is 1.1.1.

Status in India and Kerala : Only one species is hitherto reported from Kerla as well as India. (Mani and Sharma, 1980).

Species Diagnosis

1. *Sparasion travancoricum* Mani and Sharma

1980. *Sparasion travancoricum* Mani and Sharma. *Orient. Ins.*, 14(4) : 443

Length = 5 mm

Female : Body black. Antenna also black. Wings slightly infusate. Head coarsely punctate; body sculptured throughout; frons between eyes with one transverse ledge; OOL 2xOD. Notauli absent. Propodeum with a forked median carina.

T1 with deeper striae than of T2 and T3. Vein *pm* longer than *stg*; *stg* curved.

Male : Unknown.

Material examined : One female, collected from Vayalar (Alleppy, Kerala) by T.C. Narendran and party on 18-ii-1989.

39. Genus *Triteleia* Kieffer

1906b. *Triteleia* Kieffer. *Berl. Ent. Z.*, **50** : 1926, *Das Tierreich*, **48** : 364.

1956. *Discogeriscelio* Szabo : 151. Type : *Discogeriscelio nixonii* Szabo, by monotypy. Synonymized by Masner (1976b).

Diagnosis : One of the largest scelionids, even 10mm long, very robust, elongate and with wings often dark and infuscated. Prepectus distinct; skaphion absent or weakly indicated. Propodeum often dorsally produced into teeth or atleast dorsal points forming a subtriangular protruberance. Vein *m* almost as long as a *stg* or shorter. T6 in females strongly depressed dorsoventrally to form a flat triangle, often spined at apex, T7 in males often with tiny pointed structures at sides.

Distribution : Australian, Neotropic, Palearctic and Oriental Region.

Discussion : This genus closely resemble *Macroteleia* Westwood, but differs in the structure of tergite 6 in females and tergite 7 in males and in aspects mentioned earlier under *Macrotelia*.

Status in India and Kerala : Mani and Sharma (1982) reports that a large series of females and males of this genus were collected from Kerala and labelled as "24.8 Kottur, 24.9 Palode, 24.1. Peroorkada, 24.2. Pechiparai, Collected by M.S. Mani and party, 23.ix. 1980"

Remarks : Only one species of this genus has been reported from Oriental Region.

This genus is not represented in the present collection; the diagnosis given is adapted from Mani and Sharma (1982).

Family PLATYGASTRIDAE

1833. *Platygastrus* Haliday, : 269.

1856. *Platygastridae* Foerster. *Hym. Stud.*, **2** : 20, 28, 106-116.

Diagnosis : Usually black. Often small sized, ranging between 1-2 mm long, rarely upto 4mm. Body slender, usually melanic. Antenna inserted close to clypeus, elbowed, often with 10 segments, rarely with 7-9 segments. Male with F1 or F2 modified. Scutellum either semicircular or with an apical spine or conical in shape. Forewing usually veinless, if *sm* developed, then barely reaching anterior margin of forewing; *stg* and *pm* altogether absent. Hindwing almost with a stub of *sm*. T2 distinctly longest and widest; mostly six metasomal tergites visible in females, cerci or sensory plates also not visible.

Biology : Ubiquitous. Hosts are generally the gall forming Cecidomyiidae (Diptera), though there are some records of Homopterans (Coccoidea, Aleurodidae) being hosts. While members of genus *Tetrabaeus* Kieffer are parasites of Sphecoidea (Hymenoptera), those of *Fidiobia* Ashmead are egg-parasites of Curculionidae and Chrysomelidae (Coleoptera). There are records of Heteropteran as well as Chrysomelid (Coleoptera) egg-parasitism by *Aphanomerella* Dodd (Vlug, 1995).

Classification : According to Masner and Huggert (1989) two subfamilies are met with, viz., Sceliotrachelinae and Platygastrinae. The species under Inostemmatinae of the earlier classification were redistributed among the two present subfamilies.

Discussion : Schrank in 1781 described the first platygastrid as *Cynips phragmitis* (*Platygastrus phragmitis*). By Curtis (1837), 115 species of Platygastridae of Great Britain were listed and Kirchner (1867) in the 'Catalogus Hymenopterorum Europae listed 159 species. Dalla Tore dealt with 375 species in his well known catalogue of Hymenoptera of the world. Kieffer (1926) recognized 55 genera and a total of 560 species in Platygastrinae.

According to Vlug (1995) Platygastridae of the world has about 987 species under 82 valid genera. Of all the genera, *Platygastrus* Latreille

ranks the largest, having high species richness, followed by *Synopeas* Foerster and *Leptacis* Foerster.

Status in India and Kerala : A total of 18 genera which are hitherto reported from India (Vlug, 1995) are listed below :

Platygastriidae of India

- 1 *Amblyaspsis* Foerster
- 2 *Amitus** Haldeman
- 3 *Anectadius* Kieffer
- 4 *Anopedias* Foerster
- 5 *Ceratacis* Thomson
- 6 *Inostemma* Haliday
- 7 *Isocybus* Foerster
- 8 *Isostasius* Foerster
- 9 *Leptacis* Foerster
- 10 *Metanopedias* Brues
- 11 *Plutomerus** Masner and Huggert
- 12 *Platygaster* Latreille
- 13 *Proleptacis* Kieffer
- 14 *Sacespalus* Kieffer
- 15 *Synopeas* Foerster
- 16 *Tetrabaeus** Kieffer
- 17 *Trichacoides* Dodd
- 18 *Trichacis* Foerster

*Under subfamily : **Sceliotrachelinae**
Rest 16 genera under subfamily : **Platygastrinae**

The present study reports from Kerala, six genera namely *Amblyaspsis* Foerster, *Inostemma* Haliday, *Isostasius* Foerster, *Leptacis* Foerster, *Platygaster* Foerster and *Synopeas* Foerster.

Remarks : The generic synonyms listed here are as per Vlug (1995).

Key to subfamilies of PLATYGASTRIDAE

- 1. *Sm* present or absent, if present, tubular and usually knobbed at apex; laterotergites wide, metasoma often short and plump **Platygastrinae**

— *Sm* usually absent, if present, never knobbed at apex; laterotergites narrow, in female, metasoma usually elongate **Sceliotrachelinae**

I. Subfamily SCELIOTRACHELINAE

1908. *Sceliotrachelinae* Brues. Hymenoptera. Fam. Scelionidae. *Genera Insectorum*. 80 : 1-59.

Members of Sceliotrachelinae resemble Telenomines, with wide laterotergites. The clava of females is abrupt, with three clavomeres or the segments are fused to form a solid clavomere. Antenna of males, subclavate. Forewing with a tubular *sm*, knobbed apically.

Hosts include Curculionidae, Cerambycidae (Coleoptera) and Aleyrodidae (Homoptera); includes squat and plump species

Includes about 20 genera world wide.

II. Subfamily PLATYGASTRINAE

Inostemmini Ashmead, 1893 : 248. Original description, synonymized by Masner and Huggert (1989).

Includes slender to very elongate species, with narrow laterotergites, appressed towards sternites. Antennal clava in females with four or five distinct clavomeres. Males with a thread like flagellum. Forewing usually without *sm*, though at times present, in primitive forms.

Hosts are often exclusively gall forming Cecidomyiidae.

Key to genera of PLATYGASTRIDAE of Kerala

- 1. Forewing with a closed basal cell or with vein *sm* distinct and distally forming a node, not touching front margin 2
- Forewing without distinct vein, often with only traces of *sm* and not thickened distally 3
- 2.(1). T1 with a median dorsal horn curving towards mesosoma; abdomen of females with 6 and of males with 7 tergites ***Inostemma*** Haliday

- T1 without horn; abdomen of females with 2 and males with 4-5 tergites *Isostasius* Foerster
- 3.(1). Scutellum posteriorly elongate ending in a distinct spine 4
- Scutellum rather semicircular, not elongate, at the most with a short tooth 5
- 4.(3). Scutellar spine elongate and often towering over whole of propodeum; basal metasomal tergites never sac-like and distal tergite never tapering *Leptacis* Foerster
- Scutellar spine not towering over whole of propodeum; basal metasomal tergites often sac-like and distal tergite drawn to a tapering tube *Synopeas* Foerster
- 5.(3). Scutellum conical; apical 0.5 with long hairs forming a spine-like structure *Amblyaspis* Foerster
- Scutellum semicircular; if triangular in dorsal view, the short dense hairs not forming a spine-like structure *Platygaster* Latreille

Generic Diagnosis

39. Genus *Amblyaspis* Foerster

1856. *Amblyaspis* Foerster. Type species : *Platygaster tritici*, *Hym. Stud.*, 2 : 152.

Diagnosis : Body black. Distance between posterior ocelli and margin of eyes 3 to 4 times greater than diameter of posterior ocellus. Antenna 10 segmented in both sexes. In females, segments 7-10 often forming a club, 9th and 10th antennal segments often almost fused, separated only by suture. Thorax not laterally compressed, usually equal in height and width, without deep groove between mesonotum and scutellum. Mesonotum usually with traces of notauli. Scutellum conical; apical 0.50 with long dense hairs that form spinelike structure. Forewings without *sm*. Abdominal petiole with sparse scattered hairs. Metasoma never longer than mesosoma.

Biology : Parasites of Cecidomyiidae.

Status in India and Kerala : Only one species,

viz. *A. dalhousianus* (Mukerjee) has been known from Kerala as well as from India.

Remarks : This genus was not represented in collection on which this study was based. Generic diagnosis is compiled from (Kozlov, 1978).

Species Diagnosis

1. *Amblyaspis dalhousianus* (Mukerjee)

1978. *Anopodias dalhousianus* Mukerjee. *Mem. Sch. Ent.*, 5 : 73-75, synonymised by Masner, in Vlug, 1995.

Length (Female) = 1.80 mm; (Male) = 1.25 mm.

Body brownish black. Eyes naked. OOL 1.45xOD; club in female subequal to preceding 4 funicular segments, pedicel and 0.14 of scape combined. Thorax finely reticulate; notauli present; T2 longest; T3 onwards finely reticulate.

Type locality : Ahla (Dalhousie).

Remarks : Mukerjee (1978) reports that some material of this species were collected along Munnar-Kodaikanal Road.

The diagnosis given here is based on the original description.

40. Genus *Inostemma* Haliday (Fig. 78)

1833. *Inostemma* Haliday. Type species : *Psilus boscii* Jurine, *Ent. Mag.*, 1 : 270. Kieffer, 1926, *Das Tierreich*, 48 : 579.

1856. *Acerota* Foerster. Type species : *Acerota caryae* Ashmead, designated by Muesebeck and Walkley, Synonymized by Masner (1964a).

