

**STUDIES ON THE SYSTEMATICS OF SOME
GENERA AND SPECIES OF EPELMIDAE
(HYMENOPTERA: CHALCIDOIDEA)
OF KERALA AT ALPHA LEVEL**

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C E R T I F I C A T E


This is to certify that this thesis is an authentic record of the work carried out by **Ms. ANITHA P.V.**, from 2001 October to 2004 October under my guidance and supervision in partial fulfilment of the requirements of the Degree of Doctor of Philosophy in Zoology, under the Faculty of Science of the University of Calicut. No part of the thesis has been presented before for any other degree.

It is further certified that the candidate has passed the Ph.D. Qualifying examination of the University of Calicut held in June, 2003.

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DECLARATION

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



Anitha P.V.

Dedicated to
My Beloved Parents

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INTRODUCTION

Anitha P.V. “Studies on the systematics of some genera and species of eupelmidae (hymenoptera: chalcidoidea) of Kerala at alpha level ” Thesis. Department of Zoology, University of Calicut, 2004

INTRODUCTION

Systematics is the science of classification of organisms. It is built upon the basic fields of morphology, physiology, ecology and genetics. It is a synthesis of many kinds of knowledge, theory and method applied to the particular field of classification. Its potentialities and its limitations are largely those of the basic fields whose raw material it utilizes. The first step in the resolution of any kind of biological knowledge is the classification of phenomena in an orderly system. This means ultimately naming, description and classification of all organisms.

According to F. S. BODENHEIMER(1959), accurate systematics is the basis on which all meaningful research in biology is based. It is essential for a zoologist to have a good knowledge on a special group of animals, not matter, how small it is. Every biological problem can be manipulated only on the basic taxonomic information.

Sound systematics is especially important to the success of biological control of pests. When natural enemies are sorted or transferred from one region to another for biological control of an arthropod pest, the correct identification of both the pest and the natural enemy species and the recognition of the cryptic species and infraspecific entities are important. The correct identification of the pest species is of utmost importance in the studies on the biological control programmes. When established exotic pest species are misidentified, the search will be conducted for natural enemies of wrong species with the result that these natural enemies if at all species specific will fail to become established in the new habitat. Thus inadequate systematic

knowledge of pest species will often result in the wastage of time and effort of biological control workers. Correct identification of natural enemies is as important as correct identification of pest species in biological control programmes. Adequate systematics help in directing the attention of the biological control researchers towards the area of origin of a pest. In biological control programmes, we cannot rule out the possibilities for the contamination of mass cultures of natural enemies with unwanted species. This should be recognized on the basis of accurate systematics.

Any part of biology or life-sciences depends upon taxonomic capability built up over two centuries of generations of taxonomists. It is essential that every scientist of life-sciences acquire a good knowledge of at least basic knowledge of taxonomy. An enquiry into a branch of biology can be reliably conducted only on the basis of accurate taxonomy. Taxonomic research at the alpha, beta and gamma levels is an absolute necessity for the understanding of our fauna on which we want to study and acquire knowledge on any aspects.

Pest management using pesticides has been an usual way to control insect pests primarily because of the quick and obvious results provided by the pesticides. Chronic and cumulative poisoning, secondary pest outbreaks and pest resurgence became common phenomena. Thus it has become imperative to all concerned to seek alternate methods of pest management. Parasitic Hymenopterans are good alternatives for chemical pest control. They form an important component in biological control programmes of several insect pests. Parasitic Hymenoptera (Apocrita: Parasitica) are the most important group of entomophagous insects which are utilized in various biological control programmes against insect pests. They are very myriad, diverse, ecologically

significant and economically important. Studies on the biosystematics of these interesting insects can supply a lot of information necessary for undertaking biological control or integrated pest management programmes involving these insects. While majority of parasitic Hymenoptera are primary parasitoids of pests of agricultural crops, some are hyperparasitoids of beneficial parasitoids. A few others are primary pests of crops. Thus in view of their positive role as beneficial primary parasitoids of pests of crops and negative role as hyperparasitoids of primary parasitoids of pests and as primary pests of crops, studies on the biosystematics of parasitic Hymenoptera will be highly rewarding from the economic point of view. Among the natural enemies used in biological control of insect pests, the parasitic Hymenoptera has been the most successful [(CLAUSEN, 1978), NOYES, 1985]. According to Greathead(1986) out of 393 species of parasitoids which have been established in classical biological control programmes, 344(87%) have been parasitic Hymenoptera.

Parasitic Hymenoptera is composed of many keystone species, which forms an important component in any biological control programmes. Any advance knowledge on the systematics and behaviour of parasitic Hymenoptera is therefore of potential practical value. Biological control will not progress on a large scale without basic taxonomic knowledge of the parasitoids. Among the natural enemies used for biological control of insect pests, the parasitic Hymenoptera has been the most successful group of insect parasitoids. The presence of high level density of parasitic Hymenoptera in nature has great bearing in biological control projects involving these beneficial parasitoids. Parasitic Hymenoptera can regulate the population of their hosts in nature so that a state of homeostasis is maintained in the ecosystem. Many species of parasitic Hymenoptera are the keystone

species and without their presence in the ecosystem, cascade effect will result and this will cause the annihilation of several species. Rare parasitic Hymenoptera can maintain host populations at low population levels. They can live in advanced trophic level and this is an important factor in maintaining a stable and stronger homeostasis in the ecosystem.

The family Eupelmidae comprises about ninety nominal genera and nine hundred described species. (GIBSON, 1993). Eupelmids are found all over the continents. The family is closely related to Encyrtidae and Tanaostigmatidae. (NARENDRAN, 2001). Some characteristic features of eupelmids are: large convex mesopleura, middle coxae placed near the hind coxae and axillae which do not meet medially. Brachypterous forms are present in this family along with macropterous forms.

The family Eupelmidae consists of three subfamilies,(1) Calosotinae (2) Eupelminae (3) Metapelmatinae. The common genera are *Anastatus*, *Eupelmus*, *Neanastatus* etc Indian genera of Eupelmidae were reviewed by Islam and Hayat(1985). Indian and world gall associated Eupelmidae were studied by Narendran(1984). Anil and Narendran (1991) published a paper on Indian *Eupelmus*.

Members of Eupelmidae are primary or secondary internal or external parasitoids of a wide range of insects including Lepidoptera, Heteroptera and Diptera. Some eupelmids have been employed as biological control agents against insect pests in India. Narasimham and Sankaran(1982) made some biological control experiments with *Anastatus umae* Boucek against various cockroaches. This species was erroneously identified by Boucek in 1979 and later corrected the mistake himself in 1988 by synonymising the name with

A. madagascarensis Risbec. *Anastatus ramakrishnae* Mani is one of the most successful parasitoids of eggs of pentatomid bugs like *Eupaleopada concinna* Westwood, *Halys dentatus* Fabricius and *Chrysocaris perpureous* Westwood which attacked *Azadircta indica* A. Juss, *Casuarina equisetifolia* and *Croton sparciflora* Velayudhan.

Eupelmus urozonus Dalman and *Macroneura pedatoria* (Ferriere) are parasitic on cotton- stem weevil *Pempherus affinis*. *E.urozonus* Dalman is also parasitic on cynipid oak galls in England. The female of *Anastatus axigasti* Ferriere leaves the host egg after feeding through the ovipositor puncture merely to return to chew the dried fluid of the puncture and to reintroduce the ovipositor through the same puncture for laying the eggs. (NARENDRAN, 2001). Several eupelmids have the habit of covering each of their egg with a fibrous network. [(PHILIPS AND POUS, 1921); TAYLOR, 1937]) and the material from which the covering is formed is probably derived from the colleterial glands of the female parasite. The larvae of *Eupelmus cicadae* Girault are predaceous upon the eggs of cicada and larva of *Eupelmus popa* Girault is predaceous on the larvae and pupae of sorghum midge, *Contarinia sorghicola* Coq. (NARENDRAN, 2001). Taylor (1937) reported an interesting case of *Eupelmus* sp. which normally is a solitary external parasite of *Elasmus* and *Tetrastichus* which develop upon the larvae of coconut leaf miner beetle *Promeothea* sp.

Several species of Eupelmidae are reported to be associated with plant galls and some are supposed to be gall inducers (NARENDRAN, 1984). *Anastatus disparis* Ruschka has been successfully used in the control of Gypsy moth and *Anastatus tenuipes* Bolivar (*A. blattidarum* Ferriere) is a potential biological control agent against cockroaches of the species *Supella supellectilium*(F), *Supella longipalpa* (F), *Periplaneta*

americana L. and *Phyllodromia* sp. [(MANI, 1938; HAYAT, 1975); FLOCK, 1941; ISLAM AND HAYAT, 1986)]. *Anastatus bangalorensis* Mani and Kurien is an egg parasitoid of the pentatomid bug *Halyomorpha marmorea* F. which causes immature fruit drop in areca palm. These pentatomid bugs are also found to be agricultural pests of many vegetable crops like cowpea, chilli and ashgourd. *Neanastatus cinctiventris* Girault parasitises rice pest, *Orseolia oryzae*(Wood-Manson). These are only a few examples to cite from the lot. Exhaustive investigations were made and many interesting eupelmids were brought into light which are parasitoides of important pests of agricultural crops, thus expanding the horizon and scope of eupelmids in future in the biological control projects and integrated pest management programmes.

Kerala, being endowed with areas of diverse geographical features and natural vegetation, the land is rich in the eupelmid fauna. Eupelmids collected from different localities were subjected to systematic analysis and identified. Taxonomic descriptions with illustrations are provided. During the preparation of taxonomic keys, keys to genera and species of India is prepared instead of preparing keys to genera and species of Kerala. Key to the subfamilies of Eupelmidae, detailed checklist of Eupelmidae of Indian subcontinent (India, Pakisthan, Nepal, Bhutan, SriLanka, Bangladesh and Burma) and Host- Parasite index are prepared in the present investigation.

REVIEW OF LITERATURE

Anitha P.V. "Studies on the systematics of some genera and species of eupelmidae (hymenoptera: chalcidoidea) of Kerala at alpha level " Thesis. Department of Zoology, University of Calicut, 2004

CHAPTER I

REVIEW OF LITERATURE

In this chapter an attempt has been made to review the detailed literature concerning the systematics of the family Eupelmidae. Literature concerning all the major works on the Eupelmidae of the world with particular emphasis on Indian fauna.

RETZIUS (1783) described *Macroneura vesicularis* under the name *Ichenumon vesicularis* from Sweden. This may be regarded as the first report of eupelmid species from the world. Two years later **FOURCROY** (1785) reported *Anastatus bifasciatus* in the name of *Cynipis bifasciatus*.

In the year 1820 **DALMAN** raised the genus *Eupelmus*. He described six species, viz, *Eupelmus memnonius*, *Eupelmus urozonus*, *Eupelmus atropurpureus*, *Eupelmus degeeri*, *Eupelmus excavatus* and *Eupelmus rufus*

In *Monographia Chalcidum* by **WALKER**(1832), he included Eupelmids in the subdivision of Pentameri of Chalcides which he called 'Chalcides'. In the year 1833, **WALKER** introduced the family name Eupelmidae in his *Monographia Chalcidum*. **PERTY** (1833) described the genus *Phlebopenes* with *Phlebopenes splendidus* as the type species. **WESTWOOD**(1835) established two new genera, *Metapelma* and *Prinopelma* with *Metapelma spectabile* and *Prinopelma viridis* as the type species respectively. Two new genera, *Calosota* and *Stenocera* from Britain were established by **CURTIS** (1836) with *Calosota vernalis* and *Stenocera walkeri* as the type species respectively. In his *Monographia Chalcidum* **WALKER** (1837) erected three new genera viz. *Macroneura*, *Calosoter* and *Merostemus* with *E. excavatus* Dalman as

the type species. **WESTWOOD**(1839) in his classification of chalcids, chalcids were treated under the family name Chalcididae and eupelmids were included under family Encyrtidae. *Eupelmus memnonius* Dalman was designated as the type species of *Eupelmus* and *C. vernalis* Walker was designated as the type species of *Calosoter* Walker by **WESTWOOD** in the year 1839. **WESTWOOD**(1840) erected the genus *Urocryptus* based on *Eupelmus excavatus* Dalman.

WALKER(1846) CONSIDERED Eupelmidae as a group and described two species .viz., *Calosoter anemata* and *E. amphitus* from Philippines and India respectively. **RATZEBURG**(1852) erected a new genus *Eusandalum* from Germany. **FOERSTER** (1856) separated Eupelminae from the family of Encyrtidae by Westwood and placed them in a distinct family named eupelmidae and designated *Eupelmus* Dalman as the type genus. **FOERSTER** in the year 1856 established four new genera, viz. *Polymoria*, *Ratzeburgia*, *Halidea* and *Charitopus* (presently under Encyrtidae). **FOERSTER** presented a table of seven genera known to him. Apart from the above mentioned genera, *Eusandalum* Ratzburg, *Calosoter* Walker and *Eupelmus* Dalman also included. *Urocryptus* Westwood, *Phlehopenes* Perty and *Prinopelma* Westwood were overlooked by Foerster and were not included in this table. In the year, 1859, . **FOERSTER** erected a new genus, *Anastatus* with *Anastatus mantoidae* from Srilanka as the type species

HALIDAY(1862) erected a new genus, *Chirolophus* from Algiers with *Chirolophus eques* as the type species. **WALKER** (1862) described a new genus, *Balcha* from South Africa with *B. cylindrica* as the type species. In the year 1863, **MOTSCHULSKY**, erected a new genus from Srilanka, *Cacotropia* with *Cacotropia echidna* as the type species. **WALKER** in the same year described two new species,

Roptrocerus testaceiventris and *Callimome ceylonicus* from Sri Lanka. In the year 1869, WALSH and RILEY erected a new genus *Antigaster* with *Antigaster mirabilis* as the type species. WALKER (1872) reported a new species of *Eupelmus*, viz. *Eupelmus leithi* from India.

WESTWOOD (1874) described four new species of *Metapelma* from Oriental region; *M. obscuratum* from India, *Metapelma taprobanae* from Sri Lanka, *Metapelma gloriosum* from Philippines and *Metapelma rufimana* from Borneo. THOMSON (1876) designated *Polymoria coronata* Thomson as the type species of *Polymoria* Foerster. THOMSON (1876 And 1878) divided chalcids, which he called Pteromalidae (following Dalman) into two sections, Macrocentri and Microcentri. Eupelmids were included in the former subdivision, as a tribe Eupelmina. RONDANI in the year 1877 reported the genus *Misocoris* with *Misocoris oophagus* from Italy as the type species. FOERSTER (1878) established a new genus from Europe, *Charitolophus* with *Charitolophus coerulescens* as the type species.

CAMERON (1883) established a new genus, *Solindenia* from Hawaii with *Solindenia picticornis* as the type species. In the same year CAMERON reported a new species of *Eupelmus*, *Eupelmus flavipes* from Hawaii. CAMERON in the year 1884 described three new species, viz. *Brasema brevispina* from Guatemala, *L. ornaticornis* from Panama, *Aseirba caudata* from Guatemala. *Aseirba* is now placed under the family Encyrtidae.

HOWARD and ASHMEAD (1896) described a new species *Anastatus tachardiaae* Howard from Sri Lanka. ASHMEAD (1896) considered the family on world basis for the first time and presented a table of the genera of males and females of Eupelminae. About twenty seven genera including nine new genera such as *Ooderella* with

Ooderella smithi from Brazil as the type species, *Idoleupelmus* with *Idoleupelmus annulicornis* from St. Vincent as the type species, *Macroeupelma* with *Macroeupelma brasiliensis* from Brazil as the type species, *Tineobius* with *Tineobius citri* from Australia as the type species, *Ischnopsis* with *Ischnopsis ophthalmica* from St. Vincent as the type species, *Cerambycobius* with *Eupelmus deri* as the type species, *Arachnophaga* with *Eupelmus picen* as the type species, *Tanaostigmodes* with *Tanaostigmodes howardii* from South Africa as the type species. *Tanaostigmodes* is currently placed in the family Tanaostigmatidae. The genera like *Oodera* Westwood, *Charitopus* and *Tanaostigma* were also treated in the above work. [The genera *Charitopus* and *Tanaostigma* are currently placed in the families Encyrtidae and Tanaostigmatidae respectively.] ASHMEAD synonymised *Halidea* Foerster with *Metapelma* Westwood and *Prinopelma* Westwood with *Phlebopenes* Perty. DALLA TORRE(1897) proposed *Halidayella* as an emendation of *Halidea* Foerster and *Eupelminus* as a new generic name for *Urocryptus* Westwood.

ASHMEAD (1904) established a new genus *Encyrtaspis* with *Encyrtaspis brasiliensis* from Brazil as the type species and synonymised the generic name *Balcha* Walker with *Eusandalum* Ratzeburg and designated *Eusandalum abbreviatum* Ratzeburg from Germany as the type species of the genus *Eusandalum*. He also proposed *Zaishnopsis* as the replacement name for *Ischnopsis* Ashmead. In the same year he treated the group as a subfamily Eupelminae which he divided into two tribes, Tanaostigmini and Eupelminariae and described six new species, from Japan, such as *Calosota albitarsis*, *A.japonicus* *Anastatus gastropachae*, *Anastatus brevipennis*, *Anastatus albitarsis* and *Eupelmus formosae*. A new species *Anastatus stantoni* from Philippines was also reported along with the above mentioned species.

CAMERON (1905) erected two new genera, *Mesocomys* and *Holceupelmus* with *Mesocomys pulchriceps* and *Holceupelmus bifasciatus* as the type species respectively. **KIEFFER** (1905) described two new species of *Eupelmus* from India, viz. *Eupelmus carinatus* and *E.tenuicornis*. **BRUES** (1907) erected a new genus, *Parasolindenia* from South Africa with *Parasolindenia aptera* as the type species. in the year 1908, **CAMERON** established a new species, *Elemba* with *E.levicollis* from Borneo. **CRAWFORD**(1908) described a new genus *Zalophthrix* with *Zalophthrix mirum* as the type species. **CAMERON** in the year 1909 reported a new species of *Metapelma*, *Metapelma compressipes* from Borneo. **CROSBY** (1909) erected a new genus , *Charitopella*, with *Charitopella setigera* from East Africa as the type species. **GIRAULT** (1911) in his classification of Australian Chalcidoidea treated Eupelmids under Encyrtidae. In the same year, he erected a new genus *Paraguaya* with *Paraguaya pulchripennis* from Paraguay as the type species. **CAMERON**(1912) described a new species of *Brasema*, *Brasema annulicaudis* from India. **CRAWFORD** in the year 1912, described two new species of *Anastatus*, *Anastatus vuilleti* from Africa and *Anastatus colemani* from India. **ENDERLIN**(1912) described *Metapelma albisquamulatum* from SriLanka. **CRAWFORD**(1913) erected a new genus *Bruchocid*, *Bruchocid vuilleti* from Senegal – Niger as the type species and described a new species of *Bruchocida orientalis* from India and a new species of *Anastatus*, *Anastatus formosanus* from Formosa.

GIRAULT(1913) described a new species of *Cerambycobius*, *Cerambycobius pax* from Australia and erected four new genera, viz. *Neanastatus*, *Neanastatus cinctiventris* from Australia as the type species, *Parooderella* with *Parooderella aptera* as the type species , *Parasolindenia* with *Parasolindenia hemiptera* as the type species,

Ooderelloides with *Ooderelloides nigripurpureus* as the type species. **BRETHES** in the year 1913, erected a new genus, *Brasemopsis*, with *Brasemopsis halysidotae* from Argentina as the type species .

GIRAULT(1914) erected two new genera, *Solindenelleus* and *Episolindelia* with *Solindenelleus pulchricorpus* and *Episolindelia varicolor* respectively, from Australia as type species. **GIRAULT** in the year 1915 revised Australian species of *Anastatus*, *Eupelmus*, *Neanastatus* and *Solindenellus* with keys. In the same year, **GIRAULT** synonymised generic names *Episolindelia* with *Eupelmus*, *Paraguayia* and *Ooderelloides* with *Anastatus* and erected a new genus *Meseusandalum* with *Meseusandalum cyaneiventris* as the type species. In the year 1915 **GIRAULT** reported two new species of *Neanastatus*, *Neanastatus orientalis* and *Neanastatus philippinensis* from Philippines.

GIRAULT (1917) published a key to Nearctic species of *Meseusandalum* and synonymised *Meseusandalum* with *Eusandalum* and described two new species of *Eupelmus*, *Eupelmus javae* from Java and *Eupelmus popa* from Australia.

BRIDWELL (1918) erected a new genus *Charitopodinus* with *Eupelmus swezeyi* Crawford as the type species. **MASI**(1919) erected two new genera , *Eupelmella* with *Eupelmus degeeri* Dalman as the type species and *Calymmochilus* with *Calymmochilus atratus* from Mediterranean subregion as the type species.

GAHAN(1919) synonymised *Solindenelleus* with *Neanastatus* Girault and reported *Neanastatus pulchricorpus* Girault from India. In the same year **GAHAN** reported a new species of *Neanastatus*, *N. trochantericus* from India.

In the year 1921, **GIRAULT** established a new genus *Australeupelmus* with *Eupelmus multicolor* Girault as the type species. In the year 1921, **RUSCHKA** for the first time recognized a separate group in the Family Eupelmidae and later named as Calosotinae (Boucek, 1988). In year, 1921 **RUSCHKA**, synonymised *Charitolophus* Foerster with *Chirolophus* Haliday and published keys to Palearctic species of *Calosota* and *Eusandalum*.

GAHAN (1922) redescribed *Eupelmus popa* Girault. **BRETHES** in the year 1922 established a new genus, *Pseudooderella* from Argentina with *Pseudooderella catamarcensis* as the type species. **GIRAULT** (1922) erected a new genus from Australia, *Australoodera* with *Australoodera varicornis* as the type species and reported six new species of *Eusandalum* from Australia.

MASI (1922) erected a new subgenus, *Paracalosota*, a subgenus of *Calosota*, with *Calosota*(*Paracalosota*) *viridis* from Italy as the type species. In the year 1923, **MASI** described two new species of *Metapelma*, *Metapelma patrizii* and *Metapelma feae* from Kenya.

GAHAN and **FAGAN** (1923) designated *E. abbreviatum* Ratzeburg as the type species of *Ratzeburgia* Foerster. **BOLIVAR y PIELTAIN** (1923) provided keys to Spanish species of *Polymoria* Foerster and *Calosota* Curtiz.

AYYAR (1925) prepared a checklist of Indo-Ceylonese Chalcid flies and listed *Anastatus colemani* Crawford, *Bruchocida* sp., *E. tachardiae* (H) *Metapelma* Westwood and *Eupelmus amorphococci* Ashmead (nomen nudum)

BOLIVAR y PIELTAIN (1925) reported two species *Chirolophus eques* Haliday, *Eupelmus urozonus* Dalman and a new

species *Anastatus tenuipes* from Egypt. **GAHAN** (1925) reported three new species of *Metapelma* from Philippines, viz. *M.alrotegularis*, *M. tenuicrum*, *M. speciosum* and *Oodera ornata*(now included under Pteromalidae). In the year 1926 **BOLIVAR y PIELTAIN** improved the key to Spanish species of *Polymoria* Foerster. **MASI**(1926) erected a new genus, *Metaplopoda* with *Metaplopoda grallarius* from Taiwan as the type species and described *Hylephila* as a subgenus of *Calosota* Curtis with *Calosota(Hylephila) stenogastera* from Taiwan as the type species. **MASI** (1926) erected a new genus, *Sauteria*, with *Sauteria elegans* from Taiwan as the type species.

AYYAR(1927) in his list of Parasitic Hymenoptera of economic importance from South India included *Anastatus colemani* Crawford , *Bruchocida orientalis* Crawford, *Neanastatus trochantericus* Gahan and a species of *Anastatus*. **GAHAN** (1927) erected a new genus, *Anastatoidea* from Java with *Anastatoidea brachartoniae* as the type species. *Encyrtaspis* Ashmead was redescribed and key to three known species was provided. **GIRAULT**(1927) described a new species *Calosota splendida* from Philippines.

GOURLAY in the year 1928 erected a new genus, *Neosolindenia*, with *Neosolindenia cyanea* as the type species. **BOLIVAR y PIELTAIN** (1929) modified the key to Spanish species of *Calosota*.

FERRIERE(1929) described a new species *Eupelmus orientalis* from Java. In the next year the same author published an account of some egg parasites from Africa and included a new species viz. *A. blattidarum*, along with *Mesocomys pulchriceps* Cameron, *Anastatus bifasciatus* (Fourcroy). In the same year, **FERRIERE** reported a new species *Anastatus menzeli* from Java.

In the year 1931, **GIRAULT** erected a new genus, *Eueupelmus* from Australia with *Eueupelmus cornutus* as the type species. **FERRIERE** in the year 1933 described *Anastatus axigasti* and *rufithorax* as its new variation from Solomon Islands. **BOLIVAR y PIELTAIN**(1933) erected a new genus *Mercetina* from Algeria with *Mercetina matritensis* as the type species.

In the year 1934, **GIRAULT** established a new genus *Finlayia* with *Finlayia puella* from Australia as the type species. **FERRIERE** (1935) described many new species from Asia and Africa which included *Eupelmus curculionis* from Dutch East Indies, *Anastatus dasyni* from Malaya, two species of *Anastatus* viz. *Anastatus piezosterni* and *Anastatus brevipennis* from Uganda, *Mesocomys orientalis* from Burma and *Calosota sinensis* from China *Eupelmus javae* Girault from Sri Lanka and *Anastatus blattidarum* from Sudan.

MAHDIHASSAN(1935) studied *Eupelmus tachardiae* (Howard). **MANI**(1935) treated eupelmids as a subfamily Eupelminae of family Encyrtidae. **MANI**(1936) described a new species *Solindenia blattiphagus* from India.

FERRIERE (1936) studied eupelmid fauna of Madagascar. **FERRIERE** (1938) revised and presented keys to Indo-Australian and African species of *Metapelma* Westwood. In this paper he also dealt with Australian, Asian and African species of *Anastatoidea* Gahan and Asian, African and Palaeartic species of *Neanastatus* Girault. He described eight species under *Metapelma* Westwood with two new species, *Metapelma salomonis* and *Metapelma giraulti* from Indo-Australian region and also described four species of *Anastatoidea* from Asia, viz. *Anastatus philippinensis*, *A. longiclava*, *Anastatoidea indea* and *Anastatoidea jacobsoni* and two new species of *Neanastatus*,

Neanastatus longitarsis and *Neanastatus oryzae* from Asia and synonymised *Metaplopora* Masi with *Neanastatus* Girault.

HAFIZ (1938) described a new species *Eupelmus terminaliae* from India. **MANI**(1938) published a Catalogue of Indian Chalcidoidea and treated eupelmids as a tribe Eupelmariae of subfamily Encyrtidae. Twenty species were included in this catalogue.

FERRIERE(1939) described a new species *Eupelmus pedatoria* from India and also recorded *Eupelmus urozonus* and *Bruchocida orientalis* Ferriere from India.

FERRIERE (1941) described two new species viz. *Eupelmus aspidoprocti* from East Africa and *Eupelmus catoxanthae* from Javae. In the same paper he reported male *Anastatoidea* Gahan for the first time. **MASI**(1941) erected a new genus, *Polymorioides*, with *Polymorioides tessellatus* from Somalia as the type species. **GAHAN**(1943) revised two genera, *Arachnophaga* Ashmead and *Encyrtaspis* Ashmead from North and South America. **KLOET** and **HINKS**(1945) transferred *Ichenumon vesicularis* Ratzius to *Macroneura* Walker. **HESQUIRE** (1946) proposed *Hylephilisca* as a replacement name for *Hylephila* Masi. **ERDOS** (1946) erected a new genus *Cerycium*.

DESANTIS(1950) described a new species of *Lecanobius*, *Lecanobius grandis* from Argentina. **PECK**(1951) treated eighty nine species of Eupelmids under ten genera in *Hymenoptera of America North of Mexico*. He separated the tribe Tanaostigmini from the subfamily Eupelminae and accorded a family status. **RISBEC**(1951) erected two new genera, *Paravignalia* with *Paravignalia hemiptera* as the type species and *Vignalia* with *Vignalia halyomorphae* as the type

species and also described three new species of *Calosota* Curtis, viz. *Calosota aristidae*, *Calosota halyomorpha* and *Calosota versicolor*.

GAHAN(1951) proposed *Zaischnopsis schwarzii* as a new combination for *Charitopus schwarzii* Ashmead. **BHATNAGAR** (1952) reported a species *Solindenia vermai* from India. **DE SANTIS** (1952) described a new genus, *Proanastatus* with *Proanastatus excavatus* from Argentina as the type species. **NIKOLSKAYA**(1952) in his publication 'The Chalcid Fauna of USSR' treated ninetyeight species of eupelmids under fourteen genera with keys to genera and species. **RISBEC**(1952) provided keys to species of *Macroneura* Walker and *Neanastatus* Girault of Ethiopian Region including Madagascar and erected two new genera *Ankaratrella* with *Ankaratrella elongata* as the type species and *Pterooderella* with *Pterooderella ornata* as the type species reported from Madagascar. **MANI** and **KURIEN** (1953) described a new species *Anastatus bangalorensis* from India and published descriptions and records of chalcids from India.

FERRIERE (1954) published key to brachypterous species of *Merostenus* Walker, *Eupelmus* Dalman, *Eupelmella* Masi, *Anastatus* Motschulsky and *Mercetina* Bolivar. Keys to recognize brachypterous species of Palearctic *Eupelmella*, *Anastatus* and *Mercetina* were also provided.

RISBEC(1955) erected a new genus, *Descampsia* from Cameroun with *Descampsia dipterae* as its type species. **MATHUR** (1956) described a new species of *Anastatus*, *Anastatus kashmirensis* from India. **HEDQVIST**(1956) provided a key to the Palearctic species of *Calosota*. **SUBHARAO** (1957) described *Solindenia amara* from India. **ERDOS**(1957) erected a new genus *Anastatomorpha* with *Anastatomorpha siderae* as the type species. **BOUCEK** (1958) proposed major changes in classification and organized the genera into

Eupelminae and separated *Calosota* and related genera into new subfamily Calosotinae. He suggested that Calosotinae were related to Pteromalidae through several genera of *Cleonymina*, in particular *Oodera* Westwood.

NARAYANAN, SUBHARAO and **RAMACHACHANDRA RAO**(1960) described two new species of *Anastatus*, viz. *A. acherontiae* and *A. dentatus* from India. **ERDOS** (1960) provided a knowledge of Hungarian eupelmidae through his studies of chalcidoidea of Hungary. **HEDQVIST**(1961) synonymised *Elemba* Cameron with *Balcha* Walker. **PECK**(1963) published a catalogue of Nearctic Chalcidoidea in which he studied ninety one species of Eupelmidae under eleven genera. **HEDQVIST** (1963) studied Swedish Chalcidoidea in which he dealt with *Eupelmus urozonus* Dalman, *Calosota vernalis* Curtis, *Eupelmella vesicularis* (Retzius) and a new species of *E. suecicus*

PECK, BOUCEK and **HOFFER**(1964) provided key to eupelmid genera of Czechoslovakia. **BOUCEK** (1965) transferred *Roptrocerus testaceiventris* Motschulsky to *Eupelmus* Dalman. **FERRIERE** (1966) published Eupelmid fauna of Sahara. **BURKS** (1967) revised North American species of *Anastatus* Motschulsky and provided key to fifteen treated species. **BOUCEK** and **ANDRIESCU**(1967) described a new species of *Calymmochilus* Masi, *Calymmochilus dispar* from Europe and also provided a key to distinguish it from the European type species, *Calymmochilus atratus* Masi.

BOUCEK(1967)revised Palaearctic species of *Eusandalum* Ratzburg and synonymised *Polymoria* Foerster, *Stenoceroides* Dalla Torre and *Polymorioides* Masi with *Eusandalum* Ratzeburg. *Balcha* Walker was removed from synonymy and independent status was accorded. Out of fourteen valid Palaearctic species, three species, *Eusandalum afganum*,

Eusandalum longivena and *Eupelmus dezorti* were new and a key was also published. **BOUCEK** (1968) published an account of eupelmid fauna of Czechoslovakia.

DE SANTIS (1968) erected a new genus, *Notosandalum* with *Notosandalum filicornis* from Argentina as the type species. **GRAHAM** in the year 1969 brought back the genus *Oodera* Westwood from Cleonyminae of Pteromalidae to subfamily Eupelminae under family Eupelmidae. *Oodera* was considered as a connecting link between Eupelmidae, especially Calosotinae and Pteromalidae, some characteristics were peculiar to both and they were supposed to be evolved from a common stock. **GRAHAM** in the year 1969 studied the British eupelmidae including three new species of *Eupelmus*. He reported *Eupelmus pullus* Ruschka, *Eupelmus hartigi* Foerster and *Eupelmus atropurpureus* Dalman. Descriptions of three species of *Calosota* Curtis, *Calosota vernalis* Curtis, *Calosota aestivalis* Curtis and *Calosota acron* Walker were also provided. Other treated species included, *E. urozonus* Dalman, *M. vesicularis* (Retzius), *Merosternus sexcavatus* (Dalman), *Eusandalum walkeri* (Curtis) and *Macroneura maculipes* as the type species of the genus. **YOSHIMOTO** (1969) erected a new genus *Reikosiella* from Hawaii with *Reikosiella melina* as the type species.

BOUCEK (1970) studied Italian Eupelmidae which included twenty one species coming under nine genera. *Calymmochilus atratus* Masi, type species of the genus was synonymised with *C. subnubilis* Walker and described under *Eupelmus* Dalman and *Anastatimorpha* Erdos was synonymised with *Anastatus* Motschulsky. Generic status of *Stenoceroides* Dalla Torre was reestablished. *Callimome ceylonica* M. was synonymised with *Eupelmus testaceiventris* M. *E. renominatus* was proposed as a new name for Australian *E. testaceiventris* Cameron.

Cynipis bifasciatus Fourcroy was transferred to *Anastatus* Motschulsky. **DE SANTIS** (1970) described a new species *Phebopenes ogoblina* from Argentina and erected a new genus, *Oozetetes* with *Oozetetes bucheri* from Argentina as the type species. **HEDQVIST**(1970) worked on South African Eupelmidae and studied the group under three subfamilies, named as Calosotinae, Eupelminae and Tanaostigmatinae and included twenty two new species and six genera. Keys to species of *Anastatus*, *Calosota* and *Polymoria* of Ethiopian region and a preliminary catalogue of Eupelmidae of Ethiopian region represented by hundred and sixty one species belonging to twenty eight genera were also provided. **RIEK**(1970) treated Eupelmidae under Encyrtidae.

DESANTIS(1971) synonymised *RafaBrethes* with *Eupelmus* Dalman. **BURKS** (1973) revised North American species of *Calosota* Curtis. **MANI, M. S., DUBEY, O. P. , KAUL, B. K. And SARASWAT, G. G.** (1973) published some chalcidoidea from India. **MANI & KAUL**(1973) described two new species of *Metapelma*, *Metapelma mesandamana* and *Metapelma strychnocolum* from India. **SHAFEE** (1973) described two new species of *Anastatus*, *Anastatus yasumatsui* and *Neanastatus indicus* from India. **BOUCEK**(1974) placed *Misocoris* Rondani as a junior synonym of *Anastatus* Motschulsky and its type species *Misocoris oophagus* as *Anastatus bifasciatus* Geoffrey. **HAYAT**(1975) dealt with three Indian species of *Anastatus*, viz. *A. acherontiae* Narayanan et al, *Anastatus tenuipes* Bolivar and *Anastatus ramakrishnai* (Mani)(originally placed under *Neanastatus* Girault.)Systematic position of *A.dentatus* Narayanan et.al. was discussed. Key and Host-Parasite index of known Indian species were also provided.

BOUCEK(1976) made numerous changes in the classification of African Chalcidoidea and studied twenty seven species of Eupelmidae.

Pseudanastatus Masi, *Holceupelmus* Cameron and *A. wanei* Risbec were synonymised with *Anastatus* M., *Eupelmus* Dalman and *A. tenuipes* Bolivar respectively. JOY and JOSEPH (1976) reported *Anastatoidea brachartoniae* Gahan from pupa of *Opisina arenosella* (Walker) from India.

MANI(1976) in his studies on Indian Chalcidoidea included following eupelmids, *Anastatus* sp., *Eupelmus* sp., *E.amorphococci* Ashmead, *Metapelma albisquamulatum* Enderlin, *Metapelma mesandamana* Mani and Kaul, *Metapelma obscuratum* Westwood, *M.strychnocolum* Mani and Kaul.

BOUCEK(1977) in his studies on Yugoslavian eupelmids included thirty nine species coming under nine genera. BOUCEK and SUBHA RAO (1978) transferred *Macromesus gardneri* Mani and Kaul into the genus *Eusandalum* Ratzburg from family Pteromalidae. BOUCEK and GRAHAM (1978) published taxonomic notes and additions of British Chalcidoidea including Eupelmidae. The species studied included *Eupelmus aloysii* Russo, *E. nubilipennis* Foerster and *Stenoceroides walkeri* Curtis.

TRJAPITSYN (1978) studied the eupelmid fauna of European part of USSR and dealt with fifty two species coming under nine genera. Keys to new genera and species were also provided. NOYES(1978) published the number of Chalcidoid species in world which includes seven hundred and four valid species under fifty seven valid genera of Eupelmidae. BOUCEK (1978) described a new eupelmid species from India and assigned it into a new subgenus *Cladanastatus* and the species was named as *A. (Cladanastatus)umae* Boucek. An Indian species of *Eupelmus*, *Eupelmus leithi* Walker was transferred to *Anastatus* Motschulsky. BURKS (1979) in the *Catalogue of Hymenoptera in America North of Mexico* suggested that eupelmids and encyrtids

were diverged separately from the evolutionary stem of the Chalcidoids at a remote time in development of the superfamily. In the catalogue, family Eupelmidae was divided into three subfamilies, viz. Calosotinae, Eupelminae and Tanaostigmatinae. **GRAHAM**(1979) in his studies on *Chalcidoidea of Madeira* recorded the species *Macroneura veesicularis* (Retzius). **PRINSLOO**(1980) reviewed the eupelmid genera of the Ethiopian Region and studied one hundred and seventy species coming under twenty five genera recorded from Ethiopian Region. **DESANTIS** (1980) clarified the systematic position of *Proanastatus* Desantis by treating it as a subgenus of *Anastatus* Motschulsky.

KALINA(1981) studied the Palaearctic species of *Macroneura* Walker and provided key to fifteen treated species. A new subgenus *Euronmacra* was erected and *Eupelmella angustifrons* Nikolskya was transferred to *Anastatus* Motschulsky.

NARENDRAN(1984) divided the family Eupelmidae into three subfamilies such as Calosotinae, Eupelminae and Tanaostigmatinae. **ISLAM AND HAYAT**(1985) revised the family Eupelmidae of Indian and adjacent countries and provided a key to subfamilies and genera of the family. The genera included in the key were, *Eusandalum* Ratzeburg, *Neanastatus* Girault, *Macroneura* Walker, *Metapelma* Westwood, *Anastatoidea* Gahan, *Eupelmus* Dalman, Subgenus *Cladanastatus* Boucek,, *Bruchocida* Crawford, *Arachnophaga* Ashmead, *Mesocomys* Cameron and *Anastatus* Motschulsky. In the year 1985, **MOHANDAS, T.V.** And **NARENDRAN, T.C.** published a paper on the ecology of population fluctuations of chalcid wasps of Malabar in which they also treated Eupelmidae. **PRINSLOO**(1985) reported a new species *Metapelma riparia* from Namibia.

BOUCEK(1986) reported *Eupelmus* sp. near to *Argentinotatus* Girault from India. DESANTIS (1986) synonymised *Cordyloodera* Griot with *Lecanobius* Ashmead and its type species *C. incognita* Griot with *Lecanobius grandis* De Santis. GIBSON (1986) published an excellent account of the morphology and musculature of the mesosoma of Eupelminae and discussed the contortion of female eupelmines and sexual dimorphism of the subfamily. In the year 1986, LIVSHITS and MITROFANOV presented a key to Hymenopteran egg parasitoids of insect pests of fruits of USSR, in which *Anastatus bifasciatus* Geoffrey was also treated. ISLAM and HAYAT(1986) published *A catalogue of the family eupelmidae of India and the adjacent countries* . A few generic and specific synonyms and an alphabetical host-parasite list were also provided. *Anastatus vermai* (Bhatnagar) was transferred to *Eupelmus* Dalman. The catalogue showed that thirty nine species coming under eleven genera existed at that time. *A. coimbatorensis* Girault, *Eupelmus amorphococci* Ashmead and *Metapelma indica* Girault were treated as nomina nuda. ASKEW (1987) recorded *A. ruficaudus* Ferriere, the first *Anastatus* species and fourteenth eupelmid species to be reported from Britain. A key to the brachypterous species of British eupelmidae was provided which included *Macroneura vesicularis* (Retzius), *Merostenus excavatus* (Dalman)*Eupelmus atropurpureus* Dalman and *Anastatus ruficaudus* Ferriere. In the year 1987, LIAO DINGX et.al. published an account on the eupelmid fauna of China. *Anastatus japonicus* Ashmead, *Anastatus acherontiae* Narayanan et.al., *Anastatus albitarsis* Ashmead , *Anastatus* sp., *Mesocomys orientalis* Ferriere, *Calosota sinensis* Ferriere, *Eupelmus tachardiae* Howard, *Eupelmus cyniceps scolyti* Liao, *Neanastatus cinctiventris* Girault and *Neanastatus orientalis* Girault .

BOUCEK (1988) in his elaborate work *Australasian Chalcidoidea* studied the family Eupelmidae by dividing it into three subfamilies. A new subfamily, Metapelmatinae was established to deal with two genera, *Metapelma* and *Neanastatus*. A key to subfamilies and genera of Australasian Eupelmidae was provided. Nineteen genera were studied which included five new genera from Australia, *Exosandalum* with *Eusandalum comprssiscapus* girault as the type species, *Duanellus* with *Anastaoidea jacobsoni* Ferriere as the type species, *Hirticauda* (as a replacement name for *Finlayia* Guiles 1904) with *Cerambycobius pax* Girault as the type species, *Tasmanastatus* with *Tasmanastatus planus* as the type species and *Xenanastatus* with *E. partisanguineus* Girault as the type species. He proposed the synonyms such as *Cacotropia* Motschulsky, *Ischnopsis* Ashmead, *Zaishnopsis* Ashmead, *Parooderella* Girault, *Parasolindenia* Girault and *Eupelmoides* Masi for *Anastatus* Motschulsky. *Ooderelloides* Girault was proposed as the generic synonym for *Brasema* Cameron. *Bruchocida* Crawford and *Neosolindenia* Gourlay was synonymised with *Eupelmus* Dalman. *Charitopella* Crosby, *Charitopodinus* Bridwell and *Euronmacra* Kalina were the generic synonyms for *Macroneura* W. *Australeupelmus* Girault and *Anastatoidea* Gahan were synonymised with *Tineobius* Ashmead. *Sauteria* Masi was synonymised with *Balcha* Walker. Subgeneric names *Paracalosota* Masi and *Hylephila* Masi were synonymised with *Calosota* Curtis. *Stenoceroides* DallaTorre was synonymised with *Eusandalum* Ratzeburg. *Halidea nobilis* Foerster was designated as the type species of *Halidea* Foerster. He synonymised *Anastatus* (*Cladanastatus*) *umae* Boucek with *A. madagascarensis* Risbec. *E. popa* Girault and *N. grillarius* Masi, *E. testaceiventris* Cameron and its replacement name *Eupelmus renominatus* were synonymised with *Eupelmus australiensis* Girault, *Neanastatus cinctiventris* Girault and *Eupelmus testaceiventris* Motschulsky respectively. *A. menzeli* Ferriere, the

Javan species was transferred to *Mesocomys* Cameron. He recorded *Eueupelmus* Girault and *Eupelmus longicarpus* Girault from India. In the year 1984, NARENDRAN, studied Chalcids and sawflies associated with plant galls.

GIBSON(1989) revised the genera of Calosotinae and Metapelmatinae of the world with a key to the genera of two subfamilies. In this work a catalogue of species were also provided. Out of the eight genera treated under Calosotinae, four were new, viz. *Archaeopelma* with *Archaeopelma tropeotergum* from the United States as the type species, *Licrooides* with *Licrooides umbilicus* from the United States as the type species, *Parasandalum* with *P.chilense* as the type species and *Tanythorax* with *Tanythorax spinosus* from Philippines as the type species. The generic status of *Balcha* Walker was re-established. *Notosandalum* De Santis and *Exosandalum* Boucek were proposed as the generic synonyms for *Eusandalum* Ratzeburg and *Metacalosota* Masi for *Calosota* Curtis. Mani and Kaul described the Indian species *Thaumara indica* under Metapelmatinae which included two new genera, *Eopelma* with *Eopelma mystax* from Philippines as the type species and *Lambdobregma* with *Charitopus schwarzii* Ashmead as the type species. MANI (1989) presented a key to Eupelmid genera of India and adjacent countries. Thirty eight species under nine genera were treated and provided keys to Indian species of *Anastatus* Motschulsky and *Neanastatus* Girault were also provided. SHENG JINKUN (1989) published a key to the known genera of Eupelmidae which included *Mesocomys orientalis* Ferriere, *C.sinensis* Ferriere, *A.brevipennis* Ashmead, *Anastatus albitarsis* Ashmead, *Anastatus* sp., *E. urozonus* Dalman, *Eupelmus spongipartus* Foerster, *Neanastatus cinctiventris* Girault and *Neanastatus orientalis* Girault. NOYES (1990) published the number of Chalcidoid genera and species of the world,

and recorded the existence of seven hundred and fifteen valid species and forty five valid genera of Eupelmidae exist in the world.

GIBSON (1990) revised the species of *Macroneura* Walker in America, North of Mexico. Four new species were described out of the seven species studied and they were *Macroneura camptoptera*, *Macroneura cerasma*, *Macroneura chrysozinomora*, and *M.tanyaris*. *Macroneura meteroi* (Gahan) was accorded specific status by removing from synonymy with *Macroneura picaste*(Walker). *E. melenderi* Brues was synonymised with *Eupelmus dryorhizoxeni* Ashmead and the taxa were reassigned to *Eupelmus* Dalman from *Macroneura* Walker. A key was published to females and known males of the North American species.

ANIL and **NARENDRAN** (1991) described a new species of *Hirticauda* Boucek, viz . *Hirticauda gibsoni*, which was the first species of the genus to be reported from the Oriental Region.

NARENDRAN& ANIL(1995) published a key to Indian species of *Eupelmus* Dalman and described eleven new species. In the same year, **NARENDRAN & SHEELA** decribed a new species of *Mesocomys* Cameron and provided a key to the species of *Mesocomys* C. In the year, 1995, **GIBSON** transferred the genus *Hirticauda* to *Reikosiella* Yoshimoto and transferred *Hirticauda gibsoni* Anil & Narendran to *Reikosiella gibsoni*(Anil &Narendran) and *Macroneura* was synonymised with *Eupelmus*. In the year 1996, **NARENDRAN, T. C.** studied the alpha systematics of some eupelmidae from India. In the same year, **NARENDRAN & SHEELA**, described a new species of *Reikosiella*Yoshimoto from India. **AUSTIN, GIBSON,And HARVEY,** (1998) published a synopsis of Australian *Calymmochilus*(Masi) with a description of a new western Australian species associated with a

pseudoscorpion and a review of pseudoscorpion parasites. In the year 1998, **NARENDRAN** described two new species of the rare genus *Xenanastatus* Boucek with key to the species of the genus *Xenanastatus* Boucek from Indo- Australian region .

In the year, 2001, **NARENDRAN**, published a volume, *Parasitic Hymenoptera And Biological Control* in which he dealt with the biosystematics of Eupelmidae also. In the year same year, **NARENDRAN, BUHROO & CHISTI** published a paper on taxonomic studies on four new species of Chalcidoidea of economic importance from Kashmir. *Macroneura* was transferred to *Eupelmus* Dalman.

MARIAMMA DANIEL, NARENDRAN And KESHAVABHAT (2003) studied the eupelmid egg parasitoid of the pentatomid bug, *Halymorpha marmoreal* F. in Dakshina Kannada district of Karnataka, India. In the year, 2004, *M.nirupama* N. was transferred into *Eupelmus nirupama*. (**NARENDRAN&SUDHEER**, in press). In the same year, **GIBSON** transferred *Australoodera quilonica* Narendran to *Reikosiella(Hirticauda) quilonica* (Narendran) new combination.

NARENDRAN& ANITHA. P. V. (2004) described a new species *Anastatus biharensis* Narendran, on lac insects, from Bihar. In the same year, **ANITHA. P. V.** published a checklist of Eupelmidae of Indian subcontinent.

MATERIALS AND METHODS

Anitha P.V. "Studies on the systematics of some genera and species of eupelmidae (hymenoptera: chalcidoidea) of Kerala at alpha level " Thesis. Department of Zoology, University of Calicut, 2004

CHAPTER II

MATERIALS AND METHODS

Adult Eupelmids were collected alive from the fields for the systematic analysis. Eupelmids were found usually among green vegetation during morning hours in the bright sunshine. For obtaining adult insects rearing methods were also utilized. For rearing, the immature stages of hosts such as larvae or pupae are collected along with various stem and leaf galls. These were then kept in emergence cages or glass vials or containers and host larvae were reared enabling the adult eupelmids to emerge.

METHODS OF COLLECTING EUPELMIDS

(a) Sweeping with sweep nets

This is the best method for collecting eupelmids. The sweeping was done using a triangular type of sweep net(fig. 2). The sides of the frame measures 48 x 46 x 48cm. The handle measures about 106-122 cm. The frame can be fitted to one end of the handle and can be easily separated when not in use. The net bag is made up of durable white cotton cloth or terelene cloth with fine meshes so that easy passage of air is permitted, at the same time escape of specimens were prevented. The mouth of the frame was wide enough so that the head and hand of the collector could be put into the net bag and the removal of the specimens from the net were done by an aspirator. The specimens from the net were sucked by the aspirator. The results obtained using the triangular type of net showed that the insects collected were roughly ten times more than the insects obtained by the conventional type of round nets.(NOYES, 1982)

(b) Aspirator(Pooter)

Aspirator (Fig. 3) is a device for collecting eupelmids from sweep net by sucking through one tube and collecting through the other. When insects were not sucked up, a small cork or piece of cotton was placed at the end of the tube to prevent the escape of insects.

The collected insects were killed by plugging a piece of cotton dipped in ethyl acetate in the entry tube of the aspirator. After this, the aspirator was kept aside for about ten minutes. When the eupelmids became immobile, they were removed into a cavity block containing 70% of alcohol for further systematic analysis.

(c) Suction trap

A tube of length of diameter 5-30cm. in diameter with a motor is pushed into the vegetation and specimens were sucked into the tubes.

(d) Beating tray

A tray with frame measuring approximately 70- 100 cm. square held beneath a tree branch or bush and then by strongly tilting the branch or bush using a stick, many insects were dislodged and consequently fell on the tray and were collected using aspirator and sorted out for systematic analysis.

(e) Rearing

This is one of the most useful method of collecting adult eupelmids and rearing provided the information of the host data, host association and other biological information. Rearing of egg, larvae, pupae, galls etc. were found to be very effective. When the larvae

were reared, they were collected and transferred to emergence cages or glass vials for rearing quiescent hosts and larvae were fed actively until the adult eupelmids emerged.

(f) Malaise trap

It was originally invented by Dr. R. Malaise and makes use of the negatively geotactic and positively phototactic behaviour of insects. The complete trap is about 183cm. wide, 106.7cm high at one end and 198 cm. high at the other end, and resembles a tent made up of fine mesh terelene guaze with specially adapted collecting bottle at the top containing 70-90% alcohol. The insects when flying into the sides of the trap by chance crawled upwards to the roof (negative geotactism) and enter into collecting bottle containing 70- 90% alcohol.

(g) Yellow pan trap (Moericke trap)

This is a simple tray measuring 60-70mm. deep and about 30cm. square. The trap is based on the principle that many insects are attracted to yellow colour. The tray was placed on the field and was filled with water containing few drops of detergent to break the surface tension. The pan is emptied once in a day using fine net in order to filter the specimens.

II. PRESERVATION

The unmounted materials were stored in 70% alcohol in small bottles which were kept in a refrigerator. The bottles were properly numbered and labelled. The preservative was periodically changed and replenished to prevent deterioration. In general specimens should not be preserved in alcohol for more than five years. They should be dry-mounted or slide-mounted before completing five years in alcohol. The

card mounted specimens were preserved in insect boxes. Naphthalene balls were placed on the inside corners of the insect boxes to protect the specimens from injurious insects. 2-Methyl benzoate granules were wrapped in a piece of clean and moist free cloth and pinned to a corner of the box to act as a fungicide.

III. RELAXING THE SPECIMEN

In order to prevent breakage of highly rigid specimens, they were subjected to relaxing chamber containing a few drops of glacial acetic acid in a layer of cotton wool which was again covered over by a second layer of cotton wool without glacial acetic acid. Specimens were kept on a piece of tissue paper in a glass dish and kept over the cotton wool for relaxing. Then the relaxing chamber was tightly closed and kept for 5-10 hours.

IV. MOUNTING AND STORING

(a) Card-point Mounting:

In this method specimen was glued to a triangular card point on lateral or ventral part of specimen. This kind of mounting facilitated easier examination, but ensured little protection for the specimen as the area of attachment were small.

(b) Rectangular Card mounting:

In this method the specimen was mounted on a rectangular card in such a way that the specimen was made to lie on one side on the card with specimen lying at an angle of 45° to the plane of the card and drop of water soluble glue sticking it to the card. This enabled to observe the characters from front(face), dorsal side and lateral aspects with better protection of specimens.

(c) Slide Mounting

Smaller specimens of length less than 2mm. were mounted on slides. Before mounting heavy sclerotized specimens were subjected to clearing in 10% KOH solution for 24- 48 hours. After sufficient clearing they were washed with glacial acetic acid followed by distilled water and dehydrated through graded series of alcohol. The cleared specimens or parts of specimens were then mounted in DPX.

V. LABELLING AND REGISTERING

Temporary labels were written in the field at the time of collecting the specimens. After mounting the specimens, permanent small rectangular labels were given which contain the information such as name of the country, name of the state, name of the collection locality, name of the collector and name of person who determined the specimen written using a Rotring 0.1 or 0.2 microtip pen. All specimen collected were registered in a register book with the details, including serial number, scientific name, name of the person who determined the specimen, collection locality, date of collection, name of the collector, name of the host and remarks.

VI. IDENTIFICATION

Identification of specimens upto species level were done adopting the various taxonomic procedures such as, use of keys, examination of types etc.

Sorting and mounting was done by using Stereozoom Binocular Olympus Microscope. Specimens mounted either on rectangular card or triangular card point. were identified, described and drawn using Camera Lucida attached to WILD M3Z Stereozoom binocular microscope

(Switzerland) and LEICA MZ6 MICROSCOPE. The drawings were enlarged using KB enlarger of B2M model. The scale of magnification of each figure was registered at the time of drawing.

MORPHOLOGY AND MEASUREMENTS

(Figs. 4-12)

Anellus (an)	Strongly shortened proximal flagellar segment seen between pedicel and first funicle segment
Antenna(at)	A paired segmented sensory appendage of the head between the compound eyes.
• Antennal toruli (ai)	A paired socket on the front part of the head upon which scape is articulated.
Axilla(ax)	Posterolateral portion of mesoscutum separated from mesoscutum and lateral to scutellum.
Carina	A ridge or raised line
Clava	The enlarged apical flagellomere of an antenna
Clypeus	The middle sclerite of the head immediately above the labrum
Coxa	The first segment of a leg, between the body and the trochanter
Femur	The third segment of a leg, between the trochanter and tibia.
Flagellum (fl)	The part of antenna after the pedicel.
Foramen magnum	The hole through which the head is connected with the mesosoma

Forecoxa (fc)	Coxa of the first pair of leg.
Funicle (fn)	The part of flagellum excluding the clava and anelli
Gaster(gs)	The posterior division of the body, posterior to the leg - bearing segments.
Gena	The anterior part of the back of the head between the compound eye and occiput.
Hind coxa	Coxa of the third pair of the leg.
Lateral ocellus (lc)	One of a pair of round or oval facet on vertex
Lower face (lf)	The front part of the head below the antenna
Lower ocular line (ll)	An imaginary line joining the bases of eyes.
Mandible (mn)	The paired, heavily sclerotized biting and chewing lateral appendage of the mouth parts between the labrum and maxilla
Marginal vein(MV)	Vein along anterior margin of forewing extending from distal end of coastal cell to the reaching point of stigmal vein.
Median ocellus (mo)	The anterior median round or oval facet on vertex.
Mesonotum	The dorsal part of mesothorax.
Mesopleuron	The lateral and ventral part of the mesosoma

Mesoscutum(mm)	The mesonotum excluding the scutellum
Mesosoma(ma)	The thorax and the propodeum
Notauli(no)	The usually oblique, longitudinal groove on the mesoscutum, often dividing the mesoscutum into median and lateral parts.
Occiput	The posterior part of the head behind the vertex dorsally and the gena laterally.
Ocellocular distance (OOL)	Distance from eye to the lateral ocellus of that side.
Ovipositor (ov)	In females, a slender, paired and interlocking, saw- like or tubular structure used for laying the eggs.
Ovipositor sheath (ovps)	A paired, sclerotized structure enclosing the external part of the ovipositor.
Parascrobal area (pa)	Part of the frons between the scrobal margin and inner orbit.
Parastigma(ps)	Stub to which submarginal vein joins at the distal end.
Pedicel (pd)	The second primary division or segment of the antenna, it articulates with the flagellum and basally with the scape.
Petiole	The narrow parallel- sided stalk joining the propodeum to the rest of the gaster.
Postocellar distance (POL)	Distance between two lateral ocelli

Postmarginal vein (PMV)	The vein along the anterior margin of forewing from the branch point of the stigmal vein.
Prepectus	A sclerite of the thorax between the pronotum and the mesepisternum.
Pronotum (Pr)	The dorsal sclerite of the prothorax.
Propodeum (pp)	The first tergum of the gaster, widely and immovably fused with the metanotum and with each metapleuron of the thorax, and usually narrowly and flexibly joined to the rest of the gaster.
Scape (sc)	The first primary division or segment of the antenna; it articulates apically with the pedicel and basally with the torulus.
Scrobe	A longitudinal depression of the head above each torulus for reception of the scape.
Scutellum(sm)	The middle region of the mesonotum or metanotum behind the scutum.
Seta(se)	A slender, hair-like, usually sensory extension of the cuticle, connected to the body wall by a socket.
Submarginal vein(SMV)	Vein arising from the anterior proximal end of forewing, below the coastal cell and extending to parastigma.

Stigmal vein (STV)	Short vein arising from the distal end of marginal vein and reaching the knobbed apex, stigma.
Tarsus	The fifth segment of a leg, attached basally to the tibia and subdivided into tarsomeres.
Tarsomere	A subdivision of the tarsus; each tarsus has 3-5 tarsomeres
Tegula(tg)	A small, scale- like sclerite covering the base of the fore wing, basal to the humeral plate.
Tergite	A sclerotized subdivision of a tergum bounded by grooves, or membranous lines or areas.
Tibia	The fourth segment of a leg, between the femur and the tarsus.
Tibial spur	A spine - like, multicellular extension of the cuticle connected to an appendage by a socket; usually found apically on the tibia.
Trochanter	The second segment of a leg. between the coxa and femur.
Vein	Narrow, usually dark thickenings of a wing arising at the wing base and branching towards the apex
Vertex	The top of the head between the eyes, from the anterior margin of the median ocellus to the occiput.

GENERAL ABBREVIATIONS

DZUC	:	Department of Zoology, University of Calicut
EL	:	Eye length
EW	:	Eye width
F1-F5	:	Funicular segment One to funicular segment Five
MS	:	Malar sulcus
MV	:	Marginal vein
OOL	:	Ocellocular distance
PMV	:	Postmarginal vein
POL	:	Postocellocular distance
SMV	:	Submarginal vein
STV	:	Stigmal vein
T1-T6	:	First tergite of gaster to sixth tergite of gaster
ZSI	:	Zoological Survey of India

FAMILY EUPELMIDAE

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CHAPTER III
FAMILY EUPELMIDAE

FAMILY EUPELMIDAE

The family Eupelmidae comprises about ninety nominal genera and about ninehundred described species. (GIBSON,1993). Members of this family are found all over the continents. The family is closely related to Encyrtidae and Tanaostigmatidae. The important diagnostic features of the eupelmids are: middle coxae placed near hind coxae, axillae which do not meet medially and if the axillae meet then they are atleast as long as wide and not transverse. Brachypterous forms are met along with macropterous forms within this family. The subfamily consists of three subfamilies, Calosotinae, Eupelminae and Metapelmatinae. *Calosota* is the important genera coming under Calosotinae; *Anastatus*, *Eupelmus*, *Mesocomys* etc. form the important genera under the subfamily Eupelminae and *Metapelma* and *Neanastatus* are the important genera of the subfamily Metapelmatinae.

KEY TO THE SUB FAMILIES OF FAMILY EUPELMIDAE

1. Mesoscutum quadrangular or almost so(Fig.18); anteriorly with conspicuous rounded shoulders , protruding outside narrow and low pronotum; notauli present as shallow lines indicated by sculpture and confined to anterior scutum which is almost regularly convex **Calosotinae**
=Mesoscutum in dorsal view with sides not or hardly forming shoulders, notauli broad qnd shallow, almost always delimitting anteriorly subtriangular middle lobe.....(2)
2. Pronotum undivided, large, conical or almost regularly convex, its hindmargin capping horizontal scutum **Metapelmatinae**

=Pronotum medially divided by line of weak sclerotization, often small, its hind margin usually far below midlobe of scutum
 **Eupelminae**

**KEY TO THE GENERA OF FAMILY
 EUPELMIDAE OF INDIA**

1. Mesoscutum quadrangular or almost so, anteriorly with conspicuous rounded shoulders protruding outside narrow and low pronotum, linear traces of notauli almost parallel(Fig. 18) not meeting anteriorly *Calosota* Curtis
 =Mesoscutum in dorsal view with sides not or hardly forming shoulders, notauli broad and shallow.....(2)
2. Hind tibia and basitarsus widened and foliaceous
*Metapelma* Westwood
 =Hind tibia and basi tarsus not foliaceous..... (3)
3. Antenna with five funicular segments.....*Neanastatus* Girault
 =Number of funicular segments of antenna more than five....(4)
4. Head nearly or quite as high as broad, frons less than 0.33 x width of head; scrobes not deep.....*Tineobius* Ashmead
 =Head in facial view strongly transverse; frons more than 0.33 x width of head; scrobes deep, converging towards median ocellus.....(5)
5. Clypeal margins in both sexes semicircularly produced (Fig.107)
*Calymmochilus* Masi

- =Clypeal margin not semicircularly projecting, although sometimes broadly rounded.....(6)
6. Fore wing often with linea calva (Fig. 126); gaster narrow, yellow, and collapsing (Fig. 127); sixth tergite in females medially divided (Fig.127) *Eupelmus* Dalman
- =Fore wing without linea calva; sixth tergite of gaster not medially divided (7)
7. External margins of scrobe distinct, parallel with eye orbits*Australoodera* Girault
- =Scrobal margins not parallel with eye orbits.....(8)
8. Head with horizontally elongate eyes; scapes enlarged, foliaceous (Fig. 240).....*Reikosiella* Yoshimoto
- =Eyes not horizontally elongate; scapes not foliaceous.....(9)
9. Mesoscutum with broadly U-shaped notaular impression; pronotum anteriorly with transverse ridge bearing few elongate bristles(Fig.217); scutellum anteriorly with conspicuous pit on either side of axillar groove..... *Mesocomys* Cameron
- =Mesoscutum without broadly U-shaped notaular impressions; pronotum anteriorly without transverse ridge bearing elongate bristles; scutellum without pits on axillar grooves.....(10)
10. Mesoscutum without distinct median and lateral lobes*Coryptilus* Gibson
- =Mesoscutum with distinct median and lateral lobes.....(11)
11. Gaster posteriorly more or less flattened(Fig.68); forewing not elongate and narrow; length of body usually less than 5mm*Anastatus* Motshulsky

=Gaster elongate and subcylindrical ; fore wing elongate; body length more than 5mm*Xenanastatus* Boucek

SUB FAMILY CALOSOTINAE

Genus *Calosota* Curtis

Calosota Curtis, 1836 : 596. Type species: *Calosota vernalis* Curtis; by original designation.

Calosoter Walker, 1837 : 358. Type species : *Calosoter vernalis* Walker; designated by Westwood, 1839: 72.

Metacalosoter Masi, 1917: 167. Type species:*Metacalosoter frequens* Masi; by monotypy.

Calosota(*Paracalosota*)Masi,1922:142.Typespecies:

Calosota (*Paracalosota*) *viridis* Masi; by monotypy.

Calosota(*Hylephila*)Masi,1926:330.Typespecies:

C. (Hylephila)stenogastra Masi ; by monotypy. Preoccupied by *Hylephila* Billberg, 1820: 81, and by *Hylephila* Rondani, 1877: 233.

Hylephilesca Ghesquiere, 1946: 368. New name for *Hylephila* Masi(1926)

Diagnostic Characters

Head more or less oval in lateral view; non crested parascrobal areas; first funicular segment of antenna usually shorter or only slightly longer than pedicel; clava three segmented. Mesoscutum broad, with shoulder like angle on either side of pronotum; subparallel notaular lines; axillae reduced to narrow sclerites on sides of broad base of scutellum; wing pilosity well developed, SMV slightly longer than MV. Gaster with last tergite subtriangular; ovipositor sheath subexserted.

Distribution

All continents (altogether atleast 40 sp.), including Australia and some Pacific islands as far east as Fiji.

Biology

Parasites of wood boring beetle larvae. Atleast one species group is associated with stems of grasses (probably also parasitic on beetles), yet another group (with very thick pilosity on the underside of the mesotarsus) develops in stems of rougher herbaceous plants. (eg. thistles) (BOUCEK, 1988).

Discussion

This genus is very close to *Balcha* Walker with which it shares the following structural features: scutoscutellar sutures carinately extended to apex of scutellum; notauli paramedially parallel and clava three segmented. *Calosota* Curtis differs from *Balcha* Walker in having a prepectus that extends to tegula.

KEY TO THE INDIAN SPECIES OF *CALOSOTA* CURTIS

1. Head with broad sulcus below eyes; antenna with two segmented clava; non-metallic mesosoma; propodeum with median carina and submedian grooves; scutellum with narrow punctate furrow

.....*C.kottiyoorica* sp. nov.

=Broad sulcus below eyes absent; antenna with three segmented clava; mesosoma metallic green; propodeum without median carina and submedian grooves; scutellum without narrow punctate furrow

.....*C.shyama* Narendran

Calosota kottiyoorica sp. nov.

(Figs. 14-19)

Female : Length 7.1mm. Black. Head in front view with ventral 0.75 (to level slightly dorsad of scrobes) with dull metallic green reflection; interantennal areas, clypeus, edges of toruli and malar area black; spot below front ocellus with dull metallic reflection (when viewed at some angle); frontovertex dull black; eye pale yellow with dark patches; ocelli black; basal part of mandibles red. Antenna black with scape reddish brown except black apex. Sides of pronotum, propodeum and metanotum with dull metallic green reflection. Fore and mid legs black with trochanter, bases of femora, apices of tibiae and tarsi pale yellowish brown, hind coxa black with metallic green reflection, remaining segments yellowish red with apices and tarsi paler. Wings hyaline with veins pale brown, pilosity brown. Pubescence on body white.

Head(Fig. 14): Width in anterior view 1.3 x its length; head width in dorsal view 3.1 x its median length; maximum diameter of eye in side view 2.13 x malar space length; POL 1.6 x OOL; frons and vertex distinctly punctate; vertex evenly curved into occiput; head, vertex, occiput and eye pubescent; scrobe deep, margin carinate on sides, ecarinate on upper border; inter antennal projection reaching middle; clypeus triangular, smooth and shiny, its lower margin slightly concave; mandibles bidentate. Antenna (Fig. 17) inserted at level of lower margin of eye; eyes diverging towards lower side of frons; scape not exceeding front ocellus, clava two segmented. Relative measurement of length: width of antennal segments; Scape =31.6; pedicel = 9.4; anellus = 5.4; F1 = 15.6; F2 12.6; F3 = 10.7; F4 = 8.7; F5 = 8.8; F6 = 7.8; F7 = 7.8; clava = 11.8.

Mesosoma(Fig. 15) : Pronotum smooth and shiny with sparse reticulation, pubescent; mesonotum densely and closely punctate, notauli parallel, incomplete; scutoscutellar suture straight; scutellum closely and longitudinally punctate, punctae relatively smaller than that of mesoscutum, with median shallow furrow containing punctae; prepectus coarsely punctate; acropleuron with distinct pits, except posterior upper smooth and shiny part, lower epimeron micropunctate; scutellar axillar complex quadrate; length of scutellum little more than its width; propodeum with short and thick median carina and two submedian grooves containing pits, submedian and lateral parts smooth and shiny, callus densely pubescent; middle legs with two rows of pegs on metatarsus to fourth tarsal segment; fifth tarsal segment without pegs. Hind coxa densely pubescent, wings(Fig. 16) hyaline with brownish venation. Relative lengths of veins : SMV = 30; MV= 24; PMV = 9; STV = 6.

Gaster (Fig.19) : Length of gaster 1.5 x length of mesosoma in side view; gaster sessile; densely pubescent on sides, finely coriaceous-strigulose from T2 to T5; T6 coarsely sculptured.

Male : Unknown

Material Examined

Holotype : Female, INDIA: Kerala, Kottiyoor Forest, Coll. T.C. Narendran & Party, x. 2003 (DZUC)

Host : Unknown

Biology : Unknown

Etymology : Species is named after Kottiyoor forest from where it was collected.

Discussion : This new species of *Calosota* differs from the only other Indian species, *Calosota shyama* in having nonmetallic mesosoma (whereas in *C. shyama* mesosoma is metallic green.); propodeum with median carina and submedian grooves (whereas in *C. shyama* no median carina and submedian grooves); scutellum with a median punctate furrow (whereas in *C. shyama* scutellum without median punctate furrow.); clava two segmented and not swollen (whereas in *C. shyama* clava swollen and with three segments.); head with broad sulcus below eyes (whereas in *C. shyama* such a sulcus is not present.)

Calosota kottiyoorica sp.nov. does not fit to the descriptions of the other Oriental species viz. *Calosota*(*Hylephila*) *stenogastra* Masi., *Calosota frequens* Masi and *Calosota splendida* Girault.

Calosota shyama Narendran

(Figs. 20-25)

Calosota shyama Narendran, 1996. *Entomon*, 21(1):77-87

DIAGNOSIS

Female : Length 3.49 mm. Black with metallic blue green reflections; ocellar region, parascrobal region, pronotum, mesoscutum, scutellar-axillar complex, callus part of propodeum with metallic green reflections; scape except apex brown, rest of antenna, plical region of propodeum, all coxae, fore femur, fore tibia except base and apex, dark brown: mid femur, mid tibia hind femur except base and hind tibia, pale brown; tarsi pale white: gaster black with metallic blue reflections. Head (Figs. 20 & 21) width more than its median length (excluding mandibles), minutely reticulate; mandibles tridentate, toruli not wide apart; interantennal area moderately convex; malar groove distinct,

scrobe deep, scrobal margins ecarinate; parascrobal region flattened. Antenna (Fig. 23) inserted slightly below level of lower margin of eye orbit; scape slightly bent, length of pedicel more than length of F1; anellus subquadrate; length of clava subequal to length of preceding three segments combined. Length of mesosoma less than length of gaster, covered with short white hairs on dorsolateral sides; mesoscutum densely reticulate punctate, width more than length, with wide shoulder like angle on either side of pronotum and with shallow depression medially at about half its length; scutellar-axillar complex with longitudinal striations; scutellum distinctly convex, quadrangular; axillae linear along metanotum with dorsellum extended over scutellar apex; propodeum with plical region convex, linear without median carina. Fore wing hyaline; Midtibial spur short, length of mesobasitarsus; length of hind basitarsus subequal to length of following three segments combined. Gaster (Fig.25) with epipygium elongated, rounded at apex; ovipositor sheath slightly protruding.

Male : Unknown

Material Examined : Type only

Details of Type

Holotype : Female, INDIA: Kerala, Calicut University Campus, Coll. T. C. Narendran, 10.ix. 1986(DZUC)

Host : Unknown

Biology : Unknown

Distribution : India (Kerala)

Discussion : Only two species of *Calosota* have been reported from the Oriental region so far. *C. splendida* Girault from Philippines(Girault,1927)

differs from this species in having body colour brilliant green (in *C. shyama* it is black with metallic blue green reflection; PMV twice longer than STV(PMV equal to STV in *C. shyama*; anellus longer than wide(subquadrate in the new species) ; length of clava equal to F5 (in *C. shyama* clava subequal to F5-F7 combined). *C. stenogastra* Masi (Masi 1926) from Taiwan differs from this species in having ; a transverse furrow across parascrobal region at about dorsal level of interantennal area(in *C.shyama* transverse furrow absent); scrobe not reaching median ocellus(in *C.shyama* scrobe reaching median ocellus); PMV longer than STV(in *C.shyama* PMV subequal to STV). *C.sinensis* Ferriere from China differs from *C.shyama* in having pedicel slightly shorter than F1(in *C.shyama* pedicel distinctly longer than F1); clava distinctly shorter than F5- F7 combined(in *C. shyama* clava subequal to F5-F7 combined); SMV twice longer than MV (in *C. shyama* SMV about 1.4 x longer than MV); PMV nearly twice STV (in *C. shyama* PMV as long as STV).

SUB FAMILY EUPELMINAE

Genus *Anastatus* Motschulsky

Anastatus Motshulsky, 1859: 116. Type species:

Anastatus mantoidae Motshulsky; by monotypy.

Cacotropia Motschulsky, 1863:55. Type species:

Cacotropia echidna Motschulsky; by monotypy.

Antigaster Walsh & Riley, 1869a:156. Typespecies:

Antigaster mirabilis Walsh & Riley by monotypy.

Misocoris Rondani, 1877:187. Type species:

Misocoris oophagus Rondani; by designation of Boucek.

Solindenia Cameron, 1883: 189. Type species :

Solindenia picticornis Cameron; by monotypy.

Ischnopsis Ashmead, 1896:16 Type species :

Ischnopsis ophthalmica Ashmead; by original designation.
Preoccupied by *Ischnopsis* Walsingham, 1881.

Zaischnopsis Ashmead, 1904 b:126. Replacement name for

Ischnopsis Ashmead.

Paraguaya Girault, 1911:385. Type specis:

Paraguaya pulchripennis Girault; by monotytpy and original designation.

Parooderella Girault, 1913C:88. Type species:

Parooderella aptera Girault; by original designation.

Parasolindenia Girault, 1913C: 90. Type species:

Parasolindenia hemiptera Girault; by original designation.
Preoccupied by *Parsolindenia* Brues, 1907.

Eupelmoides Masi , 1917:162. Type species

Eupelmoides obscuratus Masi; by monotypy.

Pseudanastatus Masi, 1917: 162. Type species:

Pseudanastatus crassicornis Masi; by monotypy.

Pseudooderella Brethes, 1922: 127. Type species :

Pseudooderella catamarcensis Brethes, by monotypy.

Vignalia Risbec, 1951: 272. Type species:

Vignalia halyomorphae Risbec; by original designation.

Paravignalia Risbec, 1951: 274. Type species:

Paravignalia hemiptera Risbec; by monotypy and original designation.

Proanastatus De Santis, 1952:267. Type species:

Proanastatus excavatus De Santis by monotypy and original designation. (Treated as subgenus by De Santis, 1981)

Anastatimorpha Erdos, 1957. Type species:

Anastatimorpha siderea Erdos; by monotypy and original designation

Cladanastatus Boucek, 1979. Type species:

Anastatus (Cladanastatus) umae Boucek: by monotypy and original designation.(as subgenus)

Diagnostic characters

Head usually with whitish unmodified or lanceolate setae on interantennal region and parascrobal region, in frontal view head subquadrate to , distinctly wider than high; upper face with scrobal margin usually incurved, scrobal depression usually bell shaped. Antenna usually with elongated scape and unicoloured flagellum. Pronotum divided medially, usually concave or medially depressed; mesoscutum varied, relatively flat or with distinct median and lateral lobes; scutellum and axillae low convex to flat; metanotum V like angulate behind

scutellum; propodeum often bare; prepectus with frontal surface small and inconspicuous. Macropterous or brachypterous, macropterous female possess highly varied forewing colour pattern, fore wing partly brown to orange, white setae in varied hyaline regions behind marginal vein. Forecoxa and forefemur with short white setae; mesotibia with oblique apical groove and with dark apical pegs in small patch, mesotarsus with row of dark pegs along each side of tarsomeres; hindtibia not compressed to carinate dorsal margin. Gaster short, flat, gradually widening, last tergite with hind margin stiffened and upturned. Ovipositor sheath short, ovipositor sheath barely protruding.

Distribution

All continents (at least 200 spp., but many of them undescribed.)
(BOUCEK, 1988)

Biology

The genus is well known mainly by the species developing as parasites in eggs of some Lepidoptera and Heteroptera, including many pests, hence some are used in biological control (eg. in China). Relatively few species of *Anastatus* attack cockroaches, Orthoptera and eggs of Mantodea, still fewer may be reared from other hosts, including small cocoons of some Braconidae. Individual species, although generally host-specific in eggs of certain hosts can occasionally parasitise also some other hosts in similar ecological condition. (BOUCEK, 1988).

Discussion

Some species of *Anastatus* Motschulsky could be confused with *Eupelmus*, but the apical tergites of gaster are quite different in both

genera and based on this feature, the two genera can be easily separated.

KEY TO SPECIES OF *ANASTATUS* MOTSCHULSKY OF INDIA

1. Length of forewing distinctly less than 2x length of gaster
..... *A. apoorvus* sp. nov.
=Length of forewing distinctly more than 2 x length of gaster.....(2)
2. Lateral lobes of mesoscutum with transverse sulcus posteriorly
..... *Anastatus abhinavi* sp. nov.
=Lateral lobes of mesoscutum without transverse sulcus posteriorly
..... (3)
3. Length of anellus more than its width
..... *A. yasummatsui* Shafee
=Length of anellus less than its width.....(4)
4. Scutellum with median longitudinal carina.....*A. ashokai* sp. nov.
=Scutellum without median carina(5)
5. Ovipositor sheath not exserted.....*A. japonicus* Ashmead
=Ovipositor sheath exserted(6)
6. Length of marginal vein equal to length of submarginal vein
..... *A. colemani* Crawford

- =Length of marginal vein not equal to length of submarginal vein
.....(7)
7. Length of ovipositor sheath equal to 0.2 x length of gaster
.....*A. tenuipes* Bolivar
- =Length of ovipositor sheath distinctly less than 0.2 x length of
gaster.....(8)
8. Vertex separated from occiput by distinct carina
.....*A. narendrani* sp. nov.
- =A distinct carina between vertex and occiput absent.....(9)
9. Lateral lobes of mesoscutum connected by transverse ridge
before transscutal line.....*A. leelae* sp. nov.
- =Lateral lobes of mesoscutum not connected by transverse
ridge.....(10)
10. T1 with two dark brown lateral spots
.....*A. kashmirensis* Mathur
- =T1 without two dark brown lateral spots.....(11)
11. Scrobal margins ecarinate.....*A. leithi* Walker
- =Scrobal margins carinate.....(12)
12. Interantennal region medially with longitudinal ridge
.....*A. abalus* sp. nov.
- =Interantennal lacks median longitudinal ridge.....(13)
13. Scrobe ending about two ocellar diameter before median ocellus;
forewing venation obscure.....*A. galatus* sp. nov.

- =Scrobe ending less than two ocellar diameter before median ocellus; forewing venation well developed.....(14)
14. Length of postmarginal vein equal to 4 x length of stigmal vein; brachypterous, forewing not extending beyond apex of gaster
.....*A. excelsus* sp. nov.
- =Length of postmarginal vein subequal to or distinctly less than 2 x length of stigmal vein; macropterous, forewing extending beyond apex of gaster(15)
15. Forewing medially with hyaline band.....*A. dentatus* Narayanan
=Forewing medially with oval hyaline patches.....(16)
16. Hind tibial spur armed with denticles.....*A. amarus* (Subha Rao)
=Hind tibial spur not armed with denticles.....(17)
17. Forewing with median hyaline band, below marginal vein, commencing from about its middle and ending before its junction with stigmal vein
.....*A. bangalorensis* Mani & Kurien
=Forewing without median hyaline band.....(18)
18. Forewing with fuscous streak in middle of submarginal vein
.....*A. madagascarensis* Risbec
=Forewing without fuscous streak in middle of submarginal vein
.....(19)

19. Hyaline patch on forewing commencing from about middle of marginal vein and ending before junction of marginal vein and stigmal vein

.....*A. imatus* sp. nov.

= Hyaline patch on fore wing commencing from about middle of marginal vein and extending to junction of marginal vein and stigmal vein

.....*A. acherontiae* Narayanan.

Anastatus abalus sp. nov.

(Figs. 26 - 32)

Female : Length 3.4mm. Body brown with coppery and bronzy reflections; head black with metallic green reflections on occiput, malar sulcus; interantennal with purple reflections; eyes yellow; ocelli brown. Antenna(fig. 29) inserted more or less at level of lower orbital, scape golden yellow, enlarged, length of scape 0.2 x length of antenna, length of pedicel 0.2 x length of scape, anellus longer than wide, F1, F2 and F3 subequal, F5, F6 and F7 subequal, clava three segmented, less than length of three preceding segments combined. Pronotum brown, mesoscutum orange yellow with purple reflections; mesopleura dark brown. Brachypterous, fore wing black basally, hyaline medially, apically with black and yellow colour patterns. Mid leg and hind leg except tarsi brown, rest yellow. Gaster hyaline basally, rest dark brown. Ovipositor sheath slightly exerted.

Head (Figs. 26, 27 & 28): Width in front view 1.6 x its median length, EL 2.2 x EW; POL 2 x OOL; scrobe deep, channel like, not reaching to anterior ocellus, scrobal margins not carinate, interantennal region convex with deep median groove, toruli not wide apart, torular sulcus carinate.

Mesosoma : Pronotum with median sclerotization, mesoscutum with lateral lobes raised, space between lateral lobes concave, mesoscutum densely reticulate, scutellum convex, triangular, apex more or less rounded, densely reticulate, axillae separate anteromedially; mesopleura densely reticulate anteriorly, more lineolate posteriorly; prepectus rectangular; propodeum with convex plical region, separated from callar region by plical furrow. Brachypterous, fore wing (fig. 30) not reaching to apex of gaster, venation not clear. length of midtibial spur (fig. 31) equal to basitarsus; mesotarsus with row black pegs on four tarsal segments; hind basitarsus equal to three segments combined.

Gaster (Fig.32) : Length of T1 more than length of T2 , T1 with posterior margin medially incised, length of T2 less than T3, posterior margin of T2 slightly incurved, length of T5 more than T6, posterior margin of T5 broadly concave, posterior margin of T6 convex, last tergite with upturned rim. Ovipositor sheath slightly exserted

Male : Unknown

Holotype : Female, INDIA: Kerala, Trichur, Coll. T. C. Narendran & Party, 4.ii. 1988

Paratypes : 4F, INDIA:Kerala, Calicut University Campus, Coll. Anil. K., 5 .ii.1988, 29.ii. 1988, 27.iii. 1988, 16.i. 1989.

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

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

Discussion : *Anastatus abalus* sp. nov. resembles with *Anastatus apoorvus* sp. nov. in having scrobe with margins carinate; interantennal region convex; scape golden yellow, enlarged; propodeum without median carina; brachypterous; length of hind basitarsus equal to length of three following segments combined; length of mid tibial spur equal to length of mesobasitarsus; length of T1 more than length of T2; length of T2 less than length of T3; posterior margin of T1 medially incised; posterior margin of T2 incurved medially; posterior margin of T5 concave; posterior margin of T6 convex.

In *Anastatus abalus* sp. nov. median longitudinal groove between posterior margin of scrobe and anterior ocellus absent (whereas in *Anastatus apoorvus* sp. nov. a median longitudinal groove between posterior margin of scrobe and anterior ocellus present); in *A. abalus* sp. nov. head width in front view 1.6 x distance between front ocellus and clypeal margin (in *A. apoorvus* sp. nov. head width in front view 1.2 x distance between front ocellus and clypeal margin); in *A. abalus* sp. nov. POL 2 x OOL (whereas in *A. apoorvus* sp. nov. POL 2.5 x OOL).