1913f. *Ceratopsilus* Kieffer. Type species : *Ceratopsilus rufipes* Kieffer, synonymized by Yamagishi (1982).

1916c. *Brachinostemma* Kieffer. Type species : *Inostemma mediterraneum* Kieffer, synonymized by Masner (1964a.)

1938. *Inocerota* Szelenyi. Type species : *Inocerota discessus*, synonymized by Masner (1964a).

Diagnosis : Body black. Smooth and shiny. Head globose; antennal insertions just above clypeus. Eyes bare, ocellocular space more than front ocellar space. Mandibles bidentate. Antenna geniculate, with 10 segments; scape not lamellate. Mesonotum long. Notauli complete. Scutellum

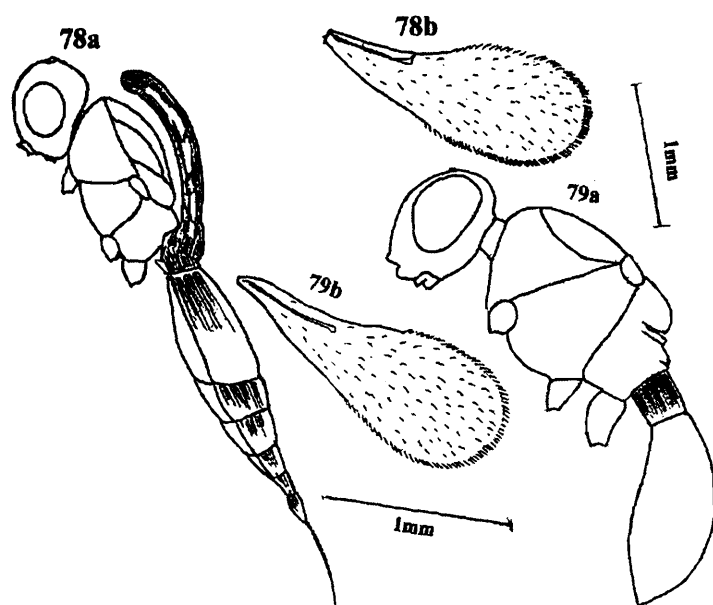


Fig. 78. *Inostemma* Haliday
a. Body (Profile); b. Forewing.

Fig. 79. *Isostasius* Foerster
a. Body (Profile); b. Forewing.

unarmed. Forewing with a straight *sm* swollen into a node apically and not reaching margin. In females, T1 with a slender, cylindrical horn, curved and towering above median mesonotum.

Biology : Parasites of Cecidomyiidae.

Distribution : Worldwide.

Status in India and Kerala : 9 species have been reported from India (Vlug, 1995), of which one species, viz., *Inostemma shencottahensis* Mukerjee has been reported from Kerala.

Remarks : The genus was represented in the collections made from PWLS, Palghat, Kerala. Species analysis is yet to be made.

1. *Inostemma shencottahensis* Mukerjee

1981. Mukerjee, *Rec. zool. Surv. India, Occ. Paper No.*, 27 : 56-58.

Length = 1.54 mm

Female : Body black. Antenna brownish black except for brown scape. Wings hyaline. Head finely reticulate. Eyes bare. OOL 0.75xOD. AF 1.1.4.4. Scape 5x longer than thick; pedicel 0.24 of scape; F1 largest and subequal to pedicel; F2 0.64 as F1. Notauli complete. Petiole longitudinally striated; T2 raised in front in middle with paired lateral sulci continued behind into fine striations.

Male : Unknown.

Type locality : Shencottah Gap.

Remarks : The diagnosis given is based on the original description.

42. Genus *Isostasius* Foerster (Fig. 79)

1856. *Isostasius* Foerster. Type species: *Platyaster punctiger* Nees. *Hym. Stud.*, 2 : 106; Kieffer, 1926, *Das Tierreich*, 48 : 596.

1856. *Monocrita* Foerster. Type species : *Inostemma atinas* Walker. Synonymized by Masner (1965).

1914b. *Trisinostemma* Kieffer (In Vlug, 1995). Type species : *Inostemma braesis* Walker. Synonymized by Masner (1965).

Diagnosis : Smooth and shiny body. Head globose. Vertex without reticulations. Eyes bare. Ocellocular space more than front ocellar space, almost 4x ocellar diameter. Antenna with 10 segments; clava in females with 4 broad segments; In female AF 1.1.4.4, in males AF 1.1.3.5; in males A3 minute, A6 transverse, A10 conical and equal to A8 and A9 combined. Notauli distinct. Scutellum highly convex. Vein *sm* with a node-like swelling at tip; apex separated from anterior margin of wing by a distance 2x greater than its width. Metasoma in female with 2 visible tergites, T2 longest, acuminate at tip; males with 4 to 5 tergites, rounded at tip.

Biology : Parasites of Cecidomyiidae.

Distribution : Worldwide.

Status in India and Kerala : Only one species viz. *Isostasius poroicus* Mukerjee has been reported from India.

The collection localities included Calicut, Palghat and Waynad districts of Kerala.

Remarks : This genus is reported from Kerala for the first time. Species level studies are yet to be done.

43. Genus *Leptacis* Foerster (Fig. 80)

1856. *Leptacis* Foerster. Type species : *Ichneumon tipulae*, Kirby *Hym. Stud.*, 2 : 107; Kieffer, 1926, *Das Tierreich*, 48 : 635.

1953. *Mandraka* Risbec. Type species : *Leptacis pauliani* Risbec, sub genus of *Leptacis* Foerster by Masner (1960).
- 1914c. *Mirambylaspsis* Dodd. Type species : *Mirambylaspsis mirabilis* Dodd, synonymized by Huggert (1976).
1926. *Prosamblyaspsis* Kieffer. Type species : *Amblyaspsis flavosignata*, synonymized by Masner (1965).
1919. *Xestonotidea* Gahan. Type species : *Xestonotus andriciphilus* Ashmead, by substitution of *Xestonotidea* (*X. foersteri* Gahan incorrectly designated as type). Replacement name. Synonymized by Masner (1964a).

Diagnosis : Body black; smooth and shiny. Head almost round; vertex usually pointed with a fine transverse carina behind. Ocellocular space less than the front ocellar space. Antenna with 10

segments; A3 in male minute, A4 large, A5 equal to A2, next 5 segments cylindrical, A10 truncated; in female A3-A10 elongate, gradually thickened, A3 very minute, A9 and A10 well separated; club at times 4 segmented. Notauli present or absent. Scutellum ovate behind, produced into a long pointed median spine, often extending till top of propodeum. Metasoma in female narrower at base than in male.

Status in India and Kerala : Mukerjee (1981) reports 9 species from India. This genus is represented for the first time from Kerala.

Remarks : The present collection includes males and females of two undescribed species. Collection locality included Calicut and Malappuram districts of Kerala.

44. Genus *Platygaster* Latreille (Fig. 81)

1809. Type species : *Platygaster ruficornis* Latreille.
1838. *Rhacodia* Panzer. Type species : *Diapria striolata* Nees, synonymized with *Polygnotus* Foerster by Kieffer, 1926, in Vlug (1995).
1856. *Hypocampsis* Foerster. *Hypocampsis angustula* Thomson, synonymized with *Platygaster* Latreille.
1856. *Polygnotus* Foerster. Type species : *Platygaster striolatus* Nees ab Esen beck.
1893. *Coelopelta* Ashmead. Type species : *Coelopelta mirabilis* Ashmead, by monotypy and original designation. Synonymized by Fouts (1920).
1910. *Aneurion* Brues. Type species : *Aneurion anormis* Brues, by monotypy and original designation. Synonymized by Fouts (1924).
- 1913c. *Triplatygaster* Kieffer. Type species : *Platygaster contorticornis* Ratzeburg. Synonymized by Szelenyi (1938).
1919. *Xestonotidae* Gahan. Type species : *Xestonotidae foersteri* Gahan, synonymized by Ghesquiere (1948).
1926. *Parepimeces* Kieffer. Type species : *Epimeces ensifer* Westwood, 1833c. Synonymized by Masner (1965).
1856. *Isorhombus* Förster. Type species : *Isorhombus hyalinipennis* Ashmead, first included species. Synonymized by Muesebeck and Walkley (1951).
- 1833c. *Epimeces* Westwood. Type species : *Epimeces ensifer* Westwood, by elimination. Preoccupied by *Epimeces* Bilberg (Coleoptera). Synonymized by Walker (1836).
- 1906c. *Misocyclops* Kieffer. Type species : *Platygaster ornatus* Kieffer, by monotypy. Synonymized by Masner (1965).

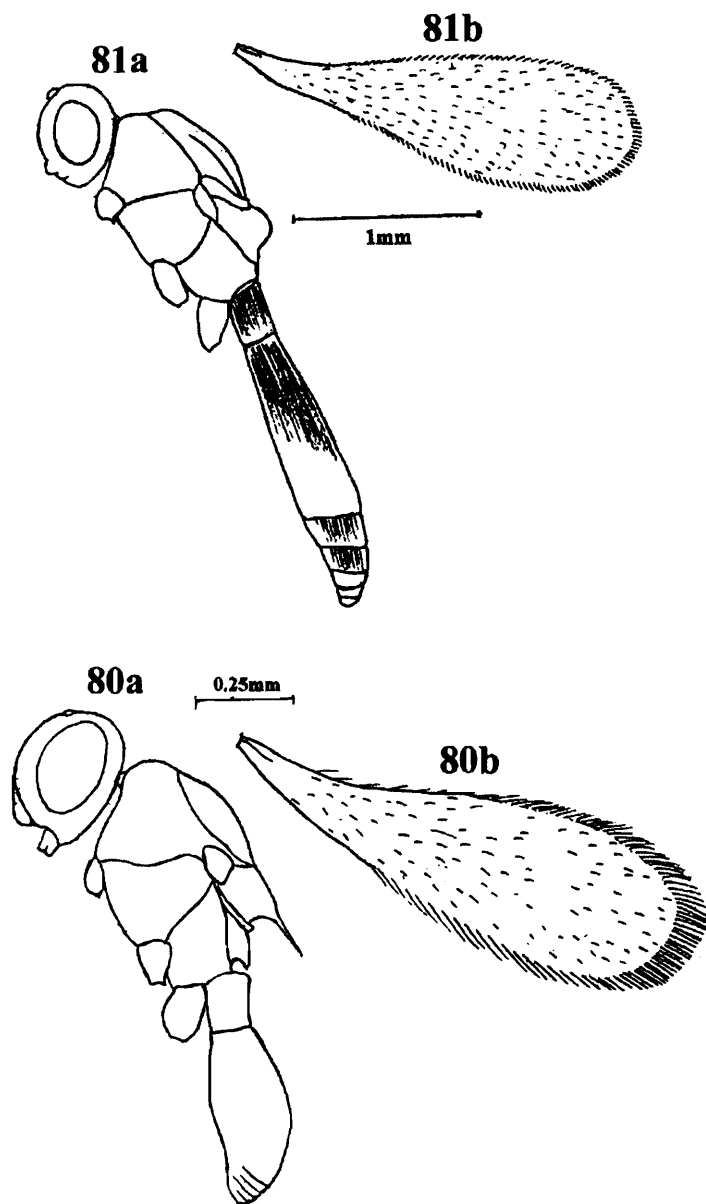


Fig. 80. *Leptacis* Foerster
a. Body (Profile); b. Forewing.