***Anastatus abhinavi* sp. nov.**

(Fig 33 – 39)

Female : Length 2.41 mm. Dark brown, head with coppery reflections on scrobe, parascrobal region, metallic green reflections on occiput, lower eye orbital, malar sulcus, clypeus; eyes yellow, ocelli brown. Antenna (fig.36) dark brown except scape, scape golden yellow, elongated, slightly curved, length of scape 0.22 x length of antenna; length of pedicel 0.24 x length of scape; length of F1 and F2 subequal, length of F3 little more than length of F1 and F2, length of

F4 little less than length of F3, length of F5 and F6 subequal, length of F7 little less than length of F6; length of clava more than length of preceding three segments combined. Pronotum golden yellow; median lobe of mesoscutum dark brown, lateral lobes dark brown with metallic blue reflections; mesopleura dark brown basally, golden yellow medially. Macropterous, fore wing extending to apex of gaster, infuscate with two hyaline patches medially. Legs dark brown, fore, meso and hind tarsi pale yellow, mesotarsus with black pegs. Gaster dark brown with stiff setae, ovipositor sheath slightly exerted.

Head (Figs. 33, 34 & 35): Width in front view 1.4 x distance between front ocellus and occipital margin; finely sculptured; POL 4.5 x OOL; EL 1.04 x MS; scrobe channel like not reaching to anterior ocellus; margins ecarinate; interantennal region convex, finely reticulate, toruli not wide apart, pubescence on head white with brown tinge.

Mesosoma : Pronotum divided medially by weak sclerotization, finely reticulate; notauli V shaped, median lobe of mesoscutum densely reticulate, lateral lobes of mesoscutum with transverse sulcus posteriorly; scutellum broad, convex, densely reticulate; axillae widely separate; propodeum with narrow, transverse plical region, median carina absent; prepectus small, finely sculptured; mesopleura finely reticulate, brown pubescence anteriorly. Macropterous, fore wing (fig. 37) hyaline basally, infuscation interrupted medially by two hyaline patches; length of SMV 1.7 x length of MV, length of PMV 1.25 x length of STV. Length of midtibial spur (fig 38) subequal to length of mesobasitarsus; mesotarsus with row of dark pegs ventrally on either side on basal three tarsal segments; length of hind basitarsus subequal to length of following three segments combined.

Gaster (Fig.39) : Length of gaster 0.9 x length of mesosoma; length of T1 less than length of T2, posterior margin of T1 and T2 medially incised; length of T2 more than length of T3, posterior margin of T3 and T4 straight; posterior margin of T5 concave; posterior margin of T6 convex; last tergite with apical upturned rim.

Male : Unknown

Holotype : Female, INDIA: Kerala, Vazhani dam, Coll. T. C. Narendran & Party, 8.ii.1989

Paratypes : 2 F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K., 12.iii.1985, 27.i. 1989; 1F, INDIA: Kerala, Kayamkulam, Coll. Anil. K., 20 .ii. 1989; 1F, INDIA: Kerala, Aakkalam, Coll. Anil. K., 25.ii.1989

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Etymology : The species is named after the author's son.

Discussion: *Anastatus abhinavi* sp. nov. resembles with *Anastatus acherontiae* Narayanan in having head brown in colour with metallic green reflections; gaster dark brown; length of scape 0.2 x length of antenna; length of pedicel 0.2 x length of scape; propodeum without median carina; mesotarsus with row of dark pegs on either side ventrally; length of hind basitarsus equal to length of following three segments combined; macropterous, forewing with two hyaline patches medially.

In *Anastatus abhinavi* sp. nov. scrobal margins are ecarinate(whereas in *Anastatus acherontiae* the scrobal margins are

carinate); in *A. abhinavi* sp. nov. POL 4.5 x OOL (whereas in *A. acherontiae* POL 4 x OOL); in *A. abhinavi* sp. nov. width of head in front view 1.4 x distance between front ocellus and clypeal margin (whereas in *A. acherontiae* width of head in front view 1.3 x distance between front ocellus and clypeal margin); in *A. abhinavi* sp. nov. EL 1.4 x length of MS (whereas in *A. acherontiae* EL 4 x length of MS).

Anastatus acherontiae Narayanan

(Figs. 40 - 46)

Anastatus acherontiae Narayanan, Subha Rao & Ramachandra Rao, 1960.

Proc. Natl. Inst. Sci. India, B.26: 171. F.India: Delhi(IARI)

REDESCRIPTION

Female : Length 2.98 mm. Head brown with metallic green reflections; eyes yellow; ocelli pale reflecting yellow. Antenna (fig.43) dark brown inserted below level of lower orbital border with thirteen segments; scape golden yellow, extending to vertex, slightly bent in middle, length of scape 0.2 x length of antenna, length of pedicel 0.2 x length of scape, anellus short, not broader than pedicel, length of F1 and F2 subequal, length of F3 little more than length of F4, length of F5 and F6 subequal, length of F7 little less than length of F6, length of clava more or less equal to preceding three segments combined. Pronotum golden yellow with four dark brown spots; propleura, mesopleura golden yellow; tegula brown. Macropterous, fore wings with two hyaline patches in middle bearing transparent setae. Legs pale brownish yellow with fore, mid and hind coxae pale

yellow; pegs of mesotibia and mesotarsus black; midtibial spur yellow. Gaster blackish brown; ovipositor slightly exerted; pubescence white.

Head (Figs. 40, 41 & 42): Width in front view more or less equal to 1.3 x distance between front ocellus and clypeal margin; head finely punctate; eyes bare; maximum diameter of eye in profile more than 4 x length of malar sulcus; POL more or less equal to 4 x OOL; scrobe deep, punctate, scrobal margins carinate; parascrobal area broad, punctate; clypeal margin broad, slightly incurved.

Mesosoma : Pronotum medially divided by line of weak sclerotization; length of mesoscutum less than its width, median lobe of mesoscutum densely reticulate, lateral lobes of mesoscutum posteriorly raised with sharp dorsal margins, interspace between lateral lobes concave; notauli V shaped, not reaching transscutal sulcus; scutellum convex, axillae widely separate anteromedially; scutellar-axillar complex densely reticulate; metanotum narrow with dorsellum extended over apex of scutellum; propodeum with plical region narrow without median carina, separated from callar region by plical furrow; prepectus triangular, minutely punctate, reaching base of tegula; mesopleura lineolate. Macropterous, fore wing as in (fig. 45) infuscate, infuscation commencing from bent of SMV and extending towards apex, infuscation interrupted by two oval hyaline patches medially, opposite each other below MV, length of SMV equal to length of MV, length of STV 3 x length of PMV. Length of midtibialspur subequal to length of mesobasitarsus; mesotarsus with single row of dark pegs ventrally on basal three tarsal segments; length of hindbasitarsus subequal to three of following segments combined.

Gaster (Fig. 46): Length of gaster subequal to length of mesosoma; length of T1 more than length of T2, hind margin of T1 medially

incised, length of T2 subequal to length of T3, hind margin of T2 incised medially, length of T3 little less than length of T4, posterior margin of T5 broadly concave, T6 with posterior margin convex, last tergite broadly exposed with upturned apical rim; ovipositor sheath slightly exerted.

Male : Unknown

Plesiotype : Female, INDIA: Kerala, Karimpuzha Dam Coll ..Narendran & party(DZUC) , 8.ii.1989

Other Material Examined : 1F, INDIA: Kerala, Calicut University Campus , Coll. .T.C.Narendran , x.1985; 1F, INDIA: Kerala, Silent Valley, Coll. .T.C. Narendran, 30.x.1988; 1F, INDIA: Kerala , Kadakkatupara, Coll. Anil. K., 8-X1-1988; 2F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K., 5.x.1988; 3.xii.1989,3F,INDIA:Kerala, Calicut University Campus, Coll. Anil. K, 25.i.1989, 27.i.1989, 2..xii.1989; 3F, INDIA: Kerala, Eranakulam, Coll. T.C. Narendran, 9.ii.1989; 1F, INDIA: Kerala, Calicut University Campus, Coll. T.C. Narendran, 30.xii.1989; 1F, INDIA, Kerala, Calicut University Campus, Coll. Anil. K., 13.xii.1991; 1F, INDIA: Kerala, Calicut University Campus, Coll. Anitha. P.V, 15.v.2001

Host : *Acherontia styx* Westwood (M. S. MANI , 1989)

Biology : Unknown

Distribution : India(Kerala, Delhi & Punjab)

Discussion : It is given under the discussion of *A. ashokai* sp. nov. elsewhere in this work.

Variation : In the original description of *A. acherontiae* by Dr. M. S. Mani, the female length is 2.00-2.10mm. whereas in the present description, female length is 2.98 mm. In the original description, POL more than 2xOOL, whereas in the present description POL is more or less equal to 1.6x OOL. In the original description malar space less than 0.50 of eye whereas in the present description it is equal to 0.33 of eye. In one of the material examined (Aa 56) pronotum golden yellow with five dark brown spots.

Remarks : As the original description of *A. acherontiae* Narayanan is very inadequate for easy identification, a redescription is provided here.

***Anastatus apoorvus* sp. nov.**

(Figs. 47 - 53)

Female: Length 2.4 mm. Body yellowish brown; head metallic green with coppery reflections; eyes yellow; ocelli brown; pubescence on head white. Antenna (fig. 50) dark brown, except scape, inserted below lower orbital border; scape golden yellow, elongated, cylindrical with hairs, length of scape 0.2 x length of antenna, length of pedicel 0.2 x length of scape, anellus quadrate, length of F1, F2 and F3 subequal, length of F6 and F7 subequal, clava three segmented, length of clava less than length of F5, F6 and F7 combined. Pronotum brown, mesoscutum golden yellow; mesopleura dark brown with bronzy reflections. Brachypterous, basal part of fore wing hyaline, apical portion orange. Legs brown, midtibial spur brown. Gaster pale yellow basally, rest dark brown; ovipositor sheath not exerted.

Head(Figs. 47, 48 & 49) : Finely reticulate, width in front view 1.2 x distance between front ocellus and clypeal margin; POL 2.5 x OOL;

EL 2 x EW; interantennal region convex; toruli not wide apart; scrobe not deep, channel like, not reaching to anterior ocellus, scrobal margins carinate.

Mesosoma : Pronotum finely reticulate, with median sclerotization; median lobe of mesoscutum reticulate, notauli U shaped, median lobe of mesoscutum with posteriomedian depression; scutellum densely reticulate; axillae separate; propodeum with narrow plical region, without median carina; prepectus rectangular, finely reticulate; mesopleura anteriorly reticulate, posteriorly more lineolate. Brachypterous, fore wing (fig.51) hyaline basally, orange apically. Midtibial spur (fig.52) subequal to basitarsus; mesotarsus with single row of dark pegs on four basal tarsal segments; length of hind tarsus as long as following three segments combined.

Gaster (Fig.53) : Length of T1 more than length of T2, its posterior margin medially incised, length of T2 less than T3, posterior margin of T2 medially incurved; length of T3 equal to length of T4, posterior margin of T3 and T4 straight, length of T5 more than length of T4, posterior margin of T5 concave; length of T6 less than length of T5, posterior margin of T6 convex, last tergite with upturned rim at apex. Ovipositor sheath slightly exerted.

Male : Unknown.

Holotype : Female, INDIA: Kerala, Calicut University Campus, Coll. T.C.Narendran & Party, 8.ii.1987

Paratypes : 1F, INDIA: Kerala, Silent Valley, Coll. T. C. Narendran & Party, 9.xii.1987, 1 F, INDIA: Kerala, Nilambur, Coll. Anil. K., 22.vi.1988, 3F, INDIA : Kerala, Calicut University Campus, Coll. Anil. K.

,1.x. 1988, 12- I 1989, 14.v.1989, 1F, INDIA: Kerala, Muthanga, Coll. Sheela. S., 7.x.1995

Host : Unknown

Biology : Unknown

Distribution : India (Kerala)

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

Discussion: This species is discussed under *Anastatus abalus* sp. nov. elsewhere in this work.

***Anastatus ashokai* sp. nov.**

(Figs. 54 - 59)

Female : Length 2.7mm. Body coppery brown; head dark brown; eyes golden yellow; ocelli reflecting red. Antenna (fig.57) dark brown inserted more or less at level of lower orbit; scape, pedicel and lower orbital border with metallic green reflections, scape elongate, cylindrical, length of scape 0.2 x length of antenna; length of pedicel 0.3 x length of scape; anellus golden yellow, transverse; length of F1 little more than length of pedicel, length of F1 and F2 subequal, length of F3 more than length of F2, length of F4 and F5 subequal, length of F6 and F7 subequal; clava with three segments, length of clava little less than length of preceding three segments combined; interantennal region with brown reflection. Pronotum dark brown, densely reticulate; mesoscutum dark brown; mesopleuron dark brown with metallic reflections. Foretibia, forefemur, midfemur dark brown, midfemur at base, mesotarsus, hind tarsus pale yellow. Macropterous, fore wing with two hyaline patches, dark brown medially and towards apex. Gaster dark brown, truncate, ovipositor sheath pale yellow.

Head (Figs. 54,55 & 56): Densely reticulate, width in front view little more than 1.4 x distance between front ocellus and clypeal margin; POL 2.5 x OOL; eyes bare; toruli not wide apart; interantennal region convex; scrobe not deep, extending to ocellar region, reticulate, margins not carinate; parascrobal region posteriorly reduced.

Mesosoma : Pronotum medially divided by deep groove; notauli broad, U shaped, median lobe of mesoscutum densely reticulate, lateral lobes granulose; scutellum broad, convex, densely reticulate with median line along entire length, axillae separate anteromedially; propodeum with plical region broad, with median carina, separated by plical furrow from callar region; prepectus subtriangular, reticulate. Macropterous, fore wing with two large, oval, hyaline patches below MV. Length of mesobasitarsus (fig. 58) equal to length of following three segments combined; mesobasitarsus with single row of dark pegs ventrally.

Gaster (Fig. 59) Gradually broadening towards apex, finely reticulate; length of T1 more than length of T2, length of T2 less than length of T3, posterior margin of T3 medially incurved, length of T4 more than length of T3, length of T5 less than length of T4, T6 exposed, posterior margin convex, last tergite with rim at apex; length of ovipositor sheath 0.13 x length of gaster.

Male: Unknown

Holotype : Female, INDIA: Kerala, Calicut University Campus, Coll. T.C. Narendran & Party, 14.iii. 1985

Paratypes : 2F, INDIA: Kerala, Calicut University Campus, Coll. T. C.Narendran & Party, 14.ii.1985, 12.iii.1985.

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Etymology : The species is named after King Ashoka, brave ruler of India.

Discussion: *Anastatus ashokai* sp. nov. resembles with *Anastatus acherontiae* Narayanan in having antenna dark brown, inserted below lower orbital border; scape elongated, cylindrical, length of scape 0.2 x length of antenna; macropterous, fore wing with two oval hyaline patches medially; mesotarsus with rows of dark pegs on either side ventrally; notauli broad, U shaped.

In *Anastatus ashokai* sp. nov. scrobal margins ecarinate(whereas in *Anastatus acherontiae* scrobal margins are carinate); in *A. ashokai* sp. nov. propodeum with median carina (whereas in *A. acherontiae* propodeum without median carina); in *A. ashokai* sp. nov. POL 2.5 x OOL(whereas in *A. acherontiae* POL 4 x OOL); in *A. ashokai* sp. nov. head width in front view little more than 1.4 x distance between front ocellus and clypeal margin (whereas in *A. acherontiae* head width in front view 1.3 x distance between front ocellus and clypeal margin); in *A. ashokai* sp. nov. scutellum broad, convex, densely reticulate, with median line along entire length(whereas in *A. acherontiae* scutellum without median line); in *A. ashokai* sp. nov. parascrobal area posteriorly reduced(whereas in *A. acherontiae*

parascrobal area broad and punctate); in *A. ashokai* sp. nov. EL 2.1 x length of MS (whereas in *A. acherontiae* EL 4x MS).

Anastatus bangalorensis Mani & Kurien

(Figs. 60-64)

Anastatus bangalorensis Mani & Kurian, 1953. Indian J.

Ent.; 15: F. India:Bangalore(?SEA).

REDESCRIPTION

Female : Length 2.50mm. Head dark brown, densely pubescent with metallic green reflection; eye yellow; ocelli reflecting yellow. Antenna (fig.62) brown, inserted at level of lower orbital border with thirteen segments; scape golden yellow, bent in middle, thicker apically than basally, pedicel about 0.28 x length of scape; anellus about 0.33 x length of pedicel, first funicular segment more or less equal to pedicel, second funicular segment shorter, third and fourth funicular segments subequal, longer than second, other funicular segments gradually becoming thicker, clava equal to preceding two segments combined. Mesosoma brown with two dark brown spots; propleura, mesopleura blackish brown; tegula pale brown. Legs yellowish brown; pegs of mesotibia and mesotarsus black; mesotarsus pale yellow. Fore wings with straight hyaline band in middle and hyaline patch basally, veins and pilosity brown, SMV subequal to MV. Gaster apically truncate, first tergite with white patch. Ovipositor sheath pale yellow, slightly exerted.

Head (Figs.60, 61) : Width in front view 1.4 x distance between front ocellus and clypeal margin; head finely punctate; eye bare; maximum diameter of eye in profile equal to 3 x length of malar sulcus; POL

equal to 2 x OOL; scrobe deep, reaching nearly to front ocellus, margins carinate; parascrobal area broad, pubescent.

Mesosoma : Punctate; mesoscutum broad, U shaped, not reaching transscutal sulcus; axillae separate; apex of scutellum more or less rounded; propodeum rugostriate at sides with median areas smooth apically; prepectus subrectangular; mesopleura lineolate. Macropterous, fore wing as in fig.63. Midtibial spur less than in length to mesotarsus; mesotarsus ventrally with partly double rows of dark pegs on either side; hind basitarsus almost equal in length to two following segments combined.

Gaster (Fig. 64): More than in length of mesosoma; truncate apically; first tergite with white patch in middle and at sides.

Male : Length 2mm. Head black with metallic green reflection; eye dark brown; ocelli dark brown; antenna golden yellow with clava brown and scape yellow. Mesosoma blackish brown with metallic green reflection; propleura, mesopleura blackish brown; tegula pale brown. Legs brownish yellow with fore, mid and hind femora blackish brown. Wings hyaline with pilosity pale brown. Gaster brown with metallic green reflection.

Head :Width in front view 4 x distance between front ocellus and clypeal margin; head punctate, setose; eye bare; maximum diameter of eye in profile little more than 2 x length of malar sulcus; POL subequal to 4 x OOL; scrobe deep, punctate.

Mesosoma : Punctate; length of mesoscutum equal to width; notauli groove like; axillae separate; mesopleura lineolate. Macropterous.

Gaster : Little shorter than mesosoma, apex more or less rounded.

Plesiotype : Female, INDIA, , Karnataka, Koorlugaya, Coll.M. Daniel,
26.ix.2001

Other Material Examined : 3M, data same as that of plesiotype.

Distribution : India (Kerala, Karnataka)

Host : Eggs of *Halymorpha marmorea* F. {(Mariamma Daniel,
Narendran, T. C. and Keshava Bhat, S.(2003) }

Biology : Unknown

Discussion : *A. bangalorensis* Mani & Kurien resembles with *A. dentatus* Narayanan in having forewings with a transverse hyaline band. In *A. bangalorensis* and *A. dentatus* F1 is clearly longer than pedicel; in *A. bangalorensis* and *A. dentatus* head width in front view is 4 x distance between front ocellus and clypeal margin).

In *A. bangalorensis* hyaline band of forewings nearly straight(whereas in *A. dentatus* hyaline band of forewing is curved); in *A. bangalorensis* forefemora lacks a denticle , (whereas in *A. dentatus* forefemora bears a denticle at distal third of ventral margin.); in *A. bangalorensis* maximum diameter of eye in profile a trifle more than 3.5x length of malar sulcus, (whereas in *A. dentatus* maximum diameter of eye in profile equal to 5.1x length of malar sulcus); in *A. bangalorensis* POL is equal to 2 x OOL, (whereas in *A. dentatus* POL is equal to 1.5 x OOL.)

Variation : In the original description of *A. bangalorensis* by Dr. M.S. Mani , length of female is 2.60 mm., whereas in the present description it is about 2.50mm. In the original description pedicel about 0.20 of scape whereas in the present description pedicel is

about 0.28 of scape. In the original description anellus about 0.30 of pedicel whereas in the present description anellus is about 0.33 of pedicel.

Remarks : This extralimital species is involved in the present investigation as the specimen was collected from a locality belonging to Karnataka, lying adjacent to northern district of Kerala and possibilities are there for its distribution in northernmost districts of Kerala. Male of *Anastatus bangalorensis* Mani & Kurien is described for the first time and a redescription of female *A. bangalorensis* Mani & Kurien is made above due to an inadequate original description for the easy identification of the species.

Anastatus dentatus Narayanan

(Figs. 65 - 68)

Anastatus dentatus Narayanan Subha Rao & Ramachandra Rao 1960.

Proc. Natl. Inst. Sci. India, B.26: 173. M, F. India: Delhi (IARI)

REDESCRIPTION

Female : Length 2.2mm. Head blackish brown with metallic green reflection; eyes dark brown; ocelli reflecting brown. Antenna (fig. 88) blackish brown; scape golden yellow, elongate, slightly bent in middle, longer than pedicel, longer than thick; anellus short, not broader than pedicel; first two funicular segments subequal, third slightly shorter than preceding, fourth equal to first but slightly thicker, fifth little longer than sixth, sixth and seventh subequal; clava broad at base and narrow at apex. Mesosoma blackish brown with metallic green reflections, median yellow line on pronotum; propleura, mesopleura blackish brown

with metallic green reflections; tegula brown. Legs brown with fore and mesotarsi yellow; pegs of midtibia and mesotarsus black; midtibial spur yellow. Macropterous, fore wings infusate with transverse hyaline band in middle and hyaline patch at base. Gaster blackish brown; ovipositor sheath slightly exerted. Pubescence white.

Head (Figs. 65,66 & 67) : Width in front view 3 x distance between front ocellus and clypeal margin; head punctate; eyes bare; maximum diameter of eye in profile subequal to length of malar sulcus; POL subequal to OOL; scrobe deep, carinate with white pubescence; parascrobal area broad; punctate.

Mesosoma : Pronotum with weak median sclerotization; length of mesoscutum little more than its width; notauli broad, U shaped not reaching transscutal sulcus; axillae well separate anteromedially; apex of scutellum rounded ; propodeum narrow in middle with weak median carina; prepectus rectangular; mesopleura finely reticulate. Macropterous, fore wing as in fig.68. Midtibial spur less than in length to mesotarsus; mesotarsus ventrally with partly double rows of dark pegs on either side; hindbasitarsus as long as following three segments combined.

Gaster : Length of gaster equal to length of mesosoma, narrow at base, widening gradually at apex; length of T1 more than length of T2, length of T3 less than length of T4, posterior margin of T5 broadly concave, last tergite with upturned apical rim; ovipositor sheath slightly exerted.

Male : Length 1.00-1.20mm. Head transverse, vertex finely rugulose; face minutely punctate, eyes greyish brown; scape short, thick, not reaching front ocellus; pedicel short, much narrower than scape; first funicular segment slightly bent in middle and little longer than

following two segments , which are subequal, fourth slightly longer than fifth and sixth, fifth and sixth subequal, seventh distinctly smaller and narrower ; length of clava equal to length of first funicular segment.

Head : Width in anteroposterior view 3 x length; POL 2x OOL; scrobes deep, nearly reaching front ocellus; MS subequal to EL; malar furrow distinct.

Mesosoma : Convex; pronotum narrow, transverse; parapsidal furrows distinct, complete; mesoscutum lineolate punctate, width subequal to width of head; propodeum narrow in middle with weak median carina. Wings hyaline, length of SMV 1.5 x length of MV, length of PMV less than 0.50 x length of MV, length of STV more than 0.50 x length of PMV.

Gaster : Length of gaster subequal to length of mesosoma, narrow at base and broadest at apex.

Plesiotype : Female, INDIA, Kerala, Nilambur, Coll. T.C. Narendran, 1982(DZUC)

Other material examined : 9F, INDIA, Kerala, Nilambur, 1982 (Coll. T. C. Narendran(DZCU)

Hosts : *Halys dentata*, *Tessarotoma javanica* Thunberg

Biology : Unknown

Distribution : India (Kerala, Delhi)

Discussion : It is given under the discussion of *Anastatus bangalorensis* Mani & Kurien elsewhere in this work.

Remarks : Since the original description is very inadequate for as easy identification of the species, a redescription of *A. dentatus*

Narayanan is provided here. The description of male is based on the description given in *The Fauna Of India & Adjacent Countries (Chalcidoidea, Hymenoptera)* Part-1, by M.S. Mani since the male specimen is not represented in my collection.

Variation : In the original description given by Dr. M.S. Mani, the length of female is 2.00-2.50mm. whereas in the present description, it is 2.2mm.. In the original description, the malar space is nearly 0.50 of eye, whereas in the present description malarspace is subequal to length of eye.

***Anastatus exelsus* sp. nov.**

(Figs. 69 - 75)

Female : Length 2mm. Body golden yellow; head golden yellow; eyes brown; ocelli dark brown; mandibles dark brown. Antenna (fig. 72) dark brown, except scape, inserted below lower orbital border, scape golden yellow, elongated, length of scape 0.24 x length of antenna, length of pedicel 0.36 x length of scape; anellus subquadrate, length of F1 0.81 x length of pedicel, length of F2 and F3 subequal, length of F4 and F5 subequal, length of F6 and F7 subequal, clava three segmented. Pronotum golden yellow; mesocutum brown; mesopleura golden yellow. Brachypterous, fore wing not reaching to apex of gaster. Legs pale yellow, mesotarsal pegs, hind coxa and hind trochanter black. Gaster yellowish brown.

Head (Figs. 69,70 & 71) : Width in front view 1.6 x distance between front ocellus and clypeal margin; EL 2.3 x EW; 1.5 x MS 0.6 x EL; POL 5 x OOL; ocelli arranged in regular triangle; clypeal margin notched; interantennal region convex.

Mesosoma : Pronotum with weak median sclerotization; notauli elongate, V shaped, densely reticulate; lateral lobes of mesoscutum with sharp dorsal margins, interspace between lateral lobes concave with few white hairs; scutellum convex, finely reticulate, apex rounded, axillae well separate; propodeum with plical region transverse, separated from callar region by plical furrow; prepectus short, triangular. Brachypterous, fore wing (Fig 73) infusate, two hyaline patches beyond junction of marginal and stigmal vein. Length of midtibial spur (Fig. 74) less than length of mesobasitarsus ; mesotarsus with single row of dark pegs on either side ventrally; length of hind basitarsus equal to length of following three segments combined.

Gaster (Fig. 75) : Length of T1 more than length of T2, length of T2 equal to T3, posterior margin incurved medially, T3 and T4 with straight posterior margin, length of T5 more than length of T4, posterior margin concave, T6 with posterior margin convex, last tergite with stiff rim at apex; ovipositor sheath slightly exerted.

Male : Unknown

Holotype : Female, INDIA : Kerala ; Trichur Agricultural University , Coll. T.C. Narendran & Party, 15.x. 1988

Paratype : F, INDIA: Kerala; Calicut University Campus, Coll. Anil. K., 4.ii. 1988

Host : Unknown

Biology : Unknown

Distribution : India (Kerala)

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

Discussion: *Anastatus exelsus* sp. nov. resembles with *Anastatus acherontiae* Narayanan in having infuscated fore wings with two oval hyaline patches opposite each other; length of scape 0.2 x length of antenna; mesotarsus with row of dark pegs on either side ventrally; length of hindbasitarsus equal to length of following three segments combined.

In *Anastatus exelsus* sp. nov. head width in front view 1.6 x distance between front ocellus and clypeal margin (whereas in *Anastatus acherontiae* head width in front view 1.3 x distance between front ocellus and clypeal margin; in *A. exelsus* sp. nov. POL 5 x OOL (whereas in *A. acherontiae* POL 4 x OOL); in *A. exelsus* sp. nov. EL 1.3 x MS (whereas in *A. acherontiae* EL 4 x MS); *Anastatus exelsus* sp. nov. is brachypterous, fore wing not extending beyond apex of gaster (whereas *Anastatus acherontiae* is macropterous, fore wing extending beyond apex of gaster.)

Anastatus exelsus sp. nov. resembles with *Anastatus galatus* sp. nov. in having head width in front view 1.6 x distance between front ocellus and clypeal margin; dark brown antenna inserted below lower orbital border; brachypterous; mesotarsus with row of dark pegs on either side ventrally; length of hind basitarsus equal to length of following three tarsal segments combined; length of T1 more than length of T2; posterior margin of T5 concave; last tergite with slightly upturned rim at apex; ovipositor sheath slightly exerted.

In *A. exelsus* sp. nov. POL 5 x OOL (whereas in *A. galatus* sp. nov. POL 2 x OOL); in *A. exelsus* sp. nov. fore wing with two oval

hyaline patches opposite each other (whereas in *A. galatus* sp. nov. fore wing without hyaline patches).

Anastatus galatus sp. nov.

(Figs. 76 - 80)

Female : Length 3.1 mm. Body dark brown, head dark brown with metallic green reflections; eyes yellow; ocelli brown. Antenna (Fig 79) dark brown, except scape, inserted below lower orbital border, scape golden yellow, elongated, cylindrical, length of scape x length of antenna, length of pedicel x length of scape, width of anellus more than its length, length of F1 and F2 subequal, length of F3 more than length of F2, length of F4 and F5 subequal, clava three segmented, length of clava less than length of F5, F6 and F7 combined. Pronotum brown; median lobe of mesoscutum dark brown, lateral lobes of mesoscutum with purple reflections; mesopleura dark brown with purple reflections. Brachypterous, fore wing infusate. Legs dark brown, fore and mesotarsus pale yellow. Gaster with hyaline transverse band at apex, rest dark brown with purple reflections, ovipositor sheath slightly exerted.

Head (Figs. 76, 77 & 78) : Finely reticulate; width in front view 1.6 x distance between front ocellus and clypeal margin; POL 2 x OOL; EL 2.5 x MS; scrobe channel like, not deep, not reaching anterior ocellus, scrobal margins carinate; interantennal region convex, toruli not wide apart.

Mesosoma: Pronotum medially divided by weak sclerotization; slightly depressed posteromedially; median lobe of mesoscutum densely reticulate, lateral lobes with carinate margin, notauli U shaped; scutellum triangular, convex, densely reticulate, axillae separate

anteromedially; propodeum with transverse plical region, without median carina; prepectus rectangular reaching base of tegula; mesopleura finely reticulate anteriorly, more lineolate posteriorly. Brachypterous, forewing venation not clear, fore wing (Fig. 80) black at base and apex, orange yellow medially. Length of midtibial spur subequal to length of mesobasitarsus; mesotarsus with row of dark pegs ventrally on four basitarsal segment; length of hind basitarsus subequal to length of following three segments combined.

Gaster : Length of T1 more than length of T2, posterior margin deeply incised medially, length of T2 less than length of T3, length of T3, T4 and T5 subequal, posterior margin of T5 concave; T6 with posterior margin convex, last tergite with slightly upturned rim at apex; ovipositor sheath slightly exerted.

Male : Unknown

Holotype : Female, INDIA: Kerala, Calicut University Campus, Coll. T.C.Narendran & Party, 9.i.1988

Paratypes : 3F, INDIA: Kerala, Calicut University Campus, Coll. T. C. Narendran & Party, 14.iii.1985, 19.iii.1988, 19.i.1988; 1F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K. ,1.ii.1988, 1F, INDIA: Kerala; C.P.C.R.I. Vittal, Coll. T. C. Narendran & Party, 16.xii.1988

Host : Unknown

Biology : Unknown

Distribution : India (Kerala)

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

Discussion : This species is discussed under *A. exelsus* sp. nov. elsewhere in this work.

Anastatus imatus sp. nov.

(Figs. 81 - 87)

Female : Length 2.23mm. Head dark brown with coppery reflections on frons, occiput, malar sulcus, lower face; clypeus with metallic green reflections; eye golden yellow; ocelli brown; parascrobal area with metallic blue reflections. Antenna (fig. 84) dark brown except scape; scape golden yellow, elongated, cylindrical, length of scape 0.3 x length of antenna; length of pedicel 0.18 x length of scape; length of F1 little more than length of pedicel, length of F2 and F3 subequal, length of F4 little less than length of F5, length of F6 and F7 subequal, clava three segmented, length of clava less than preceding three segments combined. Pronotum golden yellow; mesoscutum black; mesopleura golden yellow with violet reflections. Fore wings infuscate; Legs dark brown except mesotarsus, mesotarsus pale yellow.

Head(figs. 81, 82 & 83) : Width in front view 1.08 x its median length ; finely punctate; pubescence brown; EL 2 x EW; EL 2.6x MS POL 2 x OOL; inter antennal region convex; scrobe broad, not reaching to anterior ocellus, channel like, scrobal margins carinate.

Mesosoma : Pronotum finely reticulate with weak median sclerotization; mesoscutum densely reticulate punctate, notauli broad, V shaped; concave space between lateral lobes and median lobe of mesoscutum; scutellum convex, densely reticulate, apex rounded, axillae separate

anteromedially; propodeum with transverse plical region, without median carina; prepectus triangular; mesopleura densely reticulate. Macropterous, fore wing (fig. 85) infuscate, infuscation interrupted by two hyaline patches. Length of midtibialspur (fig. 86) little more than length of mesobasitarsus, mesotarsus with single row of dark pegs on ventral side except on apical mesotarsal segment, length of hindbasitarsus equal to following three segments combined.

Gaster (Fig. 87) : Length of T1 more than length of T2, posterior margin of T1 medially incised, length of T2 less than length of T3, length of T4 less than length of T5, T5 with posterior margin concave, T6 with posterior margin convex, last tergite with apical upturned rim; ovipositor sheath not exerted.

Male : Unknown

Holotype : Female, INDIA: Kerala; Calicut University Campus, Coll. T. C. Narendran & Party, x-X-1987

Paratypes : 1F, INDIA: Kerala, Malampuzha, Coll. T. C. Narendran & Party, 11.xii. 1987; 3F, INDIA: Kerala, Coll. Anil.K., 1.x.-1988, 17.xi. 1988, 2.xii. 1988.

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

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

Discussion : *Anastatus imatus* sp. nov. resembles with *Anastatus acherontiae* Narayanan in having scrobe with carinate margins; POL 2 x

OOL; propodeum without median carina; macropterous, hyaline patch on forewing commencing from middle of fore wing; mesotarsus with rows of dark pegs on either side ventrally.

In *Anastatus imatus* sp. nov. hyaline patch on fore wing commencing from about middle of MV and ending before junction of MV and STV (whereas in *Anastatus acherontiae* hyaline patch on fore wing commencing from about middle of MV and extending to junction of MV and STV); in *A. imatus* sp. nov. EL 2.6 x MS (whereas in *A. acherontiae* EL 4 x MS); in *A. imatus* head width in front view 1.08 x its median length (whereas in *A. acherontiae* head width in front view 1.3 x its median length); in *A. imatus* sp. nov. length of scape 0.3 x length of antenna (whereas in *A. acherontiae* length of scape 0.2 x length of antenna); in *A. imatus* sp. nov. length of pedicel 0.18 x length of scape (whereas in *A. acherontiae* length of pedicel 0.2 x length of scape); in *A. imatus* sp. nov. length of mid tibial spur 1.18 x length of mesobasitarsus (whereas in *A. acherontiae* length of mid tibial spur subequal to length of mesobasitarsus).

Anastatus leelae sp. nov.

(Figs. 81 – 87)

Female : Length 2.9 mm. Blackish brown with metallic green and bronzy reflections; head dark brown with metallic green reflections; eyes yellow; ocelli golden yellow arranged in broad triangle. Antenna dark brown inserted more or less at level of lower orbital border; scape golden yellow, elongated, cylindrical, length of scape 0.35 x length of antenna; length of pedicel 0.25 x length of scape; width of anellus more than its length; length of F1 little less than length of F2, length of F3 little more than length of F4, length of F5 and F6 subequal, clava three segmented. Pronotum golden yellow, dark

brown medially; mesoscutum dark brown with moderate white pubescence; mesopleuron dark brown with orderly arranged white hairs anteriorly. Macropterous, fore wing hyaline basally, infuscate medially with hyaline band. Legs golden yellow, fore, mid, hind tarsi pale yellow. Gaster with metallic green reflections, hyaline basally, dark brown towards apex.

Head(Fig.88, 89 &90): Width in front view 1.3 x its median length; EL 2 x MS; POL 3 x OOL; eyes bare; interantennal region convex; toruli not wide apart; scrobe channel like, shallow posteriorly, lateral margins carinate, finely reticulate, reaching near anterior ocellus.

Mesosoma : Pronotum with median line of weak sclerotization; lateral lobes of mesoscutum interconnected by convex transverse ridge; scutellum broad, convex, densely reticulate, apex rounded; axillae separate anteromedially; propodeum with plical region narrow, transverse, without median carina; prepectus small, subtriangular. Macropterous, fore wing(fig. 91) infuscated with slightly angulated hyaline band below marginal vein. Length of midtibialspur (fig. 92) equal to length of mesobasitarsus; mesotarsus with single row of dark pegs ventrally.

Gaster (Fig. 93) : Widening towards apex, finely reticulate; length of T1 more than length of T2; posterior margin of T2 medially incurved, length of T2, T3 and T4 subequal, T5 with posterior margin concave, posterior margin of T6 convex; last tergite with upturned rim at apex; ovipositor sheath slightly exerted.

Male : Unknown

Holotype : Female, INDIA: Kerala; Calicut University Campus, Coll. Anil.K, 1.x.1988

Host : Unknown

Biology : Unknown

Distribution : India (Kerala)

Etymology : This species is named after author's mother for her constant encouragement and moral support.

Discussion : This species is discussed under *A. narendrani* sp. nov. elsewhere in this work.

Anastatus narendrani sp. nov.

(Figs. 94 - 99)

Female : Length 2.7 mm. Body dark brown; eyes yellow; ocelli yellow; lower face of eye and malar sulcus with coppery reflections. Antenna (fig. 96) dark brown; scape golden yellow, elongated, more or less rectangular in shape; length of scape 0.11 x length of antenna, length of pedicel 0.3 x length of scape, anellus small, almost transverse, length of F1, F2 and F3 subequal, length of F4 and F5 subequal, length of F6 and F7 subequal, clava three segmented, length of clava equal to length of preceding three segments combined. Pronotum dark brown, finely reticulate; lateral lobes of mesoscutum with metallic green reflection, mesopleura brown. Macropterous, fore wing infusate. Legs dark brown, midtibial spur pale yellow. Gaster dark brown, gradually widening towards apex; ovipositor sheath exerted.

Head (Figs. 94, 95) : Width in front view 1.6 x distance between front ocellus and clypeal margin; finely reticulate; POL 2 x OOL; EL 2 x MS; scrobal margins carinate, not reaching anterior ocellus;

toruli not wide apart; inter antennal region convex; lower face with white pubescence.

Mesosoma : Pronotum finely reticulate, medially divided by line of weak sclerotization, shallow depression posteromedially, lateral lobes of mesoscutum raised dorsally, notauli broad, U-shaped, median lobe of mesoscutum reticulate; scutellum convex, axillae separate anteromedially; propodeum with plical region narrow, without median carina, separated from callar region by plical furrow; prepectus rectangular, finely sculptured; mesopleura densely reticulate anteriorly, posteriorly lineolate. Macropterous, fore wing(fig. 97) hyaline transverse band medially with angulated margin, length of SMV equal to length of MV, length of PMV 2.1 x length of STV. Length of midtibial spur (fig. 98) equal to mesobasitarsus; length of hind basitarsus equal to following three segments combined.

Gaster (Fig. 99) : Length of gaster equal to length of mesosoma; length of T1 more than length of T2, posterior margin of T1 medially incised; length of T2 less than length of T3, posterior margin of T2 medially incurved ; length of T3 more than length of T4; posterior margin of T4 straight, posterior margin of T5 concave; posterior margin of T6 convex; last tergite with upturned apical rim; length of ovipositor sheath 0.08 x length of gaster.

Male : Unknown

Holotype : Female, INDIA: Kerala, Malampuzha, Coll. T. C. Narendran & Party, 11.x.1987

Paratypes : 1F, INDIA: Kerala, Edayar, Coll. T.C. Narendran & Party, 31.i.1988; 1F, INDIA: Karnataka; Uppinangadi; Coll. T.C. Narendran & Party, 17.xii.1987

Host : Unknown

Biology : Unknown

Distribution : India(Karnataka, Kerala).

Etymology : The species is named to honour Dr. T. C. Narendran for his immense contribution to Insect Systematics.

Discussion : *Anastatus narendrani* sp. nov. and *Anastatus leelae* sp. nov. resemble with *Anastatus bangalorensis* Mani & Kurien in having forewing with hyaline band medially; notauli broad, U shaped; scutellum convex, axillae separate anteromedially; mesotarsus with rows of dark mesotarsal pegs on either side ventrally.

in *A. narendrani* sp. nov. EL 2 x MS(whereas in *A. bangalorensis* EL 3 x MS); in *A. narendrani* sp. nov. length of pedicel 0.3 x length of scape(whereas in *A. bangalorensis* length of pedicel 0.2 x length of scape); in *A. narendrani* fore wing with angulated hyaline band(whereas in *A. bangalorensis* hyaline band of fore wing straight.)

In *A. narendrani* sp. nov. POL 2 x OOL(whereas in *A. leelae* sp. nov. POL 3 x OOL); in *A. narendrani* sp. nov. scrobe not reaching to anterior ocellus (whereas in *A. leelae* sp. nov. scrobe reaching near anterior ocellus); in *A. narendrani* sp. nov. length of scape 0.11 x length of antenna(whereas in *A. leelae* sp. nov. length of scape 0.35 x length of antenna); in *A. narendrani* sp. nov. length of pedicel

0.3 x length of scape (whereas in *A. leelae* sp. nov. length of pedicel . 0.25 x length of scape); in *A. narendrani* sp. nov. transverse ridge connecting lateral lobes of mesoscutum absent (whereas in *A. narendrani* sp. nov. lateral lobes of mesoscutum are interconnected by a transverse ridge before transscutal line); in *A. narendrani* sp. nov. width of hyaline band of fore wing equal to 0.33 x length of MV in the most constricted region (whereas in *A. leelae* sp. nov. width of hyaline band of fore wing equal to 0.23 x length of MV in the most constricted region).

In *A. leelae* sp. nov. head width in front view 1.5 x distance between front ocellus and clypeal margin (whereas in *A. bangalorensis* head width in front view 1.4 x distance between front ocellus and clypeal margin); in *A. leelae* sp. nov. POL 3 x OOL (whereas in *A. bangalorensis* POL 2 x OOL); in *A. leelae* sp. nov. length of pedicel 0.25 x length of scape (whereas in *A. bangalorensis* length of pedicel 0.20 x length of scape.).

Genus *Calymmochilus* Masi

Calymmochilus Masi, 1919: 316. Type species:

Calymmochilus atratus Masi ; by monotypy.

Diagnostic characters

Head dorsoventrally flattened, width of head more than its length; clypeus denticulate on front margin, strongly protruding ; mandibles tridentate, concealed under clypeus, outer tooth long, narrow, inner ones smaller; malar space facing ventrally; eyes oval; scrobes not deep, scrobal margins blunt; antenna inserted at clypeal margin; antennal

formula 11173; vertex flat, separated from occiput by carina . In brahypterous forms mesoscutum flat, without notauli and parapsidal lines; axillar grooves absent. Gaster narrow, elongate, laterally compressed; last tergite conical, round at apex; ovipositor sheath not exerted.

Distribution : Mediterranean sub region, Southern Africa, South Asia and Australia.

Biology : Unknown

Discussion : *Calymmochilus* Masi differs from all other genera of family Eupelmidae in the peculiarity of head in both sexes; clypeus sharply produced semicircularly and denticulate on the front margin.

Calymmochilus nilamburicus Narendran

(Figs. 100-103)

Calymmochilus nilamburicus Narendran, 1996. *Entomon*, 21(1):77-87

DIAGNOSIS

Female : Length 3.65 mm. Body blackish brown, head, mesosoma, forewing brown; scape, legs, prepectus brownish yellow. Head flattened dorsoventrally, slightly broader than high in dorsal view, clypeus strongly protruding, denticulate on front margin, clypeal margin dorsally with smaller projection, latter strongly carinate, slope down to join larger projection. Scrobal margins ecarinate, not extending to anterior ocellus. Antenna (Fig. 102) inserted at clypal margin; scape elongated, slightly bent at middle, length of pedicel more than length of F1, anellus almost as long as wide; F1- F5 longer than wide; F6 and F7 as long as wide; clava three segmented, length of clava

equal to length of preceding three segments combined. Head (Fig. 100) flattened dorsoventrally, slightly broader than high, clypeus strongly protruding, denticulate on front margin, mandibles tridentate, lower face separated from malar space by distinctly raised, carinate ridge, malar space facing ventrally; scrobes shallow, broadly U shaped minutely reticulate, margins carinate, not extending to anterior ocellus; vertex flat, separated from occiput by carina, latter facing ventrally. Mesoscutum finely reticulate, broader than long, lateral margins carinate, abruptly decline, bearing thin lamella; scutellar-axillar complex flat, in same plane; axillae faintly demarcated, not meeting anteromedially; scutellum finely reticulate and longitudinally striate, with lateral and posterior margins carinate, apex rounded, metanotum short with dorsellum slightly declined, propodeum short with plical region depressed, declined with median carina. Brachypterous, fore wing (Fig. 103) reaching base of gaster, its posterior margin slightly concave; midtibial spur as long as basitarsus, basal three tarsal segments with single row of dark pegs on either side ventrally. Gaster elongated, laterally compressed, length of gaster more than combined length of head and mesosoma; ovipositor sheath not exerted.

Male : Unknown

Material Examined : Type only

Details of Type

Holotype : Female, INDIA: Kerala; Coll. T. C. Narendran & Party, x.1982(DZUC)

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Discussion : This species resembles the European, *C. dispar* Boucek and Andriesan (Boucek and Andriesan, 1967) in reduced forewing, but the latter species differs in having an anellus which is distinctly longer than wide (anellus almost as long as wide in *C. nilamburicus*); gaster almost as long as head and mesosoma combined (gaster longer in *C. nilamburicus*); gastral tergites almost subequal, epipygium bent (T1 longer than T2 and T3 combined, epipygium longest, straight, in *C. nilamburicus*); colouration of the body shiny black with metallic greenish violet reflections on lower face; body blackish brown in *C. nilamburicus*). It also differs from the type species *C. atratus* Masi (Masi, 1919) and the Australian *C. marksae* Boucek (Boucek, 1988) both of which are fully winged.

***Coryptilus* Gibson**

Coryptilus Gibson, 1995 : Type species : *Coryptilus indicus* Gibson; by monotypy.

Diagnostic characters

Dark with varied dull metallic green luster on head and mesosoma, or with mesosoma partly or entirely orange. Head with dark setae along posterior of vertex and temple; in frontal view head wider than high; in lateral view head high, triangular, with face subequal in length and abruptly angled relative to slightly convex frontovertex; torulus with about middle in line with lower orbit, distance between toruli subequal to distance to oral margin; in dorsal view upper parascrobal region extended only slightly anterior to eye as flat, carinately margined region; mandibles tridentate. Mesoscutum without distinctly convex anteromedian and lateral lobes. Forewing infuscate except for hyaline region behind SMV and hyaline spot or obliquely

tapered streak with whitish setae behind about middle of MV. Gaster brown, without subbasal whitish region dorsally or ventrally, usually rhomboidal with sides diverging to level of cerci; T2 with posterior margin emarginated, T3, T4 and T5 with posterior margin almost straight, T6 with posterior margin broadly rounded; ovipositor sheath short, extending slightly beyond apex of gaster.

Distribution

Taiwan, Nepal, India(Kerala, Karnataka)

Biology

Unknown

Discussion

This genus is hypothesized to have diverged from a clade from which *Anastatus* also diverged, after the evolution of a propodeum with the plical furrows along the foramen; infusate forewings with a hyaline region having white setae behind the marginal vein and a gaster with the sides straight divergent to about the level of the cerci. The relatively broad parascrobal region of females of *Coryptilus* Gibson is superficially more similar to most females of *Anastatus* Motshulsky.

Coryptilus indicus Gibson

(Fig. 104 – 109)

Coryptilus indicus Gibson(1995). *Memoirs on Entomology International* 5 : 188. F.

DIAGNOSIS

Female : Length 2.75 mm. Body blackish brown with bronzy reflections; head blackish brown with metallic green reflections on scrobe and interantennal region; eyes yellow; ocelli brown; lower face

with silvery white pubescence and pubescence on occiput and pronotum with blackish brown pubescence. Antenna(Fig. 107) blackish brown except scape, scape golden yellow; clava with three segments. Pronotum blackish brown with metallic green reflections and posteromedian margin with yellowish orange reflections; mesoscutum blackish brown; mesopleura blackish brown, pale brown medially; tegula blackish brown. Brachypterous, fore wing infusate. Legs blackish brown except apical two segments of mesotarsus and hind tarsus, hind tarsus and apical two segments of mesotarsus pale yellow. Gaster blackish brown with silvery white pubescence. Ovipositor sheath yellow .Head (figs. 104 & 105) width in front view 1.4 x distance between front ocellus and clypeal margin; parascrobal area anteriorly raised into blunt horn, behind each torulus. Length of mesosoma more than its width; pronotum finely punctate with deep, median longitudinal groove; mesoscutum quadrangular, lateral margins of mesoscutum lamellate; Brachypterous, fore wing(Fig. 108) infusate with two hyaline patches below submarginal vein and marginal vein. Length of midtibial spur little less than length of mesobasitarsus; length of hind basitarsus little less than length of following three segments combined. Length of gaster (Fig. 109) little more than length of mesosoma; posterior margin of T1 medially incised; length of T2, T3 and T4 subequal; hind margin of T5 incurved, last tergite with upturned rim at apex; length of ovipositor sheath 0.1 x length of gaster.

Male : Unknown

Plesiotype : F, INDIA : Kerala; Calicut University Campus, Coll. Anil. K., 2.xii.1988

Distribution : India(Kerala)

Host : Unknown

Biology : Unknown

Remarks : Without attempting for a redescription of *Coryptilus indicus* Gibson, diagnosis of the species is given above.

Eupelmus Dalman

Eupelmus Dalman, 1820. *Eupelmus memnonius* Dalman; by designation of Westwood, 1840.

Cerambycobius Ashmead, 1896. Type species: *Eupelmus cleri* Ashmead; by monotypy and original designation.

Holceupelmus Cameron, 1905. Type species:

(*Holceupelmus bifasciatus* Cameron) = *Eupelmus orthoptera* Risbec, by monotypy.

Rafa Brethes, 1916. Type species: *Rafa albitarsis* Brethes, by original designation.

Diagnostic characters

Length of head less than its width; mandibles tridentate; posterior margin of scrobe usually not carinate; scape elongated, cylindrical, clava three segmented. Pronotum divided medially; mesoscutum with groove like notauli; convex median lobe and two lateral lobes; forewing often with linea calva. Gaster yellow, narrow and collapsing; ovipositor often with black base, pale for distance and such species have short stigmal vein subequal to postmarginal vein, sixth tergite in female medially divided, if division difficult to see then either fifth tergite strongly produced medially beyond cerci; some slender species often with yellowish gaster and black long ovipositor sheath, very rarely brachypterous.

Biology

The variety of hosts is very wide but the species are always parasitic or sometimes predatory. Most host records indicate a single parasite on a host of small size developing in a sheltered situation (gall, cocoon or seed). Some of the species may attack a number of different hosts, others tend to be hyperparasitic.

Distribution

In all regions (at least 200 species).

Discussion

Eupelmus Dalman is very rich in species and is distributed in all continents and the species cluster into many species groups. Some of them are poorly known and yet some others are being segregated as valid genera. *Eupelmus urozonus* Dalman is the most widespread group. In *Eupelmus urozonus* Dalman gaster is narrow at apex; length of marginal vein more than length of stigmal vein, length of postmarginal vein subequal to length of post marginal vein; mesotarsus with partly double rows of dark pegs; ovipositor sheath dark brown at base and apex. *Eupelmus* Dalman share a common structure of the last tergite of gaster with other genera of Eupelminae such as *Australoodera* Girault and *Reikosiella* Yoshimoto.

KEY TO SPECIES OF *EUELMUS* DALMAN OF INDIA

1. Macropterous; mesotarsal pegs pale yellow or rufous or white and in simple even row along each side of mesotarsus; mesotibia usually without apical pegs, if pegs are rarely present then they are obscure and often same colour of mesotibia
..... subgenus *Episolindelia* Girault (2)

- =Brachypterous or macropterous; pegs not as above, usually numerous and black in colour, in two or more rows on mesotarsus; mesotibia usually with black apical pegs (8)
2. Fore wing without linea calva.....(3)
- =Fore wing with linea calva.....(6)
3. Ovipositor sheath dark brown at base and apex, pale yellow or white in middle, 0.70 x length of gaster; antenna black, parasitic on Cecidomyiidae, Australia, Africa, Southern Europe, Sri Lanka and India (West Bengal).....*E.testaceiventris* (Motschulsky)
- =Ovipositor sheath uniformly dark brown or black; other characters not as in above combination, partly or completely different.....(4)
4. Length of ovipositor sheath less than length of gaster (0.80 x length of gaster), Australia, Europe, Africa, U. S. A., former U. S. S.R. and India(Karnataka)*E.australiensis* Girault
- =ovipositorsheath longer than gaster(5)
5. Ovipositor sheath slightly longer than half of body, 0.55 x length of body, Australia, India*E.australis* Girault
- =Ovipositor sheath little shorter than body (0.9 x)
-*E.indicus* Narendran
6. Length of ovipositor sheath 0.16 x length of gaster, uniformly yellowish brown, India(Maharashtra, Kerala).....*E. amplitus* Walker

- =Length of ovipositor sheath distinctly more than above alternative(7)
7. Length of ovipositor sheath more or less equal to half length of last tergite*E.carinata* Kieffer
- =Length of ovipositor sheath distinctly more than half length of last tergite, distinctly longer than gaster.....*E.bonus* Narendran
8. Brachypterous; metanotum with dorsellum may or may not appressed over apex of scutellum.....(9)
- =Macropterous; metanotum with dorsellum always appressed over apex of scutellum.....Subgenus *Eupelmus* Dalman (11)
9. Pronotal collar with distinct transverse ridge or with stiff black hairs; last tergite in vertical position; metanotum with dorsellum not appressed over apex of scutellum; forewing not extending beyond T1.....(10)
- =Pronotal collar without transverse ridge or black hairs; last tergite not as above; metanotum with dorsellum appressed over apex of scutellum; forewing reaching little beyond T1
.....*E. rexonus* Narendran
10. Pronotal ridge with long dark erect hairs arranged in two tufts paramedially; mesotarsus ventrally with pair of black pegs at apical joints of basal two segments; length of ovipositor sheath 0.38 x length of gaster; length of pedicel subequal to length of F1; tegula black.*E.pedatoria* (Ferriere)
- =Pronotal ridge with short dark erect hairs; mesotarsus without black pegs ventrally; length of ovipositor sheath 0.30 x length of

- gaster; length of pedicel less than length of F1; tegula white.....*E.nirupama* Narendran
11. Forewing without lineacalva; length of ovipositor sheath 0.33 x length of gaster.....*E.tachardiae*(Howard)
 =Forewing with lineacalva, other characters partly or completely different.....(12)
12. Ovipositor sheath not exerted.....*E.terminaliae* Hafiz
 =Ovipositor sheath distinctly exerted.....(13)
13. Length of ovipositor sheath 0.16 x length of gaster
*E.longicorpus* Girault
 =Length of ovipositor sheath distinctly more than 0.16 x length of gaster.....(14)
14. Length of ovipositor sheath subequal to or distinctly less than 0.5 x length of gaster.....(15)
 =Length of ovipositor sheath distinctly more than 0.5 x length of gaster..... (23)
15. Hairs on body widened, scale like*E.orientalis* Crawford
 =Hairs on body not widened, not scale like.....(16)
16. Mesoscutum densely covered with white hairs arranged in regular rows.....*E. catoxanthae* Ferriere
 =Arrangement of mesoscutal hairs not as above.....(17)

17. Scape and legs pale red; antenna, face and mesosoma metallic blue; abdomen copper coloured; distance between front ocellus and scrobe margin more than distance between scrobe and eye margin; length of scape equal to length of preceding four segments combined.....*E.tenuicornis* Kieffer
 =Characters not as in above combination, partly or completely different.....(18)
18. Length of ovipositor sheath 0.80 x length of hind tibia; length of marginal vein 4 x length of postmarginal vein; length of stigmal vein subequal to length of postmarginal vein; length of pedicel 1.5 x length of F1; body metallic green with blue and bronze cast; forehead violet, legs brown; fore and hind femur with metallic lusture; knees, apices of tibiae and tarsi pale yellow; ovipositor sheath medially pale yellow or pale white, base and apex black or brown ; forewing colourless; parasitic on many species of Diptera and Hymenoptera and Lepidoptera.
*E. urozonus* Dalman
 =Characters not as in above combination; partly or completely different.....(19)
19. Distance between front ocellus and scrobe more than distance between front ocellus and eye.....(20)
 =Distance between front ocellus and scrobe less than or subequal to distance between front ocellus and eye.....(21)
20. Length of ovipositor sheath 0.96 x length of gaster; length of submarginal vein subequal to length of marginal vein; length of

scape distinctly less than 1.5 x length of clava

.....*E.retrosus* Narendran

=Length ovipositor sheath 0.33 x length of gaster; length of submarginal vein less than length of marginal vein; length of scape little more than 1.5 x length of clava..

.....*E.ignotus* Narendran

21. Antenna brown with apical half of scape with pale brown; head width in front view 1.7 x distance between front ocellus and distal clypeal margin; length of scape 2.90 x length of clava length of ovipositor sheath 0.30 x length of gaster

.....*E.zandanus*Narendran

=Characters not as in above combination partly or completely different.....(22)

22. Length of ovipositor sheath 0.40 x length of gaster, 0.63 x length of hindtibia ; length of scape little more than 1.2 x length of clava*E.vermai* (Bhatnagar)

=Length of ovipositor sheath less than 2.27 x length of gaster; 0.50 x length of hind tibia; length of scape little more than 1.5 x length of clava.....*E.keralicus* Narendran

23. Upper scrobe margin carinate.....(24)

=Upper scrobe margin ecarinate..... (25)

24. Length of submarginal vein distinctly more than length of marginal vein*E. atus* Narendran

- =Length of submarginal vein distinctly less than length of marginal vein *E. licinus* Narendran
25. Scape little longer than 1.75 x length of clava; length of marginal vein distinctly less than length of sub marginal vein; ovipositor sheath little more than 1.3 x length of hind tibia.....*E. javae* Girault
- =Characters not as in above combination, partly or completely different.....(26)
26. Scape length little more than 1.5 x length of clava; head width in front view little more than 1.2 x distance between front ocellus and clypeal margin.....*E. curiosus* Narendran
- =Characters not as in above combination, partly or completely different.....(27)
27. Length of scape little more than 1.6 x length of clava; head width little more than 1.2 x distance between front ocellus and distal clypeal margin.....*E. caudatus* sp. nov.
- =F4 to F7 brown; length of scape little more than 1.3 x length of clava; head width little more than 1.4 x distance between front ocellus and distal clypeal margin; notauli V- shaped, not reaching transcutal sulcus; axillae narrowly separate anteromedially
.....*E. malabaricus* Narendran



Eupelmus amphitus Walker

(Figs.110-116)

Eupelmus amphitus Walker, 1846. *Ann. Mag. Nat. Hist.* 17:114. F. India: Bombay (HDEO).

REDESCRIPTION

Female : Length 4.05mm. Head dark brown with metallic green reflections; eyes golden yellow; ocelli brown. Antenna (Fig.113) dark brown, slightly curved in middle, inserted about in middle of face, length of scape 0.2 x length of antenna, length of pedicel 0.27 x length of scape, anellus small, transverse, length of F1 little more than length of F2, length of F2, F3 and F4 subequal, length of F5 little less than length of F4, length of F6 and F7 subequal, length of clava less than length of preceding three segments combined. Pronotum blackish brown; mesoscutum blackish brown. Macropterous, fore wings hyaline with linea clava. Legs except mid and hind coxae brownish yellow, mid and hind coxae black. Gaster blackish brown, ovipositor sheath blackish brown.

Head (Fig.110, 111 &112) : Width in front view 1.3 x its median width; vertex and frons umbilicately punctate; POL 2 x OOL; eyes bare; ocelli in regular triangle; toruli not wide apart; interantennal region distinctly convex; scrobe not channel like, umbilicately punctate.

Mesosoma : Pronotum with median sclerotization; mesoscutum broad, quadrangular, umbilicately punctate, notauli V shaped; scutellum convex, apex rounded, axillae separate anteromedially; propodeum with transverse plical region; prepectus broadly triangular; mesopleura densely reticulate anteromedially, posteriorly with honeycomb like quadrangular sculpture. Macropterous, fore wing (Fig.114) hyaline, linea calva

present, length of MV less than length of SMV, length of PMV 2 x length of STV . Length of mid tibial spur (Fig. 115) subequal to length of mesobasitarsus; length of hindbasitarsus subequal to length of following three segments combined.

Gaster (Fig.116): Length of gaster more than length of mesosoma, umbilicately punctate; length of T1 more than length of T2, posterior margin of T1 incised medially, length of T3 and T4 subequal, T5 posteriorly produced over T6; length of ovipositor sheath 0.11 x length of gaster.

Male : Unknown

Plesiotype : Female, INDIA: Kerala; Calicut University Campus, Coll. T. C. Narendran & Party, 22.i.1987

Host : Unknown

Biology : Unknown

Distribution : India (Maharashtra, Kerala)

Discussion : *Eupelmus amphitus* Walker resembles with *Eupelmus terminaliae* Hafiz in having body with metallic green reflections and forewing with linea calva.

In *E. amphitus* Walker ovipositor sheath exserted(whereas in *E. terminale* ovipositor sheath not exserted); in *E. amphitus* length of PMV more than length of STV(whereas in *E.terminale* PMV equal to STV)

Variation : In the original description of *Eupelmus amphitus* Walker length of antenna equal to length of mesosoma, whereas in the present description , the length of antenna 0.9 x length of mesosoma; in the

original description the length of gaster little more than length of mesosoma, whereas in the present description, the length of gaster distinctly more than length of mesosoma.

Remarks : Due to the inadequate original description, a redescription of *Eupelmus amphitus* Walker is given above.

Eupelmus (Eupelmus) atus Narendran

(Figs. 117-120)

Eupelmus (Eupelmus) atus Narendran, 1995. *J. Zool. Soc. Kerala*, 5(1&2):1-15

DIAGNOSIS

Female : Length 3.06 mm. Head black with dull metallic and purple reflections; eyes pale whitish yellow, anterior ocellus pale reflecting yellow, posterior ocelli brown. Pubescence on body silvery white. Antenna black with scape and pedicel with dull metallic green reflections. Pronotum black with dull metallic green mixed with median pale yellow line; mesoscutum metallic green, lateral lobes black with dull metallic reflection; axillae metallic green; tegula pale brown; propodeum metallic green. Legs with fore and hind coxae dull metallic green, mid coxae pale brownish yellow, fore and mid femur blackish brown with base paler, mid femur brown medially with base and apex pale yellow, fore and mid tibiae brown with bases and apices paler, hind tibia brownish black with apex pale yellow, all trochanters and tarsi pale yellow. Gaster black with base metallic green, ovipositor sheath yellow with base black and apical part pale brown. Head (Fig. 117) width in front view 3 x distance between front ocellus and clypeal margin; head finely reticulate; eyes bare; scrobe microsculptured,

margins carinate, parascrobal area irregularly sculptured. Pronotum with transverse striations with line of weak median area, row of long erect bristles on posterior margin; width of mesoscutum subequal to its length, finely reticulate; propodeum with anterior margin straight, carinate, plical region transverse, without median carina. Macropterous, fore wing(Fig. 119) hyaline, area beyond basal one- third of fore wing with slight brown infuscation, pilosity and veins pale brown. Length of midtibialspur subequal to mesotarsus, mesotarsus with double rows of black pegs ventrally on either side on four tarsal segments from base, length of hind basitarsus equal to combined length of following three segments. Gaster (Fig. 120) with coriaceous sculpture, length of gaster more than length of mesosoma; length of T1 more than length of T2, posterior margin of T1, T2, and T3 deeply incised medially. Length of ovipositor sheath little more than 0.65 x gaster, equal to length of hind tibia.

Male : Unknown

Material Examined: Type only.

Details of Type

Holotype: Female, INDIA: Kerala, Parambikulam, Coll. T. C. Narendran, 22.xii. 1985(DZCU).

Host : Unknown

Biology : Unknown

Distribution : India (Kerala)

Discussion : It is given under the discussion of *E. licinus* Narendran elsewhere in this work.

Eupelmus australis Girault

(Figs. 121 - 127)

Eupelmus australis Girault, 1915a *Mem. Qd. Mus.* 6. F. Australia:

Queensland(QMB)

REDESCRIPTION

Female

Length 1.3 mm. Body blackish brown. Head dark brown with metallic green reflection on occiput, interantennal region and clypeus; eyes dark brown, yellow marginally; occiput reflecting brown. Antenna (Fig.124) yellowish, brown inserted well below lower orbital border; scape flattened, slightly curved, length of scape 0.27 x length of antenna, length of pedicel 0.34 of scape, length of F1 little less than length of F1, length of F3 little more than length of F4, clava enlarged, length of clava equal to preceding four segments combined. Pronotum black with metallic green reflection; mesoscutum dark brown with metallic green reflections on lateral lobes; mesopleura brown. Macropterous, forewing hyaline. Mid coxa, hind coxa, fore tarsus, small patch towards apex of mid femur and base of mid tibia dark brown, rest yellow. Gaster and ovipositor sheath dark brown.

Head (Figs. 121, 122&123): Densely reticulate; width in front view 2.2 x as long as its median length; POL 1.3 x OOL; EL little more than 2 x MS; toruli not wide apart, interantennal region convex; scrobe deep, not reaching to anterior ocellus, margins ecarinate.

Mesosoma : Pronotum with weak median sclerotization; notauli furrow like, reaching transscutal sulcus, lateral lobes of mesoscutum raised dorsally, margins carinate, space between lateral lobes concave;

scutellum convex, axillae separate anteromedially; propodeum with V shaped plical region, without median carina; prepectus subrectangular, smoothly sculptured. Macropterous, fore wing (Fig. 125) hyaline, densely pubescent. Length of mid tibial spur (fig. 126) equal to length of basitarsus; mesotarsus with single row of light coloured pegs ventrally on either side, hind basitarsus as long as following three segments combined.

Gaster (Fig. 127): Densely reticulate; length of gaster more than length of mesosoma; length of T1 less than length of T2, posterior margin of T1 deeply incised medially, length of T2 less than length of T3, posterior margin of T1 and T2 incurved medially, length of T4 more than length of T3, posterior margin of T4 almost straight, T5 exposed broadly, posterior margin of T5 angularly produced over T6, length of T6 less than length of T5, posterior margin of T6 convex, last tergite with posterior margin deeply emarginated medially, above ovipositor sheath; length of ovipositor sheath 1.02 x as long as gaster.

Male : Unknown

Plesiotype : Female, INDIA: Kerala; Calicut University Campus, Coll. Anil. K., 19.xi.1988

Other Material Examined : 2F, INDIA; Calicut University Campus, Coll. T. C. Narendran & Party, 31.xii.1985, 30.xi.1986; 1F, INDIA: Kerala, Neeleshwaram, Coll. T.C. Narendran & Party, 26.ii.1988; 1F, INDIA : Kerala, Kadakkatupara, Coll. T.C. Narendran & Party, 9.x.1988; 6F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K., 27.x.1988, 4.xi.1988, 10.x.1988, 10.xi.1988, 14.xii.1988; 1F, INDIA: Kerala; Varkala, Coll. Anil. K., 26.xii.1989.

Host : Unknown

University Campus, Coll. T.C. Narendran & Party, x .1987; 1F, INDIA: Kerala, Nilambur, Coll. T. C.Narendran & Party, 17.ii.1988; 1F, INDIA: Kerala, Ranni, Coll. T.C. Narendran & Party, 20.x.1988; 6F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K., 1.x..1988, 22. x.1988, 24. x.1988 ; 9F, INDIA: Karnataka, Uppinangadi, Coll. T.C. Narendran & Party; 17.ii. 1988; 1F, INDIA: Kerala, Munnar, Coll. T.C. Narendran & Party, 3.xii. 1988; 3F, INDIA: Kerala, Silent valley, Coll. T.C. Narendran & Party, 17.ii.1989; 1F, INDIA: Kerala, Aakkalam, Coll. T.C. Narendran & Party; 1F, INDIA: Kerala; R.R.S. Kayamkulam, Coll. Anil. K, 21.ii. 1989; 1F, INDIA: Kerala, Aayiramthengu, Coll. Anil. K. , 23.ii. 1989; 1F, INDIA: Kerala; CTCRI, Sreekaryam, Coll. Anil.K. , 25-II-1989; 3F, INDIA; Kerala, Kanzhikuzhi, Coll. Anil. K., 27.ii. 1989; 3F, INDIA; Kerala, Vayalar, Coll. Anil. K., 27. ii. 1989; 1F, INDIA: Kerala, Calicut University Campus, Coll. Snehalatha, 19. ix. 1991.

Distribution : India (Madhya Pradesh, Orissa, Tamilnadu, Kerala)

Host : Rice pest, *Pachydiplosis oryzae* (Manson, Wood) (Diptera: Ceccidomyiidae) {RAMAIAH, B. N., (1968); PATNAIK, N. C. AND SATPATHY, J. M.(1984); SHRIVASTAVA, S. K., SHUKLA, B. C., KITTUR, S. U. AND AGARWAL, R. K.(1987); CHANDRAKAR, H. K., POPHALY, D. J., GUPTA, R. AND KAUSHIK, U. K. (1989) ; M. S. MANI, (1989)}

Biology : Unknown

Discussion : *N. cinctiventris* Girault resembles with *N. trochantericus* Gahan and *Neanastatus turneri* Ferriere in having mesopleura without triangular yellow spot anteriorly; hindbasitarsus pale yellow, rest of tarsal segments dark brown; infuscated fore wing; in *Neanastatus cinctiventris* and *Neanastatus trochantericus* POL 2 x OOL.

Biology : Unknown

Distribution : Australia, India (Kerala)

Discussion : This species is discussed under *E. indicus* Narendran elsewhere in this work.

Remarks : Due to the inadequate original description, a redescription of *Eupelmus australis* Girault is provided here.

***Eupelmus (Episolindelia) bonus* Narendran**

(Figs. 128-130)

Eupelmus (Episolindelia) bonus Narendran *J.Zool. Soc.Kerala,*

5(1&2):1-15,1995

DIAGNOSIS

Female : Length 1.48mm. Head dark, dull, metallic green; eye blackish grey; ocelli pale reflecting yellow. Antenna(Fig.129) brown with anellus paler at apex; mesosoma and gaster pale liver brown with dark metallic colour on dorsum except on base of gaster.Legs pale yellowish white with coxae,median region of femora and subbasal band on tibiae, fourth tarsal segment of hind leg, fifth tarsal segments of all legs and pretarsus of all legs brown.Wings with pilosity brown, veins pale brown with stigmal vein paler.Ovipositor sheath brownish black.Pubescence on body white,pubescence of ovipositor sheath dark brown. Head (Fig. 128) width in dorsal view about 5 x distance between front ocellus and occipital margin; eyes bare; region posterior to malar sulcus finely rugoso-reticulate; scrobe deep, margins ecarinate; parascrobal area reticulate. Mesosoma finely reticulate on dorsum. Pronotum with median line of weaker sclerotization;

median and lateral lobes of mesoscutum interconnected by transverse, slightly arched ridge before transscutal sulcus; axillae narrowly separated anteromedially; scutellum rounded at apex. Propodeum short, plical region transverse, narrow without median carina. Macropterous, fore wing as in fig. 130. Midtibial spur as long as mid metatarsus; mesotarsus with single row of light coloured pegs ventrally on either side. Hind tibia as long as combined length of following three segments. Gaster collapsing, about 1.3 x length of mesosoma, shorter than combined length of head and mesosoma; ovipositor sheath stout, about 1.2 x longer than gaster, about 0.55 x length of body.

Male : Unknown

Material Examined : Type only

Details of Type

Holotype : Female, INDIA, Kerala, Vallikunnu (Near Calicut), Coll. T.C. Narendran (DZCU), 30.viii.1987 *Paratypes*: 1F, INDIA: Kerala, Thalappara, Coll. T. C. Narendran & Party, 31.viii.1987(DZUC); 1F, INDIA: Kerala, Tiruvannoor, Coll. Mohana, R, 23.vii.1995

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Discussion : *E.bonus* Narendran resembles with *E.keralicus* Narendran in having deep scrobe with ecarinate margins; pronotum with a median line of weaker sclerotization; ovipositor sheath longer than gaster.

In *E. bonus* ovipositor sheath 1.2 x longer than gaster (whereas in *E.keralicus* ovipositor sheath little less than 2.27 x length of gaster); in *E.bonus* POL 3 x OOL (whereas in *E.keralicus* POL 2.3 x OOL).

Eupelmus catoxanthae Ferriere

(Figs. 131-140)

Eupelmus catoxanthae Ferriere, 1940. *Bulletin of Entomological Research*, 32. F. Indonesia: Java.

REDESCRIPTION

Female : Length 2.8 mm. Head dark brown with metallic green reflections on vertex, frons and genal sulcus; eyes golden yellow; ocelli brown. Antenna (Fig. 134) inserted below lower orbital border, dark brown except scape, scape golden yellow, enlarged in middle, slightly curved, length of scape 0.24 x length of antenna, length of pedicel 0.37 x length of scape, anellus small, transverse, length of F1 little less than length of F2, length of F2 little less than length of F1, length of F3 equal to 1.3 x length of F2, length of F4 1.28 x length of F5, length of F6 1.3 x length of F7, length of clava little less than length of preceding three segments combined. Pronotum dark brown; mesoscutum dark brown. Macropterous, forewing infusate. Legs yellow except fore coxa, trochanter of fore leg, femur of fore leg, base of mid tibia, mid coxa and mid trochanter. Gaster dark brown; ovipositor sheath dark brown at base and apex, pale yellow in middle.

Head (Fig. 131, 132 & 133): Width in front view 1.6 x distance between front ocellus and clypeal margin; vertex and frons with rectangular comb like sculptures; eyes bare; ocelli in broad triangle; toruli not wide apart; POL 3 x OOL; scrobe V shaped, anterior region deep, posterior region shallow, lateral margins carinate; lower face with white pubescence.

Mesosoma : Pronotum setigerous; mesoscutum broad, quadrangular, densely covered with white hairs, arranged in regular rows; notauli V

shaped; scutellum triangular, apex rounded, striate, axillae well separate; mesopleura finely reticulate; propodeum short; prepectus finely reticulate; Macropterous, fore wing (Fig. 135) infusate, length of MV 0.8 x length of SMV, length of PMV subequal to STV. Midtibial spur (Fig. 136) short and stout, length of mid tibial spur 1.5 x length of meso basi tarsus; mesotarsus with partly double rows of dark pegs ventrally on basal four segments on either side, apical segment with single row of pegs ventrally; length of hind basitarsus subequal to length of following three segments combined.

Gaster (Fig. 137): Length of gaster subequal to length of mesosoma; length of T1 more than length of T2, length of T2 less than length of T3, posterior margin of T2 medially incised, length of T3 subequal to length of T4, posterior margin of T3 and T4 medially incised, T5 broadly exposed, extended over T6, T6 short, posterior margin deeply emarginated; length of ovipositor sheath equal to 0.4 x length of gaster.

Male (Figs. 138- 140): Length 1.30- 2.30mm. Body black with greenish reflections. Antenna (Fig. 138) black, except scape and pedicel, scape and pedicel green. Legs black except fore tibia below and at tip, mid and hind tibia at tip and hind tibia at base, yellow.

Head : Scape thickened in middle, length of pedicel more than its width, funicular segments subequal, length of clava equal to 1.25 x length of preceding two segments combined.

Mesosoma : Parapsidal furrows complete; length of scutellum subequal to length of mesoscutum; propodeum short; length of MV subequal to 4 x length of STV.

Gaster (Fig. 140): Length of gaster less than length of mesosoma, triangular, slightly thickened behind.

Plesiotype : Female, INDIA: Kerala; Feroke, Coll. T. C. Narendran & Party, 27.xi.1985

Other Material Examined : 2F, INDIA: Kerala, Olavanna, Coll. Chandrashekharan, 21.iii.1991; 1F, INDIA: Karnataka, Chickmangalore, Coll. Prakash, x.1983; 1F, INDIA: Kerala, Feroke, Coll. Narendran & Party, 27.xi.1995; 1F, INDIA: Karnataka, C. P. C.R. I., Vittal, Narendran & Party, 16.xiii.1988; 1F, INDIA: Kerala, Nilambur, Coll. Narendran & Party, 11.viii.1987; 1F, INDIA: Kerala, Kerala University Campus, Coll. Anil. K., 23.ii.1989; 1F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K. , 22.iii.1989; 6M, INDIA: Kerala: Olavanna, Coll. K. Chandrasekharan, 21.iii.1996.

Hosts : Primary or secondary parasites of *Artona catoxantha* (Hampson) (Lepidoptera: Zygaenidae); *Apanteles artonae* Rohw (Hymenoptera: Braconidae); *Ptychomyia remota* (Diptera : Tachinidae) (FERRIERE, 1941); *Bracon brevicornis* Wesmael (Hymenoptera: Braconidae) (ISLAM& HAYAT, 1985)

Biology : Unknown

Discussion: *Eupelmus catoxanthae* Ferriere resembles with *E. tachardiae* Howard in having ovipositor sheath which is black or dark brown at base and apex with median part pale yellow; mesotarsus with double rows of dark coloured tarsal pegs on the ventral side.

In *Eupelmus catoxanthae* the linea calva is present in the fore wing (whereas in *Eupelmus tachardiae* the linea calva is absent); in *E. catoxanthae* the mesoscutum is densely covered with white hairs arranged in regular rows (whereas in *E. tachardiae* mesoscutum is not densely covered with white hairs); in *E. catoxanthae* MV less than SMV (whereas in *E. tachardiae* length of MV more than length of

SMV); in *E. catoxanthae* length of clava little less than length of preceding three segments combined(whereas in *E. tachardiae* length of clava subequal to length of preceding three segments combined); in *E. catoxanthae* length of mesosoma distinctly equal to length of gaster(whereas in *E. tachardiae* length of mesosoma equal to or more than length of gaster).

Variation : In the original description of *Eupelmus catoxanthae* Ferriere, the length of pedicel is equal to 2 x its width, whereas in the present description , length of pedicel is equal to 1.5x width; in the original description, length of F1 is more than its width(whereas in the present description, the length of F1 is 2.5 x its width); in the original description, width of F7 little more than its length, whereas in the present description, width of F7 more or less equal to its length; in the original description, the length of MV equal to 6 x length of STV and PMV, whereas in the present description, the length of MV equal to 4 x length of STV and PMV;in the original description , length of ovipositor sheath equal to 0.40- 0.45 x length of gaster and 0.8 x length of hind tibia, whereas in the present description, the length of ovipositor sheath 0.4 x length of gaster and 11.6 x length of hind tibia .

Remarks : As the original description of *E. catoxanthae* is very inadequate for easy identification, a redescription is provided here.

Eupelmus caudatus sp. nov.

(Figs. 141-144)

Female : Length 3.75 mm. excluding length of ovipositor sheath; length of ovipositor sheath 2 mm. Body black with metallic bluish green reflections. Head black with metallic bluish green reflections on occiput,

malar sulcus and clypeus; lower face with white pubescence. Antenna(Fig. 142) yellowish brown with bluish green reflections on scape, pedicel and funicular segments; interantennal region with bronzy and bluish green reflections; scape elongated, rectangular, length of scape 0.2 x length of antenna, length of pedicel 0.3 x length of scape, anellus transverse, brownish yellow, length of F1 subequal to length of F2,length of F3 more than length of F4, length of F4 subequal to length of F5, length of F6 subequal to length of F7, clava three segmented, length of clava little less than three segments combined. Pronotum dark brown with metallic bluish green reflections, pubescence on pronotum brown; mesoscutum black with metallic blue reflections; mesopleura dark brown with bluish green and bronzy reflections. Macropterous, infusate, linea calva present. Legs pale yellow except fore coxa, fore femora and hind tibia. Gaster dark with regularly arranged brown hairs apically. Ovipositor sheath exerted, elongate, dark brown basally, rest pale yellow.

Head (Fig. 141) : Reticulate punctate, width in front view x distance between front ocellus and eye margin; POL x OOL; EL x EW; interantennal region convave; scrobe broad, channel like, not reaching anterior ocellus, scrobal margins carinate.

Mesosoma : Pronotum densely reticulate with median sclerotization ; mesoscutum densely reticulate, notauli groove like, V shaped; lateral lobes of mesoscutum raised, with regularly arranged hairs, margins carinate; scutellum convex, apex more or less rounded, axillae distinctly separate anteromedially; mesopleura densely reticulate; prepectus triangular, densely reticulate; propodeum with median plical carina. Macropterous, fore wing (Fig. 143) infusate, length of SMV less than length of MV, length of PMV more than length of STV. Length of

mid tibial spur less than length of mesobasitarsus; basal three mesotarsal segments with row of dark pegs on ventral side.

Gaster (Fig. 144) : Length of gaster more than length of mesosoma; densely reticulate; length of T1 more than length of T2, posterior margin of T1, T2 and T3 medially incised; length of ovipositor sheath 1.3 x length of gaster.

Male : Unknown

Holotype : Female, INDIA: Kerala: Calicut University Campus, Coll. M. Gokuldas, 4.ii.1994

Paratypes: 3F, data same as that of Holotype.

Host : From *Mantis* ootheca

Biology : Unknown

Distribution : India(Kerala)

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

Discussion : *Eupelmus caudatus* sp. nov. resembles with *Eupelmus atus* Narendran in having fore wing with linea calva; fore wing infuscated from near parastigmal part and beyond upto level of apex of PMV; SMV distinctly longer than MV; mesotarsus with black coloured mesotarsal pegs.

In *E. caudatus* sp. nov. length of ovipositor sheath subequal to length of gaster(whereas in *E. atus* Narendran length of ovipositor sheath equal to 0.65 x length of gaster); in *E. caudatus* sp. nov. length of scape 2.1 x length of clava (whereas in *E. atus* Narendran length of scape 1.5 x length of clava); in *E. caudatus* sp. nov. EL 2.5 x MS(whereas in *E. atus* EL 3.3 x MS); in *E. caudatus* sp. nov. head

width in front view x distance between front ocellus and clypeal margin (whereas in *E. atus* head width in front view $1.32x$ distance between front ocellus and clypeal margin.)

Eupelmus(Eupelmus) curiosus Narendran

(Figs. 145-148)

Eupelmus (Eupelmus) curiosus Narendran, 1995. *J. Zool. Soc. Kerala*,
5(1&2):1-15

DIAGNOSIS

Female : Length 2.13 mm. Head black with metallic green reflections; eyes brownish black with marginal area pale yellowish grey; anterior ocellus pale reflecting yellow, posterior ocelli reddish brown. Antenna (Fig. 146) with scape, pedicel, F1 to F3 and clava dark brown with metallic green refringence on scape and pedicel, F4- F7 pale brownish yellow. Mesosoma blackish brown with metallic green reflections, sides of mesosoma liver brown. Legs pale brownish yellow, fore and hind coxae and median region of hind femur dark brown; mesotarsal pegs black. Gaster brownish black with metallic green reflection on base of dorsal side; ovipositor sheath pale yellow with base black and apex pale brown. Pubescence on body silvery white. Head(Fig. 145) width in front view $3x$ distance between front ocellus and clypeal margin, head finely reticulate. Pronotum with median line of weaker sclerotization; length of mesoscutum less than its width, finely reticulate punctate; scutellum convex, apex rounded; propodeum with broadly U shaped, shallowly concave plical region without median carina. Macropterous, fore wing(Fig. 147) hyaline with pilosity and veins brownish yellow. Length of mid tibial spur equal to length of

mesotarsus; mesotarsus with rows of black pegs ventrally on either side, length of hind tibia as long as combined length of following three segments. Length of gaster(Fig. 148) subequal to length of mesosoma; length of T1 more than length of T2, posterior margins of T1 and T2 deeply incised medially; length of ovipositor sheath little more than 0.6 x length of gaster, more than length of hind tibia.

Male : Unknown

Material examined: Type only

Details of Type

Holotype : Female, INDIA: Kerala; Chavidi, Coll. T. C. Narendran & Party, 8.i.1989(DZUC)

Host : Unknown

Biology : Unknown

Discussion : *E. curiosus* Narendran resembles with *E. malabaricus* Narendran in having pronotum with line of weaker sclerotization; notauli groove like, V shaped, not reaching transscutal sulcus; length of mid tibial spur equal to length of mesotarsus; length of hind tibia equal to following three segments combined; last tergite of gaster with posterior margin deeply emarginated surrounding a subcircular sclerite.