Fig. 81. *Platygaster* Latreille
a. Body (Profile); b. Forewing.

1936. *Urocyclops* Maneval. Type species: *Paracyclops bettyae* Maneval, by substitution of *Urocyclops* by *Paracyclops*. Replacement name. Synonymized, change to subgeneric status by Huggert (1974).

1973. *Parallelogaster* Huggert. Type species : *Platygaster compressiventris* Ashmead, designated by Huggert (1980). Proposed as a subgenus of *Platygaster* Latreille.

1980. *Cylindrogaster* Huggert. Type species : *Platygaster tubulosa* Brues, by monotypy and original designation. Described as a subgenus of *Platygaster* Latreille.

Diagnosis : Black to brownish yellow. Eyes bare; Antenna 10 segmented in both sexes; if antenna in females clavate, then usually 4-6 segmented. Scutellum semicircular, often highly convex; without tuft of hair at apex. Notauli usually present; rarely absent, converging posteriorly. Forewing usually without *sm*, if present, then stump like, not knobbed distally; at times metasoma longer than combined length of head and mesosoma.

Distribution : Worldwide.

Biology : Parasites of Cecidomyiidae.

Status in India and Kerala : A total of 20 species of *Platygaster* have been reported from India (Vlug, 1995; Ushakumari, 2004), of which 13 species are known from Kerala.

Remarks : The limits of this genus are rather not well defined. Quite recently many species under different genera have been transferred to this genus.

Key to *Platygaster* Latreille of Kerala, based on females

(Modified from Ushakumari, 2004)

1. Antennal club 5 segmented 2
- Antennal club 4 or 6 segmented 7
- 2.(1). Notauli present 3
- Notauli absent 5
- 3.(2). Scutellum flat *P. tanus* Ushakumari
- Scutellum slightly convex 4

- 4.(3). Notauli weak; marginal fringe moderately long *P. minimus* (Mukerjee)
- Notauli distinct *Psasii* Ushakumari
- 5.(4). Scutellum flat, circular *P. coorgensis* (Mukerjee)
- Scutellum convex 6
- 6.(5). Body translucent; yellow *P. galbus* Ushakumari
- Body not transparent, black *P. malabaricus* (Mukerjee)
- 7.(1). Antennal club 4 segmented 8
- Antennal club 6 segmented 12
- 8.(7). Notauli absent; scutellum flat; metasoma elongate, tapering, with tufts of hairs on petiole and T2 *P. intermedius* Ushakumari
- Notauli present; scutellum convex; metasoma not as above 9
- 9.(8). *Sm* absent; notauli weak or not distinct; scutellum rounded at apex *P. oryzae* Cameron
- *Sm* present; notauli distinct; scutellum semicircular 10
- 10.(9). Scutellum flat, metasoma slightly depressed; tibia shorter than combined length of hind tarsal segments *P. zandanus* Ushakumari
- Scutellum slightly convex; metasoma not as above 11
- 11.(10). Hindtibia shorter than combined length of hindtarsal segments; hyperoccipital carina distinct *P. nigrocoxatus* Ushakumari
- Hindtibia as long as combined length of hind tarsal segments; hyperoccipital carina distinct *P. keralicus* Ushakumari
- 12.(7). Notauli present; scutellum highly convex *P. narendrani* Ushakumari
- Notauli absent; scutellum not convex *P. interdaadi* Mukerjee

Species Diagnosis

1. *Platygaster coorgensis* (Mukerjee)

1978. *Anopiedias coorgensis* Mukerjee. *Mem. Sch Ent.*, **5** : 71-73; synonymized by Masner in Vlug (1995).

Male : Length = 0.8 mm. Body dark brown. OOL 1.28x OD. Head and thorax finely reticulate. Eyes naked. Notauli absent. Scutellum flat and circular.

In females antennal club 5 segmented, club subequal to preceding 3 segments, pedicel and 0.8 of scape combined (Ushakumari, 2004).

Type locality : Coorg (Kerala-Karnataka border)

2. *Platygaster galbus* Ushakumari

2004. *Platygaster coorgensis* Ushakumari. *T.C.N. Vol.* : 576

Female. Length = 0.85 mm. Body with head and mesosoma pale yellowish brown; antennal club 5 segmented. Head width in dorsal view 2.7x its median length. Eye diameter in lateral view 1.6x malar space. Petiole 1.5x as wide as long. Metasoma distinctly longer than head and mesosoma combined, 1.7x longer than wide in dorsal view.

Male : Unknown.

Type locality : Calicut University Campus (Malappuram, Kerala).

3. *Platygaster interdaadi* (Mukerjee)

1978. *Eritrissomerus indicus* Mukerjee, Mukerjee. *Mem. Sch. Ent.*, **5** : 78-80.; Synonymized by Masner in Vlug (1995)

Male : Length = 1.30 mm. Body brownish black to black. Vertex transversely striate. Interantennal projection distinct. OOL 2x OD. Scape 4.33x longer than thick. Notauli absent.

In females antennal club six segmented (Ushakumari, 2004).

Type locality : Kodaikanal hills (Tamil nadu)

4. *Platygaster intermedius* Ushakumari

2004. *Platygaster intermedius* Ushakumari. *T.C.N. Vol.* : 578

Female. Length = 1.1 mm. Black; antenna with scape yellowish brown. Head width in dorsal view 3.08x its median length. POL 6x OOL. Antennal club 4 segmented. Eye diameter in lateral view 2.5x malar space. Notauli absent. Scutellum flat. Metasoma elongate and tapering, with tufts of hair on petiole and T2. Metasoma distinctly longer than head and mesosoma combined, 3.7x longer than wide in dorsal view.

Male : Unknown.

Type locality : Arattupuzha (Pathanamthitta, Kerala).

5. *Platygaster keralicus* Ushakumari

2004. *Platygaster keralicus* Ushakumari. *T.C.N. Vol.* : 580

Female. Length = 0.8 mm. Body and antenna black. Antennal club 4 segmented. Head width in dorsal view about 2.2x its median length. POL 3x OOL; maximum diameter of eye in lateral view about 3.2x malar space. Hyperoccipital carina not distinct. Notauli present. Scutellum convex. Hind tibia as long as combined length of hind tarsal segments. Metasoma distinctly shorter than combined length of head and mesosoma, a little less than 2x its maximum width in dorsal view.

Male : Unknown.

Type locality : Vellanikkara (Trichur, Kerala).

6. *Platygaster malabaricus* (Mukerjee)

1978. *Trichacis malabaricus* Mukerjee. *Mem. Sch., Ent.*, **5** : 93 synonymized by Masner, in Vlug (1995).

Length = 1.1 mm.

Female : Body black to brownish black; antenna dark brown, except for yellowish scape. Wings hyaline. Head finely reticulate. OOL 1.6x OD. Antennal formula 1.1.3.5. Scape 4.18x as long as thick. F1 shortest, transverse and 0.83x as long as thick. Club subequal to preceding 3 segments. Notauli absent. Scutellum small and bulging. *sm* short and straight, without a distal node. Metasoma smooth and shiny; petiole transverse, T2 longest.

Male : Unknown

Type locality : Muzhiyar (Cardamom hills, Idukki, Kerala)

Remarks : The diagnosis of the species is based on the original description.

7. *Platygaster minimus* (Mukerjee)

1978. *Anopiedias minimus* Mukerjee. *Mem. Sch. Ent.*, 5 : 73-75, synonymized by Masner, in Vlug (1995).

Length of body = 1 mm.

Female : Body brown to black. Vertex, frons and occiput smooth. Eyes bare; club subequal to preceding 3 funicular segments, pedicel and 0.28 scape combined; smooth and shiny thorax. Notauli present. T2 longest. Metasoma smooth.

Male : Unknown.

Type locality : Cardamom hills (Idukki, Kerala).

8. *Platygaster narendrani* Ushakumari

2004. *Platygaster narendrani* Ushakumari. *T.C.N. Vol.* : 574

Length = 1.27 mm.

Female : Body black; antenna brown to dark brown; club 6 segmented; POL 3.2x OOL; scrobe and interantennal projection indistinct; hyperoccipital carina distinct. Head width in dorsal view 3.08x its median length. Eye diameter in lateral view 2.2x malar space. Notauli present. Scutellum highly convex. Petiole width 1.75x its maximum length. T3 to T6 externally visible. Metasoma much shorter than combined length of head and mesosoma; 2.29x longer than wide in dorsal view.

Male : Unknown.

Type locality : Coorg (Kerala-Karnataka border).

9. *Platygaster nigrocoxatus* Ushakumari

2004. *Platygaster nigrocoxatus* Ushakumari. *T.C.N. Vol.* : 581.

Length = 0.88 mm.

Female : Body black; antenna brown to dark brown. Antennal club 4 segmented. Head width

in dorsal view about 2.7x its median length; POL about 2.2x OOL; diameter of eye in lateral view about 2x malar space. Hyperoccipital carina distinct. Notauli present; scutellum slightly convex. Metasoma distinctly shorter than combined length of head and mesosoma; metasomal length 2x its own maximum width in dorsal view.

This species is distinct from *P. keralicus* Ushakumari in having hind tibia shorter than combined length of hind tarsal segments.

Male : Unknown.

Type locality : Kollakadav (Alleppy, Kerala).

10. *Platygaster oryzae* Cameron

1891. *Platygaster oryzae* Cameron. *Mem. Proc. Manchester Lit. Philos. Soc.*, 4 : 182-194.

Antennal club 4 segmented; scutellum convex, with apex rounded. Metasoma not elongate and tapering, petiole without tuft of hairs. Notauli weak and indistinct. *Sm* absent.

Widely documented species, almost from all districts in Kerala.

11. *Platygaster sasii* Ushakumari

2004. *Platygaster sasii* Ushakumari. *T.C.N. Vol.* : 583

Length = 1.4 mm.