In *E. curiosus* POL 3 x OOL(whereas in *E. malabaricus* POL little less than 4 x OOL); in *E. curiosus* EL 2.75 x length of MS(whereas in *E. malabaricus* EL 2 x length of MS); in *E. curiosus* ovipositor sheath little more than 0.6 x length of gaster, more than length of hind tibia(whereas in *E. malabaricus* ovipositor sheath little more than half length of gaster, subequal to length of hind tibia); in

E. curiosus length of gaster subequal to length of mesosoma (whereas in *E. malabaricus* length of gaster little more than length of mesosoma).

***Eupelmus (Eupelmus) ignotus* Narendran**

(Figs. 149- 152)

Eupelmus (Eupelmus) ignotus Narendran, 1995. *J. Zool. Soc. Kerala*,
5(1&2): 1-15.

DIAGNOSIS

Female : Length 2.65 mm. Head metallic bluish green; eyes grey; ocelli reflecting pale yellow; Antenna (Fig. 150) yellowish brown with clava and base of scape dark brown; mandibles brown with apices black. Mesosoma dark brown with concave part of mesoscutum, scutellar-axillar complex, callus of propodeum, metallic bluish green; Macropterous. Legs brownish yellow with apical half of fore femur and basal half of hind femur brown, mid tibial and mid tarsal pegs black. Pubescence on head and mesosoma dirty white. Gaster blackish brown with base of T1 metallic bluish green, ovipositor sheath yellow with base black and apex brown. Pubescence on gaster brown. Head (Fig. 149) width in front view little more than 4 x distance between front ocellus and occipital margin, head finely reticulate; vertex with posterior margin broadly concave, smoothly rounded into occiput; parascrobal area reticulate. Mesosoma with reticulate sculpture, pronotum with median line of weak sclerotization; length of mesoscutum more than its width; scutellar-axillar complex almost in same plane, axillae narrowly separate anteromedially, apex of scutellum rounded; propodeum with shallowly concave, V shaped plical region, without median carina. Macropterous, forewing as in Fig. 151. Length of midtibial spur more

than length of mesotarsus, mesotarsus with rows of pegs on either side ventrally, length of hind tarsus less than following three segments combined. Length of gaster (Fig. 152) more than 1.5 x length of mesosoma; length of T1 more than length of T2, T1 and T2 with posterior margin deeply incised; ovipositor sheath little more than one-third length of gaster, length of ovipositor sheath less than hind tibia.

Male : Unknown

Material Examined : Type material (ZSI)

Details of Type

Holotype : Female, INDIA: Kerala; Calicut University Campus, Coll. T. C. Narendran, 2.ii.1985(DZUC)

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Discussion : *Eupelmus ignotus* Narendran resembles with *Eupelmus rexonus* Narendran in having POL 3 x OOL; pronotum with weak line of median sclerotization; propodeum without median carina; genal region posterior to MS finely reticulate and sparsely pubescent; fore wing without linea calva.

In *Eupelmus ignotus* ovipositor sheath is yellow with base black and apex brown (whereas in *E. retrosus* ovipositor sheath pale brown with base black); in *E.ignotus* notauli groove like not reaching transscutal sulcus(whereas in *E. rexonus* notauli furrow like almost reaching transscutal sulcus); in *E.ignotus* plical region transverse (whereas in *E.rexonus* plical region V shaped); in *E. ignotus* length of midtibial

spur more than length of mesotarsus (whereas in *E. rexonus* length of mid tibial spur equal to length of mesotarsus); in *E. ignotus* hind basitarsus shorter than length of following three segments combined (whereas in *E. rexonus* length of hind basitarsus equal to length of following three segments combined.)

Eupelmus (Episolindelia) indicus Narendran

(Figs. 153-155)

Eupelmus (Episolindelia) indica Narendran, 1995, *J. Zool. Soc. Kerala*,
5(1&2): 1-15.

DIAGNOSIS

Female: Length 2.08mm. Ovipositor sheath 1.89 mm. Head metallic green; eyes dull grayish yellow; ocelli reflecting whitish yellow; mandibles brown. Antenna (Fig. 154) brown with metallic green reflection on scape and pedicel, anellus and apex of pedicel whitish yellow. Mesosoma metallic green with pale yellow median line on pronotum; prepectus and tegula pale yellow. Wings hyaline, pilosity and veins pale yellow. Legs pale yellow with base of fore coxa, mid coxa, hind coxa, fore tarsus, small patch towards apex of mid femur and below base of mid tibia brown. Gaster and ovipositor sheath brown. Pubescence on body pale white. Head (Fig. 153) width in dorsal view little more than 2.5 x its median length, finely reticulate. Mesosoma finely reticulate, pronotum with weak line of median sclerotization; length of mesoscutum equal to its width; scutellum convex, axillae separate anteromedially; propodeum with plical region narrow, V shaped, without median carina; prepectus subrectangular, smoothly sculptured. Length of mid tibial spur subequal to mesotarsus, mesotarsus with single row of light and pale brown pegs on ventral side on either side. Length of gaster more than

length of mesosoma; T5 broadly exposed, length of T6 less than T5, T6 medially divided, posterior margin convex; ovipositor sheath more than 2 x as long as rest of gaster and little shorter than rest of body.

Male : Unknown

Material examined : Type only

Details of Type

Holotype : Female, INDIA: Kerala, Calicut University Campus, Coll. T. C. Narendran, 17.ix.1987 (DZUC). *Paratypes* : 5 females of same data as that of holotype except dates as , 10.ii.1988, 8.i.1988, 3-i.1988, 29.xii. 1988, 3.xii.1988 and 2.ii.1988

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Discussion: *Eupelmus indicus* Narendran resembles with *Eupelmus australis* Girault in having a scape of length 0.27 x length of antenna; scrobe deep, margins ecarinate; fore wing without linea calva; pronotum with weak line of median sclerotization; notauli furrow like, reaching transscutal sulcus; T5 broadly exposed, its posterior margin medially and angularly produced over T6, T6 medially divided and its posterior margin convex, last tergite with posterior margin deeply emarginate.

In *Eupelmus indicus* width of head in dorsal view little more than 2.5 x median length(whereas in *Eupelmus australis* width of head in dorsal view 2.2 x its median length; in *E.indicus* EL 2 x MS(whereas in *E.australis* EL little more than 2 x MS); in *E. indicus* length of pedicel 0.38 x length of scape(whereas in *E. australis* length of pedicel 0.34 x length of scape); in *E.*

indicus length of F1 and F2 subequal, length of F3 and F4 subequal (whereas in *E. australis* length of F1 little less than length of F2, length of F34 little less than length of F3); in *E. indicus* POL 2.5 x OOL (whereas in *E. australis* POL 1.3 x OOL); in *E. indicus* length of ovipositor sheath 2 x as long as rest of gaster (whereas in *E. australis* length of ovipositor sheath 1.02 x as long as rest of gaster.)

Eupelmus javae Girault

(Figs. 156- 162)

Eupelmus javae Girault, 1917. *New Javanese Hym.*, Indonesia:

Java (USNM)

REDESCRIPTION

Female : Length 4.2 mm. (excluding length of ovipositor sheath); length of ovipositor sheath 1.02 mm. Head coppery brown with metallic blue reflections; eyes yellow, bare, ocelli golden yellow. Antenna (Fig. 159) dark brown with metallic green reflections, inserted more or less in middle of face, widely separated from each other, scape golden yellow, length of scape 0.26 x length of antenna, length of pedicel equal to 0.3 x length of scape, anellus small, transverse, length of F1 more than length of F2, length of F2 less than length of F3, length of F4 less than length of F3, length of F5 and F6 subequal, length of F7 little less than length of F6, length of clava little more than length of preceding two segments combined. Pronotum dark brown; mesoscutum dark brown; mesopleura dark brown with metallic green reflections. Macropterous, fore wing hyaline, with linea calva. Legs golden yellow, except fore, mid and hind coxae, fore femora and basal portion of hind femora. Gaster dark brown; ovipositor sheath exerted, base and apex dark coloured with hyaline ring medially.

Head (Fig.1562, 157 & 158): Width in front view $1.5 \times$ distance between front ocellus and clypeal margin; vertex and frons with comb like rectangular sculptures; face with stiff glistening hairs; POL $4 \times$ OOL; scrobe broad, triangular, deep anteriorly, shallow posteriorly, scrobal margins ecarinate, minutely punctate.

Mesosoma : Pronotum with median weak sclerotization, stiff setae in bunches on lateral sides; mesoscutum quadrangular with sparsely distributed hairs; finely sculptured; notauli V shaped; scutellum more or less triangular; axillae eparate; mesopleura finely reticulate; propodeum with U shaped plical region. Macropterous, fore wing (Fig.160) hyaline, length of MV less than length of SMV, length of PMV subequal to length of STV. Length of mid tibial spur (Fig. 161) subequal to length of meso basitarsus; meso basitarsus with partly double rows of dark pegs on either side ventrally; length of hind basitarsus equal to length of three following segments combined.

Gaster(Fig.162): Length of gaster more than length of mesosoma; length of T1 more than length of T2, length of T2 and T3 subequal, posterior margin of T2 deeply incised, length of T4 more than length of T3, posterior margin of T5 produced over T6, T6 short, medially divided, posterior margin of last tergite deeply emarginated surrounding subcircular sclerite; length of ovipositor sheath equal to $0.6 \times$ length of gaster and $1.3 \times$ length of hindtibia.

Male : Unknown

Plesiotype : Female, INDIA: Kerala; Thekkady, Coll. T. C. Narendran & Party, x . v.1988

Other Material Examined : 2F, INDIA:Meghalaya; Methum(Aizwal), Coll. P. T. Cherian, 13.iii.1999

Hosts : *Araecerus fasciculatus* (Degeer) (Coleoptera: Anthribidae) in pods of *Tephrosia candida*, *Aximopsis javensis* Girault (Hymenoptera: Eurytomidae) (SUBHA RAO & HAYAT, 1986)

Biology : Unknown

Distribution : Indonesia, Java, Srilanka, India (Kerala, Meghalaya)

Discussion : *Eupelmus javae* Girault resembles with *Eupelmus atus* Narendran in the length of SMV which is distinctly longer than MV; length of scape more than length of clava; forewing with lineal calva.

In *E. javae* the length of ovipositor sheath more than the length of hind tibia (whereas in *Eupelmus atus* the length of ovipositor sheath equal to length of hind tibia); in *E. javae* the upper scrobal margin is ecarinate (whereas in *E. atus* upper scrobal margin is carinate); in *E. javae* EL little less than $2.6 \times MS$ (whereas in *E. atus* EL $3.3 \times MS$); in *E. javae* the length of ovipositor sheath little more than $1.3 \times$ length of HTB (whereas in *E. atus* the length of ovipositor sheath subequal to length of hindtibia).

Variation : In the original description of *Eupelmus javae* Girault, the female length is 3.20 mm, whereas in the present description the length of female is 3.20mm; in the original description length of ovipositor sheath is $0.5 \times$ length of gaster, whereas in the present description the length of ovipositor sheath is $0.6 \times$ length of gaster; in the original description the length of PMV little more than length of STV, whereas in the present description the length of PMV subequal to length of STV.

Remarks : Due to the inadequate original description, a redescription of *E. javae* Girault is provided here.

Eupelmus(Eupelmus)keralicus Narendran

(Figs. 163-166)

Eupelmus(Eupelmus)keralicus Narendran *J.Zool. Soc. Kerala*, 5(1&2)1-15,1995.

DIAGNOSIS

Female : Length 2.90mm. Head dark metallic green with metallic bluish black colour on parts of frons; eye pale yellow; ocelli pale brownish yellow. Antenna brown with dark metallic green on scape and pedicel; mesosoma black with metallic green tint; tegula brown; prepectus brownish black; gaster black with metallic green tint on dorsobasal side; legs pale brownish yellow with fore and hind coxae darker and pegs on mid tarsus and mid tibia black. Ovipositor sheath pale yellow with base black and apical part yellowish brown. Pubescence on body silvery white. Head (Fig. 163) width in front view about 3 x distance between front ocellus and clypeal margin. POL 2.3 x OOL. Head finely microsculptured and minutely punctate, eye with minute sparse pubescence. Antenna as in Fig. 164. Mesosoma finely microsculptured and minutely punctate. Pronotum with median line of weaker sclerotization; length of mesoscutum subequal to its width; notauli groove like, not reaching transscutal sulcus; separate anteromedially, scutellum rounded at apex; propodeum with plical region large, V shaped, shallowly concave, without median carina; prepectus subrectangular microsculptured; Macropterous, fore wing as in Fig. 165. Length of midtibial spur subequal to length of mid metatarsus which is with partly double rows of black pegs ventrally on either side; single row of black pegs from second to fourth

segments; hind metatarsus as long as combined length of following three segments. Gaster(Fig. 166) little longer than 1.6 x mesosoma, finely reticulate. T1 longer than T2; posterior margins of T1, T2 and T3 incised medially; last tergite with posterior margin deeply emarginated, surrounding subcircular sclerite; ovipositor sheath little less than 2.27 x of gaster and 0.50 x as long as hind tibia.

Male : Unknown

Material Examined: Type only

Details of Type

Holotype : Female : INDIA: Kerala, Malampuzha, Coll. T. C. Narendran, 15.i.1986(DZCU). *Paratypes*: 1F, INDIA: Kerala; Parambikulam, Coll. T. C. Narendran, 22.xii.1985; 1F, INDIA: Kerala, Calicut University Campus, 20.viii.1989; Coll. T. C. Narendran; 4F, same coll. Data, except 20.ix.1989, 2.viii.1989, 7.xii.1989, 2.ix.1987.

Other material Examined : 1F, INDIA : Kerala, Calicut University Campus, Coll. Anitha. P. V., 17.xi.2001

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Discussion : *E. keralicus* Narendran closely resembles with *E. vermai* (Bhatnagar) in having black body with metallic green reflections; mesotarsus with numerous black coloured pegs in two rows on the ventral side, forewing with linea calva.

In *Eupelmus keralicus*, the length of ovipositor sheath is 2.27 as long as of gaster (whereas in *Eupelmus vermai* length of the ovipositor sheath is

0.40 x length of gaster); in *Eupelmus keralicus* length of scape little more than 1.5 x longer than clava(whereas in *Eupelmus vermai* scape little more than 1.2x length of clava);in *Eupelmus keralicus* the length of gaster little over 1.6 x length of mesosoma(whereas in *Eupelmus vermai* length of gaster equal to length of mesosoma).

Eupelmus (Eupelmus) licinus Narendran

(Figs. 167-170)

Eupelmus(Eupelmus) licinus Narendran, 1995. *J. Zool. Soc. Kerala*,5(1&2):
1-15.

DIAGNOSIS

Female : Length 2.90 mm. Head dull metallic green; eyes yellow; ocelli blackish brown. Antenna(Fig.168) brownish black with scape and pedicel dull metallic green reflection, interantennal region with purple tint; mandibles blackish brown. Pronotum ,mesonotum, scutellum and propodeum metallic green; tegula dark brown. Macropterous, wings hyaline with veins and pilosity pale brown. Fore and hind coxae concolorous with sides of mesosoma, mid coxa pale brownish yellow, all femora dark brown with base and apex dull yellow, fore and mid tibia dull yellow with brown infuscation on inner middle region, hind tibia dark brown with base and apex yellow, all trochanters and tarsi pale yellow. Gaster brownish black with base metallic green; ovipositor sheath pale whitish yellow with base black and apex pale brown. Head (Fig. 167) width in front view little more than 2.8 x distance between front ocellus and clypeal margin; head finely reticulate. Mesosoma finely reticulate with median sclerotization on pronotum; mesoscutum little wider than its median length; propodeum with plical region narrow, without median carina. Length of gaster (Fig. 170) more than length of

mesosoma; length of T1 more than length of T2, posterior margin of T1 and T2 medially incised; ovipositor sheath elongated, length of ovipositor sheath less than length of gaster, more than length of hind tibia.

Male : Unknown

Material examined: Type only

Details of Type

Holotype: Female, INDIA: Kerala, Anakatty, Coll. T.C. Narendran, 12-xii.1988 (DZUC)

Host : Unknown

Biology : Unknown

Distribution : India (Kerala)

Discussion: *E. licinus* Narendran resembles with *E. atus* Narendran in having fore wing without linea calva; upper scrobal margins carinate; POL 3 x OOL; last tergite with posterior margin deeply emarginated medially surrounding a sub circular sclerite; length of T1 more than length of T2; posterior margin of T1 and T2 medially incised.

In *E. licinus* length of SMV less than length of MV (whereas in *E. atus* length of SMV more than length of MV); in *E. licinus* EL little more than 2 x length of MS (whereas in *E. atus* EL 3.3 x length of MS); in *E. licinus* mid lobe of mesoscutum half as long as mesoscutum (whereas in *E. atus* mid lobe of mesoscutum more than half as long as mesoscutum); in *E. licinus* ovipositor sheath 0.80 x length of gaster, longer than hind tibia (whereas in *E. atus* ovipositor sheath 0.65 x as

long as gaster, equal to hind tibia); in *E. licinus* fore wing not infuscated (whereas in *E. atus* fore wing infuscated.)

Eupelmus (Eupelmus) malabaricus Narendran

(Figs. 171-174)

Eupelmus (Eupelmus) malabaricus Narendran *J.Zool.Soc.Kerala*,
5(1&2):1-15,1995

DIAGNOSIS

Female : Length 1.94mm. Head black with metallic green reflection; eye yellowish grey; ocelli pale reflecting yellow. Antenna (Fig. 172) brown with clava blackish brown and scape black with metallic green reflection on three fourths from base and paler colour on one fourth at apical end. Mesosoma dull metallic green with median brownish yellow line on pronotum; propleura, mesopleura blackish brown; tegula pale brown. Legs pale brownish yellow with fore and hind coxa brown; pegs of mesotarsus and mesotibia black; fore tarsi blackish brown. Wings hyaline with veins and pilosity pale brown. Gaster brown with metallic green reflection on base. Ovipositor sheath pale yellow with base blackish brown and apex pale brown. Pubescence pale white. Head(Fig. 171) width in front view 3x distance between front ocellus and clypeal margin; head finely reticulate; eye bare; parascrobal area narrow, finely reticulate. Mesosoma finely reticulate on dorsum with line of weaker median sclerotization on pronotum propodeum with large V shaped , shallowly concave plical region , without median carina; prepectus subrectangular ,finely reticulate, Macropterous, fore wing as in Fig.173. Midtibial spur subequal in length to mesotarsus; mesotarsus ventrally with partly double rows of dark pegs on either side, following segments(except fifth one) with single row of pegs on either side; hind metatarsus as long as

following three segments combined. Gaster (Fig. 174) little longer than mesosoma, collapsing ; T1 longer than T2, its posterior margin deeply incised medially; T2 very short with posterior margin medially incised; ovipositor sheath trifle more than half length of gaster, subequal to hind tibia.

Male : Unknown

Material Examined: Type only

Details of Type

Holotype: Female, INDIA, Kerala: Calicut University Campus, Coll. T.C. Narendran(DZUC), 27.xi.1988

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Discussion : *Eupelmus malabaricus* Narendran resembles with *E. javae* Ferriere in having ecarinate upper scrobe margin; ovipositor sheath dark brown in base and apex, pale yellow medially; forewings with linea calva mesotarsus with dark coloured pegs on ventral side.

In *E.malabaricus* scape length 1.3x length of clava (whereas in *E.javae*, scape length 1.75x length of clava); in *E.malabaricus* POL little less than 4x OOL(whereas in *E. javae* POL 6 x OOL).

Eupelmus nirupama Narendran

(Figs. 175-177)

Macroneura nirupama Narendran, *Entomon* 21(1): 77-87(1996).

DIAGNOSIS

Female : Length 2.53 mm. Brownish black; head brownish black with metallic green mixed with purple tints, pronotum posteriolaterally, narrow patch posterolaterally on mesoscutal plate, callus part of propodeum, gaster at its base brownish black with metallic green refringence; scape except apex, mid femur, mid tibia at its base, yellowish brown; rest of antenna, gaster black; pronotum, mesoscutal plate posteromedially with violaceous tinge; rest of mesoscutal plate chocolate brown; mid femur, mid tibia at middle brown; mid tibia at base, mid tibial spur, mid tarsus except apical segment, hind tibia at apex, hind tarsus except at base and narrow patch ventrolaterally towards apex, pale white; tegula white. Head (Fig.175) width in front view little more than its length in front view; lower face finely reticulate with short white hairs; inter antennal region convex; toruli wide apart, scrobal margins not carinate, parascrobal region broad, reticulate; fronto vertex broad, broader than width of eye. Antenna (Fig. 176) inserted below level of lower margin of eye orbit; scape elongated, subcylindrical, slightly curved, long as F1- F3 combined; length of clava less than length of preceding three segments combined; ocelli small vertex separated from occiput by broadly incurved carinate margin. Pronotum smooth and shining medially; pronotal ridge carinate with short, dark, erect hairs in two tufts paramedially; scutellum very narrow anteriorly elongate oval, slightly convex; axillae elongate, subtriangular, flat, nearly meeting anteromedially, propodeum very short; transverse, anterior margin

straight, posterior margin broadly concave. Brachypterous; fore wing hyaline, closely attached to mesosoma; midtibia with few dark pegs at apex in straight row, length of mid tibial spur subequal to length of basitarsus; mesotarsus without dark pegs ventrally; length of hind basitarsus subequal to length of following three segments combined. Length of gaster subequal to length of mesosoma; T1-T4 with posterior margins medially concave, T1 slightly deeply incurved than rest; length of ovipositorsheath 0.30 x length of gaster.

Male : Unknown

Material Examined : Type only.

Details of Type

Holotype :Female,INDIA : Kerala , Kayamkulam, Coll. T.C Narendran & Party (DZU), 29.xi.1998 QMB *Paratypes*: 2F, INDIA: Kerala, Elamathukavala, Coll.T. C. Narendran, 1.xii. 1988; 1F,INDIA: Kerala, Chindaki, Coll. T.C.Narendran , 13.xii.1988; 2F, INDIA: Kerala, CPCRI, Kayamkulam, Coll. T.C.Narendran & Party, 24.iv.1991; 6F data same as that of that of Holotype.

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Discussion : This species runs to *Macroneura pedatorioides* (Headqvist)in Headqvist's (1970)Key to species of Ethiopian Region . However in *M.pedatorioides* the pronotal hairs are much longer; fore wing extends to base of gaster, pedicel longer than F1,F1 subequal to F2,F7 longer than wide. This species (*E. nirupama*) differs from *M.pedatoria* Ferriere (Ferriere,

1939), the only known oriental species in which the hairs on pronotal ridge, are much longer, the meso tarsus ventrally with a pair of dark, short pegs at apical joint of basal two segments, the ovipositor sheath $0.38 \times$ length of gaster, length of pedicel subequal to length of F1 and tegula black.

Eupelmus pedatoria (Ferriere)

(Figs. 178-183)

Eupelmella pedatoria Ferriere, 1940. *Bull. Ent. Res.*, 30: 166. F. India:
Coimbatore (BMNH)

REDESCRIPTION

Female : Length 2.3 mm. Head black with cupreous reflections; eyes dark brown; ocelli brown. Antenna (Fig. 181) dark brown except scape, inserted slightly below level of lower orbital border; scape golden yellow, slightly bent in middle, not reaching to level of vertex, length of pedicel $0.27 \times$ length of scape, length of anellus $0.20 \times$ length of pedicel, length of F1, F2, F3 more than their width, slender, F4, F5, F6 and F7 gradually becoming shorter, clava with three segments. Pronotum dark brown; mesoscutum dark brown; tegula brown; mesopleura brown. Brachypterous. Legs dark brown, pegs of mesotibia and mesotarsus black. Gaster black, ovipositor sheath elongated, yellow basally, brown apically.

Head (Figs. 178, 179 & 180) : Width in front view $4.6 \times$ distance between front ocellus and clypeal margin; head setose; eyes bare; EL equal to $2 \times$ MS; POL subequal to OOL; scrobe short, triangular, shallow; parascrobal area broad, pubescent.

Mesososoma : Length of pronotum more than its width, divided into collar and neck by transverse ridge bearing row of numerous elongated, dark coloured bristles; mesoscutum broad; axillae elongate meeting in middle; propodeum arched without median carina; hind margin of prepectus deeply, semicircularly excised; mesopleura lineolate. Brachypterous, fore wings with reduced venation. Length of mid tibial spur (Fig.182) more than its maximum width, length of hindbasitarsus equal to length of following three segments combined.

Gaster(Fig. 183): Length of gaster equal to 3 x its width ; length of exerted part of ovipositor sheath more or less equal to 0.42 x length of gaster.

Male : Unknown

Plesiotype : Female, INDIA: Kerala, Calicut University Campus, Coll. Anil. K. ,21.xii. 1988

Other Material Examined : 1F, INDIA: Kerala, Malampuzha, Coll. Narendran & Party, 11.xii.1987; 1F, INDIA: Kerala, Agali, Coll. Narendran & Party, 7.i.1988, 2F, INDIA: Kerala, Kerala University Campus, Coll. Anil. K. , 23.xi. 1989, 1F, INDIA: Kerala, C. P. C. R. I. , Kayamkulam, 25.xi. 1989; 6F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K. , 1.x. 1988, 10.xi. 1988, 21.xi. 1988, 4.iv. 1988, 3. ix. 1990, 30.i.1999

Host : *Hypolixus sp.*, *Hypolixus truncatulus*, *Pempherus affinis*, *Euderus pempherophilus* Ayyar & Mani (SUBHARAO & HAYAT, 1986)

Biology : Unknown

Distribution: India (Kerala, Tamilnadu, Uttarpradesh)

Discussion : This species is discussed under *Eupelmus nirupama* Narendran elsewhere in this work.

Variation : In the original description of *Eupelmus pedatoria*(Ferriere) the length of female is 1.40 - 3.5mm., whereas in the present description length of female is 2.3mm; in the original description of *Eupelmus pedatoria* length of exserted part of ovipositor sheath 0.5 x length of gaster , whereas in the present description the length of exserted part of ovipositor sheath is 0.46 x length of gaster.

Remarks : As the original description of *E.pedatoria* is inadequate for the easy identification of the species, a redescription of *E.pedatoria* (Ferriere) is provided here.

Eupelmus (Eupelmus) rexonus Narendran

(Figs. 184-187)

Eupelmus (Eupelmus) rexonus Narendran, 1995. *J. Zool. Soc. Kerala*, 5
(1&2):1-15

DIAGNOSIS

Female : Length 2.78 mm. Brownish black. Scape, fore and mid legs pale yellowish brown; eyes blackish grey; ocelli brown; frons and vertex brownish black with coppery and slight metallic green refringence. Pubescence on head and body dirty white. Pedicel brownish black with metallic green refringence on its dorsal side. Mesosoma with median narrow pale yellowish white part on pronotum; tegula brown; hind leg with coxa brownish black with apex brown; hind femur brownish black with base and apex paler. Brachypterous, fore wings (Fig. 186) hyaline with brownish tinge; ovipositor sheath pale yellowish

white with black and apex slightly darker. Head reticulate, moderately pilose, width in front view little more than 6.2 x distance between front ocellus and clypeal margin; eyes bare. Pronotum reticulate-punctate with less sclerotized median narrow yellowish white area; mesoscutum closely punctate and reticulate, length of mesoscutum more than its width, mesoscutum shallowly concave medially; notauli obscure; scutellum finely punctate reticulate, flat, apex rounded, axillae meeting anteromedially; propodeum without median carina, posterior margin carinate, slightly convex. Brachypterous, fore wing infuscated, length of fore wing as long as 0.49 x of gaster. Mittibial spur subequal in length of mesotarsus, mesotarsus with double row of dark pegs on either side ventrally, hind basitarsus as long as following three segments combined. Length of gaster (Fig. 187) more than length of mesosoma, length of T1 more than length of T2, length of T2 more than length of T3, length of T3 subequal to length of T4, posterior margin of T1, T2, T3 and T4 medially incised; length of ovipositor sheath 0.65 x of hind tibia.

Male : Unknown

Material examined : Type only

Details of Type

Holotype : Female, INDIA: Kerala; Eranakulam, Coll. T. C. Narendran, 7.ii.1989(DZUC)

Host : Unknown

Biology : Unknown

Distribution : India (Kerala)

Discussion : *Eupelmus rexonus* Narendran resembles with *Eupelmus nirupama* Narendran in having brachypterous fore wings; white coloured tegula; length of mid tibial spur subequal to mesotarsus; hind basitarsus subequal to length of following three segments combined; last tergite with posterior margin deeply emarginated medially.

In *E. rexonus* mesotarsus with double rows of dark pegs on either side ventrally with a single row of pegs on either side on segments 2-4 (whereas in *E. nirupama* mesotarsus without dark pegs ventrally); in *E. rexonus* EL 2.6 x MS (whereas in *E. nirupama* EL x 3 x MS); in *E. rexonus* POL little more than OOL (whereas in *E. nirupama* POL 3 x OOL); in *E. rexonus* length of ovipositor sheath little less than 0.35 x remaining part of gaster (whereas in *E. nirupama* ovipositor sheath 0.30 x of gaster).

Eupelmus tachardiae(Howard)

(Figs.188 -191)

Anastatus tachardiae Howard, in Howard & Ashmead, 1896. *Proc. U.S. Natn.*

Mus., 18: 641. F.Srilanka: Pundaluoya(USNM)

Brasema annulicaudis Cameron, 1913. *Indian Forest Rec.*, 4: 98. F.India.

Dehra Dun(FRI)

REDESCRIPTION

Female : Length 2.66mm. Head coppery brown with metallic green reflections; eyes golden yellow. Antenna (fig.190) dark brown except scape, pedicel and apical segment of clava; scape golden yellow extending to vertex, length of scape 0.2 x length of antenna, length of pedicel 0.3 x length of scape, anellus small and transverse, length of F1

less than length of F2, length of F2 subequal to length of F3, length of F4 more than length of F5, length of F5 subequal to length of F6, length of clava subequal to length of preceding three segments combined. Mesosoma dark brown, broad, quadrangular; mesopleura dark brown. Macropterous, forewings extending to tip of gaster. Legs reddish yellow, fore, mid and hind coxae dark brown with metallic green reflections; fore and hind tibiae dark brown except at tip. Gaster dark brown, ovipositor sheath exerted, dark brown at base and tip, pale yellow in middle.

Head (Fig. 188 & 189): Width in front view 1.5 x distance between front ocellus and clypeal margin; vertex and frons with honey-comb like rectangular sculpture; eyes bare; POL 2 x OOL; scrobes closely punctate; distance between antennal toruli and clypeal margin more or less equal to distance between lower orbital border and antennal toruli and clypeal margin.

Mesosoma : Pronotum finely punctate; mesoscutum with groove like notauli; length of mesoscutum more or less equal to its width; scutellum convex, triangular, apex rounded; axillae separate anteromedially; propodeum with plical region smooth, U shaped, shallowly concave, without median carina, separated from callar region by plical furrow; prepectus finely reticulate. Macropterous, fore wing as in Fig. 191. Length of MV more than length of SMV, length of PMV subequal to length of STV. Length of midtibial spur subequal to length of mesobasitarsus; mesotarsus with dark coloured pegs.

Gaster : Length of T1 more than length of T2, emarginated, length of T2 less than length of T3; length of T3 and T4 subequal, T5 broadly exposed, extending over T6, T6 short; length of ovipositor sheath 0.3 x length of gaster.

Plesiotype : Female, INDIA: Kerala, Calicut University Campus, Coll. T. C. Narendran, i.1986.

Other material examined: 2 F, INDIA: Kerala, Calicut University Campus, Coll. Anil, K., 24.viii.1988,28.viii.1988; 1F, INDIA: Kerala, Trichur Agricultural University, Coll. T.C.Narendran, 8. x. 1988; 5F, INDIA: Ranchi, Namkum, Coll. K.K. kumar, 5.xi. 1999.

Male : Length 1.30-2.30mm. Head dark brown; eyes yellow; ocelli golden yellow. Antenna inserted below level of lower orbital border; scape enlarged. Mesosoma dark brown with metallic green and blue reflections; mesopleura with metallic blue reflections. Macropterous, fore wings hyaline basally, slightly fuscous apically. Gaster dark brown with metallic green reflections basally.

Head : Head with quadrangular comb like sculptures; ocelli in broad triangle; eyes bare; toruli not wide apart.

Mesosoma : Pronotum with stiff hairs; mesoscutum broad with stiff hairs.

Gaster: Length of gaster less than length of mesosoma, narrow, slightly thickened behind, triangular.

Hosts: *Eublemma amabilis*; *Holococera pulvereae*; *Machaerota plantiae*; *Kerria lacca*((Kerr); *Apanteles tachardiae*; *Microbracon greeni*; *Microbracon tachardiae*; *Evencyrtes deurti*; *Tachardiaepagus tachardiae* (B.R SUBHA RAO & M.HAYAT , 1986).

Biology: Chowdhury ,M.K., Sen, P. and Battacharya, A. (1973) studied the relationship between density of lac insect, *Kerria lacca* and chalcid parasitisation.

Distribution: Srilanka, India(Kerala, Orissa)

Discussion : *Eupelmus tachardiae*(Howard) is discussed under *Eupelmus catoxanthae* Ferriere elsewhere in this work.

Remarks : *Eupelmus tachardiae* (Howard) is reported for the first time from Kerala. The male of *E. tachardiae* is not represented in my collection, so the above description of male *E.tachardiae* is based on the description of *E. tachardiae*(MANI, M. S.1989)

Eupelmus testaceiventris Motschulsky

(Figs. 192- 198)

Eupelmus testaceiventris Motschulsky, 1863 : 49. F. Sri Lanka. Mt. Nuara Eliya (ZMMS)

Callimome ceylonica Motschulsky, 1863. 47. F. Srilanka(ZMMS)

Eupelmus testaceiventris Cameron, 1912: 212. Australia : NSW.

Idoleupelmus vulgaris Girault, 1913 : 94. F. Australia: QLD(QMB)

Episolindelia varicolor Girault, 1914 : 23. F. Australia: QLD(QMB)
(Replacement name for *vulgaris*) Australia QLD(QMB)

Eupelmus folsomi Girault, 1915 : 7. F. Australia: :QLD(QMB)

Eupelmus baileyi Girault, 1915 : 8. F. Australia:QLD(QMB)

Eupelmus scudderi Girault, 1915. 13. F. Australia QLD(QMB)

Eupelmus auriventris Girault, 1915 : 15. F. Australia: QLD(QMB)

Eupelmus inkaka Girault, 1921 : 187. F. Australia : QLD(QMB)

Eupelmus dodo Girault,1921 : 188. F. Australia: QLD(QMB)

Eupelmus flavigaster Masi, 1934 : 21. F. Cyprus(MSNG)

Eupelmus renominatus Boucek, 1970: 83. F.(Replacement name for *Eupelmus testaceiventris* Cameron, 1912.)

REDESCRIPTION

Female

Length 1.5 mm. excluding length of ovipositor sheath; length of ovipositor sheath 0.2 mm. Head dark brown with metallic green reflections; eyes golden yellow; ocelli dark brown; vertex and frons with metallic blue reflections. Antenna (Fig. 195) dark brown inserted in middle of face, scape enlarged, length of scape 0.2 x length of antenna, pedicel flat, apex of pedicel and anellus yellowish brown, length of pedicel 0.3 x length of scape, length of F1 less than length of F2, length of F2 and F3 subequal, length of F4 little more than length of F3, length of F5, F6 and F7 subequal; length of clava equal to length of preceding three segments combined. Mesosoma brown with metallic green reflection; mesopleura with metallic green reflection. Macropterous, fore wing hyaline, pubescent. Legs golden yellow except apical segments of mid and hind tarsi. Gaster dark brown basally, apex yellowish brown, metallic green reflection on lateral side; ovipositor sheath elongated, uniformly dark brown.

Head (Fig. 192, 193 & 194) : Width in front view little more than 1.3 x its median length; distance between front ocellus and occipital margin; vertex and frons setigerous, finely reticulate; eyes bare; POL 3 x OOL; scrobe broadly U shaped, not deep, margins ecarinate; parascrobal region narrow; toruli not wide apart; interantennal region triangular.

Mesosoma : Pronotum densely reticulate with median sclerotization; length of mesoscutum less than its width; notauli broadly U shaped, lateral lobes of mesoscutum with setae, margins of lateral lobes raised; scutellum triangular, slightly convex; axillae separate anteromedially; mesopleura finely reticulate; propodeum with plical region narrow, V

shaped, without median carina; prepectus broadly triangular. Macropterous, fore wing (Fig. 196) hyaline, without linea clava, length of MV less than length of SMV, length of PMV more than length of STV. Length of midtibial spur (Fig. 197) more or less equal to length of two meso tarsal segments combined.

Gaster (Fig. 198): Length of gaster equal to 1.5 x length of mesosoma, T6 medially divided, last tergite with posterior margin emarginated medially; length of ovipositor sheath 0.7 x length of gaster.

Male : Unknown

Plesiotype: Female, INDIA: Kerala, Kulamavu, Coll. T. C. Narendran, 1-xii. 1987

Other Material Examined : 2F, INDIA: Kerala, Malampuzha, Coll. T. C. Narendran & Party, x-i. 1986; 1F, INDIA: Kerala, Thalappara, Coll. T. C. Narendran & Party, 31.viii. 1987; 1F, INDIA: Kerala, Vallikunnu, Coll. T. C. Narendran & Party, Coll. 30. xii. 1987; 1F, INDIA: Kerala, Aaralam, Coll. T. C. Narendran & Party, 31.x. 1988; 2F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K., 21.xi. 1988, 2-xii-1988; 1F, INDIA: Karnataka, Vittal, Coll. T. C. Narendran & Party, 26 .ix. 1988; 1F, INDIA: Kerala; Vallikunnu, Coll. T. C. Narendran & Party, 16.xii.1988.

Hosts : Parasites of Cecidomyiidae associated with herbaceous vegetation, especially grasses (also rice) (BOUCEK, 1988)

Biology : Unknown

Distribution : Australia, Africa, Southern Europe and Southern Asia, Sri Lanka, India (Kerala)

Discussion: *E. testaceiventris* Motshulsky is close to *E. australiensis* Girault in having forewing with linea calva; mesotarsal pegs in even rows along each side of mesotarsus; length of ovipositor sheath less than length of gaster.

In *E. testaceiventris*, ovipositor sheath is dark brown at base and apex, pale yellow medially (whereas in *E. australiensis* the ovipositor sheath is uniformly dark brown); in *E. testaceiventris* ovipositor sheath is 0.7 x length of gaster (whereas in *E. australiensis* ovipositor sheath is 0.8 x length of gaster.)

Remarks: As the original description of *E. testaceiventris* is inadequate for the easy identification, a redescription of *E. testaceiventris* Motschulsky is provided here.

Eupelmus vermai (Bhatnagar)

(Figs. 199-205)

Solindenia vermai Bhatnagar, 1952. *Indian J. Agric. Sci.*, 21:162

REDESCRIPTION

Female: Length 3.7 mm. (excluding length of ovipositor sheath); length of ovipositor sheath 0.6 mm. Body blackish brown. Head black with metallic bluish green reflections on occiput and malar sulcus, interantennal region and clypeus with metallic bluish green and bronzy reflections; pubescence on head dirty white. Antenna (Fig. 202) dark brown with dirty white pubescence, inserted below lower orbital border, scape minutely punctate with metallic bluish green reflections, enlarged, cylindrical, length of scape 0.2 x length of antenna, pedicel with metallic bluish green reflections, length of pedicel 0.3 x length of

scape, anellus subquadrate; length of F1 subequal to length of F2, length of F3 more than length of F4, length of F4, F5, F6 and F7 subequal, length of clava little less than length of preceding three segments combined. Pronotum and mesoscutum black; mesopleura black; tegula blackish brown. Macropterous, fore wing hyaline. Fore femur, hind femur except apex, apical half of hind tibia, blackish brown, fore tibia, mid femur, basal half of mid tibia brown. Gaster black with metallic green reflections, pubescence on gaster brown; ovipositor sheath black at base and apex, pale yellow medially.

Head (Figs. 199, 200 & 201): Width in front view 5.6 x distance between front ocellus and clypeal margin; EL 2 x MS; POL 3 x OOL; toruli not wide apart; interantennal region convex; scrobe deep, channel like, margins ecarinate, not extending to anterior ocellus.

Mesosoma : Pronotum densely reticulate with weak median sclerotization; mesoscutum densely reticulate, notauli broad U shaped, lateral lobes medially concave; scutellum convex, apex rounded, axillae separate anteromedially; propodeum with large, broadly U shaped plical region, median carina absent; prepectus subrectangular, reticulate; mesopleura finely reticulate. Macropterous, fore wing (Fig. 203) hyaline, length of MV little less than length of SMV, length of PMV less than length of STV. Length of mid tibial spur (Fig. 204) subequal to length of mesobasitarsus; mesotarsus with rows of dark pegs on either side ventrally; length of hindbasitarsus equal to length of following three segments combined.

Gaster (Fig. 205): Length of gaster equal to length of mesosoma, length of T1 more than length of T2, length of T3 less than length of T4, posterior margin of T1, T2, T3 and T4 medially incurved, T5 broadly

exposed, posterior margin of T5 broadly concave, T6 short, posterior margin convex, last tergite with posterior margin deeply emarginated, surrounding subcircular sclerite; length of ovipositor sheath 0.3 x length of gaster.

Male : Unknown

Plesiotype : Female, INDIA: Kerala, R.R.S. Kayamkulam, Coll. Anil. K. , 21ii. 1989

Other Material Examined : 1F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K. , 8. xii. 1988; 1F, INDIA: Kerala; Chavidi, Coll. T. C. Narendran, 8.i. 1989; 1F, INDIA: Kerala, Vazhani Dam, Coll. T. C. Narendran, 8.ii. 1989; 1F, INDIA: Kerala; Varkala, Coll. Anil. K. , 26. ii. 1989.

Host : Grubs of *Epilachna* sp. (Coleoptera; Coccinellidae) (SUBBA RAO & HAYAT, 1986)

Biology : Unknown

Distribution: India(Andhra Pradesh , Goa, Karnataka, Kerala, UttarPradesh)

Discussion: *E. vermai* (Bhatnagar) is discussed under *E. keralicus* Narendran elsewhere in this work

Variation : In the original description of *Eupelmus vermai*, the length of female is 3mm, whereas in the present description the length of female is 3.7 mm; in the original description the length of scape is equal to 5.50 x its width , whereas in the present description the length of scape is equal to 5.3 x its width ; in the original description the length of gaster equal to length of head and mesosoma combined,

whereas in the present description the length of gaster equal to 1.17 x length of head and mesosoma combined.

Remarks : Due to the inadequate original description of *E.vermai* (Bhatnagar) for the easy identification, a redescription of *E. vermai* (Bhatnagar) is provided here.