Female : Black. Antenna yellowish brown to dark brown. Head width in dorsal view about 3.7x its median length. POL about 2.8x OOL. Diameter of eye in lateral view about 3.5x malar space. Notauli distinct. Metasoma shorter than combined length of head and metasoma, about 1.5x maximum width in dorsal view. T2 with longitudinal carinae at its anterior.

Male : Unknown.

Type locality : Trichur (Kerala).

12. *Platygaster tanus* Ushakumari

2004. *Platygaster tanus* Ushakumari. *T.C.N. Vol.* : 585

Female : Length = 0.9 mm. Body black; antenna brown to dark brown. Head width in

dorsal view about 2.2x its median length. POL about 6x OOL. Diameter of eye in lateral view about 5x malar space. Notauli present. Scutellum flat and hairy. Metasoma distinctly shorter than combined length of head and mesosoma.

Male : Unknown.

Type locality : Calicut University Campus (Malappuram, Kerala).

13. *Platygaster zantanus* Ushakumari

2004. *Platygaster zantanus* Ushakumari. *T.C.N.* Vol. : 587

Length = 0.77 mm.

Female : Body black. Antenna brown to dark brown, club 4-segmented. Head width in dorsal view about 2.5x its median length. POL about 3.5x OOL. Diameter of eye in lateral view about 1.8x malar space. Notauli distinct. Scutellum flat. Metasoma distinctly shorter than the combined length of head and mesosoma, a little less than 2x its width in dorsal view.

Male : Unknown.

Type locality : Calicut University Campus (Malappuram, Kerala).

45. Genus *Synopeas* Foerster (Fig. 82)

1956. *Synopeas* Foerster. Type species : *Platygaster sosis* Walker, *Hym. Stud.*, 2 : 108; Kieffer, 1926, *Das Tierreich*, 48 : 667.

1856. *Ectadius* Foerster. Type species : *Platygaster craterus* Walker, (*Ectadius* preoccupied. *Polymecus* proposed by Foerster (1856) as a new name. *Hym. Stud.*, 2 : 108, 113, 114, 144

1856. *Sactogaster* Foerster. Type species : *Sactogaster pisi* Foerster, subgenus of *Synopeas* by Kozlov (1978). *Hym. Stud.*, 2 : 108, 113.

1856. *Polymecus* Foerster. Type species : *Platygaster craterus* Walker, synonymized by Foerster (1856).

1911. *Dolichotrypes* Crawford and Bradley. Type species: *Dolichotrypes hopkinsi* Crawford and Bradley. Synonymized with *Polymecus* Foerster by Brues

(1922), to *Leptacis* Foerster by Fouts (1924) and to *Synopeas* by Masner (1964a).

Diagnosis : Body black; smooth and shiny. Eyes bare. Mandibles bidentate. Ocellocular space less than the front ocellar space. Antenna with 10 segments; A3 in male minute, A4 large, A5 equal to A2, 5 following segments cylindrical, A10 truncated; in female A3-A10 elongate, gradually thickened, A3 very minute, A9 and A10 well separated; club at times 4 segmented. Notauli present or absent. Scutellum broad, rarely unarmed, usually produced into a small median tooth. Abdominal petiole and base of 2nd tergite

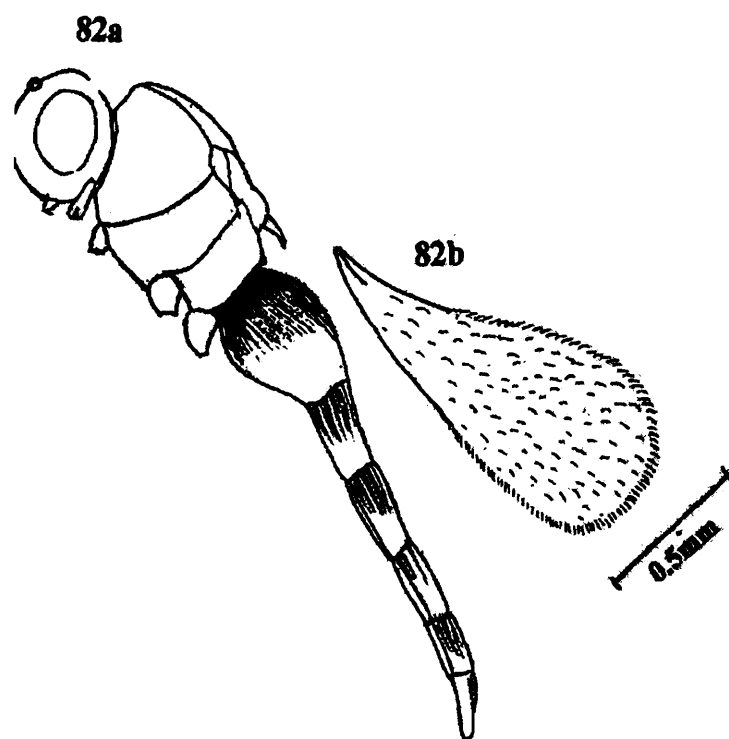


Fig. 82. *Synopeas* Foerster
a. Body (Profile); b. Forewing.

with dense white hairs forming tuft-like structure. Second sternite of females often sac-like basally or 4 to 6th tergites extending like a narrow tail.

Status in India and Kerala : 8 species have been hitherto reported from India. (Vlug, 1995; Mukerjee, 1981). This genus is reported from Kerala for the first time.

Remarks : Two species with varied metasomal shapes and structures is represented in the collection. Collection locality included Calicut, Malappuram and Palghat districts of Kerala.

SUMMARY

The present report forms the first consolidated document dealing with the taxonomy and systematics of the two superfamilies, Proctotrupeoidea and Platygastroidea (Hymenoptera : Insecta) in Kerala, India. This taxonomic treatment has also presented identification keys at family, generic as well as species levels. A total of 118 species under 45 genera and 7 subfamilies and 4 families are treated in this document, along with descriptions of 44 new species.

For Superfamily Proctotrupeoidea, considerable information on the species diversity with regard to the study area, Kerala, has been furnished. Under Diapriidae, the study reports 61 species in 19 genera, of which 44 species are new to science. The study documents from Kerala for the first time, subfamily Belytinae through 4 genera and 6 new species. Along with 5 genera of Diapriinae forming first report, thus a total of 9 diapriid genera are being reported for the first time in Kerala. This study also documents *Calogalesus* Kieffer, an African genus for the first time from India.

In the light of present study, a few generic transfers have been made resulting in new combinations. Accordingly, under Belytinae, *Cinetus indicus* Sharma has been transferred to *Belyta* Jurine, while in Diapriinae, *Spilomicrus nilamburensis* Sharma has been transferred to *Odontopria* Kieffer, *S. karnatakensis* Sharma and *S. nilgiriensis* Sharma to *Basalys* Westwood. It was also found that all the Indian species of *Psilus*

Panzer had to be placed under *Coptera* Say.

The family Proctotrupidae is represented in Kerala by 1 genus and 4 species.

As to Scelionidae of Superfamily Platygastroidea, 14 genera of Scelioninae, with 25 species and 2 genera of Teleasinae with 12 species have been dealt with in detail. It was found that the vast diversity of Telenominae can be addressed only through a separate indepth study of the group; such a study will be taken up in due course.

Of the 16 genera of Platygastriidae documented in India, the present study through 15 species, documents 6 genera in Kerala, of which, 3 are reported for the first time.

ACKNOWLEDGMENTS

The author is grateful to the Director, Zoological Survey of India, for the award of a Junior Research Fellowship (1994-96) and a subsequent Senior Research Fellowship (1996-1999) for this work. Thanks are due to Mr. C. Radhakrishnan, (Officer-in-Charge, Zoological Survey of India, Western Ghats Field Research Station, Calicut), for providing the necessary facilities and also for the valuable advice towards refining the manuscript. The author is indebted to Dr. T.C. Narendran, (Emeritus Professor, Dept. of Zoology, University of Calicut), for his expert guidance without which, this work could not have been completed in the present form. Thanks are also due to the authorities, Department of Zoology, University of Calicut, for providing additional laboratory facilities for this work.

REFERENCES

- Ashmead, W.H. 1888. Descriptions of some new genera and species of Canadian Proctotrupidae. *Can. Entomol.*, **20** : 48-55.
- Ashmead, W.H. 1893. A monograph on the North American Proctotrypidae. *Bull. U.S. Nat. Mus.*, **45** : 1-472.
- Ashmead, W.H. 1897. Descriptions of some new genera and species of Canadian Proctotrypidae. *Can. Entomol.*, **29** : 53-56.
- Ashmead, W.H. 1902. A new genus of diapriids from Texas. *Biol. Bull.*, **3** : 15.

- Ashmead, W.H. 1903. Classification of the pointed tailed wasps, of the superfamily Proctotrypidae-III. *J.N.Y. Entomol. Soc.*, **11** : 86-99.
- Austin, A.D. 1985. The function of spider egg sacs in relation to parasitoids and predators, with special reference to the Australian fauna. *J. Nat. Hist.*, **19** : 359-379.
- Bin, F., and S.B. Vinson. 1986. Morphology of the antennal sex-glands in male *Trissolcus basalis* (Woll.) (Hymenoptera : Scelionidae) and egg parasitoid of the green stink bug, *Nezara viridula* (Hemiptera : Pentatomidae). *International Journal of Morphology and Embryology*, **15**(3) : 359-376.
- Brethes, J. 1917. Quatre hymenopteres parasites du Chili. *An. Zool. Aplic.*, **3** : 24-27.
- Brethes, J. 1909. Himenopteros nuevos de las Republicas del Plata y del Brazil. *An. Mus. Nac. Buenos. Aires*, **19** : 49-69.
- Brethes, J. 1913. Himenopteros de la America meridional. *An. Mus. Nac. Buenos Aires*, **24** : 35-165.
- Brues, C.T. 1908. Hymenoptera. Fam. Scelionidae. *Genera Insectorum*, **80** : 1-59.
- Brues, C.T. 1910. Notes and description of North American parasitic Hymenoptera IX. *Bull. Wisconsin Soc.*, **8** : 49-85.
- Brues, C.T. 1922. Some hymenopterous parasites of lignicolous Itoniidae. *Proc. Am. Acad. Arts Sci.*, **57** : 263-288.
- Buhl, P.N. 1998. New or little known Oriental and Australasian Belytinae (Hymenoptera : Diapriidae). *Oriental Ins.*, **32** : 41-58.
- Cameron, P. 1891. Hymenopterological notices. *Mem. Proc. Manchester Lit. Philos. Soc.*, **4** : 182-194.
- Cameron, P. 1906. On the phytophagous and parasitic Hymenoptera collected by Mr. E. Ernst Green in Ceylon. *Spolia Zeylanica*, **3** : 67-142.
- Cameron, P. 1912a. Descriptions of new genera and species of parasitic Hymenoptera taken at Kuching, Sarawak, Borneo by Mr. Hohn Hewitt B.A. *Soc. Entomol.*, **27** : 63-64, 69-70, 74-78, 84, 84-85, 90, 94-95.
- Cameron, P. 1912b. On some new and other species of Hymenoptera in the collections of the Zoological branch of the Forest Research Institute, Dehradun. *Indian For. Rec.*, **4** : 91-123.
- Chambers, V.H. 1955. Some hosts of *Anteon* spp. (Hymenoptera : Dryinidae) and a hyperparasite *Ismarus* (Hymenoptera, Belytinae). *Entomologist's Monthly Magazine*, **91** : 114-115.
- Chambers, V.H. 1971. Large populations of Belytinae (Hym., Diapriidae). *Entomol. Month. Mag.*, **107** (1274-76) : 149-154.
- Cornell H.V. and B.A. Hawkins. 1993. Accumulation of native parasitoid species on introduced herbivores : a comparison of hosts as natives and hosts as invaders. *American Naturalist*, **141** : 847-865.
- Costa Lima, A. 1928. Notes sobre o *Pseudotelenomus pachycoris* (n.g., n. sp.), parasito endophago dos ovos de *Triatoma megista* (Burm.). *Sciencia Medica*, **5** : 450-452.
- Crawford, J.C. 1910. New Hymenoptera from the Philippine Islands. *Proc. U.S. Nat. Mus.*, **38** : 119-113.