Eupelmus (Eupelmus) zandanus Narendran

(Figs. 206-209)

Eupelmus (Eupelmus) zandanus Narendran, 1995. *J. Zool. Soc.*

Kerala, 5(1&2): 1-15, 1995

DIAGNOSIS

Female : Length 2.50 mm. Black; head metallic green; eyes yellowish brown; ocelli yellowish brown. Antenna (Fig. 207) brown except apical yellow half of scape. Pronotum posteromedially, lateral lobes and concave posterior part of mesoscutum, collar region and base of T1 metallic green; prepectus, tegula, fore femur, basal half of fore tibia, median part of mid femur, patch below base of mid tibia, apical half of hind femur, ovipositor sheath at base and apex dark brown, median part of ovipositor sheath and rest of legs pale yellowish white. Head (Fig. 206) width in front view little less than 4 x distance between front ocellus and clypeal margin, finely reticulate; parascrobal area rugose and slightly raised. Mesosoma finely reticulate on dorsum, pronotum with median line of weaker sclerotization; length of mesoscutum equal to width; scutellum rounded at apex; propodeum with broad U shaped, shallowly concave plical region without median carina. Macropterous. Length of midtibial spur subequal to length of mesotarsus, mesotarsus

with rows of black pegs ventrally on either side. Gaster (Fig. 209) little longer than mesosoma, finely reticulate; length of T1 more than T2; T1, T2 and T4 with posterior margin deeply incised medially. Length ovipositor sheath 0.30 x as long as gaster, 0.60 x of hind basitarsus.

Male :Unknown

Material examined:Type only(ZSI)

Details of Type

Holotype : Female, INDIA: Kerala; Coll. T. C. Narendran, 7. ii. 1989(DZUC)

Host : Unknown

Distribution: India (Kerala)

Discussion : *Eupelmus zandanus* Narendran resembles with *Eupelmus keralicus* Narendran in having POL little more than 2.2 x OOL ; notauli groove like not reaching transscutal sulcus; length of mid tibial spur equal to mesotarsus; length of hind basitarsus equal to combined length of three following segments; pronotum with median line of weak sclerotization; last tergite with posterior margin deeply emarginated surrounding subcircular sclerite; fore wing without linea calva.

In *E.zandanus* width of head in front view little more than 4 x distance between front ocellus and clypeal margin(whereas in *E. keralicus* width of head in front view about 3 x distance between front ocellus and clypeal margin); in *E. zandanus* ovipositor sheath 0.30 x as long as gaster, 0.60 x hind basitarsus (whereas in *E. keralicus* ovipositor sheath little less than 2.27 x of gaster, 0.5 x as long as hind basitarsus); in

E.zandanus lateral lobes of mesoscutum raised to form a transverse ridge posteriorly before transscutal sulcus (whereas in *E. keralicus* lateral lobes with sharp dorsal margin not forming transverse ridge); in *E. zandanus* ovipositor sheath at base and apex dark brown, median part pale yellowish white (whereas in *E. keralicus* ovipositor sheath pale yellow with base black and apical part yellowish brown).

Mesocomys Cameron

Mesocomys Cameron 1905 :210 Type species :

Mesocomys pulchriceps Cameron by monotypy.

Semianastatus Kalina, 1984: 18-19. Type species:

Semianastatus orientalis Kalina by monotypy and original designation.

Diagnostic characters

Head in front view distinctly wider than high, in lateral view head meniscoidal or with anterior surface conspicuously convex, frontovertex long; toruli widely separated near oral margin, distance between toruli equal to twice distance between torulus and oral margin or to inner orbit; scrobe deep, bell shaped, margins carinate, extending about two-thirds distance and sometimes to within about one ocellar diameter of anterior ocellus; clypeus flat, with apical margin incurved or medially incised; mandibles bidentate. Pronotum with ridge like margin differentiating neck from transverse, depressed collar, medially divided by light coloured line; propodeum with almost flat, U or V shaped plical region; prepectus with light coloured frontal surface. Macropterous, forewing usually infumated with two whitish spots in cross band; mesotibia without oblique apical groove or apical pegs; mesotarsus with irregular or serrate row of black pegs along each side

of yellowish tarsomeres. Sixth tergite of gaster not divided medially; last tergite more or less rounded, convex with stiffened, slightly upturned rim at apex. Ovipositor sheath slightly exerted.

Distribution

Africa, South Asia

Biology

Parasites in clusters of large eggs of Saturniidae, Lasiocampidae, eg.in the eggs of *Attacus atlas*, *Antheraea* and *Dendrolimus sp.* , probably also in similar eggs of some other Lepidoptera. (BOUCEK 1988)

Discussion

This genus is similar to *Anastatus* Motschulsky. Females of both *Mesocomys* and *Anastatus* have apically broad, bidentate mandibles and often have banded forewings and a sub basal white band on the gaster. Females of *Anastatus* do not have a light coloured frontal prepectal surface, and they have a mesotibia with black apical pegs and an apical groove. Genus *Mesocomys* can be readily distinguished by the broadly U shaped notaular impression on the mesoscutum, all the funicular segments transverse to subquadrate and by the pronotum with a transverse ridge bearing long bristles.

KEY TO THE INDIAN SPECIES OF *MESOCOMYS* CAMERON

1. Scutellum with large pit anteriorly on each axillar groove on either side.....(2)

- =Sutellum without large pit anteriorly on each axillar groove.....(4)
2. Length of pedicel 4x its width, length of marginal vein equal to 0.25 x submarginal vein.....*M.pulchriceps* Cameron
- =Length of pedicel less than 3 x its width, length of marginal vein equal to or less than 0.4 x length of submarginal vein.....(3)
3. Upper margin of scrobe separated from anterior ocellus by trifle more than 2 x diameter of anterior ocellus; length of pedicel 1.5 x its width; length of marginal vein 0.33x length of submarginal vein*M.atulyus* Narendran
- =Upper margin of scrobe separated from anterior ocellus by about 1 x diameter of anterior ocellus; length of pedicel 2.75 x its width; length of marginal vein 0.4 x length of submarginal vein.....*M.orientalis* Ferriere
4. Pronotum with median longitudinal line.....(5)
- = Pronotum without median longitudinal line... *M. albitarsis* Ashmead
5. Forewing with one broad transverse cloud under stigmal vein; length of mesoscutum little more than its width
.....*M.menzeli* Ferriere
- =Forewing with two broad transverse clouds under stigmal vein; length of mesoscutum more or less equal to its width.....*M. manii* sp. nov.

Mesocomys atulyus Narendran

(Figs 210 – 215)

Mesocomys atulyus Narendran *Entomon*21(1):77-87(1996)

DIAGNOSIS

Female : Length 4.39 mm. body dark brown;; head with metallic dark green reflections on clypeal margin, malar space, scrobe and on parascrobal region. Most of antennae. Legs, gaster at its base, brown; pedicel above , clava, ocelli, pronotum and mesopleura dark brown. Head (Fig. 210) little more than long in frontal view; clypeal margin broad, slightly concave, over roofed laterally by long dark, erect bristles; scrobe deep, broadly subtriangular, densely ,minutely reticulate, margins carinate, sides parallel to diverging inner eye orbit, not extended to front ocellus; parascrobal region with sculpture rugulose; frontovertex broad, dorsally rather flat. Antenna (fig.212) inserted far below level of lower margin of eye orbit, nearer to clypeal margin; scape slightly expanded at base with sharp ventral margin, 0.48 x of rest of antenna; pedicel 2.2 as long as wide, longer than anellus, longer than combined length of F1 and F2; anellus 2x as wide as long ,subequal to F1; all funicular segments transverse; F5, F6 and F7 subequal, about 2x as wide as long;clava longer than preceding four segments combined. Pronotum twice longer than broad, anteriorly with transverse ridge, bearing few, dark, long bristles; mesoscutum smoothly sculptured, shining with broadly U shaped scutellum with few long , dark bristles, anteriorly on axillar groove with large pit on either side; propodeum with plical region with transverse median depression anteriorly, without median carina, separated from callus region by submedian plical furrow, posterior margin of propodeum broadly concave; prepectus large, subrectangular with sculpture coriaceous, extending to base of tegula; Macropterous; fore wing (fig.212) strongly pubescent, infumated with brown bands and with two whitish hyaline spots as in fig. 217. Midtibial spur 0.7 x

of basitarsus with single row of dark pegs on either side ventrally on basal three segments; hind basitarsus compressed, longer than following segments combined. Gaster (Fig.213) slightly shorter than mesosoma; T1 longer than T2, its posterior margin incised, medially; T2 subequal to T4.

Male(Fig.214-215) : Length 3.2mm. Body dark brown; head metallic green with brassy reflections on scrobes, malar space and on parascrobal region. Antennae and legs dark brown. Head as in female. Antenna (Fig.214) with pedicel length little more than 2x its width, clava undivided, shorter than preceding four segments combined. Mesosoma as in female. Pronotum dorsally rather flat; pronotal ridge not prominent but with few dark erect bristles; mesoscutum convex with linear converging notauli; scutellum without pits anteriorly on axillar grooves; metanotum large with shallow depression laterally; propodeum with median carina, posterior margin incurved; forewing as in female, less infumated in middle, hyaline spots less conspicuous; midtibial spur slender, 0.5 x basitarsus. Gaster (Fig.215) compressed, shorter than mesosoma.

Material Examined : Type only

Details Of Type

Holotype : Female, INDIA, Kerala, Calicut University Campus, egg clusters of *Antheraea* sp., Coll. T. C. Narendran, 18.i.1988; Depository: Dept. of Zoology, Calicut university.

Host : Egg clusters of *Antheraea* sp. (Lepidoptera: Saturniidae)

Biology: Unknown

Distribution : India(kerala)

Discussion : *Mesocomys atulyus* Narendran resembles with *Mesocomys orientalis* Ferriere in having scutellum with a large pit anteriorly on each axillar groove. In *M. atulyus* Narendran antennal scape does not have a ventral green spot (whereas in *M.orientalis* Ferriere antennal scape which is yellow in colour has a green spot ventrally); in *M.atulyus* posterior margin of scrobe separated from front ocellus by a little more than 2xdiameter of front ocellus(whereas in *M.orientalis* posterior margin of scrobe separated from front ocellus by about one diameter of front ocellus);in *M.atulyus* length of SMV is 3xlength of MV(whereas in *M.orientalis* SMV more than 2.3x length of MV).

***Mesocomys manii* sp.nov.**

(Figs. 216-219)

Female : Length 2.5mm. Head dark brown with metallic reflections; eyes yellow; ocelli reflecting brown. Antenna (Fig.217) dark brown inserted more or less at level of lower orbital border with thirteen segments; scape golden yellow bent in middle, length of scape 0.2 x length of antenna, length of pedicel 0.4 x length of scape, anellus x length of pedicel, length of F1 little less than length of F2, length of F2, F3 and F4 subequal, length of clava less than length of scape. Mesosoma black with metallic green reflection; propleura black with metallic green reflection; mesopleura black, punctate; tegula black with metallic green reflections. Fore wings fuscous , veins and pilosity brown. Gaster dark brown with metallic reflections.

Head (Figs. 216) : Width in front view 1.4 x its median length; head punctate, setose; eyes bare; EL little more than 2 x MS; POL 2.5 x OOL; scrobe deep, carinate, punctate.

Mesosoma : Punctate; length of mesoscutum more than its width; notauli U-shaped; axillae separate; scutellum rounded with metallic green and coppery

blue reflections; mesopleuron punctate. Macropterous. Midtibial spur less than in length to mesotarsus; mesotarsus ventrally with partly double rows of blackish brown pegs; hindbasitarsus more or less equal to following three segments combined.

Gaster (Fig. 219) : Gradually widening towards apex; length of gaster more than length of mesosoma; ovipositor sheath not exerted.

Male : Unknown

Holotype: Female, INDIA: Kerala; Calicut University Campus, Coll. Anitha. P. V., 15.v. 2001.

Distribution : India(Kerala)

Etymology : This species is named to honour Dr. M.S. Mani for his immortal contributions to Insect Taxonomy.

Host : Unknown

Biology : Unknown

Discussion: *Mesocomys manii* sp. nov. resembles with *M. menzeli* Ferriere and *M.albitarsis* Ashmead in having scutellum without large pits on either side of axillar groove.

In *M.manii* sp. nov. length of SMV more than length of MV(whereas in *M.menzeli* Ferriere SMV shorter than MV); in *M.maniisp. nov.* pronotum lacks median white line(whereas in *M. menzeli* pronotum with median white line)

Mesocomys manii sp. nov. resembles with *M. albitarsis* Ashmead in having pronotum without median white line.

Mesocomys orientalis Ferriere

(Figs. 220-224)

Mesocomys orientalis Ferriere, 1935. *Stylops*, 4: 151. M, F. Burma:

Rangoon(BMNH)

REDESCRIPTION

Female: Length 1.91mm. Head black with cupreous reflections, metallic green reflections on temple, gena and clypeus; eyes yellow; ocelli reflecting yellow. Antenna (Fig. 223) brown inserted well below lower orbital border ; scape golden yellow, with green spot on ventral side, length of scape 0.2 x length of antenna, length of pedicel 0.3 x length of scape, anellus small, transverse, length of anellus more or less equal to 0.4 x length of pedicel, F1, F2 and F3 subequal, length of F5, and F6 subequal, clava three segmented, length of clava more than length of preceding three segments combined. Mesoma aenous with metallic green reflections; mesopleura aenous blue; tegula brown. Macropterous, fore wing infusate, two hyaline spots medially. Legs brown except fore tibia, fore tarsus, mid tibia, meso tarsus yellow; pegs of mesotibia and mesotarsus black. Gaster blackish brown; ovipositor sheath brownish yellow.

Head (Figs. 220, 221 & 222): Finely reticulate; width in front view 1.6 x distance between front ocellus and clypeal margin; eyes bare; maximum diameter of eye equal to 2 x length of MS ; POL equal to 2.6 x OOL; scrobe deep, carinate, finely punctate.

Mesosoma : Pronotum rectangular, anteriorly with distinct transverse ridge, bearing dark long bristles; mesoscutum finely reticulate; notauli U shaped; scutellum finely reticulate, anteriorly on axillar grooves with large, conspicuous pit on either side; propodeum short, hind margin

incurved; prepectus large, subrectangular, extended to tegula; mesopleura finely reticulate. Macropterous, fore wing (Fig. 224) infusate, length of MV 0.5 x length of SMV, length of PMV 1.3 x length of STV. Length of mid tibial spur less than length of mesotarsus, mesotarsus with single row of dark pegs on basal three segments ventrally on either side; length of hind basitarsus more than following three segments combined.

Gaster : Length of gaster 1.7 x length of mesosoma; length of T1 more than length of T2, posterior margin of T 1 medially incised; length of T2 more than length of T3, length of T3 subequal to length of T4, posterior margin of T4 convex, posterior margin of T6 straight, last tergite with apical rim; ovipositor sheath little exerted.

Male : Length 2.00- 2.40 mm. Head and mesosoma green. Antenna yellow, pedicel elongated, length of pedicel equal to 3 x its width, funicular segments short and transverse, length of clava equal to preceding three segments combined. Legs yellow, except hind coxa and hind femora, hind coxa and slight reflections on hind femora green.

Head : As in female, frontovertex finely transversely striate.

Mesosoma : Mesosoma shagreened; parapsidal furrows narrow and fine; scutellum convex without depression at base; . Fore wings slightly infusate in middle, hyaline spots less conspicuous.

Gaster : Depressed, triangular, length and width of gaster not more than that of mesosoma.

Plesiotype : Female, INDIA: Kerala; Edakkara, Coll. Anil. K. , 24-IV-1989(DZUC)

Host : *Trabala vishnoui* Lefbre (Lepidoptera : Lasiocampidae) (B.R. SUBHA RAO & MOHAMMED HAYAT, 1986)

Biology : Unknown

Distribution : Burma, India(Kerala)

Discussion : This species is discussed under *Mesocomys atulyus* Narendran elsewhere in this work.

Variation : In the description of *Mesocomys orientalis* (Mani, 1989), the length of female is 2.40- 2.70 mm, whereas in the present description the length of female is 1.91 mm. ; in the original description POL equal to 2 x OOL, whereas in the present description POL equal to 2.6 x OOL; in the original description the length of pedicel equal to 2x its width, whereas in the present description the length of pedicel equal to 1.2 x its width; in the original description the length of clava equal to length of preceding five segments combined, whereas in the present description the length of clava equal to preceding four segments combined;

Remarks : As the original description of *Mesocomys orientalis* Ferriere was inadequate for the easy identification, a redescription of *M. orientalis* is provided here.

Reikosiella Yoshimoto

Reikosiella Yoshimoto, 1969: 627. Type species: *Reikosiella melina*

Yoshimoto by original designation.

Diagnostic characters

Two species groups exist. In first group (type species), gaster posteriorly rather depressed, scapes slender, forewing mostly without infumation. The second group (*Reikosiella insularis*) has scape widened proximally, forewing usually with transverse infumation, T7 distinctly convex, with anal emargination usually round in dorsal view and part of tergite in front of it of medium to considerable length, ovipositor sheath not elongated.

Biology

The Hawaiian type species was reared from the pyralid moth *Orneodes objurgatella* Walsh in fruits of *Canthium odoratum*. No record is available on the species of the treated region.

Distribution

Apparently circum- tropical.

Discussion

This genus can be separated as a specialized form with a cubical head, much more elongate body; ovipositor with long, stout and with strong bristles, usually bearing longitudinal dark streak on fore wing.

KEY TO INDIAN SPECIES OF *REIKOSIELLA* YOSHIMOTO

1. Length of ovipositor sheath more than length of body.....(2)
=Length of ovipositor sheath less than length of body
.....*R. luxa* Narendran
2. Scrobe shallow, transversely oval, occupying almost entire region
between eyes
.....*R. gibsoni* (Anil & Narendran)
=Scrobe triangular, densely reticulate, channel like, deep, not
occupying entire region between eyes(3)
3. Length of mid tibial spur exactly equal to length of basitarsus
.....*R. (Hirticauda) quilonica* Narendran
=Length of mid tibial spur distinctly less than length of basitarsus
.....*R. (Cupreocauda) crisagatra* Narendran

Reikosiella(Cupreocauda)crisagatra Narendran

(Figs. 225- 231)

Reikosiella(Cupreocauda) crisagatra Narendran, 1996. *Entomon* 21(1):77-87

DIAGNOSIS

Female : Length 4.20mm. Ovipositor sheath 8.97mm. Body brown, head, pronotum, mesoscutum metallic green mixed with coppery tinge; scrobe posteriorly purple; toruli, scape at base, pronotum antero-medially pale white; callus of propodeum with metallic green tints; ocelli pale yellowish brown; legs pale yellow; ovipositor sheath

brownish black; mandibles reddish brown. Length of head(Figs. 225 & 226) little more than 1.1 x width in frontal view, cubical in lateral view; lower face above clypeal margin clothed with long, white hairs medially, lateral margins of scrobe carinate, ending about one ocellar diameter before median ocellus; parascrobal region very narrow with row of short, white hairs. Antenna(Fig.227) inserted below level of lower margin of eye orbit; scape subcylindrical, slightly curved, 0.29 x of rest of antenna; pedicel slightly longer than F1; length of clava more than length of preceding three segments combined. Pronotum rectangular, medially deeply divided, mesoscutum densely reticulate, longer than broad scutellar axillar complex finely reticulate; axillae almost meeting antero-medially; scutellum slightly convex, rounded at apex; propodeum with plical region broad, with median carina. Macropterous, fore wing(Fig. 228) lightly and evenly infuscated, midtibia with group of pegs at apex, midtibial spur (Fig. 229) distinctly shorter than basitarsus; each meso tarsus with single row of brown pegs on either side ventrally on basal three segments; length of hind basi tarsus more than length of following three segments combined. Gaster (Fig. 231) narrow, longer than mesosoma, T1 longer than T2, posterior margin of T1 medially incised; ovipositor sheath stout, densely hairy, very long, more than twice length of body.

Male : Unknown

Material Examined : Type only

Details of Type

Holotype : Female, INDIA: Kerala, Calicut University Campus, Coll. . T.C. Narendran & Party, x.1981(DZUC)

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Discussion : *Reikosiella crisagatra* Narendran differs from the following Australian species; in *R.compressicauda* (Girault)(Girault, 1915), the ovipositor sheath is as long as gaster and has white tips. In *R.pachyscapa*(Girault) (GIRAULT 1915), the ovipositor sheath is 0.75 x length of gaster and scape greatly enlarged. In *R.pax* (Girault) (Girault,1913b) the ovipositor sheath is slightly longer than gaster, fore wing deeply infuscated and scape foliaceously expanded. In *R.muramura*(Girault)(GIRAULT,1921), the ovipositor sheath is only 0.50 x length of gaster and the forewing infuscated from the bent of SMV to apex, with two longitudinal streaks. *R.gibsoni* Anil &Narendran(1991)(from India) differs from *R.crisagatra* in having ovipositor sheath slender, 1.5 x length of body; forewing hyaline, SMV shorter than MV,PMV slightly longer than STV; scrobe shallow, margins not carinate; scape 0.37 x of antenna; pedicel shorter than F1; anellus longer than wide; F1 longer than F2.

Reikosiella gibsoni (Anil & Narendran)

(Figs.232-236)

Hirticauda gibsoni Anil & Narendran, 1991. *Hexapoda* 21. F. India :
Memana,Quilon (DZCU)

DIAGNOSIS

Female : Length 2.28 mm. Body orange yellow. Median ocellus pale white, lateral ocelli, ocellar region, toruli dark brown; mandibles brown. Antenna (Fig. 235) inserted below level of lower orbital

border, scape enlarged, basal half expanded and curved, scape except base and apical two-thirds pale yellow, length of scape 0.37 x rest of antenna, pedicel except base pale yellow, pedicel at base brown, length of pedicel less than length of F1, rest of antenna dark brown, length of clava less than preceding three segments combined. Median lobe and along inner margin of lateral lobes of mesoscutum dark brown; scutellum, metanotum and propodeum brown; axillae lemon yellow. Hind coxa, hind trochanter dark brown; base of fore femur, apex of fore tibia and mid coxa brown. T1, T2, T3, T4 and T5 brown, ovipositor sheath brown. Head (Figs. 232 & 233) width in front view more than its length, finely sculptured, head cubical in lateral view; clypeal margin broadly incurved; malar groove distinct; parascrobal area narrow. Mesosoma finely sculptured, pronotum with median line of weak sclerotization; length of mesoscutum more than its width; propodeum with plical region transverse without median carina. Macropterous, fore wing (Fig. 236) hyaline, length of mid tibial spur less than length of mesotarsus; mesotarsus with single row of pegs ventrally on either side on basal three segments; length of hind basitarsus equal to following three segments combined. Length of gaster little more than length of mesosoma, length of T1 more than length of T2, its posterior margin deeply incised medially.

Male :Unknown

Material Examined :Type only(ZSI)

Details of Type

Holotype :Female, INDIA: Kerala, Memana(Quilon), Coll. Anil. K., 26-ii.1989

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Discussion : It is discussed under *R.crisagatra* Narendran elsewhere in this work.

Reikosiella luxa Narendran

(Figs.237-238)

Reikosiella luxa Narendran, 1996. *Geobios NewReports* 15:82

DIAGNOSIS

Female

Length 1.57 mm. Body yellowish brown; Body yellowish brown; ocelli reddish brown, mandibles dark red. scape at its apex, rest of antenna except last funicular segment, clava and prepectus white. Last funicular segment and clava black; scape at its base, fore tibia, fore femur, mid femur and hind femur with brown patches; rest of legs, gaster at base and median part of ovipositor, pale white; concave posterior part of mesoscutum brownish green. Head and rest of mesosoma, orange yellow; mesopleura, toruli, scape along ventral edge, basal half and apex of ovipositor sheath and hind margin of F6 brown. Head (Fig. 237) wider than long in front view, finely reticulate; clypeal margin broad, concave; lower face abruptly declined, convex; scrobal margins ecarinate, dorsal margin blunt, almost enclosing median ocellus; inter antennal region rather flat. Antenna inserted below level of lower margin of eye orbit; scape enlarged, with sharp ventral margin, clava subequal to preceding three segments combined. Mesosoma

longer than gaster (excluding ovipositor), finely reticulate; pronotum broader than long; mesoscutum slightly longer than broad, scutellum convex with few black hairs dorsally, apex rounded; axillae broadly separate anteriorly; propodeum with plical region with shallow, transverse depression. Macropterous; fore wing elongate, narrow, strongly pubescent, slightly infuscated from near middle of MV to apex of PMV. Midtibial spur with double rows of pegs ventrally; hind basitarsus subequal to following three segments combined. Length of gaster (Fig.238) (excluding ovipositor sheath) 0.8x of mesosoma; posterior margins of first two tergites medially incised; ovipositor sheath thin, elongate, length of ovipositor sheath 0.55 x length of gaster.

Male

Unknown

Material Examined

Type only

Details of Type

Holotype: Female, INDIA: Kerala; Calicut University Campus, 25.v.1989 (DZUC)

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Discussion : *Reikosiella luxa* Narendran resembles with *R. clauda* (Girault,1915) from Australia in the pattern of body colouration and in both the posterior concave part of mesoscutum being brownish. The

two species differ in the following characters. In *R. clauda* the fore wing is infuscated from the bent of SMV towards apex (whereas in *R. luxa* the fore wing is infuscated from middle of MV to apex of PMV); in *R. clauda* the acropleuron is angulate posteriorly (whereas in *R. luxa* it is broadly rounded posteriorly); in *R. clauda* the F6 is black (whereas in *R. luxa* F6 is white).

Reikosiella (Hirticauda) quilonica (Narendran) comb. nov.

(Figs. 239-245)

Australoodera quilonica Narendran, 1996. *Entomon* 21(1):77-87

DIAGNOSIS

Female : Length 2.70mm., ovipositor sheath 1.11mm. Body yellowish brown; scape basally and small patch ventrally above middle, pedicel, anellus, first funicular segment, clava, ovipositor sheath at its basal half and apex, propodeum, prepectus, mesopleura anteriorly, narrow strip along each mid femur, along each mid tibia, along each hind tibia, dark brown; most part of gaster dark brown; rest of antenna yellowish brown, concave part of mesoscutum along its middle with green reflections. Head (Figs. 239&240) finely sculptured, mandibles tridentate; lower face convex, clothed with sparse, dark, erect hairs, malar groove distinct, toruli not wide apart, inter antennal area slightly convex; scrobes short, shallow, margins carinate, gradually merging with frons, not extending to anterior ocellus; parascrobal region reduced. Antenna (Fig. 242) inserted below level of lower orbital border; scape elongate, slightly expanded just above base, with thin lamella along ventral margin, length of pedicel little more than 0.5 x length of F1; anellus distinctly longer than wide; length of clava less than length of preceding two segments combined; vertex with hind margin

rounded, bearing dark erect hairs. Mesosoma smooth and shining, slightly longer than gaster; axillae not meeting medially, longitudinally striate; scutellum distinctly convex, finely punctate with tuft of median dark erect hairs; apex of scutellum rounded, metanotum short, dorsellum very narrow, hidden by scutellar apex; propodeum with anterior margin medially slightly incised, posterior margin deeply concave. Macropterous, fore wing (Fig. 243) strongly pubescent, infumated, infumation interrupted by two round hyaline areas opposite each other below MV at about its middle. Length of midtibial spur subequal to length of basitarsus; meso tarsus with single row of spines on either side ventrally, length of hind basitarsus more than length of following two segments combined. Gaster(Fig. 244 & 245) convex; T1 longer than T2, its posterior margin deeply emarginated medially; ovipositor sheath thin, long, 0.85 x length of gaster.

Male : Unknown

Material Examined : Type only

Details of Type

Holotype : Female, INDIA: Kerala ; Memana(Quilon), Coll. T. C. Narendran, 26 .ii.1989(DZUC)

Host : Unknown

Biology : Unknown

Distribution : India (Kerala)

Discussion : *Reikosiella(Hirticauda)quilonica* (Narendran) is readily distinguished from the Australian species of *Australoodera*, viz. *A.varicornis*(Girault) and *A.bicinctipilum*(Girault) (GIRAULT, 1922) in the presence of stiff black hairs on the scutellum.

Tineobius Ashmead

Tineobius Ashmead, 1896: 7, 14-15. Type species :

Tineobius citri Ashmead; by original designation.

Australeupelmus Girault, 1921(358)(3): Type species :

Eupelmus multicolor Girault by original designation.

Anastatoidea Gahan, 1927 :12-13 *Anastatoidea brachartoniae* Gahan, by original designation.

Diagnostic characters

Inner eye orbits more or less converging upward, delimitation of scrobal depression, form of scrobal depression, form of scutellum and of gaster, presence or absence of unusual dark bristles on vertex and scutellum; scutellum moderately convex; axillae distinctly separate; propodeum short. Macropterous, forewing infuscated, STV shorter than PMV; hindtibia widened and major part of dorsal laminate edge white; hind basitarsus compressed into flange; length of gaster less than mesosoma, apical tergites compressed; ovipositor sheath exerted.

Distribution

Tropical countries of Africa, Asia and Australia

Biology

Several species are recorded as ectoparasites on various caterpillars but also attack their primary parasites, Ichneumonidae, Braconidae and Tachinidae(BOUCEK, 1988).

Discussion

It is close to *Encyrtapsis*, especially in the form of the female gaster, but in the latter, the hind tibiae are not flattened. The flattened

tibiae seem to distinguish *Tineobius* in both sexes. The Central American *Idoeupelmus* Ashmead is also very similar to *Tineobius* but in *Idoleupelmus* the last tergite of gaster posteriorly raised into a distinct rim.

Tineobius brachartoniae (Gahan)

(Figs. 246-251)

Anastatoidea brachartoniae Gahan, 1927. *Proc. U. S. Natn. Mus.* , 74:13.

F. Indonesia: Java(USNM)

REDESCRIPTION

Female : Length 3.04 mm. Body blackish brown. Head dark brown with metallic green reflections; vertex with tuft of black setae; frons and interantennal region with translucent setae; eyes dark brown; ocelli golden yellow. Antenna (Fig. 249) inserted below lower orbital border, dark brown except scape; scape golden yellow, elongated, cylindrical, length of scape 0.2 x length of antenna, pedicel dark brown with metallic green reflection, length of pedicel subequal to length of F1, anellus subquadrate, length of F2, F3 and F4 subequal, length of F5, F6 and F7 subequal, length of clava subequal to length of preceding three segments combined. Pronotum dark brown with metallic blue reflections; mesoscutum dark brown with metallic blue and green reflections; mesopleura bluish green; tegula brown; Macropterous, forewings infusate. . Legs dark brown, hind margin of hind tibia white. Gaster dark brown, yellow basally; ovipositor sheath dark brown.

Head (Figs. 246, 247 & 248) : Finely reticulate; lower face, interantennal region squamate; width in front view 1.1 x distance between front ocellus and clypeal margin; scrobe not deep, finely reticulate, parascrobal region reduced.

Mesosoma : Pronotum finely reticulate; mesoscutum finely reticulate with sparsely distributed hairs, notauli V shaped reaching transscutal line, lateral lobes with carinate margins; scutellum densely reticulate, axillae widely separate; propodeum with transverse plical region with median carina; prepectus large, densely reticulate; mesopleura lineoloreticulate. Macropterous, fore wing (Fig. 250) length of MV subequal to length of SMV, length of STV 0.43 x length of PMV. Length of midtibial spur subequal to length of mesotarsus, length of hind basitarsus equal to length of following three segments combined.

Gaster (Fig. 251): Length of T1 more than length of T2, posterior margin of T1 slightly incised medially, posterior margin of T2, T3 and T4 medially incurved, T5, T6 and T7 narrowly exposed; apex of gaster truncate; ovipositor sheath elongated, pubescent, length of ovipositor sheath 1.3 x length of gaster.

Male : Length 1.5-2.5mm. Body bluish green with frons, parapsides partly, scutellum and gaster except base, aenous black. Antenna and legs black, except first two tarsomeres of mid leg and hind leg white.

Head : Densely ciliate; vertex narrow; eyes enlarged, oval, ciliate; lateral ocelli near orbital margin. Antenna inserted close to clypeus, scape enlarged in middle, length of scape equal to 3 x median breadth, pedicel narrow, length of pedicel equal to 2 x its width, anellus transverse, length of funicular segments less than its width, clava truncate, length of clava equal to length of two preceding segments combined; scrobe deep, smooth, limited by distinct transverse carina.

Mesosoma : Mesoscutum densely punctate; parapsidal furrows deep anteriorly, shallow posteriorly; scutellum shagreened; propodeum short with median carina. Macropterous, forewing hyaline, length of MV 3 x

length of STV, length of PMV little less than MV. Midtibia narrow, length of mid tibial spur equal to hind tarsus; hind tibia flat, flange along posterior margin absent.

Gaster : Oval, length of gaster less than length of mesosoma.

Plesiotype : Female, INDIA: Kerala, Nilambur, Coll. Mohandas.K., x.1989 from unidentified insect on *Cinnamomum verum*

Other Material Examined : 1F, INDIA: Kerala; Coll. T. C. Narendran, x-IV- 1989, from pupa of *Nephantis serinopa*

Hosts : Hyperparasitic on *Apanteles artonae* Rohw (Hymenoptera: Braconidae); *Ptychomyia remota* Ald. (Diptera: Tachinidae); *Goryphus* sp. (Hymenoptera :Ichneumonidae) (FERRIERE, 1941); *Psyche vitrea* Hamps. (Lepidoptera:Psychidae) (SUBBA RAO &HAYAT, 1986); parasitic on pupa of *Opisina arenosella* Walker (Lepidoptera : Oecophorida) (JOY & JOSEPH, 1976); unidentified insect on *Cinnamomum verum*.

Biology : Unknown

Distribution : Indonesia, Malayasia, Srilanka, India (Kerala)

Discussion : *Tineobius brachartoniae* (Gahan) is close to *Tineobius longicauda* (Ferriere) from Thailand . In *Tineobius brachartoniae* the median lobe of mesoscutum densely reticulate and lateral lobes finely reticulate(whereas in *Tineobius longicauda* the median and lateral lobes of mesoscutum faintly sculptured and shiny).

Variation : In the original description of *Tineobius brachartoniae* (Gahan), the length of female is 4mm., whereas in the present description the length of female is 3.04 mm; in the former

description the length of pedicel more or less equal to 2 x length of F3, whereas in the present description the length of pedicel more or less equal to length of F1; in the former description the length of F2 little more than 2 x its width whereas in the present description the length of F2 equal to 2.5 x its width; in the former description the length of PMV more or less equal to half length of MV, whereas in the present description, length of PMV 0.3 x length of MV; in the former description length of STV more or less equal to half length of PMV, whereas in the present description the length of STV 0.46 x length of PMV; in the former description the length of midtibial spur more or less equal to 0.6 x length of mesotarsus, whereas in the present description the length of midtibial spur equal to length of mesotarsus; in the former description the length of hind basitarsus more or less equal to length of four following segments combined, whereas in the present description the length of hind basitarsus little more than following three segments combined.

Remarks: As the original description of *Tinobius brachartoniae* Gahan is very inadequate for the easy identification, a redescription of *Tineobius brachartoniae* Gahan is provided here. As the male specimen of this species is not represented in my collection, the above description of male is based on the description of Ferriere, CH(1941)

Xenanastatus Boucek

Xenanastatus Boucek 1988:553. Type species :

Eupelmus partisanguineus Girault.

Diagnostic characters

Head in front view slightly wider than high, in lateral view head subquadrate to subcircular. Pronotum with transverse to elongate rectangular collar having subparallel sides; mesoscutum with relatively short anteromedian and long lateral lobes. The sides of scutellum converge forwards and nearly meet in point; propodeum moderately transverse, plical region subtrapezoidal separated from callar region by deep, submedian grooves. Forewing usually with hyaline cross band, without linea clava, marginal vein distinctly longer than width of wing, stigmal vein sessile. Mesotibia without oblique apical groove, with large patch of ten or more dark apical pegs in two or three rows over base of tibial spur; mesotarsus with row of yellowish to black pegs along each side of tarsomeres. Gaster elongated, subcylindrical, posteriorly slightly compressed, ovipositor sheath only slightly exerted or longer than body.

Distribution

Australia, India

Biology

Unknown

Discussion

This genus resembles with *Anastatus* Motschulsky but differs from them in having head stout with antenna having toruli on the

lower ocular line above the large, convex and punctured lower face; subsessile stigmal vein and length of F1 more than length of scape.

A KEY TO INDIAN SPECIES OF *XENANASTATUS* BOUCEK

1. Length of ovipositor sheath more or less equal to length of gaster..... *X.partisanguineus*(Girault)
=Length of ovipositor sheath distinctly less than length of gaster.....(2)
2. Length of ovipositor sheath subequal to length of hindtibia.....*X.keralicus* Narendran
=Length of ovipositor sheath distinctly less than length of hindtibia.....(3)
3. Length of ovipositor sheath 0.70 x length of hindtibia; basal three hind tarsal segments black.....*X. padus* Narendran
=Length of ovipositor sheath 0.53 x length of hind tibia; basal four hind tarsal segments white.....*X. distinctus* sp. nov.

Xenanastatus distinctus sp. nov.

(Figs. 252-257)

Female

Length 5.6mm. Body black; head black with metallic blue reflections on malar sulcus, toruli, metallic green reflections on interantennal region; eyes yellow; ocelli yellow; pubescence on head brown. Antenna (Fig.255) dark brown inserted more or less at level of lower orbital border, scape dark brown, enlarged, rectangular, length

of scape 0.1 x length of antenna; length of pedicel 0.2 x length of scape; anellus transverse, length of F1 subequal to length of F2, length of F3 less than length of F2, length of F4 subequal to length of F5, clava three segmented, length of clava less than length of preceding two segments combined. Pronotum black with metallic blue reflections; mesoscutum black with violet and metallic blue reflections; mesopleura black with violet reflections. Macropterous, fore wing (Fig.256) blackish brown medially, hyaline basally. Legs black except four tarsal segments of hind leg, mesotibial pegs black. Gaster black, ovipositor sheath exerted, pale yellow medially, base and apex dark brown.

Head (Figs. 252 & 253 & 254): Width in front view 1.1 x its median length; POL 2 x OOL; EL little more than EW; interantennal region convex; toruli not wide apart; scrobe short, not channel like, occupying entire region between eyes, scrobal margins carinate, not reaching to anterior ocellus.

Mesosoma : Pronotum densely reticulate with deep median groove, length of pronotum more than its width; mesoscutum densely reticulate, length of mesoscutum x its width; notauli groove like; scutellum convex, more or less triangular, apex rounded, densely reticulate, axillae separate anteromedially; prepectus short, triangular; propodeum transverse, plical region separated from callar region by deep grooves, mesopleura densely reticulate. Macropterous, fore wing (Fig. 256) with wavy hyaline band in between two infuscated areas, length of PMV 1.2 x length of STV. Length of midtibial spur less than length of basitarsus.

Gaster (Fig.257) : Gradually tapering towards apex, posterior margin of T1, T2 T3 and T4 medially incised, width of last tergite more or less

equal to its length, triangular; length of ovipositor sheath 0.3 x length of gaster.

Male : Unknown

Holotype : Female , INDIA: Kerala; Villuniyal, Coll. Anitha. P.V., 17.v.
2002

Host : Unknown

Biology : Unknown

Distribution : India (Kerala)

Etymology : This species name is an arbitrary combination of letters.

Discussion : *Xenanastatus distinctus* sp. nov. resembles with *Xenanastatus padus* Narendran in having a convex lower face abruptly declining towards clypeus; distinct malar groove; clava three segmented; scrobe short, not channel like, not reaching to anterior ocellus, scrobal margins carinate.

In *Xenanastatus distinctus* sp. nov. length of ovipositor sheath 0.3 x length of gaster (whereas in *X. padus* Narendran length of ovipositor sheath 0.6x length of gaster); in *Xenanastatus distinctus* sp. nov. PMV:STV-1.2(whereas in *X. padus* PMV:STV-4); in *Xenanastatus distinctus* sp. nov. OOL: POL - 1:2 (whereas in *Xenanastatus padus* OOL:POL- 1:4); in *Xenanastatus distinctus* sp. nov EL 1.2 x EW(whereas in *X.padus* EL is 3 x EW).

Xenanastatus keralicus Narendran

(Figs. 258-262)

Xenanastatus keralicus Narendran, 1998. *Senckenbergiana biologica* .

77(2): 205-209

DIAGNOSIS

Female : Length 5.25mm. Ovipositor sheath 1.48mm. Dark brown with metallic gloss; lower face, malar space, frons, pronotum posteriorly on either side of mid lobe of mesoscutum dark brown with metallic green reflections; callus part of propodeum bluish green; scrobe, parascrobal region, vertex dark brown with metallic blue reflections, ocelli brownish yellow, basal three fourth of hind coxa, ovipositor sheath from dorsal view at basal 0.29 (in side view 0.35) pale brown, apical 0.72 (in side view 0.65) dark brown. Head (Fig. 258) finely reticulate; lower face large, convex, abruptly declined towards clypeus; scrobal margins eccarinate, faintly distinct, narrowly reaching anterior ocellus; parascrobal region reduced. Antenna (Fig. 259) inserted at level of lower margin of eye; scape enlarged; flattened, almost rectangular, with sharp ventral margin, clava three segmented, subequal to preceding two segments combined. Mesosoma smoothly sculptured, shining; pronotum almost rectangular, deeply divided medially; scutellum convex; axillae elongate, narrowly separated anteriorly, propodeum smooth and shining, moderately transverse. Macropterous, fore wing (Fig. 260) with hyaline and infuscated transverse bands. Midtibial spur (Fig. 261) elongate, slender, slightly shorter than basitarsus; mesotarsus with single row of dark pegs ventrally on either on basal four segments; hind basitarsus slightly shorter than following three segments combined. Length of gaster more than combined length

of head and mesosoma, smooth and shining; T1-T4 with posterior margins medially incised; ovipositor – sheath 0.63x as long as gaster, subequal to hind tibia.

Male : Unknown

Material Examined : Type only

Details of Type

Holotype : Female, INDIA, Kerala, Calicut University Campus, Coll. T. C. Narendran (DZUC), 4.xi.1995. *Paratypes*: 2 F, same data as for holotype, except for date of one female (v.987)

Host : Unknown

Biology : Unknown

Distribution : India, Kerala

Discussion : *Xenanastatus keralicus* resembles with *Xenanastatus padus* in having convex lower face abruptly declining towards clypeus; distinct malar groove; frontovertex very narrow, longer than broad dorsally; parascrobal region reduced; pedicel longer than anellus; macropterous forewing with alternate hyaline and infusate transverse band.

In *X. keralicus* head width in front view is 1.2 times its length (whereas in *X. padus* head is little wider than long in front view (60:58); in *X. keralicus* OOL: POL-1:3 (whereas in *X. padus* OOL:POL- 1:4)

Variation : Colour in one paratype less brownish than holotype; ovipositor length variable from 0.42x to 0.64x as long as gaster.

Xenanastatus padus Narendran

(Figs. 263-269)

Xenanastatus padus Narendran, 1996. *Seckenbergiana biologica* 77(2):
205- 209.

DIAGNOSIS

Female : Length 5.9mm. Ovipositor sheath 0.8mm. Body dark brown with metallic gloss; lower face, malar space, frons, pronotum posteriorly on either side of median lobe of mesoscutum, median concave part of mesoscutum, callus region of propodeum, bluish green; T5 laterally with metallic green reflections; scrobe, parascrobal area, vertex, metallic blue; median ocellus pale yellow; mesopleura anteriorly with purple reflections; basal one –fourth of hind coxa, apical four hind tarsal segments, ovipositor sheath medially, pale white; lateral ocelli, ovipositor- sheath at base and apex dark brown. Head (Figs. 263) finely reticulate; lower face large, convex, abruptly declined towards clypeus; scrobal margins ecarinate; parascrobal region reduced. Antennae (Fig. 265) inserted at level of lower margin of eye orbit; scape enlarged, flat, almost rectangular with sharp ventral margin, shorter than F1, clava three segmented, subequal to preceding two segments combined. Mesosoma smoothly sculptured, shining; pronotum deeply divided medially, scutellar –axillar complex striate with scutellum convex, axillae elongated, narrowly separated anteriorly; propodeum smooth and shining, moderately transverse, Macropterous, fore wing (Fig. 264) with alternating hyaline and infuscated transverse bands . Mid tibial spur (Fig. 266) elongate, slender, slightly shorter than basitarsus; mesotarsus with single row of dark pegs ventrally on either side on four basal segments; hind basitarsus slightly shorter than following three segments combined. Length

of gaster more than combined length of head and mesosoma , smooth and shining; ovipositor sheath as in Fig. 264.

Male : Unknown

Material Examined : Type only

Details of Type

Holotype :Female, NDIA, Kerala,Malampuzha, Coll. T.C. Narendran(DZUC), i.1986 *Paratype*: 1F,data same as that of holotype

Host : Unknown

Biology : Unknown

Distribution : India,Kerala

Discussion : It is discussed under *X.keralicus* Narendran elsewhere in this work.

SUB FAMILY METAPELMATINAE

GENUS *Metapelma* Westwood

Metapelma Westwood, 1835. 3:69. Type species :

Metapelma spectabile Westwood; by monotypy.

Halidea Forster, 1856.2:31. Type species: *Halidea nobilis* Forster

Halidayella Dalla Torre, 1897. 16:85

Diagnostic characters

Head more or less lenticular in lateral view; vertex short, vertex and gena smoothly rounded into occiput; scrobes separate as vertical

depression dorsal to each torulus. Antennal formula 11173, F1 and F2 very long. Mesoscutum with precurrent parapsidal lines as fine longitudinal ridge between outer edge of transscutal line, anterior margin of mesoscutum convex, triangular, attenuated towards transscutal line as slightly raised ridge or differentiated line; scutellum not divided longitudinally, posterior apex not recurved as hook, but partly extended over metanotum, axillae antero-medially continuous, scutellum on either side with conspicuous axillula separated by deep parallel grooves. Metanotum projected over base of propodeum as horizontal, subtriangular region. Propodeum with plical region medially inclined, foramen narrowly incurved. Prepectus triangular, almost extending to tegula. Mesopleuron posteriorly with additional narrow, vertical sclerite before metapleuron. Fore wing fully developed, length of MV equal to or lesser than PMV; midtibial spur as long as mesobasitarsus, hind tibia and basitarsus widened, foliaceous. Gaster narrow, elongated; ovipositor sheath elongated. Females with long anal filament extended to apex of ovipositor sheath.

Distribution

Known from all biological region

Biology

Parasites of xylophagous beetles (Coleoptera) of the families Bostrichidae, Buprestidae, Cerambycidae and Curculionidae. (BOUCEK, 1989)

Discussion

Presence of both upper and lower mesepimeron also distinguishes individuals of the genus *Metapelma* from other metapelmatines. (Boucek,

1988). Discussion of *Metapelma* is given in the discussion of *Neanastatus* elsewhere in this work.

KEY TO INDIAN SPECIES OF *METAPELMA* Westwood

1. Hind tibia with dorsal forked expansion; forewing completely hyaline
..... *M. strychnocolum* Mani & Kaul

= Hindtibia without dorsal forked expansion; forewing with
infumation (2)
2. Length of anellus subequal to length of pedicel; gaster black; forewing
slightly infumated near stigmal vein *M. obscuratum* Westwood

=Length of anellus distinctly less than length of pedicel; gaster
brown; forewing deeply infumated at stigmal vein
..... *M. mesandamana* Mani & Kaul

Metapelma strychnocolum Mani & Kaul

(Figs. 267 – 269)

Metapelma strychnocolum Mani & Kaul, 1973. *Mem. School. Ent.* 2: 64.

DIAGNOSIS

Female : Length 4mm. Body brownish black with metallic blue-green reflections; head more or less black; fore leg, mid leg except basitarsus and tibial spur, hind leg except base of tibia brownish black, mid tibial spur, mesobasitarsus brown, midfemur, hind tibia at base white. Head in frontal view width more than its length, frons with fine transverse striations and shallowly punctate; eyes pubescent, converging above; genal carina distinct; vertex with few scattered minute punctae.

Antennae (Fig. 267) inserted below level of lower eye margin, eleven segmented, length of scape more than length of F1, clava undivided, length of clava less than preceding three segments combined. Mesosoma finely shagreened, mesobasitarsus (Fig . 269) with median row of acute teeth, hind tibia with dorsal forked expansion. Length of gaster less than 0.5 x of body, ovipositor sheath 0.7x of gaster. .

Male : Unknown

Host : Parasitic on an unidentified insect on *Strychnos-nux-vomica* (MANI & KAUL.1973)

Biology : Unknown

Distribution : India (Kerala, Tamil nadu)

Discussion : *M. strychnocolum* Mani & Kaul differs from *M. mesandamana* in the following characters; in *M.strychnocolum* forked expansion of hind tibia present (whereas in *M. mesandamana* forked expansion of hind tibia absent); in *M. strychnocolum* acute teeth on mesobasitarsus present (whereas in *M. mesandamana* acute teeth are absent); in *M.strychnocolum* length of scape more than length of F1(whereas in *M. mesandamana* length of scape more or less equal to the length of F1).

Remarks : As this species is not represented in my collection, the above diagnosis is based on the description of Mani & Kaul , 1973.

GENUS *Neanastatus* Girault

Neanastatus Girault, 1913(172):35-36; Type species:

Neanastatus cinctiventris Girault ; by original designation.

Solindenelleus Girault, 1914(188): 22- 23; Type species:

Solindenelleus pulchricorpus Girault; by original designation.

Metaplopoda Masi , 1926:275; Type species:

Metaplopoda grallaria Masi; by monotypy.

Diagnostic characters

Head rounded in front view, margins of vertex carinate; eyes ovate, glabrous. Antenna inserted in middle of face, with ten segments; 1.1. 1. 5. 2.; postantennal furrows absent; mesoscutum with blunt longitudinal ridges separating sloping sides; scutellum short, divided by deep median groove, with broad base; axillae very small, almost fused with scutellum; metanotum and propodeum strongly reduced. Forewing with distinct linea clava; MV and PMV long, STV short. Middle femora and tibia unusually long; middle tibia on outside with line of small bristles curving at knees; at apex anteriorly with spines of decreasing length; midtibial spur extremely long; mesotarsus with one row of dark strong pegs on outer underside, inner row weaker and paler. Gaster straight, pointed apically; ovipositor little exerted.

Biology

Records indicate that *Neanastatus* are parasites of Cecidomyiidae, especially of those species connected with grasses, and galls on herbaceous plants. Atleast two species including *Neanastatus cinctiventris* attack the rice gall midges. (BOUCEK, 1988)

Distribution

Mainly the old world tropics: from South Europe through Africa and South Asia(about 20 spp.) to Australia(also about 20 spp.) (BOUCEK, 1988).

Discussion

This genus is similar to *Metapelma* in the long convex frons, the form of the pronotum and mesoscutum and of the midcoxal attachment, the moderate contractibility of the mesosoma with raising of the transscutal suture, the long postmarginal vein and the form of the gastral tergites. *Neanastatus* can be recognized by other Metapelmatines by carinately angled occiput, longitudinally divided scutellum, five segmented funicle, midtibial carina and very short ovipositor sheath. *Neanastatus* differs from *Metapelma* in number of important features including the biology.

KEY TO THE SPECIES OF *NEANASTATUS* Girault OF INDIA

1. Hind tarsus bifurcated.....*N. bifurcatus* sp. nov.
=Hind tarsus not bifurcated.....(2)
2. Transverse elliptical spot on propodeum on each side of tip of scutellum..... *N. pulchricorpus* (Girault)
=Transverse elliptical spot on propodeum and on each side of scutellum absent(3)
3. Length of pedicel and F1 - F4 subequal..... *N.indicus* Shafee
=Length of pedicel less than length of F1(4)
4. Gaster without transverse band basally.....(5)
=Gaster with transverse band basally.....*N. cinctiventris* Girault
5. Length of PMV less than length of STV.....(6)
Length of PMV equal to 4x length of STV.....*N.turneri* Ferriere

6. Hyaline hairless streak on forewing reach to infusate area
.....*N.reksonus* Narendran
Hyaline hairless streak on forewing well separate from infusate area.....(7)
- 7 Hind tarsal segments uniformly coloured, dark brown.....(8)
Hind tarsal segments not uniformly coloured, hind basitarsus white, rest dark brown.....*N. trochantericus* Gahan
8. Length of hind basitarsus subequal to length of midtibial spur.....(9)
Length of hind basitarsus 0.7 x length of midtibial spur
.....*N. bengalicus* sp. nov.
9. Length of scape 0.11 x length of antenna; length of clava subequal to length of scape.....*N. scaposus* sp. nov.
Length of scape 0.26 x length of antenna; length of clava 0.7 x length of scape.....*N. sheelae* sp. nov.

Neanastatus bifurcatus sp. nov.

(Figs. 270-273)

Female : Length 3.7mm. Head blackish brown; eyes yellowish brown; ocelli reflecting yellow. Antenna(Fig. 272) brownish yellow, scape yellowish brown, length of scape 0.4 x length of antenna, length of pedicel 0.4 x length of scape, anellus quadrangular, length of anellus more or less equal to its width, length of F1 and F2 subequal, length of F3 less than length of F2, length of F4, F5 and F6 subequal. Clava thee segmented, length of clava 0.5 x length of scape. Macropterous, forewings infusate. Legs brown except hind basitarsus, hindbasitarsus yellow, hyaline medially. Pronotum blackish brown;

median lobe of mesoscutum yellow, lateral lobes dark brown. Gaster blackish brown; ovipositor sheath brown at base and middle, apex hyaline.

Head (Figs. 270 & 271) : Width in front view 1.2 x distance between front ocellus and clypeal margin; EL 3 x EW; POL 2 x OOL; EL 2x MS; scrobe indistinct; interantennal region convex.

Mesosoma : Pronotum minutely punctate extending over mesoscutum; mesoscutum quadrangular; notauli U shaped, not reaching transscutal sulcus; scutellum convex, triangular with deep median longitudinal groove; mesopleuron densely reticulate. Macropterous, fore wing (Fig. 273) reaching beyond ovipositor sheath, length of marginal vein more than length of submarginal vein, length of postmarginal vein more than length of stigmal vein. Length of midtibial spur more than length of mesobasitarsus; hind tarsus bifurcate, length of hind basitarsus equal to length of following three segments combined.

Gaster : Length of gaster 1.4 x length of mesosoma; length of ovipositor sheath 0.3 x length of gaster.

Male : Unknown

Holotype : Female, INDIA: Karnataka; Uppinangadi, Coll. T. C. Narendran & Party, 17.xii.-1988

Distribution : India (Karnataka)

Host : Unknown

Biology : Unknown

Discussion : *N. bifurcatus* sp. nov. resembles with *N. cinctiventris* Girault in having a pronotum extending over mesoscutum; scutellum

with deep median groove; infusate, macropterous fore wings and ovipositor sheath exerted.

In *Neanastatus bifurcatus* sp. nov. hind tarsus is bifurcated (whereas in *Neanastatus cinctiventris* Girault hind tarsus is not bifurcated); in *N. bifurcatus* sp. nov. scrobe indistinct (whereas in *N. cinctiventris* Girault scrobe is distinct and minutely punctate).

Neanastatus cinctiventris Girault

(Figs. 274-279)

Neanastatus cinctiventris Girault, 1913. *Bull. Wiscon.*

Nat. Hist. Soc. 11: 35

Metaplopa grallaria Masi, 1926. *Konowia.* 5: 276. F. Taiwan (MCSG),
also, India: Orissa.

REDESCRIPTION

Female : Length 3.5 mm. Head dark brown with metallic green reflections; eyes dark brown with yellow margin; ocelli golden brown. Antenna (Fig. 276) inserted below lower orbital border, scape yellow, enlarged, not extending to vertex, length of scape 0.27 x length of antenna, pedicel brownish yellow, length of pedicel equal to 0.31 x length of scape, anellus small, transverse, funicular segments gradually becoming thickened, length of F1 more than length of F2, length of F3 more than length of F4, length of F5 little less than length of F4, clava with two segments, length of clava more than length of two preceding segments combined. Mesosoma dark brown; propleura, mesopleura setigerous, minutely reticulate. Legs elongate, straw coloured

except hind femora, hind tibia and apical tarsal segments. Macropterous, forewings elongated, infusate, setigerous. Gaster elongate, dark brown, squamously reticulate with stiff setae.

Head (Figs. 274 & 275) : Width in front view $1.2 \times$ distance between front ocellus and clypeal margin; vertex and frons with shallow punctae; face below antenna and malar sulcus finely reticulate; eyes bare; POL equal to $2 \times$ OOL; scrobe minutely punctate.

Mesosoma : Pronotum conically produced over mesoscutum, coriaceous, minutely sculptured; mesoscutum depressed medially; scutellum with deep median groove, axillae well separate anteromedially; propleura, mesopleura reticulate. Macropterous, fore wings (Fig.277) infusate, infuscation commencing well before junction of marginal vein and stigmal vein, hyaline hairless streak on fore wing almost reaching infusate area, SMV and MV lying in straight line, Length of midtibial spur (Fig. 278) more than combined length of three mesotarsal segments, mid tibialspur with pinnately arranged spines, length of hindbasitarsus equal to length of following three segments combined.

Gaster (Fig. 279) : Length of gaster more than length of mesosoma; T1, T2 and T3 with posterior margin incurved medially, last tergite conical with posterior margin rounded; ovipositor sheath slightly exerted, length of ovipositor sheath $0.26 \times$ length of gaster.

Male : Unknown

Plesiotype : Female, INDIA:Kerala, Chethi, Coll. Anil. K. , 27-11-1989

Other Material Examined : 3F, INDIA: Kerala, Parappanangadi, Coll. T.C. Narendran & Party, 27.vii.1987; 1F, INDIA: Kerala, Thalappara, Coll. T.C.Narendran & Party, 31.viii.1987; 4F, INDIA: Kerala, Calicut

University Campus, Coll. T.C. Narendran & Party, x .1987; 1F, INDIA: Kerala, Nilambur, Coll. T. C.Narendran & Party, 17.ii.1988; 1F, INDIA: Kerala, Ranni, Coll. T.C. Narendran & Party, 20.x.1988; 6F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K., 1.x..1988, 22. x.1988, 24. x.1988 ; 9F, INDIA: Karnataka, Uppinangadi, Coll. T.C. Narendran & Party; 17.ii. 1988; 1F, INDIA: Kerala, Munnar, Coll. T.C. Narendran & Party, 3.xii. 1988; 3F, INDIA: Kerala, Silent valley, Coll. T.C. Narendran & Party, 17.ii.1989; 1F, INDIA: Kerala, Aakkalam, Coll. T.C. Narendran & Party; 1F, INDIA: Kerala; R.R.S. Kayamkulam, Coll. Anil. K, 21.ii. 1989; 1F, INDIA: Kerala, Aayiramthengu, Coll. Anil. K. , 23.ii. 1989; 1F, INDIA: Kerala; CTCRI, Sreekaryam, Coll. Anil.K. , 25-II-1989; 3F, INDIA; Kerala, Kanzhikuzhi, Coll. Anil. K., 27.ii. 1989; 3F, INDIA; Kerala, Vayalar, Coll. Anil. K., 27. ii. 1989; 1F, INDIA: Kerala, Calicut University Campus, Coll. Snehalatha, 19. ix. 1991.

Distribution : India (Madhya Pradesh, Orissa, Tamilnadu, Kerala)

Host : Rice pest, *Pachydiplosis oryzae*(Manson, Wood) (Diptera: Cecidomyiidae) {RAMAIAH, B. N., (1968); PATNAIK, N. C. AND SATPATHY, J. M.(1984); SHRIVASTAVA, S. K., SHUKLA, B. C., KITTUR, S. U. AND AGARWAL, R. K.(1987); CHANDRAKAR, H. K., POPHALY, D. J., GUPTA, R. AND KAUSHIK, U. K. (1989) ; M. S. MANI, (1989)}

Biology : Unknown

Discussion : *N. cinctiventris* Girault resembles with *N. trochantericus* Gahan and *Neanastatus turneri* Ferriere in having mesopleura without triangular yellow spot anteriorly; hindbasitarsus pale yellow, rest of tarsal segments dark brown; infuscated fore wing; in *Neanastatus cinctiventris* and *Neanastatus trochantericus* POL 2 x OOL.

In *N. cinctiventris* body black without transverse bands on gaster (whereas in *N. trochantericus* and *N. turneri* body orange yellow with black transverse bands on gaster); in *N. cinctiventris* fore wing infuscation begins from before junction of MV and STV (whereas in *N. trochantericus* and *N. turneri* fore wing infuscation begins from junction of MV and STV); in *N. cinctiventris* hyaline hairless streak on fore wing almost reaches the infuscated area (whereas in *N. trochantericus* and *N. turneri*, hyaline streak on fore wing well separated from infuscated area.); in *N. cinctiventris* POL 2 x OOL (whereas in *N. turneri* POL 1.6 x OOL); in *N. cinctiventris* EL 2.3 x MS (whereas in *N. trochantericus* EL 1.5 x MS, in *N. turneri* EL 3x MS); in *N. cinctiventris* length of gaster 1.7 x length of mesosoma (whereas in *N. trochantericus* length of gaster 1.8 x length of mesosoma, in *N. turneri* length of gaster 1.2 x length of mesosoma).

Variation : In the description of *Neanastatus cinctiventris* Girault (MANI, 1989), length of female is 3.35mm. whereas in the above description, the length of female is 3.50mm; in the former description, the length of scape about 0.30 of flagellum, whereas in the present description, the scape about 0.5 of flagellum; in the former description, length of F1 subequal to scape and F2 little shorter than F1 whereas in the present description, length of F1 1.7 x length of scape and length of F2 0.83 x length of F1.

Remarks : As the original description is very inadequate for easy identification, a redescription of *N. cinctiventris* Girault is made above.

Neanastatus reksonus Narendran

(Figs. 280-285)

Neanastatus reksonus Narendran *Entomon* 21 (1): 77-87 (1996)

DIAGNOSIS

Female : Length 2.38mm. Black, head orange yellow, except narrow strip along malar groove; small patch laterally on vertex posteriorly to eyes; antenna brown; pronotum, median part of mesoscutum yellowish; mandibles red; lateral ocelli black; legs pale yellow (except basal three fourth of hind femur, hind tibia, apical segment of hind tarsus brownish black, rest of hind tarsus white.) Head (Figs. 280 & 281) wider than long (excluding mandibles) in front view (60:55), with umbilicate sculpture on vertex and on frons, finely lineolate on lower face and on malar space; mandibles tridentate. Antenna (Fig.282) inserted below level of lower margin of eye orbit; scape little more than one - third rest of antenna, slightly expanded towards apex, distinctly longer than combined length of pedicel, vertex very short, separated from occiput by distinct carina. Mesosoma faintly sculptured, pronotum large, subtriangular, subequal to mesoscutum; scutellum medially divided by longitudinal sulcus, pointed postero-medially, apex recurved as hook, extended over dorsellum; Macropterous, length of fore wing (Fig.283) little more than length of gaster, hyaline hairless streak present as in fig. 41. Length of midtibialspur (Fig.284) subequal to length of three mesotarsal segments combined. Gaster (Fig.285) narrow, length of gaster more than 1.5x length of mesosoma; T1 longer than T2, its posterior margin incised medially; ovipositor sheath slightly exerted.

Male : Length 1.85mm. Differs from female in having conspicuously setose antenna (Fig.286) and length of gaster less than length of mesosoma.

Material Examined :Type only(ZSI)

Details of Type

Holotype: Female, INDIA: Kerala, Kayamkulam, Coll. T. C. Narendran & Party(DZUC), 21.ii. 1989. *Paratypes* : 1F,INDIA: Kerala, Malampuzha, Coll. T. C. Narendran & Party, x. 1986; 2F, INDIA: Kerala, Kayamkulam, Narendran & Party, 26. ix. 1988; 1M, Data same as above; 1F, INDIA: Kerala; Mangode, Coll. T. C. Narendran& Party, 27. xi. 1988; 3F, INDIA: Kerala, Kumarakam, Coll. T. C. Narendran & Party, 29.xi. 1988.

Host : Unknown

Biology : Unknown

Distribution : India(Kerala)

Discussion : This species is close to *Neanastatus indicus* Shafee and both species have hyaline fore wings. In *N. reksonus* the colouration of body is black with head orange yellow, pronotum and mesoscutum medially yellow (whereas in *N. indicus*, the colouration of the body is orange yellow); in *N. reksonus* pedicel is shorter than F1. F1 longer than F2, F2 and F3 subequal and F4 shorter than F3 (whereas in *N.indicus* pedicel and F1-F4 subequal in length); in *N.reksonus* the forewing 2.75X as long as wide (whereas in *N.indicus* forewing 2.5 x as long as wide); in *N.reksonus* MV longer than SMV(whereas in *N. indicus* MV slightly shorter than SMV). This new species differs from *N.pulchericorpus* (Girault) (GIRAULT,1914)in having different colour

patterns. It differs from all other species such as *N.turneri* Ferriere (Ferriere, 1938), *N.cinctiventris* Girault(GIRAULT, 1913a), and *N.trochantericus* Gahan (GAHAN, 1919) in having hyaline forewing (whereas in these above mentioned species fore wing is infuscated).

Neanastatus scaposus sp. nov.

(Figs.287-290)

Female : Length 2.2mm. Head dark brown mandibles, eyes, ocelli, antenna, anterior part of pronotum, mesopleura, median lobe of mesoscutum; scutellum, hind tibia, hind tarsus, mid tibial pegs dark brown, rest pale yellow. Antenna (Fig.289) inserted well below lower orbital border , length of scape 0.2 x length of antenna, length of pedicel 0.3 x length of scape, anellus quadrangular, length of F1 little more than length of F2 , clava three segmented; length of clava 0.5 x length of scape. Pronotum dark brown anteriorly, posteriomedially; median portion of mesoscutum yellow with equidistantly placed brown setae; mesopleuron brown, dark towards apex. Fore and mid legs pale yellow; hind legs except trochanter dark brown. Fore wings hyaline basally and infuscate towards apex. Gaster dark brown basally and apically; ovipositor sheath not exerted.

Head (Figs. 287 & 288) : Reticulate, width in front view x distance between front ocellus and clypeal margin; POL 2 x OOL; EL 2 x EW; EL 2 x MS; scrobe deep, scrobal margins indistinct.

Mesosoma : Pronotum finely punctate with equidistantly placed brown setae, pronotum extending over mesoscutum; mesoscutum finely punctate, median lobe of mesoscutum depressed medially, lateral lobes convex; scutellum with stiff hairs arranged equidistantly; mesopleura

finely reticulate. Length of mid tibial spur more than length of mesobasitarsus; length of hind tibia equal to following three segments combined.

Gaster : Length of gaster 1.5x length of mesosoma; length of T1 more than length of T2, posterior margin medially incised, length of T2 less than length of T3, length of T4 less than length of T3, last tergite narrow, conical; ovipositor sheath not exerted.

Male : Unknown

Holotype: Female, INDIA: Kerala, Calicut University Campus, Coll. Anitha. P. V. 18. xii.2003. **Paratypes :** 14F, INDIA: Kerala, Calicut University Campus, Coll. Anitha. P. V. , 15.v. 2001, 20 . vii. 2001, 22.vii. 2001, 27. vii. 2001, 17.xii. 2002; 1F, INDIA: Kerala, Calicut University Campus, Coll. Bindu. P., 5.v. 2001; 4F, INDIA: Kerala, Calicut University Campus, Coll. Saleena, 24.iv. 2001, 23.v. 2002; 1F, INDIA: Kerala, Calicut University Campus, Coll. Girish Kumar, 4.v.2001; 2F, INDIA: Kerala, Calicut University Campus, 25.iv. 2001; 1F, INDIA: Kerala, Calicut University Campus, Coll. Divakaran. K. , 18.i. 2002; 1F, INDIA: Kerala, Manjeri, Coll. Sheeba, 11. xii.2002; 1F, INDIA: Kerala, Manjeri, Coll. Simi, 11.xii.2002; 2F, INDIA: Kerala, Kootanad, Coll. Sudheer, 13.viii. 2003; IF, INDIA: Kerala, Kootanad, Coll. Santhosh, 13.viii. 2003.

Distribution : India(Kerala)

Etymology : This species name is an arbitrary combination of letters.

Host : Unknown

Biology : Unknown

Discussion : *N. scaposus* sp. nov. resembles with *N. sheelae* sp. nov. in having scape length 0.2x length of antenna; gaster with transverse band basally; hyaline hairless streak on fore wing well separated from infuscated area; posterolateral portion of pronotum extending over mesoscutum; hind tarsal segments uniformly coloured; ovipositor sheath not exerted. In *Neanastatus scaposus* sp. nov. head width in front view 1.6 x its median length (whereas in *Neanastatus sheelae* sp. nov. head width in front view 1.2 x its median length); in *N. scaposus* sp. nov. a distinct sulcus below anterior ocellus is absent (whereas in *N. sheelae* sp. nov. a distinct sulcus below anterior ocellus is present); in *N. scaposus* sp. nov. scrobal margins indistinct (whereas in *Neanastatus sheelae* sp. nov. scrobal margins distinct.) *N. scaposus* sp. nov. and *N. sheelae* sp. nov. resembles with *Neanastatus trochantericus* Gahan in having gaster with transverse hyaline band basally; hyaline hairless streak on fore wing well separated from infuscated area. In *N. scaposus* sp. nov. and *N. sheelae* sp. nov. hind tarsal segments are uniformly coloured brown (whereas in *N. trochantericus* Gahan hind basitarsus white and rest brown.)

Neanastatus sheelae sp. nov.

(Figs. 291-294)

Female : Length 3.7mm. Body yellowish brown; head yellowish brown with bronzy reflections; eyes brown with red reflections; ocelli reflecting yellow; parascrobal area brown with red reflections. Antenna (Fig. 293) yellowish brown, scape elongate, cylindrical, length of scape 0.2 x length of antenna, length of pedicel 0.2 x length of scape, length of F1 and F2 subequal, clava three segmented, length of clava equal to following three segments combined. Pronotum yellow, posterolateral margins dark brown; mesoscutum brownish yellow; pubescence on pronotum and mesoscutum brown. Macropterous, fore wing infuscate.

Fore and midlegs pale yellow except apices of mesotarsal segments, hindlegs dark brown, hind basitarsus pale yellow Gaster yellow with apex and base dark brown.

Head (Figs. 291 & 292): Finely reticulate; width in front view 1.12 x its median length; eyes prominently bulged out from plane; distinct sulcus below anterior ocelli; POL 2 x OOL; EL 2.2 x EW; EL 1.5 x MS; mandibles bidentate. Scrobe broad, scrobal margins carinate; interantennal region convex.

Mesosoma: Pronotum finely reticulate, posterolateral part of pronotum extending over mesoscutum; mesoscutum medially depressed, lateral lobes of mesoscutum raised, notauli U shaped; scutellum convex, finely reticulate with median line; mesopleura lineolate; prepectus large, quadrate, finely longitudinally striate, posterior margin broad, slightly incised, extend to tegula. Macropterous, fore wing (Fig.294) hyaline basally, infusate apically, hyaline hairless streak commencing below submarginal vein, length of submarginal vein less than length of marginal vein, length of postmarginal vein more than length of stigmal vein.

Gaster: Length of gaster more than length of mesosoma, length of T1 more than length of T2, length of T2 and T3 subequal; length of T4 more than length of T3, last tergite narrow, conical; ovipositor sheath not exerted.

Male: Unknown

Holotype: Female, INDIA; Kerala; Muthanga, Coll. Sheela, 8.xi. 1996

Paratypes: 2F, INDIA: Kerala; Muthanga, Coll. Sheela, 8. xi. 1996

Distribution: India (Kerala)

Etymology: This species is named after the collector.

Host : Unknown

Biology : Unknown

Discussion : It is discussed under *Neanastatus scaposus* sp. nov. elsewhere in this work.

Neanastatus trochantericus Gahan

(Figs. 295-300)

Neanastatus trochantericus Gahan, 1919. *Proc. U.S. Natn. Mus.* 56:520.
F. India: Coimbtore (USNM).

Female : Length 2.87 mm. Head yellow; eyes dark brown; ocelli dark brown. Antenna (Fig. 296) inserted below lower orbital border; scape golden yellow with basal region brown, not extending to vertex, length of scape 0.21 x length of antenna, length of pedicel 0.33 x length of scape, anellus small, transverse, length of F1 little more than length of F2, length of F3, F4 and F5 subequal, length of clava less than length of preceding three segments combined. Mesosoma golden yellow; propleura, mesopleura golden yellow. Legs yellow, hind tibia and hind tarsal segments except the hind basal tarsal segment black. Macropterous, fore wing infusate with hyaline hair less streak. Gaster with black transverse bands; ovipositor sheath slightly exerted.

Head (Fig. 295) : Width in front view 1.2 x distance between front ocellus and clypeal margin; vertex and frons with close shallow punctae; face below antennal toruli finely lineolate; eyes bare; POL 2 x OOL; scrobe punctate.

Mesosoma : Pronotum conically produced over mesoscutum, coriaceous; mesoscutum depressed medially; scutellum with deep median groove,

axillae separate medially; mesopleura lineolate. Macropterous, fore wing (Fig. 297) infuscation commences from junction of MV and STV; hyaline streak on fore wing well separate from infuscated area. Middle legs longer than rest, trochanter of middle leg with short distinct spine like process dorsally; midtibia (Fig. 299) with pinnately arranged short black bristles, with tuft of black apical pegs, length of midtibial spur little less than length of three mesobasitarsal segments combined.

Gaster (Fig. 300) : Slender, length of gaster more than length of mesosoma, length of T1 more than length of T2, posterior margin medially incised, length of T2 less than length of T3, length of T4 less than length of T3, last tergite narrow, conical; ovipositor sheath slightly exerted.

Male : Length 2.1 mm. Head yellow; eyes brown; ocelli dark brown. Antenna (Fig. 301) inserted below lower orbital border; scape dark brown; clava with three segments. Pronotum yellow medially, dark brown marginally; mesoscutum golden yellow. Mid legs elongated, slender; fore and mid legs pale yellow except basitarsi of fore and mid legs, hind legs, basitarsus of foreleg and mesobasitarsus dark brown. Macropterous, fore wing infuscate. Gaster slender, elongate.

Head : Width in front view $1.5 \times$ distance between front ocellus and clypeal margin; vertex and frons closely punctate; eyes bare; POL $1.5 \times$ OOL.

Mesosoma : With median depression; scutellum with deep median groove. Macropterous, fore wing infuscate. Length of midtibial spur $1.5 \times$ length of mesotarsus.

Gaster : Narrow, elongated with transverse black bands.

Plesiotype : Female, INDIA: Kerala, Calicut University Campus, Coll. Anil. K. , 11.xi. 1988.

Other Material Examined : 1F, INDIA: Kerala, Cherakkal, Coll. T. C. Narendran, x.1980; 1F, INDIA: Kerala, Vadakkanchery, Coll. T. C. Narendran & Party, 17.i. 1986; 1F, INDIA: Kerala, Vallikunnu, Coll. T. C. Narendran & Party, 26. viii. 1987; 3F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K. , 2.ii. 1988, 4.ii. 1988, 26.ix. 1988; 1F, INDIA: Kerala, Calicut University Campus, Coll. Rajashree, 10.v. 2001; 1F, INDIA: Kerala, Calicut University Campus, Coll. Anitha. P.V. , 20.viii. II-2001; 1F, INDIA: Kerala; Calicut University Campus, Coll. Sheeba, 3. ii.2003

Host : Unidentified insect on *Ischaemum ciliare* (M. S. MANI, 1989)

Biology : Unknown

Distribution : India (Kerala, Tamil nadu)

Discussion : This species is discussed under *Neanastatus cinctiventris* Girault elsewhere in this work.

Variations : In the description of *Neanastatus trochantericus* Gahan (M.S.MANI, 1989) length of female is 3.5mm. whereas in the present description, length of female is 2.87 mm.; in the former description, the length of scape is equal to length of pedicel whereas in the present description, length of pedicel 0.33 x length of scape; in the former description, length of F1 0.67 of scape, length of F3 nearly 0.80 of F2, length of F4 slightly more than 0.50 of F2, whereas in the present description, length of F1 0.78 x length of scape, length of F3

0.41 x length of F2, length of F4 little more than 0.35 x length of F2.

Remarks : As the original description of *Neanastatus trochantericus* Gahan is very inadequate for the easy identification, a redescription of *N. trochantericus* is provided here.

Neanastatus turneri Ferriere

(Figs. 302-306)

Neanastatus turneri Ferriere, 1938: 65. F. South Africa (NHM).

REDESCRIPTION

Female : Length 3.7 mm. Body black. Head brown except yellow patch on occiput; eyes brown; ocelli brown. Antenna (Fig. 304) yellowish brown, inserted below level of lower orbital border; scape enlarged, cylindrical, length of scape 0.41 x of antenna, length of pedicel 0.48 x length of scape, width of anellus equal to 2 x its length, length of F1 more than length of F2, length of F2 more than length of F3, length of F3 more than length of F4, length of F4, F5 and F6 subequal, length of clava less than length of preceding two segments combined. Pronotum yellow medially, dark brown peripherally; mesoscutum dark brown, lateral lobes yellow medially; mesopleura dark brown. Macropterous, fore wing infusate. Forelegs, mid legs except basal three tarsal segments yellow, hind basitarsus white, rest of hind tarsal segments black.

Head (Figs. 302 & 303) : Frons and vertex densely reticulate, lower face and occiput umbilicately punctate; width in front view 1.2 x its median

length; POL 6.25 x OOL; interantennal region convex; margins of toruli carinate; scrobe short.

Mesosoma : Pronotum faintly sculptured, coriaceous, posterior margin medially incurved; median lobe of mesoscutum faintly sculptured, posteromedially depressed, notauli obscure; scutellum broadly convex with median line; posterior margin of scutellum with hook; , axillae wide apart anteromedially; propodeum with linear plical region, medially divided; prepectus large, quadrate, finely longitudinally striate. Macropterous, forewings (Fig. 305) infusate, infuscation commences from junction of MV and STV, hyaline, hairless streak on forewing separated from infuscated region. Length of mid tibial spur (Fig. 306) less than length of basal three meso tarsal segments combined; length of hind basitarsus more than length of following three segments combined.

Gaster : Length of T1 more than length of T2, posterior margin medially incised, length of T2 less than length of T3, posterior margin incurved, length of T3 less than length of T4, hind margin of T3 broadly incurved, last tergite short, narrow, conical; ovipositor sheath slightly exerted.

Male : Unknown

Plesiotype : Female, INDIA: Kerala, Malampuzha, Coll. T. C. Narendran & Party, 11.xii. 1987.

Other Material Examined: 1F, INDIA: Kerala; Trichur Agricultural University Campus, Coll. T. C. Narendran & Party, 25.vii. 1985; 1F, INDIA: Andhra Pradesh, Guntur, Coll. T. C. Narendran & Party, 25.viii. 1985; 1F, INDIA: Kerala, Malampuzha, Coll. T. C. Narendran & Party, i. 1986.

Host : Unknown

Biology : Unknown

Discussion : This species is discussed under *Neanastatus cinctiventris* Girault elsewhere in this work.

Remarks : As the original description of *Neanastatus turneri* Ferriere is very inadequate for the easy identification, a redescription of *N. turneri* Ferriere is provided here.

University Campus, Coll. T.C. Narendran & Party, x .1987; 1F, INDIA: Kerala, Nilambur, Coll. T. C.Narendran & Party, 17.ii.1988; 1F, INDIA: Kerala, Ranni, Coll. T.C. Narendran & Party, 20.x.1988; 6F, INDIA: Kerala, Calicut University Campus, Coll. Anil. K., 1.x.1988, 22. x.1988, 24. x.1988 ; 9F, INDIA: Karnataka, Uppinangadi, Coll. T.C. Narendran & Party; 17.ii. 1988; 1F, INDIA: Kerala, Munnar, Coll. T.C. Narendran & Party, 3.xii. 1988; 3F, INDIA: Kerala, Silent valley, Coll. T.C. Narendran & Party, 17.ii.1989; 1F, INDIA: Kerala, Aakkalam, Coll. T.C. Narendran & Party; 1F, INDIA: Kerala; R.R.S. Kayamkulam, Coll. Anil. K, 21.ii. 1989; 1F, INDIA: Kerala, Aayiramthengu, Coll. Anil. K. , 23.ii. 1989; 1F, INDIA: Kerala; CTCRI, Sreekaryam, Coll. Anil.K. , 25-II-1989; 3F, INDIA; Kerala, Kanzhikuzhi, Coll. Anil. K., 27.ii. 1989; 3F, INDIA; Kerala, Vayalar, Coll. Anil. K., 27. ii. 1989; 1F, INDIA: Kerala, Calicut University Campus, Coll. Snehalatha, 19. ix. 1991.

Distribution : India (Madhya Pradesh, Orissa, Tamilnadu, Kerala)

Host : Rice pest, *Pachydiplosis oryzae* (Manson, Wood) (Diptera: Cecidomyiidae) {RAMAIAH, B. N., (1968); PATNAIK, N. C. AND SATPATHY, J. M.(1984); SHRIVASTAVA, S. K., SHUKLA, B. C., KITTUR, S. U. AND AGARWAL, R. K.(1987); CHANDRAKAR, H. K., POPHALY, D. J., GUPTA, R. AND KAUSHIK, U. K. (1989) ; M. S. MANI, (1989)}

Biology : Unknown

Discussion : *N. cinctiventris* Girault resembles with *N. trochantericus* Gahan and *Neanastatus turneri* Ferriere in having mesopleura without triangular yellow spot anteriorly; hindbasitarsus pale yellow, rest of tarsal segments dark brown; infuscated fore wing; in *Neanastatus cinctiventris* and *Neanastatus trochantericus* POL 2 x OOL.