- Crawford, J.C and Bradley, J.C., 1911. A new Pelicinus-like genus and species of Platygasteridae. *Proc. Ent. Soc. Wash.*, **13** : 124-126.
- Curtis, J. 1823-1840. British Entomology; Vol.3. Dermaptera, Orthoptera, Dictyoptera, Strepsiptera, Hymenoptera, part-1. E. Ellis and Co., London.
- Curtis, J. 1837. A guide to an arrangement of British Insects. 2nd edition. London, 1-VI, 1-294.
- Dalla Torre, C.G. 1898. Catalogus hymenopterorum hucusque descriptorum systematics et synonymicus. Vol. V : Chalcididae et Proctotrupidae. *Sumptibus Guilelmi Engelmann, Lipsiae* : 1-598.
- Desantis, L. 1950. Lista de sinonimias establecidas para los generos y subgenus de Chalcidoidea (Hymenoptera). *Rev. Museo La Plata (n.s.) Zool.*, **6**(37) : 47-67.
- Desantis, L and L. Esquivel. 1966. Tecera lista de himenopteros parasitos y predadores de los insectos de la Republica Argentina. *Rev. Mus. La. Plata*, **9**(69) : 47-215.
- Dodd, A.P., 1913a. Australian Hymenoptera Proctotrypoidea. No.1. *Trans. R. Soc. S. Aust.*, **37** : 130-181.
- Dodd, A.P., 1913b. Some new parasitic Hymenoptera from Australia. *Arch. Naturges.*, **79**(6) : 164-182.
- Dodd, A.P., 1914a. A new Proctotrupoid genus from Australia (Hym). *Entomol. News.*, **25** : 126-127.
- Dodd, A.P., 1914b. Further new genera and species of Australian Proctotrypoidae. *Proc. R. Soc. Queens.*, **26** : 91-40.
- Dodd, A.P., 1914c. A new Platygasterid genus with remarkable antennae (Hym.). *Ent. News Philad.*, **25** : 455-456.
- Dodd, A.P., 1914d. A new genus of Scelionidae from Australia. *Can. Entomol.*, **46** : 60.
- Dodd, A.P., 1915. Australian Hymenoptera Proctotrypoidea. No. 3. *Trans. R. Soc. S. Austr.*, **39** : 384-454.
- Dodd, A.P., 1916. Australasian Hymenoptera Proctotrypoidea. No.4. *Trans. R. Soc. S. Austr.*, **40** : 9-32
- Dodd, A.P., 1920. Notes on the exotic Proctotrupoidea in the British and Oxford University Museums, with descriptions of new genera and species. *Trans. Entomol. Soc. Lond.*, **1919** : 321-382.
- Dodd, A.P., 1930. A revision of the Australian Teleasinae (Hymenoptera : Proctotrupoidea) *Proc. Linn. Soc. N.S.W.*, **55** : 41-91.
- Early, J.W. 1978. New Diapriinae (Hymenoptera : Diapriidae) from the South Island and Subantarctic Islands of New Zealand. *J.R. Soc. New Zealand*, **8** : 207-228.
- Early, J.W., L. Masner, A.D. Austin and I.D. Naumann, 2001. Maamingidae, a new family of proctotrupoid wasp (Insecta : Hymenoptera) from New Zealand. *Invtr. Taxon.*, **15** : 341-352.
- Fergusson, N.D.M. 1983. The status of the genus *Allophanurus* Kieffer (Hymenoptera : Proctotrupoidea, Scelionidae). *Entomol. Mon. Mag.*, **119** : 207-209.
- Foerster, A. 1856. Hymenopterologische Studien. II. Heft. Chalcididae and Proctotrupii. *Ernst ter Meer, Aachen* : 1-152.
- Fouts, R.M. 1920. Some new parasites, with remarks on the genus *Platygaster* (Hymenoptera). *Proc. Ent. Soc. Wash.*, **22** : 61-72.

- Fouts, R.M. 1924. Revision of North American wasps of the subfamily Platygasterinae. *Proc. U.S. Nat. Mus.*, **63** : 145.
- Fouts, R.M. 1927. Descriptions of new Nearctic Serphoidea (Hymenoptera) *Proc. Entomol. Soc. Wash.*, **29** : 165-179.
- Gahan, A.B., 1919. *Proc. U.S. Nat. Mus.*, **56** : 524.
- Galloway, I.D. and A.D. Austin. 1984. Revision of the Scelioninae (Hymenoptera: Scelionidae in Australia. *Austra. J. Zool. Suppl. No.* **99** : 1-138.
- Gauld, I.D. and B. Bolton. 1988. *The Hymenoptera*. British Museum (Natural History), Oxford University Press, Oxford.
- Gistel, J. 1848. Naturgeschichte des Thierreiches. Fur hohre Schulen bearbeitet. Scheitlin and Kraiss, Stuttgart.
- Haliday, A.H. 1833. An essay on the classification of the parasitic hymenoptera of Britain, which correspond with the *Ichneumones minuti* of Linnaeus. *Entomol. Mag.*, **1** : 259-276.
- Haliday, A.H. 1857. Note on a peculiar form of the ovaries observed in a hymenopterous insect, constituting a new genus and species of the family Diapriidae. *Nat. Hist. Rev. Proc.*, **4** : 166-174.
- Hellen, W. 1964. Die Ismarinen und Belytinen Finnlands (Hymenoptera). *Fauna Fennica*, **18** : 1-68.
- Hellen, W. 1971. Die Scelioninen Finnlands (Hymenoptera : Proctotrupoidea) *Fauna Fennica*, **23** : 1-25.
- Herrich-Schaffer, G.A.W. 1829-1844. *Fauna Insectorum Germaniae initia oder Deutschlands Insecten*. Regensburg, Manz.
- Hope, F.W. 1837. Observations on succinic insects. *Trans. Entomol. Soc. Lond.*, **2** : 56-57.
- Huggert, L., 1973. Taxonomical studies on Platygastriidae (Hym : Proct.) *Ent. Tidskr.*, **94** : 97-108.
- Huggert, L. 1974. Taxonomical studies on the species belonging to *Urocyclops* Maneval (Hymenoptera : Proctotrupoidea, Platygastriinae). *Ent. Tidskr.*, **95** : 58-63.
- Huggert, L. 1976. A new genus and three new species of Platygasteridae from Zaire. With a key to the species of *Iphitrachelus* Walk. And supplementary descriptions of *Leptacis* spp. (Hymenoptera, Proctotrupoidea). *Ent. Scand.*, **7** : 217-229.
- Huggert, L. 1980. Taxonomical studies on some genera and species of Platygastriinae (Hymenoptera : Proctotrupoidea). *Ent. Scand.*, **11** : 97-112.
- Huggert, L. 1982. New taxa of soil inhabiting diapriids from India and Srilanka (Hymenoptera : Proctotrupoidea). *Rev. Suisse Zool.*, **89** : 183-200.
- Huggert, L. 1983. On *Telenomus*, mainly European; redescriptions, new taxa, synonymies and combinations (Hymenoptera, Proctotrupoidea : Scelionidae). *Entomol. Scand.*, **14** : 145-167.
- Johnson, N.F. 1981. The New World species of the *Telenomus nigricornis* group (Hymenoptera : Scelionidae). *Ann. Entomol. Soc. Am.*, **74** : 73-228. Johnson, N.F. 1981. The New World species of the *Telenomus nigricornis* group (Hymenoptera : Scelionidae). *Ann. Entomol. Soc. Am.*, **74** : 73-228.

- Johnson, N.F. 1984. Systematics of Nearctic *Telenomus* : classification and revisions of the *podisi* and *phymate* species groups (Hymenoptera : Scelionidae). *Bull. Ohio Biol. Surv.*, **6**(3) : 1-113.
- Johnson, N.F. 1988a. *Mudigere*, a new genus of Telenominae (Hymenoptera : Scelionidae), related to *Psix* group of genera. *Colemania*, **5** : 25-28.
- Johnson, N.F. 1988b. Species of Australian Telenominae (Hymenoptera : Scelionidae) of A.P. Dodd and A.A. Girault. *Proc. Entomol. Soc. Wash.*, **90** : 229-243.
- Johnson, N.F. 1992. Catalog of world species of Proctotrupeoidea, exclusive of Platygastriidae (Hymenoptera) *Memoirs of the American Entomological Institute*, number 51.
- Johnson, N.F. and L. Masner, 1985. Revision of the genus *Psix* Kozlov and Le (Hymenoptera : Scelionidae). *Syst. Entomol.* **10** : 33-58.
- Jurine, L. 1807. Nouvelle methode de classer les Hymenopteres et les Dipteres. Paschoud, Geneva : 1-319.
- Kieffer, J.J. 1905. Nouveaux Proctotrypides exotiques conserves au Musee Civique de Genes. *Ann. Mus. Civ. Stor. Nat. Genova* **2**(2) : 9-39.
- Kieffer, J.J. 1906a. Description de quelques nouveaux serphides. *Bull. Soc. Hist. Nat. Metz.*, **25** : 1-7.
- Kieffer, J.J. 1906b. Beschreibung neuer Proctotrypiden aus Nord-und Zentralamerika. *Berl. Entomol. Z.*, **50** : 237-290.
- Kieffer, J.J. 1906c. Description de nouveaux Hymenopteres. *Ann. Soc. Sci. Bruxelles*, **30** : 113-178.
- Kieffer, J.J. 1907. Beschreibung neuer im British Museum zu London aufbewahrter Proctotrypiden. *Ber. Entomol. Z.*, **51** : 279-302.
- Kieffer, J.J. 1908a. Noveaux proctotrypides et cynipides d'Amerique recueillis par M. Baker. *Ann. Soc. Sci. Bruxelles.*, **32** : 7-64.
- Kieffer, J.J. 1908b. Revision des Scelionidae (Hymenopteres). *Ann. Soc. Sci. Bruxelles Mem.*, **32** : 111-250.
- Kieffer, J.J. 1908c. Species des Hymenopteres d'Europe et d' Algerie. Vol. 10. Ed. E. Andre. *Librarie Scientifique* A. Hermann and Fils, Paris, : 289-448.
- Kieffer, J.J. 1909. Species des Hymenopteres d'Europe et d' Algerie. Vol. 10. Ed. E. Andre. *Librarie Scientifique* A. Hermann and Fils, Paris, : 449-592.
- Kieffer, J.J. 1910a. Hymenoptera. Fam. Belytidae. *Genera Insectorum* **107** : 1-47.
- Kieffer, J.J. 1910b. Hymenoptera. Fam. Scelionidae. Addenda et. Corridenda. *Genera Insectorum*, **80** : 61-112.
- Kieffer, J.J. 1910c. Diagnosis de nouveaux genres et de nouvelles especes de Scelionides (Hym.) des iles Sechelles. *Bull. Soc. Entomol. France*, **1910** : 292-294.
- Kieffer, J.J. 1910d. Description de nouveaux microhymenopteres. *Boll. Lab. Zool. Gen. Agr.*, **4** : 105-117.
- Kieffer, J.J. 1910e. Description de nouveaux microhymenopteres du Bresil. *Ann. Soc. Entomol. France.*, **78** : 287-348.

- Kieffer, J.J. 1910f. Species des Hymenopteres d'Europe et d'algerie. Vol. 10. Ed. E. Andre. *Librarie Scientifique* A. Hermann and Fils, Paris, : 593-675.
- Kieffer, J.J. 1911a. Species des Hymenopteres d'Europe et d' Algerie. Vol. 10. Ed. E. Andre. *Librarie Scientifique* A. Hermann and Fils, Paris : 913-1015.
- Kieffer, J.J. 1911b. Species des Hymenopteres d'Europe et d'algerie. Vol. 10. Ed. E. Andre. *Librarie Scientifique* A. Hermann and Fils, Paris : 753-912.
- Kieffer, J.J. 1912a. Hymenoptera. Fam. Diapriidae. *Genera Insectorum*, **124** :1-75.
- Kieffer, J.J. 1912b. Proctotrypidae (3e partie). In E. Andre, Species des Hymenopteres d'Europe et d'Algerie. Vol. **11** : 1-160.
- Kieffer, J.J. 1912c. Hymenoptera, Proctotrupoidea. *Trans. Linn. Soc. London Zool.*, **15** : 45-80.
- Kieffer, J.J. 1913a. Proctotrupidae, Cynipidae et Evaniidae, in Voyage de Ch. Allauud et R. Jeannel en African Orientale (1911-1912). Resultata scientifiques. Hymenoptera, **1** : 1-35.
- Kieffer, J.J. 1913b. Serphides des Iles Philippines. *Insecta*. **3** : 253-260, 317-324, 367-370, 387-390, 428-443, 545-462.
- Kieffer, J.J. 1913c. Description de nouveaux microhymenopteres. *Broteria* (Ser. Zool.), **11** : 177-197.
- Kieffer, J.J. 1913d. Serphides de l'île de lucon. *Boll. Lab. Zool. Gen. Agr.*, **7** : 189-192.
- Kieffer, J.J. 1913e. Proctotrypidae (3e partie). In E. Andre, Species des Hymenopteres d; Europe et' algerie. Vol. **11** : 161-304.
- Kieffer, J.J. 1913f. Serphides des Iles Philippines. *Insecta, Rev. III. Ent.*, **31-36** : 253-299.
- Kieffer, J.J. 1914a. Enumeration des Serphides (Proctotrupides) des Iles Philippines avec description de genres nouveaux et d' especes nouvelles. *Philipp. J. Sci. (D)* **9** : 285-311.
- Kieffer, J.J. 1916a. Diapriidae. *Das Tierreich*. Vol. 44. Walter de Gruyter and Co., Berlin, :1-627.
- Kieffer, J.J. 1916b. Neue Scelionidae aus den Philippinen- Inseln. *Broteria*, **14** : 58-64, 171-187.
- Kieffer, J.J. 1916c. Beitrag zur Kenntniss der Platygasterinae und ihrer Lebensweise. *Centralbl. Bakter. (Abt.2)*, **46** : 548-592.
- Kieffer, J.J. 1917a. Neue Scelioniden aus den Philippinen-inseln. *Broteria*, **15** : 50-62.
- Kieffer, J.J. 1917b. Über neue und bekannte Microhymenopteren. *Entomol. Medd.*, **11** : 341-355.
- Kieffer, J.J. 1926. Scelionidae. *Das Tierreich*. Walter de Gruyter and Co., Berlin, Vol. **48** : 1-885.
- Kirchner, L. 1867. Catalogus hymenopterorum Europae. C. Ueberreuter : 1-285.
- Kozlov, M.A. 1970. [Super generic groupings of Proctotrupoidea (Hymenoptera)]. *Entomol. Obozr.* **49** : 203-226.
- Kozlov, M.A. 1971. [Proctotrupoids (Hymenoptera, Proctotrupoidea) of the USSR]. *Tr. Vses. Entomol. Obshch.*, **54** : 3-67.
- Kozlov, M.A. 1978 (Superfamily Proctotrupoidea). Pages 538-664, in G.S. Medvedev ed., (Determination of Insects of the European portion of the U.S.S.R), Vol. **3**(Part 2) : 1-758.

- Kozlov, M.A. 1994. Renyxidae fam. N., a new remarkable family of parasitic Hymenoptera (Proctotrupeidea) from the Russian Far East *Far Eastern Entomologist*, 1994, 1 : 1-7.
- Kozlov, M.A. and Kononova. 1983. [Telenominae of the fauna of the USSR]. *Tr. Zool. Inst. AN SSSR* 92 : 117-123.
- Kozlov, M.A and Le Xuan Hue. 1976. [A new Palearctic genus of the family Scelionidae (Hymenoptera, Proctotrupeidea) from Afghanistan.]. *Zool. Zh.*, 55 : 143-145.
- Kozlov, M.A. and Le Xuan Hue. 1977. [Palearctic species of egg parasites of the genus *Trissolcus* Ashmead, 1893 (Hymenoptera, Scelionidae, Telenominae)]. [Insects of Mongolia] 5 : 500-525.
- Krombein, K.V. and B.D. Burks. 1967. Hymenoptera of America north of Mexico. Synoptic Catalog (Agriculture Monograph No. 2). Second supplement. U.S. Government Printing office, Washington : 1-584.
- Krombein, Karl. *et al.* 1979. Symphyta and Apocrita (Parasitica). *Cat. Hym. Amer. North of Mexico*, 1 : 1121-1198.
- Lamarck, J.B, P.A. de M. De. 1817. Historie naturelle des animaux sans vrtebres, presentat les caracteres generaux et particuliers de ces animaux, leur distribution, leurs classes, leurs families, leurs genres, et la citation des principes especes qui s'y rattachent. Vol. 4. Deterville, Paris : 1-603.
- Latreille, P. A.1805. Histoire naturelle, generale et particuliere des crustaces et des insects. Vol. 13. F. Dufart, Paris : 1-432.
- Latreille, P. A. 1802. Histoire naturelle, generale et particuliere des crustaces et des insects. Vol. 3. F. Dufart, Paris : 1-467.
- Latreille, P. A. 1809. Genera Crustaceorum et Insectorum, Secundum ordinem Naturalem in Familias Disposita, iconibus exemplisque Plurimus explicata. Tomus quartus et ultimus, Parisii et Argentorati, 1809 : 1-399.
- Maneval, H. 1936. Nouvelle espece du genre *Allotropa* Foerster (Hym. Platygasterinae). *Bull. Soc. Ent. France*, 61 : 195-199.
- Maneval, H. 1939. Deux nouveaux genres et un nouvelle espece de Diapriidae (Hym.) *Bull. Soc. Entomol. France*, 44 : 168-172.
- Maneval, H. 1940. Fam XVII. Proctotrupides, in Perrier Remy, la Faune de la france en tableaux synoptiques illustres. Tome VII. Hymenopteres par Lucien Berland avec la collaboration de MM. Raymond Benoit, Francis Bernard, Henri Maneval. Paris, : 1-213.
- Mani, M.S. 1941a. Serphoidea. *Cat. Indian Ins.* 26 : 1-52.
- Mani. M.S. 1941b. Studies on Indian parasitic Hymenoptera. I. *Ind.J. Entomol.*, 3 : 25-36.
- Mani, M.S. 1975. On a collection of Scelionidae and Platygasteridae (Hymenoptera : Proctotrypoidea) from India. *Mem. Sch. Entomol. St. John's Coll.*, 4,: 63-80.
- Mani, M.S. and Sharma, S.K. 1980[1981]. On a new species of Sparasion Latreille (Hymenoptera : Proctotrupeidea: Scelionidae) from India. *Oriental Ins.*, 14 : 443-445.

- Mani, M.S. and Sharma, S.K. 1982. Proctotrupeoidea (Hymenoptera) from India, A Review. *Oriental Ins.* Vol. **16**(2): 135-258.
- Marshall, T.A. 1874. Descriptions of a new genus and two new species of European Oxyura. *Entomol. Mon. Mag.*, **10** : 207-209.
- Masner, L., 1958. Neue Scelioniden aus Grotten von Franzosisch Aquatorial –afrika (Hym. Scelionidea). *Mitt. Schweiz. Entomol. Ges.*, **31**,: 45-51.
- Masner, L., 1960. A revision of the African species of the genus *Leptacis* Forst. (Hymenoptera, Platygasteridae). *Rev. Zool. Bot. Afr.*, **62** : 1-34.
- Masner, L., 1961. The genera of *Gryon* Haliday, *Idris* Forster and *Hemisius* Westwood. (Hym., Scelionidae) *Cas. Cesk. Spol. Entomol.*, **58** : 157-168.
- Masner, L. 1964a. A comparison of some Nearctic and Palearctic genera of Proctotrupeoidea (Hymenoptera) with revisional notes. *Cas. Csl. Spol. Entomol.*, **61** : 123-155.
- Masner, L. 1964b. A redescription of three species of Proctotrupeoidea (Hymenoptera) from Jurine's collection. *Entomophaga*, **9** : 81-89.
- Masner, L. 1965. The types of Proctotrupeoidea (Hymenoptera) in the British Museum (Natural History) and in the Hope Department of Entomology. Oxford. *Bull. Brit. (Mus. nat. Hist.), Entomol. Suppl.*, : 1-154.
- Masner, L. 1976a. A revision of the Ismarinae of the New World (Hymenoptera, Proctotrupeoidea, Diapriidae). *Can. Ent.*, **108** : 1243-1266.
- Masner, L. 1976b. Revisionary notes and keys to world genera of Scelionidae (Hymenoptera; Proctotrupeoidea). *Mem. Entomol. Soc. Can.*, **97** : 1-87.
- Masner, L. 1980. Key to genera of Scelionidae of the Holarctic region, with descriptions of new genera and species (Hymenoptera: Proctotrupeoidea). *Mem. Entomol. Soc. Can.*, **113** : 1-54.
- Masner, L. 1991. Revision of *Spilomicrus* Westwood in America North of Mexico (Hymenoptera: Proctotrupeoidea, Diapriidae). *Can Entomol.*, **123** : 107-177.
- Masner, L. 1993. Superfamily Proctotrupeoidea, Superfamily Platygastroidea, Superfamily Ceraphronoidea. In : Hymenoptera of the World, (H. Goulet and J. Huber, eds.). *Agriculture Canada, Research Branch*. IV. Series Publication.
- Masner, L., and Sudholm. A. 1959. Some nomenclatoric problems in Diapriidae (Hym., Proctotrupeoidea) *Cas. Cesk. Spol. Entomol.*, **56** : 161-168.
- Masner, L., and Huggert, L. 1989. World review and keys to genera of the subfamily Inostemmatinae with reassignment of the taxa to the Platygasterinae and Sceliotrachelinae (Hymenoptera: Platygasteridae).
- Masner, L., and J.L. Garcia , 2002. The Genera of Diapriinae (Hymenoptera: Diapriidae) in the New World. *Bull. Amer. Mus. Nat. Hist* **268** : 1-138.
- Mayr, G. 1879. Über die Schlupfwespengattung *Telenomus*. *Verh. Zool.-Bot. Ges. Wien*, **29** : 697-714.

- Mineo, G. 1979. Studies of the Scelionidae (Hym. Proctotrupeoidea). IX. Material for a revision of the genus *Gryon* Hal., with description of 4 new species (*G. australfricanum*, *G. eremiogryon*, *G. laraichii*, *G. nicolai*) and notes on other scelionids. *Boll. Lab. Entomol. Agf. F. Silvestri Portici*, **36** : 234-265.
- Mineo, G. 1980a. Studies on the Scelionidae (Hym. Proctotrupeoidea). XI. A revision of the Palearctic species of *Gryon* Haliday; the insulare and pubescens groups. *Boll. Ist. Entomol. Agr. Oss. Fitopat. Palermo*, **10** : 213-226.
- Mineo, G. 1980b. Studi sugli Scelionidae. (Hym. Proctotrupeoidea). X. Materiale per una revisione del genere *Gryon* Haliday. *Boll. Ist Entomol. Agr. Oss. Fitopat. Palermo*, **10** : 189-203.
- Morley, C. 1931. New Oxyura from Britain. *The Entomologist.*, **64** : 14-16.
- Motschoulsky, V.de.1863. Essai d'un catalogue des insects de l'ile Ceylan. *Bull. Soc. Imp. Natural. Moscou*, **36**(3) : 1-153.
- Muesebeck, C.F.W. 1956. New generic synonymy in the Scelionidae (Hymenoptera). *Proc. Entomol. Soc. Wash.*, **58** : 1-24.
- Muesebeck, C.F.W. 1958. Superfamily Proctotrupeoidea. Pages 88-94. In Krombein, ed., Hymenoptera of America North of Mexico Synoptic Catalog (Agriculture Monograph No. 2) First supplement. United States Government Printing office, Washington, D.C. : 1-305.
- Muesebeck, C.F.W. 1980. The Nearctic prarsitic wasps of the genera *Psilus* Panzer and *Coptera* Say (Hymenoptera, Proctotrupeoidea, Diapriidae). *U.S. Dept. Agric. Tech. Bull. No.* **1617** : 1-71.
- Muesebeck, C.F.W. and Walkley, L.M. 1951. Superfamily Proctotrupeoidea. Pages 655-718, in C.F.W. Muesebeck, K.V. Krombein, and H. K. Townes, Hymenoptera of America North of Mexico-Synoptic Catalog. *U.S. Dept. Agriculture Monograph No. 2* 1-1420.
- Muesebeck, C.F.W. and Walkley, L.M. 1956. Type species of the genera and subgenera of parasitic wasps comprising the superfamily Proctotrupeoidea (Order: Hymenoptera). *Proc. U.S. Nat. Mus.*, **105** : 319-419.
- Mukerjee, M.K. 1978. Descriptions of some new and records of known Platygastriidae (Hymenoptera: Proctotrupeoidea) from India. *Mem. Sch. Entomol*, **5** : 47-66.
- Mukerjee, M.K. 1979. On a collection of the genus *Scelio* Latreille (Scelionidae: Proctotrupeoidea) from India. *Mem. Sch. Entomol. St. John's Coll.*, **7** : 89-117.
- Mukerjee, M.K. 1981. On a collection of Scelionidae and Platygastriidae (Hymenoptera: Proctotrupeoidea) from India. *Rec. zool. Surv. India, Occasional Paper No.*, **27** : 1-78.
- Mukerjee, M. K, 1994. Descriptions of some new and records of some known Proctotrupeoidea (Hymenoptera) from Garhwal Himalayas India. *Rec. zool. Surv. India, Occasional Paper No.*, **163** : 1-73.
- Nakagawa, H. 1900. (Illustrations of some Japanese Hymenoptera parasitic on insect eggs. I.) *Spec. Rep., Agric. Exp. Sta., Tokyo No.* **6** : 1-26.
- Narasimham, A.U., Bhumannavar, B.S., Ramani, S., Poorani, J. and Rajeshwari, S.K. 1997. A Catalogue of natural enemies and other insects in PDBC reference collection, Technical bulletin No. **17**, Project Directorate of Biological Control, Bangalore.

- Narendran, T.C. 1998. A new species and a key to species of *Calotelea* Westwood (Hymenoptera: Scelionidae) from India. *Proc. Zool. Soc. Calcutta*, **51**(1) : 70-74.
- Narendran, T.C. 2001a. A new species and a key to species of *Anteromorpha* Dodd (Hymenoptera: Scelionidae) of India. *J. Ecobiol.*, **13**(4) : 293-296.
- Narendran, T.C., 2001b. Two new species of *Baryconus* Forster (Hymenoptera: Scelionidae) with a key to Indian species. *J. Ecobiol.*, **13**(4) 261-268.
- Narendran, T.C. and Ramesh Babu, M.G.. 1996. On the systematics of *Heptascelio* Kieffer (Hymenoptera : Scelionidae). *Uttarpradesh J. Zoo.*, **16**(2) : 89-93.
- Narendran, T.C. and Ramesh Babu, M.G.1996-97. A systematic study of six new species of *Calliscelio* Ashmead (Hymenoptera Scelionidae) of India with a key to Indian species. *J. Zool. Soc. Kerala*, **6** and **7** : 1-10.
- Nixon, G.E.J. 1933. A further contribution to the study of South African Scelionidae (Insecta, Hymenoptera, Proctotrupoidea). *Ann. Mag. Nat. Hist.*, (10) **12** : 288-324, 465-479, 549-563.
- Nixon, G.E.J. 1935. A revision of the African Telenominae (Hym. Proctotrupoidea, Scelionidae). *Proc. R. Entomol. Soc. London*, (B) **5** : 131-134.
- Nixon, G.E.J. 1936. The African species of Teleasinae (Hym. : Proctotrupoidea : Fam : Scelionidae). *Ann. Mag. Nat. Hist.*, **10**(17) : 114-141, 161-191.
- Nixon, G.E.J. 1937. New Asiatic Telenominae (Hym., Proctotrupoidea). *Ann. Ag. Nat. Hist.*, (10)**20** : 113-127.
- Nixon, G.E.J. 1938a. Asiatic species of *Microphanurus* (Hym., Proctotrupoidea). *Ann. Mag. Nat. Hist.*, (11)**2** : 122-139.
- Nixon, G.E.J. 1938b. A preliminary revision of the British Proctotrupinae (Hym: Proctotrupoidea). *Trans. R. Entomol. Soc. Lond.*, **87** : 431-465.
- Nixon, G.E.J.1957. Hymenoptera, Proctotrupoidea, Diapriidae, subfamily Belytinae.. Hand books for the Identification of British insects, Vol., **8**. 3(di) : 1-107.
- Nixon, G.E.J. 1958. A synopsis of the African species of *Scelio* Latreille (Hymenoptera: Proctotrupoidea: Scelionidae). *Trans. R. Entomol. Soc. Lond.*, **110** : 303-318.
- Nixon, G.E.J 1980. Diapriidae (Diapriinae) Hymenoptera, Proctotrupoidea Hand books for the Identification of British insects Vol. **VIII**. Part 3(di) : 1-55.
- Noyes, J.S. 1982. Collecting and preserving chalcid wasps (Hymenoptera : Chalcidoidea) *J. Nat. Hist.*, **16** : 315-334.
- Pelov. V. 1975. *Issidotelenomus*, un nouveau genre de la famille Scelionidae (Proctotrupoidea, Hymenoptera). *Acta Zool. Bulg.*, **7**(3) : 89-98.
- Polaszek, A. and S.W. Kimani. 1990. *Telenomus* species (Hymenoptera: Scelionidae) attacking eggs of pyralid pests (Lepidoptera) in Africa: a review and guide to identification. *Bull. Entomol. Res.*, **80** : 57-71.
- Priesner, H. 1951. New genera and species of Scelionidae (Hymenoptera, Proctotrupoidea) from Egypt. *Bull. Inst. Fouad I Des.*, **1**(2) : 119-149.

- Priesner, H. 1953. Further studies in Proctotrupeoidea: 1. The genus *Phaenopria* Ashm., 2. The genus *Monelata* Foerst., and 3. Remarks on *Diapria* Latr. and allied genera.. *Bull. Soc. Fouad 1^{er} Entomol.*, **37** : 441-457.
- Provancher, L. 1885-1889. Additions et corrections au volume II de la Faune entomologique du Canada traitant des Hymenopteres. C. Darveau, Quebec., : 1-477.
- Pschorn-Walcher, H. 1956. Zur Kenntnis der Diapriidae (Hym., Proctotrupeoidea). *Mitt. Schweiz., Entomol. Ges.*, **31** : 57-64.
- Rajmohana, K, 2004. A key to the Oriental Genera of Diapriinae (Hymenoptera: Proctotrupeoidea: Diapriidae). Perspectives on Biosystematics and Biodiversity *T.C.N Com. Vol.* March 2004 : 519-526.
- Rajmohana, K and Narendran, T.C 1996. Four new species of the genus *Phaenoserphus* Kieffer (Hymenoptera: Proctotrupidae) from India *J. ent. Res.*, **20**(1) : 43-51.
- Rajmohana, K and Narendran, T.C 1997. A Remarkable new subgenus *Neotrimorus* of *Trimorus* Foerster (Hymenoptera: Scelionidae) from India. *J. of Adv. Zool.*, **18**(1) : 32-37.
- Rajmohana, K and Narendran, T.C 1999a. Studies on *Oxypria* Kieffer (Diapriidae: Proctotrupeoidea) of the Oriental Region *J. Ecobiol.*, **11**(3) : 203-211.
- Rajmohana, K and Narendran, 1999b. T.C Studies on *Paramesius* Westwood (Diapriidae: Proctotrupeoidea) of the Indian Region. *Hexapoda* **11**(1and2): 75-83.
- Rajmohana, K and Narendran, T.C., 2000a. Two new genera of Diapriidae (Proctotrupeoidea: Hymenoptera) from India. *Uttar Pradesh J. Zool.*, **20**(1) : 21-28.
- Rajmohana, K and Narendran, T.C., 2000b. Descriptions of a new genus *Nigropria* and a new species of *Aneuropria* Kieffer (Diapriidae, Proctotrupeoidea) from India. *Entomon.*, **25**(3) : 193-200.
- Rajmohana, K and Narendran, T.C. 2000c. *Monelata completus*, a new species of Diapriidae (Hymenoptera: Proctotrupeoidea) from India. *J. Bombay nat. Hist. Soc.*, **97**(2) : 260-262.
- Rajmohana, K and Narendran, T.C 2001a. A new species of *Xenomereus* Walker (Teleasinae : Scelionidae) from India. *Geobios.*, **28**(4) : 253-255.
- Rajmohana, K, Jobiraj, T and Narendran, T.C., 2001b: Parasitic Hymenoptera of Kerala, its diversity and potential as biocontrol agents. *Entomon.*, **26** (Spl. Issue) : 310-319.
- Riley, C.V, A.S. Packard, Jr. and C. Thomas, 1878. First annual meeting of the United States Entomological Commission for the year 1877 relating to the Rocky Mountain locust..... Department of the Interior, U.S. Geological Survey, Washington : 1-294.
- Riley, C.V, A.S. Packard, Jr. and C. Thomas, 1880. Second report of the United States Entomological Commission for the year 1878 and 1879 relating to the Rocky Mountain locust and the western cricket.....Department of the Interior, Washington : 1-322.
- Risbec, J. 1950. Contribution a l'etude des Proctotrupidae (Serphidae). Proctotrupidae de la Section technique d'Agriculture tropicale (A.O.F.) et Proctotrupides du Museum national d'Histoire naturelle (Afrique et Colonies francaises). Travaux du Laboratoire d'Entomologie du Secteur Soundanais de Recherches Agronomiques, Gouvernement Generale de l'Afrique Occidentale Francais : 1-639.

- Risbec, J. 1953. Proctotrupidae de Madagascar. Especies recolectas par M.R. Paulian. *Mem. Inst. Scient. Madagascar*, ser. E, **III** : 314-348.
- Risbec, J. 1954. Chalcidoides et Proctotrupoides de l'Afrique tropicale française. (4th supplement). *Bull. Inst. Fr. Afr. Noire*, **16** : 524-552.
- Risbec, J. 1956a. Proctotrupides Scelionini de Madagascar (Hym. : Proctotrupoidea). *Rev. France Entomol.*, **23** : 244-264.
- Risbec, J. 1956b. Hymenopteres du Cameroun (3^e contribution). *Bull. Inst. Fr. Afr. Noire*, (A) **18** : 806-833.
- Saraswat, G.G. 1982. Some Indian Proctotrupoidea (Hymenoptera : Scelionidae). *Rec. zool. Surv. India*, **79** : 343-358.
- Saraswat, G.G. and Sharma, S.K. 1978. On some Scelionidae (Hymenoptera: Proctotrupoidea) from India. *Mem. Sch. Ent.*, **5** : 1-146.
- Sarazin, M.J. 1986. Primary types of Ceraphronoidea, Evanoidea, Proctotrupoidea, and Trigonaloidea (Hymenoptera) in the Canadian National collection. *Can. Entomol.*, **118** : 957-989.
- Say, T. 1836. Descriptions of new species of North America Hymenoptera and observations on some already described. *Boston J. Nat. Hist.* **1** : 209-305, 361-416.
- Schrank, F.de P., 1781. Enumeratio Insectorum Austriae indigenorum. Augustae Vindelicorum, Klett et Franck, 1881 : 1-548.
- Sharma S.K. 1979. Studies on Indian Diapriidae (Proctotrupoidea: Hymenoptera). *Mem. Sch. Ent.*, **7** : 1-88.
- Sharma, S.K. 1980. On some new species of Belytinae and Diapriinae (Hymenoptera : Proctotrupoidea) from India. *Oriental Ins.*, **14** : 51-61.
- Sudholm, A. 1960. On *Diapria* Latreille and allied genera (Hym. , Diapriidae). *Opusc. Entomol.*, **25** : 215-223.
- Sudholm, A. 1970. Hymenoptera: Proctotrupoidea. *South African Animal Life*, **14** : 305-401.
- Szabo, J.B. 1956. Eine neue Proctotrupiden- Gattung aus Neu-Guinea (Hymenoptera, Scelionidae). *Ann. Hist.-Nat. Mus. Nat. Hung.* (n.s.) **7** : 151-152.
- Szabo, J.B. 1966a. Okologische, ethologische und systematische Untersuchungen an palaarktischen Teleasinen (Hym., Scelionidae). *Folia Entomol. Hung.*, **19** : 9-108.
- Szabo, J.B. 1966b. Okologische, ethologische und systematische Untersuchungen an palaarktischen Gryoninen (Hymenoptera : Proctotrupoidea, Scelionidae). *Acta Zool. Acad. Sci. Hung.*, **12** : 419-449.
- Szabo, J.B. 1975. Neue Gattungen und Arten der palaarktischen Telenominen (Hymenoptera: Scelionidae). *Ann. Hist.-Nat. Mus. Nat. Hung.*, **67** : 265-278.
- Szabo, J.B. 1979. Neue Arten und Fundortangaben der mongolischen Diapriiden (Hymenoptera, Diapriidae). *Ann. Hist. Nat. Mus. Nat. Hung.*, **71** : 273-278.

- Szelenyi, G. von, 1938. Über Palaarctische Scelioniden. II. Eine neue Scelionide aus Eichengallen. *Annls. hist .nat. Mus. nat. hung. Pars. zoologica*, **31** : 108-128.
- Thomson, C.G. 1861. Severges Proctotruper. Tribus IX. Telenomini. Tribus X. Drynini. Olfvers. *K. Vet.-Akad. Forh.*, **17** : 169-181.
- Townes, H.1981. A revision of Serophidae (Hymenoptera). *Mem. Amer. Entomol. Inst.*, **32** : 1-541
- Ushakumari, R. 2004. Diversity of *Platygaster* Latreille (Hymenoptera: Platygastriidae) of Kerala. Perspectives on Biosystematics and Biodiversity *T.C.N Com. Vol.* March, 2004 : 519-526.
- Viereck, H.L. 1914. Type species of the genera of ichneumon flies. *Bull. U.S. Nat. Mus.*, **83** : 1-186.
- Vlug, H.J. 1995. *Catalogue of the Platygastriidae (Platygastroidea) of the world*. Hymenopterorum Catalogus (nova editio), editus a C. van Achterberg. SPB Academic Publishing Amsterdam, : 1-168.
- Walker 1836. On the species of *Teleas*, andc. *Entomol. Mag.*, **3** : 341-370.
- Wall, I. 1967. Die Ismarinae und Belytinae der Schweiz. *Entomol. Abh. Staatliches Mus. Tierk. Dresden*, **35** : 123-265.
- Wall, I.1971. Beitrag zur Kenntnis der mitteleuropaischen Arten der Gattung *Aneurhynchus* Westwood (1832) (Hymenoptera, Proctotrupeoidea, Diapriidae, Diapriinae). 3. Beitrag zur Kenntnis der mitteleuropaischen Zehrwespen. *Entomol. Abh. Staatliches Mis. Tierk. Dresden*, **38** : 357-372.
- Watnabe, C. 1951. On five scelionid egg-parasitoids of some pentatomid and coreid bugs from Shikoku, Japan (Hymenoptera: Proctotrupoidae). *Trans. Shikoku Entomol. Soc.*, **2** : 17-26.
- Westwood, J.O. 1832. Descriptions of several new British forms amongst the parasitic hymenopterous insects. *London and Edinburgh Philos. Mag. J. Sci.*, **1** : 127-129.
- Westwood, J.O. 1833a. Descriptions of several new British forms amongst the parasitic hymenopterous insects. *London and Edinburgh Philos. Mag. J. Sci.* **2** : 443-445.
- Westwood, J.O. 1833b. Descriptions of several new British forms amongst the parasitic hymenopterous insects. *London and Edinburgh Philos. Mag. J. Sci.* **3** : 342-344.
- Westwood, J.O. 1833c. Further notices of the British parasitic Hymenopterous insects: together with the 'Transactions of a fly with a long tail', observed by Mr. E.W. Lewis; and additional observations. *Mag. Nat. Hist. J. Zool., Bot., Min., Geol., and Met.*, **6** : 420-421.
- Westwood, J.O. 1835. Characters of new genera and species of hymenopterous insects. *Proc. Zool. Soc. London*, **3** : 51-54. 68-72.
- Yamagishi, K., 1982. Contribution to the knowledge of the Platygastriidae of Japan (Hymenoptera : Proctotrupeoidea) *Kontyu*, **50** : 88-94.