CHECKLIST

**CHECKLIST OF EUPELMIDAE OF
INDIAN SUBCONTINENT**

SUB FAMILY	Host: Eggs of <i>Acherontiae</i> Styx
CALOSOTINAE	<i>amarus</i> (SubhaRao, 1957)
GENUS <i>BALCHA</i> Walker	India (Delhi, Bihar)
<i>indica</i> (Mani & Kaul 1973)	Hosts: <i>TessarATOMA javanica</i>
<i>Thaumasuraindica</i> Mani & Kaul	<i>Hymenia recurvalis</i>
India (Uttarpradesh)	<i>Apanteles delhiensis</i> through
Host: <i>Pterocarpus marsupium</i>	<i>Hymenia recurvalis</i>
GENUS <i>CALOSOTA</i> Curtis	<i>apoorvus</i> sp. nov.
<i>kottiyoorica</i> sp. nov.	India(Kerala)
India (Kerala)	Host : Unknown
Host: Unknown.	<i>ashokai</i> sp. nov.
<i>shyama</i> Narendran 1996	India(Kerala)
India (Kerala)	Host : Unknown
Host: Unknown	<i>bangalorensis</i> Mani&kurien 1953
SUB FAMILY EUPELMINAE	India(Karnataka,Kerala)
GENUS	Host: <i>Halymorpha marmorea</i> F.
<i>ANASTATUS</i> Motschulsky	<i>bifasciatus</i> (Geoffroy1785)
<i>abalus</i> sp. nov.	India(Kashmir)
India(Kerala)	Host: <i>Cinara schmitscheki</i>
Host : Unknown	<i>Psylla pruni</i>
<i>abhinavi</i> sp. nov.	<i>coimbatorensis</i> Girault
India (Kerala)	India(Tamilnadu)
Host : Unknown	Hosts: <i>Polyptychus dentatus</i>
<i>acherontiae</i> Narayanan et.al.;1960	<i>Oxya velox</i>
India (Delhi, Punjab, Kerala)	<i>colemani</i> Crawford 1912

India(Bihar,Karnataka,
 Tamilnadu,Uttarpradesh)
 Hosts: *Degonetus serratus*
Placosternum dama
Tessaratomya javanica
Tetroda histeroides
Kerria lacca
dentatus Narayanan et.al. 1960
 India (Delhi, Bihar, Kerala)
 Hosts: *Halys dentate*
*Tessaratomya javanica*Thunberg
echidna Motschulsky 1863
 Srilanka
excelsus sp. nov.
 India(Kerala)
 Host : Unknown
galatus sp. nov.
 India(Kerala)
 Host : Unknown
imatus sp. nov.
 India(Kerala)
 Host : Unknown
japonicus Ashmead1904
disparis Ruschka 1921
 India (Himachalpradesh)
 Host: *Porthetria dispar*
kashmirensis Mathur1956
 India (Himachalpradesh, Jammu &
 Kashmir)

Hosts: *Lymantria obfuscata*
Porthetria dispar
leelae sp. nov.
 India(Kerala)
 Host : Unknown
leithi(Walker1872)
*Eupelmus leithi*Walker 1872
 Srilanka
 Host:*Duranta* sp.
madagascarensis Risbec1952
umae Boucek1979
 India(Andrapradesh,Karnataka)
 Hosts:*Neostylopyga rhombifolia*
Periplaneta americana
mantoidae Motshulsky1859
 Srilanka
 Host: Mantid ootheca
narendrani sp. nov.
 India(Kerala)
 Host : Unknown
ramakrishnai(Mani,1935)
Neanastatus ramakrishnai Mani 1935
 India(Maharashtra,Tamilnadu,
 WestBengal)
 Hosts:*Homoeocerus prominulus*
Cordius obscurus
Halys dentata
tenuipes Bolivar1925

India (Karnataka, Rajasthan,
Uttarpradesh, Westbengal)
Host: *Periplaneta americana*
yasumatsui Shafee 1973

India (Karnataka)
Host: *Acacia arabica*

GENUS CALYMMOCHILUS

Masi
nilamburicus Narendran 1996
India (Kerala)
Host: Unknown

GENUS *EUPELMUS* Dalman
amorphococci Ashmead 1925
Srilanka
Host: *Amorphococcus mesuae*

amphitus Walker 1846
India (Kerala, Maharashtra)
australiensis (Girault 1913)
India (Karnataka)

australis Girault 1915
India (Kerala)
atus Narendran 1995
India (Kerala)
Host: Unknown

bonus Narendran 1995
India (Kerala)
Host: Unknown

carinatus Kieffer 1905

India (WestBengal)
Host: Cecidomydiid galls on
Artemisia
catoxanthae Ferriere 1941

India (Kerala)
caudatus sp. nov

India (Kerala)
Host : Unknown

curiosus Narendran 1995
India (Kerala)

Host: Unknown
ignotus Narendran&Anil 1998

India(Kerala)
Host: Unknown
indicus Narendran&Anil1998

India(Kerala)
Host: Unknown

javae Girault 1917

Sri Lanka, India (Kerala, Meghalaya)
Host: *Aximopsis javensis*

kashmiricus Narendran2001
India (Jammu & Kashmir)

Hosts: *Malus sylvestris*
Scolytus sp.

licinus Narendran 1995
India (Kerala)

Host: unknown
longicarpus Girault 1915

India

- malabaricus* Narendran 1995
India (Kerala)
Host: Unknown
- nirupama* Narendran 1996
India(Kerala)
Host: Unknown
- orientalis* Crawford 1913
India (Karnataka)
- pedatorius* Ferriere 1939
India
- retrosus* Narendran 1995
India (Kerala)
Host: Unknown
- rexonus* Narendran 1995
India (Kerala)
Host: Unknown
- tachardiae*(Howard) 1896
Srilanka, Pakisthan, India
(Uttarpradesh, Kerala)
Host: *Taachardiaphagus tachardiae*
- tenuicornis* Kieffer 1905
India (Uttarpradesh, West Bengal)
Host: *Lasioptera textor*
- terminale* Hafiz 1938
India (WestBengal)
Host: Lasiocampid eggs
- testuceiventris* Motschulsky 1863
India (Kerala)
- urozonus* Dalman 1820
India (Gujarat, Tamil Nadu, West Bengal)
Host: *Apion corchori*
- Asphondyla* sps.
Hypolixus truncatulus
Pempheres affinis
- vermai* (Bhatnagar) 1952
India (Uttar Pradesh)
- zandanus* Narendran 1995
India (Kerala)
Host: Unknown
- GENUS EUSANDALUM** Ratzeburg
gardneri Mani& Kaul 1973
India ((Uttarpradesh)
- GENUS MESOCOMYS** Cameron
atulyus Narendran 1996
India (Kerala)
Host: Egg clusters of *Antheraea* sp.
(Lepidoptera: Saturniidae)
- manii* sp. nov.
India(Kerala)
Host : Unknown
- orientalis* Ferriere 1935
Bangladesh, Burma, India. (Kerala, Uttarpradesh)
Host: *Trabala vishnoui* Lefbre
- GENUS REIKOSIELLA** Yoshimoto
crisagatra Narendran 1996
India (Kerala)

Host: unknown

gibsoni Anil & Narendran 1991

India (Kerala)

Host: unknown

luxa Narendran 1996

India (Kerala)

Host: Unknown

quilonica (Narendran) 1996 comb.
nov.

India (Kerala)

Host: Unknown

GENUS TINEOBIUS Ashmead

brachartoniae Gahan 1927

Srilanka, India (Kerala)

Host: *Psyche vitrea*

indica Ferriere 1938

Pakistan

Host: On Lac

GENUS XENANASTATUS

Boucek

distinctus sp. nov.

India (Kerala)

Host: Unknown

keralicus Narendran 1998

India (Kerala)

Host: Unknown

padus Narendran 1998

India (Kerala)

Host: Unknown

SUBFAMILY

METAPELMATINAE

GENUS METAPELMA Westwood

albisquamulatum Enderlin 1912

Srilanka

compressipes Cameron 1909

Indonesia, India (Karnataka)

Host: *Xylotreacus* sp.

indica Girault?

India?

Host: *Dinoderus* sp.

mesandamana Mani & Kaul 1973

India (Middle Andaman)

obscurata Westwood 1874

India, ?

strychnocola Mani & Kaul 1973

India (Tamilnadu)

taprobane Westwood 1874

Srilanka, India

GENUS NEANASTATUS Girault

bifurcatus sp. nov.

India (Karnataka)

Host: Unknown

cinctiventris Girault 1913

India (Madhya Pradesh, Orissa,

Tamilnadu, Kerala)

Host: *Pachydiplosis oryzae*

indicus Shafee 1973

India (Uttarpradesh)

Host: gall forming *psyllids*

proximus Ferriere 1938

Hosts: *Eumarchalia gennad*

Dactylethra candida

pulchricorpus (Girault 1914)

India (Tamilnadu)

Host: galls

reksonus Narendran 1996

India (Kerala)

Host: Unknown

scaposus sp. nov.

India (Kerala)

Host : Unknown

sheelae sp. nov.

India(Kerala)

Host : Unknown

trochantericus Gahan 1919

India (Tamilnadu, Kerala)

Host: Galls

turneri Ferriere 1938

India (Kerala)

Host : Unknown

SUMMARY

SUMMARY

In the present investigation entitled *Studies on the Systematics of some Genera and species of Eupelmidae (Hymenoptera: Chalcidoidea) of Kerala at Alpha level*, the diversity of the family Eupelmidae and revision of various taxa coming under this family are analysed in detail. The diversity of family Eupelmidae in general is astonishing and the diversity of some genera in particular coming under this family like *Anastatus*, *Eupelmus*, *Neanastatus* etc. is really astounding.

The family Eupelmidae includes three subfamilies: Calosotinae, Neanastatinae and Eupelminae and the entire subfamilies of the family are dealt with in this present investigation. *Anastatus*, *Calosota*, *Eupelmus*, *Mesocomys*, *Metapelma*, *Neanastatus*, *Reikosiella*, *Tineobius* and *Xenastatus* are the important genera which are systematically treated under various subfamilies.

In the present investigation fifty five species were described under ten genera. Sixteen species, out of fifty five species are new to science. *E. tachardia* (H) is reported from Kerala for the first time. Specimens obtained from outside Kerala, like specimens from Meghalaya (*E. javae* Ferriere) and Karnataka (*A. bangalorensis* Mani & Kurien, *Neanastatus bifurcatus* sp. nov. and *Neanastatus cinctiventris* Girault) were also included in the examined materials as the plesiotypes of *E. javae* Ferriere and *Neanastatus cinctiventris* Girault from Kerala were present in the collections, so that their systematic analysis and taxonomic descriptions were made possible. Holotype of *Neanastatus bifurcatus* sp. nov. and plesiotype of *Anastatus bangalorensis* Mani and

Kurien were included in the present investigation without a single representative from Kerala because of the proximity of their collection locations to the northernmost district of Kerala and the further possibility of their distributions in the northernmost district of Kerala.

Some of the important observations of the present investigations are the following:

1. *Eupelmus tachardia* (Howard) is reported for the first time from Kerala.
2. *Hirticauda gibsoni* Anil & Narendran was transferred to *Reikosiella gibsoni* (Anil & Narendran)
3. *Macroneura* Walker was transferred to *Eupelmus* Dalman.
4. Fifteen species from Kerala and one species from Karnataka were reported as new to science.
5. *Australoodera quilonica* Narendran was transferred to *Reikosiella(Hirticauda) quilonica*(Narendran) as new combination.

The following table gives the total number of species reported from Kerala.

Sl. No.	Subfamily	Name of the genus	Name of the species	No. of species	No. of new species	No. of new records for Kerala	No. of known taxa from Kerala
1.	Calosotinae	<i>Calosota</i> Curtis	<i>C. kottiyoorica</i> sp. nov. <i>C. shyma</i> Narendran	2	1	1	1
2.	Eupelminae	<i>Anastatus</i> Motshulsky	<i>Anastatus abalus</i> sp. nov. <i>Anastatus abhinavi</i> sp. nov. <i>Anastatus acherontiae</i> Narayanan et. al. <i>Anastatus apoorvus</i> sp. nov. <i>Anastatus ashokai</i> sp. nov. <i>Anastatus bangalorensis</i> Mani&Kurien <i>Anastatus dentatus</i> Narayanan et. al. <i>Anastatus excelsus</i> sp. nov. <i>Anastatus galatus</i> sp. nov. <i>Anastatus imatus</i> sp. nov. <i>Anastatus leelae</i> sp. nov. <i>Anastatus narendrani</i> sp. nov.	12	9	8	2
		<i>Calymnochilus</i> Masi	<i>Calymnochilus nilamburicus</i> Narendran	1	--	--	1
		<i>Coryptilus</i> Gibson	<i>Coryptilus indicus</i> Gibson	1	--	--	1
		<i>Eupelmus</i> Daiman	<i>Eupelmus amphitus</i> Walker <i>Eupelmus atus</i> Narendran <i>Eupelmus australis</i> Girault <i>Eupelmus bonus</i> Narendran <i>Eupelmus catoxanthae</i> Ferriere <i>Eupelmus caudatus</i> sp. nov. <i>Eupelmus ignotus</i> Narendran <i>Eupelmus indicus</i> Narendran <i>Eupelmus javae</i> Girault <i>Eupelmus keralicus</i> Narendran <i>Eupelmus licinus</i> Narendran <i>Eupelmus malabaricus</i> Narendran <i>Eupelmus nirupama</i> Narendran <i>Eupelmus pedatoria</i> (Ferriere) <i>Eupelmus rexonus</i> Narendran <i>Eupelmus tachardiae</i> (Howard) <i>Eupelmus testaceiventris</i> Motschulsky <i>Eupelmus vermai</i> (Bhatnagar) <i>Eupelmus zandanus</i> Narendran	20	1	2	18
		<i>Mesocomys</i> Cameron	<i>Mesocomys atulyus</i> Narendran <i>Mesocomys manii</i> sp. nov. <i>Mesocomys orientalis</i> Ferriere	3	1	1	2
		<i>Reikosiella</i> Yoshimoto	<i>Reikosiella crisagatra</i> Narendran <i>Reikosiella gibsoni</i> Anil & Narendran <i>Reikosiella luxa</i> Narendran <i>R. (Hirticauda) quilonica</i> Narendran	4	--	--	4
		<i>Tineobius</i> Ashmead	<i>Tineobius brachartoniae</i> Gahan	1	--	--	1
		<i>Xenanastatus</i> Boucek	<i>Xenanastatus distinctus</i> sp. nov. <i>Xenanastatus keralicus</i> Narendran <i>Xenanastatus padus</i> Narendran	3	1	1	2
3.	Metapelmatinae	<i>Metapelma</i> Westwood	<i>Metapelma strychnocolum</i> Mani & Kaul	1	--	--	1
		<i>Neanastatus</i> Girault	<i>Neanastatus bifurcatus</i> sp. nov. <i>Neanastatus cinciventris</i> Girault <i>Neanastatus reksonus</i> Narendran <i>Neanastatus scaposus</i> sp. nov. <i>Neanastatus sheelae</i> sp. nov. <i>Neanastatus trochantericus</i> Gahan <i>Neanastatus turneri</i> Ferriere	7	3	3	4

The systematic treatment of Family Eupelmidae is given below.

SUBFAMILY CALOSOTINAE

GENUS *BALCHA* Walker

indica (Mani & Kaul 1973)

GENUS *CALOSOTA* Curtis

kottiyoorica sp. nov.

shyama Narendran 1996

SUBFAMILY EUPELMINAE

GENUS *ANASTATUS* Motschulsky

abalus sp. nov.

abhinavi sp. nov.

acherontiae Narayanan et al. 1960

amarus (Subha Rao, 1957)

apoorvus sp. nov.

ashokai sp. nov.

bangalorensis Mani & Kurien, 1953

bifasciatus (Geoffroy 1785)

coimbatorensis Girault

colemani Crawford 1912

dentatus Narayanan et al. 1960

echidna Motschulsky 1863

excelsus sp. nov.

galatus sp. nov.

imatus sp. nov.

japonicus Ashmead 1904
kashmirensis Mathur 1956
leithi (Walker 1872)
leelae sp. nov.
madagascarensis Risbec 1952
mantoidae Motschulsky 1859
narendrani sp. nov.
ramakrishnai (Mani, 1935)
tenuipes Bolivar 1925
yasumatsui Shafee 1973

GENUS CALYMMOCHILUS Masi

nilamburicus Narendran 1996

GENUS CORYPTILUS GIBSON

indicus Gibson

GENUS EUPELMUS Dalman

amorphococci Ashmead 1925
amphitus Walker 1846
australiensis (Girault 1913)
atus Narendran 1995
bonus Narendran 1995
caudatus sp. nov.
carinatus Kieffer 1905
catoxanthae Ferriere 1941
curiosus Narendran 1995
ignotus Narendran & Anil 1998
indicus Narendran & Anil 1998

javae Girault 1917
kashmiricus Narendran 2001
licinus Narendran 1995
longicarpus Girault 1915
malabaricus Narendran 1995
nirupama Narendran 1996
orientalis Crawford 1913
pedatorius (Ferriere) 1939
retrosus Narendran 1995
rexonus Narendran 1995
tachardiae(Howard) 1896
tenuicornis Kieffer 1905
terminale Hafiz 1938
testaceiventris Motschulsky 1863
urozonus Dalman 1820
vermai (Bhatnagar) 1952
zandanus Narendran 1995

GENUS *EUSANDALUM* Ratzeburg

gardeneri Mani & Kaul 1973

GENUS *MESOCOMYS* Cameron

atulyus Narendran 1996

manii sp. nov.

orientalis Ferriere 1935

GENUS REIKOSIELLA Yoshimoto

crisagatra Narendran 1996

gibsoni Anil & Narendran

luxa Narendran 1996

quilonica (Narendran) 1996 comb. nov.

GENUS TINEOBIUS Ashmead

brachartonae Gahan 1927

indica Ferriere 1938

GENUS XENASTATUS Boucek

distinctus sp. nov.

keralicus Narendran 1998

padus Narendran 1998

SUBFAMILY METAPELMATINAE

GENUS METAPELMA Westwood

albisquamulatum Enderlin 1912

compressipes Cameron 1909

indica Girault

mesandamana Mani & Kaul 1973

obscurata Westwood 1874

strychnocola Mani & Kaul 1973

taprobane Westwood 1874

GENUS NEANASTATUS Girault

bifurcatus sp. nov.

cinctiventris Girault 1913

HOST-PARASITE INDEX

indicus Shafee 1973

proximus Ferriere 1938

pulchricorpus (Girault 1914)

reksonus Narendran 1996

scaposus sp. nov.

sheelae sp. nov.

trochantericus Gahan 1919

turneri Ferriere 1938

As part of this investigation, 2105 eupelmids were collected and collections made from different localities were properly identified and described with illustrations. Redescriptions were made for the poorly described taxa. Taxonomic keys to subfamilies, genera and species of the taxa under investigation were prepared. Check-list of the family Eupelmidae of the Indian subcontinent and Host-Parasite index of all the genera subjected for study were prepared. Available taxonomic descriptions of those species were adopted which were already reported from Kerala and were not represented in the collection of the present investigation.

HOST-PARASITE INDEX

ANIMAL KINGDOM

Host : *Acherontia styx* (Westwood) (Lepidoptera: Sphingidae)

Parasite : *Anastatus acherontiae* Narayanan et. al.

Host : *Achipes rosanus* (Lepidoptera: Tortricidae))

Parasite : *Eupelmus urozonus* Dalman

Host : *Andricus albopunctatus* (Hymenoptera : Cynipidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Andricus coriarius* (Hymenoptera : Cynipidae)

Parasite : *Eupelmus linearis*

Host : *Andricus curvator* (Hymenoptera : Cynipidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Andricus fecundator* (Hymenoptera: Cynipidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Andricus grossulariae* (Hymenoptera : Cynipidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Andricus kollari* (Hymenoptera : Cynipidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Andricus lignicolus* (Hymenoptera : Cynipidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Andricus ostreus* (Hymenoptera : Cynipidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Andricus paradoxus* (Hymenoptera : Cynipidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Andricus quercusramuli* (Hymenoptera : Cynipidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Andricus solitarius* (Hymenoptera : Cynipidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Andricus testuceipes* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Antestia lineaticollis* (Heteroptera : Pentatomidae)
Parasite : *Anastatus bifasciatus* (Geoffroy)

Host : *Antheraea pernyi* (Lepidoptera : Saturniidae)
Parasite : *Anastatus japonicus* Ashmead

Host : *Anthomyiopsis plagioderae* (Diptera : Tachinidae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Aonidiella aurantii* Maskell (Homoptera : Diaspididae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Apanteles artonae*(Rohw) (Hymenoptera : Braconidae)
Parasite : *Tineobius brachartoniae* (Gahan)

Host : *Apanteles circumscriptus* (Hymenoptera : Braconidae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Apanteles delhiensis* (Muesebeck & SubhaRao)
(Hymenoptera : Braconidae)
Parasite : *Anastatus amarus* (Subha Rao)

Host : *Apanteles glomeratus* (Hymenoptera : Braconidae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Apanteles melanoscelus* (Hymenoptera : Braconidae)
Parasite : *Anastatus japonicus* Ashmead

Host : *Apanteles tachardiae* Cameron (Hymenoptera : Braconidae)
Parasite : *Eupelmus tachardiae* (Howard)

Host : *Apion corchori* Marshall (Coleoptera : Apionidae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Apion fuscirostre* (Coleoptera : Apionidae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Apion holosericeum* (Coleoptera : Apionidae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Apona crataegi* (Lepidoptera : Pieridae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Aprostocetus diplosides* Crawford (Hymenoptera : Eulophidae)
 Parasite : *Eupelmus australiensis* Girault
Host : *Araecerus fasciculatus* (Degeer) (Coleoptera : Anthribidae)
 Parasite : *Eupelmus javae* Girault
Host : *Artona catoxanthae* (Hampson) (Lepidoptera : Zygaenidae)
 Parasite : *Eupelmus catoxanthae* Ferriere
Host : *Asphondylia capparidis* (Diptera : Cecidomyiidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Asphondylia puniperda* (Diptera : Cecidomyiidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Asphondylia sarthomni* (Diptera : Cecidomyiidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Attacus atlas* Linnaeus (Lepidoptera : Saturniidae)
 Parasite : *Anastatus colemani* Crawford
Host : *Attelabus nitens* (Coleoptera : Attelabidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Aximopsis javensis* Girault (Hymenoptera : Eurytomidae)
 Parasite : *Eupelmus javae* Girault
Host : *Bactrocera oleae* (Diptera : Tephritidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Biorhiza pallida* (Hymenoptera : Cynipidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Blascoa ephedrae* (Hymenoptera : Pteromalidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Blastophagus minor* (Coleoptera : Scolytidae)
 Parasite : *Eupelmus urozonus* Dalman

- Host : *Bracon brevicornis* Wesmael (Hymenoptera : Braconidae)
Parasite : *Eupelmus catoxanthae* Ferriere
- Host : *Bracon greeni* Ashmead (Hymenoptera : Braconidae)
Parasite : *Eupelmus tachardiae* (Howard)
- Host : *Brachonyx pineti* (Coleoptera : Curculionidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Bruchidius atrolineatus* (Coleoptera : Bruchidae)
Parasite : *Eupelmus orientalis* (Crawford)
- Host : *Bruchidius chloroticus* (Coleoptera : Bruchidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Bruchidius fulvus* (Coleoptera : Bruchidae)
Parasite : *Eupelmus orientalis* Crawford
- Host : *Bruchidius unicolor* (Coleoptera : Bruchidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Bruchus chinensis* L. (Coleoptera : Bruchidae)
Parasite : *Eupelmus orientalis* (Crawford)
- Host : *Bruchus cicatricosus* (Coleoptera : Bruchidae)
Parasite : *Eupelmus orientalis*(Crawford)
- Host : *Bruchus lentis* (Coleoptera : Bruchidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Bruchus lividimanus* (Coleoptera : Bruchidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Bruchus pisorum* (Coleoptera : Bruchidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Bruchus rufipes* (Coleoptera : Bruchidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Bruchus rufulus* (Coleoptera : Bruchidae)
Parasite : *Eupelmus urozonus* Dalman

- Host : *Calliteara cerigoides* (Lepidoptera : Lymantriidae)
Parasite : *Mesocomys orientalis* Ferriere
- Host : *Callosobruchus chinensis*(Linnaeus) (Coleoptera : Bruchidae)
Parasite : *Eupelmus orientalis* (Crawford)
- Host : *Capromya incompleta* (Diptera : Tephritidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Carpocapsa pomorella* (Lepidoptera : Tortricidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Calliteara cerigoides* (Lepidoptera : Lymantriidae)
Parasite : *Mesocomys orientalis* Ferriere
- Host : *Callosobruchus chinensis* (Coleoptera : Bruchidae)
Parasite : *Eupelmus orientalis*(Crawford)
- Host : *Capromya incompleta* (Diptera : Tephritidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Caprocapsa pomorella* (Lepidoptera : Tortricidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Celama sorghiella* (Lepidoptera : Noctuiidae)
Parasite : *Eupelmus australiensis* Girault
- Host : *Celticecis japonica* (Diptera : Cecidomyiidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Ceratitis capitata* (Diptera : Tephritidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Ceroplastes floridensis* (Hemiptera : Coccidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Cerura vinula* (Lepidoptera : Notodontidae)
Parasite : *Anastatus japonicus* Ashmead
- Host : *Chaetoptelius vestitus* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman

- Host : *Chalioides vitrea* (Hampson) (Lepidoptera : Psychidae)
Parasite : *Tineobius brachartoniae* (Gahan)
- Host : *Chilocorus bipustulatus* (Coleoptera : Coccinellidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Cinara schimitscheki* (Hemiptera : Aphididae)
Parasite : *Anastatus bifasciatus*(Geoffroy)
- Host : *Coleophora hemerobiella* (Lepidoptera : Coleophidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Coleophora serratella* (Lepidoptera : Coleophidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Contarinia caudata* Felt (Diptera : Cecidomyiidae)
Parasite : *Eupelmus australiensis* Girault
- Host : *Contarinia sorghicola* (Coquillet) (Diptera : Cecidomyiidae)
Parasite : *Eupelmus australiensis* Girault
- Host : *Copidosoma geniculatum* (Hymenoptera : Encyrtidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Cordius obscurus* (Heteroptera : Pentatomidae)
Parasite : *Anastatus ramakrishnai* Mani
- Host : *Cricula trifenestrata* (Lepidoptera : Saturniidae)
Parasite : *Mesocomys orientalis* Ferriere
- Host : *Curculio vicetinus* (Coleoptera : Curculionidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Cynipis disticha* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Cynipis divisa* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Cynipis longiventris* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman

- Host : *Dactylethra candida* (Lepidoptera : Gelechiidae)
Parasite : *Neanastatus proximus*
- Host : *Dacus oleae* Diptera : Tephritidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Dahlbominus fuscipennis* (Hymenoptera : Eulophidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Dasineura oleae* (Diptera : Cecidomyiidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Dasynus piperis* (Heteroptera : Coreidae)
Parasite : *Anastatus dasynus*
- Host : *Degonetus serratus* Distant (Heteroptera : Pentatomidae)
Parasite : *Anastatus colemani* Crawford
- Host : *Dendrolimus pini* (Lepidoptera : Lasiocampidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Dendrolimus sibiricus* (Lepidoptera : Lasiocampidae)
Parasite : *Anastatus japonicus* Ashmead
- Host : *Dendrolimus spectabilis* (Lepidoptera : Lasiocampidae)
Parasite : *Anastatus bifasciatus* (Geoffroy)
Anastatus japonicus Ashmead
- Host : *Diastrophus rubi* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Dichomeris marginella* (Lepidoptera : Gelechiidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Dicranura vinula* (Lepidoptera : Notodontidae)
Parasite : *Anastatus japonicus* Ashmead
- Host : *Dinarmus basalis* (Hymenoptera : Pteromalidae)
Parasite : *Eupelmus orientalis* (Crawford)
- Host : *Diopsis thoracica* (Diptera : Diopsidae)
Parasite : *Eupelmus pedatorius* (Ferriere)

- Host : *Diplolepis centifoliae* (Hymenoptera : Cynipidae)
Parasite *Eupelmus urozonus* Dalman
- Host : *Diplolepis eglanteriae* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Diplolepis mayri* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Diplolepis rosae* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Diplolepis spinosissimae* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Diprion pini* (Hymenoptera : Diprionidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Dryocosmus kuriphilus* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Dryomyia circinnans* (Diptera : Cecidomyiidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Epinota festivana* (Hymenoptera : Tortricidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Erencyrtus dewitzi* Mahdihassan (Hymenoptera : Encyrtidae)
Parasite : *Eupelmus tachardiae*(Howard)
- Host : *Eriborus terebranus*(Gravenfrost)(Hymenoptera:Ichenumonidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Etiella zinckenella* (Lepidoptera : Pyralidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Etsuhoa thuriferae* (Diptera : Cecidomyiidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Eublemma amabilis* Moore (Lepidoptera : Noctuidae)
Parasite : *Eupelmus tachardiae*(Howard)

- Host : *Euderus pempheriphila* Ayyar & Mani (Hymenoptera : Eulophidae)**
Parasite : *Eupelmus pedatoria* (Ferriere)
- Host : *Eulecanium corni* (Diptera : Coccidae)**
Parasite : *Eupelmus urozonus* Dalman
- Host : *Eumarchalia gennadi* (Diptera : Cecidomyiidae)**
Parasite : *Neanastatus proximus*
- Host : *Euproctis fraterna* (Lepidoptera : Lymantridae)**
Parasite : *Mesocomys orientalis* Ferriere
- Host : *Eurydema festivum* (Heteroptera : Pentatomidae)**
Parasite : *Anastatus bifasciatus* (Geoffroy)
- Host : *Eurytoma appendigaster* (Hymenoptera : Eurytomidae)**
Parasite : *Eupelmus urozonus* Dalman
- Host : *Eurytoma brunniventris* (Hymenoptera : Eurytomidae)**
Parasite : *Eupelmus urozonus* Dalman
- Host : *Eurytoma gallephedrae* (Hymenoptera : Eurytomidae)**
Parasite : *Eupelmus urozonus* Dalman
- Host : *Exotelicia dodecella* (Lepidoptera : Gelechiidae)**
Parasite : *Eupelmus urozonus* Dalman
- Host : *Goniozus clavipennis* (Hymenoptera : Bethylidae)**
Parasite : *Eupelmus urozonus* Dalman
- Host : *Gonocerus acutangulatus* (Hemiptera : Coreidae)**
Parasite : *Anastatus bifasciatus* (Geoffroy)
- Host : *Grapholitha funebrana* (Lepidoptera : Tortricidae)**
Parasite : *Eupelmus urozonus* Dalman
- Host : *Halis dentata* (Lepidoptera : Arctiidae)**
Parasite : *Anastatus dentatus* Narayanan *et. al.*

Anastatus ramakrishnai Mani

- Host : *Halymorpha marmorea* F. (Heteroptera : Pentatomidae)
Parasite : *Anastatus bangalorensis* Mani & Kurien
- Host : *Halys sulcata* Thunberg (Heteroptera : Pentatomidae)
Parasite : *Anastatus dentatus* Narayanan *et. al.*
- Host : *Holocera pulverea* Meyrick (Lepidoptera : Pyralidae)
Parasite : *Eupelmus tachardiae*(Howard)
- Host : *Hylesinus fraxini* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Hylesinus vestitus* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Hymenia recurvalis* (Fabricius) (Lepidoptera : Pyralidae)
Parasite : *Anastatus amarus* (Subha Rao)
- Host : *Hypolixus truncatulus* (Fabricius) (Coleoptera : Curculionidae)
Parasite : *Eupelmus pedatorius*
- Host : *Iphidides podalirius* (Lepidoptera : Papilionidae)
Parasite : *Anastatus bifasciatus* (Geoffroy)
- Host : *Ips acuminatus* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Ips typographus* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Ips vorontzovi* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Janetia cerris* (Diptera : Cecidomyiidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Kallenbachiola strobi* (Diptera : Cecidomyiidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Kerria lacca*(Kerr.) (Homoptera : Kerridae)
Parasite : *Anastatus colemani* Crawford
Eupelmus tachardiae(Howard)

- Host : *Lasioptera rubi* (Diptera : Cecidomyiidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Lasioptera toombii*(Grover) (Diptera : Cecidomyiidae)
Parasite : *Eupelmus tenuicornis* Kieffer
- Host : *Lithocolletis corylifoliella* (Lepidoptera : Gracillaridae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Lithocolletis pyrifoliella* (Lepidoptera : Gracillaridae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Lixus juncii* (Coleoptera : Curculionidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Lixus truncatulus* (Coleoptera : Curculionidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Lobesia botrana* (Lepidoptera : Tortricidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Lymantria dispar* (Lepidoptera : Lymantriidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Lymantria obfuscata* (Lepidoptera : Lymantriidae)
Parasite : *Anastatus japonicus* Ashmead
- Host : *Machaerotia plantiae* Distant (Homoptera : Machaerotidae)
Parasite : *Eupelmus tachardiae* (Howard)
- Host : *Macrothylacic rubi* (Lepidoptera : Lasiocampidae)
Parasite : *Anastatus bifasciatus* (Geoffroy)
- Host : *Malacosoma neustria* (Lepidoptera : Lasiocampidae)
Parasite : *Anastatus bifasciatus* (Geoffroy)
Anastatus japonicus Ashmead
- Host : *Megastigmus amicorum* (Hymenoptera : Torymidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Megastigmus pistaciae* (Hymenoptera : Torymidae)
Parasite : *Eupelmus urozonus* Dalman

- Host : *Megastigmus pitus* (Hymenoptera : Torymidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Megastigmus seitneri* (Hymenoptera : Torymidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Melanagromyza hibisci* (Diptera : Agromyzidae)
Parasite : *Eupelmus pedatorius* (Ferriere)
- Host : *Melanagromyza phaseoli* (Diptera : Agromyzidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Mesopolobus tibialis* (Hymenoptera : Torymidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Mikiola fagi* (Diptera : Cecidomyiidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Myopites limbardae* (Diptera : Tephritidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Myopites olivieri* (Diptera : Tephritidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Myopites stylata* (Diptera : Tephritidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Neodiprion sertifer* (Diptera : Diprionidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Nemorilla floralis* (Diptera : Tachinidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Neostylopyga rhombifolia* (Stoll) (Dictyoptera : Blattaria)
Parasite : *Anastatus madagascariensis* (Risbec)
- Host : *Neuroterus glantiformis* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Neuroterus quercusbaccarum* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Neuroterus saltans* ((Hymenoptera : Cynipidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Nezara viridula* Linnaeus (Heteroptera : Pentatomidae)
 Parasite : *Anastatus japonicus* Ashmead
Host : *Nosema serbiae* (Nosemmatidae)
 Parasite : *Anastatus japonicus* Ashmead
Host : *Obtusiclava oryzae* (Hymenoptera : Pteromalidae)
 Parasite : *Neanastatus cinctiventris* Girault
Host : *Olynx assumes* (Hymenoptera : Eulophidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Ooencyrtus pityocampae* (Hymenoptera : Encyrtidae)
 Parasite : *Anastatus japonicus* Ashmead
Host : *Orseolia mnesithae* (Diptera : Cecidomyiidae)
 Parasite : *Neanastatus cinctiventris* Girault
Host : *Oxya velox* (Orthoptera : Acrididae)
 Parasite : *Anastatus bifasciatus*(Geoffroy)
Anastatus coimbatorensis
Host : *Pacesia pini* (Hymenoptera : Braconidae)
 Parasite : *Anastatus bifasciatus*(Geoffroy)
Host : *Pachyydiplosis oryzae* (Wood Mason) (Diptera : Cecidomyiidae)
 Parasite : *Neanastatus cinctiventris* Girault
Host : *Palomena prasina* (Heteroptera : Pentatomidae)
 Parasite : *Anastatus japonicus* Ashmead
Host : *Pandemis ribeana* (Lepidoptera : Tortricidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Paracolopha morrisoni* (Hemiptera : Aphididae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Parametriotes theae* (Lepidoptera : Momphidae)
 Parasite : *Eupelmus urozonus* Dalman

- Host : *Parthenolecanicum corni* (Hemiptera : Coccidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Pempheres affinis* (Coleoptera : Curculionidae)
Parasite : *Eupelmus orientalis*(Crawford)
Eupelmus pedatorius(Ferriere)
Eupelmus urozonus Dalman
- Host : *Pempherulus affinis* (Faust) (Coleoptera : Curculionidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Periplaneta americana*(Linnaeus) (Dictyoptera : Blattaria)
Parasite : *Anastatus madagascariensis* (Risbec)
Anastatus tenuipes Bolivar
- Host : *Philosamia cynthia* (Lepidoptera : Saturniidae)
Parasite : *Anastatus japonicus* Ashmead
- Host : *Phloeosinus aabei* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Phloetribus scarabaeoides* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Phycionia buoliana* (Lepidoptera : Tortricidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Pieris brassica* (Lepidoptera : Pyralidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Piezotrachelus varium* (Coleoptera : Apionidae)
Parasite : *Eupelmus pedatorius* (Ferriere)
- Host : *Pilyophthorus polonicus* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Pissodes notatus* (Coleoptera : Curculionidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Placosternum dama*(Fabricius) (Heteroptera : Pentatomidae)
Parasite : *Anastatus colemani* Crawford

- Host : *Plagioder a versicolora* (Coleoptera : Chrysomelidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Platygaster oryzae* (Hymenoptera : Platygasteridae)
Parasite : *Neanastatus cinctiventris* Girault
- Host : *Pnigalio mediterraneus* (Hymenoptera : Eulophidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Polychrosis botrana* (Lepidoptera : Tortricidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Polygraphus poligraphus* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Polyptychus dentatus* (Lepidoptera : Sphingidae)
Parasite : *Anastatus bifasciatus*(Geoffroy)
Anastatus coimbatorensis
- Host : *Pontania viminalis* (Hymenoptera : Pteromalidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Porthetria dispar*(L) ((Lepidoptera : Lymantriidae)
Parasite : *Anastatus japonicus* Ashmead
Anastatus kashmirensis(Mathur)
Anastatus bifasciatus(Geoffroy)
- Host : *Prays oleae* (Lepidoptera : Yponomentidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Prolasioptera berlesiana* (Diptera : Agromyzidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Psectrosema reticulatum* (Diptera : Agromyzidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Pseudasphondylia diospyri* (Diptera : Cecidomyiidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Pseudoxiphydria betulae* (Hymenoptera : Pteromalidae)
Parasite : *Eupelmus urozonus* Dalman

- Host : *Psyche vitrea* Hamps. (Lepidoptera : Psychidae)
Parasite : *Tineobius brachartoniae* (Gahan)
- Host : *Psylla pruni* (Hemiptera : Psyllidae)
Parasite : *Anastatus bifasciatus* (Geoffroy)
- Host : *Psylla pyri* (Hemiptera : Psyllidae)
Parasite : *Anastatus bifasciatus* (Geoffroy)
- Host : *Ptychomyia remota* (Diptera : Tachinidae)
Parasite : *Tineobius brachartoniae*(Gahan)
Eupelmus catoxanthae Ferriere
- Host : *Rhaphigaster nebulosa* (Heteroptera : Pentatomidae)
Parasite : *Anastatus bifasciatus* (Geoffroy)
- Host : *Rhodites rosae* (Hymenoptera : Cynipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Rhynchoris humeralis* (Heteroptera : Pentatomidae)
Parasite : *Anastatus colemani* Crawford
- Host : *Rhynchaenus hustachei* (Coleoptera : Curculionidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Riptortus clavatus* (Hemiptera : Alydidae)
Parasite : *Anastatus japonicus* Ashmead
- Host : *Rissodes notatus* (Coleoptera : Curculionidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Rogas dendrolimi* (Hymenoptera : Braconidae)
Parasite : *Anastatus japonicus* Ashmead
- Host : *Scolytus amygdali*(Hymenoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Scolytus ensifer* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Scolytus intricatus* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman

- Host : *Scolytus rugulosus* (Coleoptera : Scolytidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Spermophagus sericeus* (Coleoptera : Bruchidae)
Parasite : *Eupelmus orientalis* (Crawford)
- Host : *Sphaerolecanium prunastri* (Hemiptera : Coccidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Stilpnotia salicis* (Lepidoptera : Lymantridae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Supella longipalpa* (Dictyoptera : Blattellidae)
Parasite : *Anastatus tenuipes* Bolivar
- Host : *Supella supellectilium* L. (Dictyoptera : Blattellidae)
Parasite : *Anastatus tenuipes* Bolivar
- Host : *Synergus gallaepomiformis* (Hymenoptera : Cyniipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Synergus pallicornis* (Hymenoptera : Cyniipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Synergus reinhardi* (Hymenoptera : Cyniipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Synergus umbraculus* (Hymenoptera : Cyniipidae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Tachardiaepagus tachardiae* (Ashmead)
(Hymenoptera: Encyrtidae)
Parasite : *Eupelmus tachardiae*(Howard)
- Host : *Tessaratoma javanica* Thunberg (Heteroptera : Pentatomidae)
Parasite : *Anastatus amarus*(Subha Rao)
Anastatus colemani Crawford
Anastatus dentatus Narayanan et al.
- Host : *Tessaratoma papillosa* (Heteroptera : Pentatomidae)
Parasite : *Anastatus japonicus* Ashmead

Host : *Tetramesa eximia* (Hymenoptera : Eurytomidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Tetroda histeroides* (Fabricius) (Heteroptera : Pentatomidae)
 Parasite : *Anastatus colemani* Crawford
Host : *Thaumetopoea processionea* (Lepidoptera : Notodontiae)
 Parasite : *Anastatus bifasciatus* (Geoffroy)
Host : *Thaumetopoea wilkinsoni* (Hymenoptera : Notodontiae)
 Parasite : *Anastatus bifasciatus* (Geoffroy)
Host : *Tortrix viridana* (Lepidoptera : Tortricidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Torymus beneficus* (Hymenoptera : Torymidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Torymus cingulatus* (Hymenoptera : Torymidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Torymus nigricornis* (Hymenoptera : Torymidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Torymus sinensis* (Hymenoptera : Torymidae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Trabala vishnoi* Lefbre (Lepidoptera : Lasiocampidae)
 Parasite : *Mesocomys orientalis* Ferriere
Host : *Toxoptera aurantii* (Hemiptera : Aphididae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Toxoptera theaicola* (Hemiptera : Aphididae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Zebrotes subfasciatus* (Coleoptera : Bruchidae)
 Parasite : *Eupelmus orientalis*(Crawford)

INDETERMINED SPECIES

Host : *Antheraea* sp. (Lepidoptera : Saturniidae)

Parasite : *Mesocomys atulyus* Narendran

Host : *Apanteles* sp. (Hymenoptera : Braconidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Asphondylia* sp. (Diptera : Cecidomyiidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Blattid ootheca* (Dictyoptera : Blattidae)

Parasite : *Anastatus tenuipes* Bolivar y Pieltain

Anastatus yasumatusui Shafee

Host : *Bruchidus* sp. (Coleoptera : Bruchidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Bruchus* sp. (Coleoptera : Bruchidae)

Parasite : *Eupelmus orientalis*(Crawford)

Host : *Eurytoma* sp. (Hymenoptera : Eurytomidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Dinoderus* sp. (Coleoptera : Bostrychidae)

Parasite : *Metapelma indica*

Host : *Epilachna* sp. (Coleoptera : Coccinellidae)

Parasite : *Eupelmus vermai*(Bhatnagar)

Host : *Gastropacha* sp. (Lepidoptera : Lasiocampidae)

Parasite : *Anastatus gastropachae* Ashmead

Host : *Goryphus* sp. (Hymenoptera : Ichneumonidae)

Parasite : *Tineobius brachartona* (Gahan)

Host : *Hypolixus* sp. (Coleoptera : Curculionidae)

Parasite : *Eupelmus pedatorius*(Ferriere)

Host : *Mantis* sp. (Dictyoptera : Mantodea)

Parasite : *Anastatus mantoidae*

Host : *Mantis ootheca* (Dictyoptera : Mantodea)

Parasite : *Eupelmus caudatus* sp. nov.

Host : *Mesopolobus* sp. (Hymenoptera : Pteromalidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Meteorus* sp. (Hymenoptera : Braconidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Myopites* sp. (Diptera : Tephritidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Pteromalus* sp. (Hymenoptera : Pteromalidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Rhabdophaga* sp. (Diptera : Cecidomyiidae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Torymus* sp. (Hymenoptera : Torymidae)

Parasite : *Eupelmus urozonus* Dalman

PLANT KINGDOM

Host : *Acacia arabica* Willd (Mimosaceae)

Parasite : *Anastatus yasumatsui* Shafee

Host : *Acacia gageana* (Mimosaceae)

Parasite : *Eupelmus gardeneri* (Mani & Kaul)

Host : *Acacia horrida* (Mimosaceae)

Parasite : *Eupelmus orientalis* (Crawford)

Host : *Acacia leucophloea* Willd (Mimosaceae)

Parasite : *Anastatus ramakrishnai* Mani

Host : *Agropyron repens* Beauf (Graminae: Poaceae)

Parasite : *Eupelmus linearis*

Host : *Alhagi graecorum* Desv (Papilionacea: Fabaceae)

Parasite : *Eupelmus orientalis* (Crawford)

- Host : *Anona squamosa* Linn (Annonaceae)
Parasite : *Anastatus ramakrishnai* Mani
- Host : *Azadirachta indica* A. Juss (Meliaceae)
Parasite : *Anastatus ramakrishnai* Mani
- Host : *Cassia marginata* Linn.(Fabaceae)
Parasite : *Anastatus ramakrishnai* Mani
- Host : *Castanea crenata* (Fagaceae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Castanea sativa* (Fagaceae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Celanagrostis epigeios* (Poaceae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Citrus nobilis* (Rutaceae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Citrus sinensis* Linn. (Rutaceae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Coccinia indica* Wight & Arn.(Cucurbitaceae)
Parasite : *Eupelmus tachardiae* (Howard)
- Host : *Convolvulus arvensis* Linn. (Convolvulaceae)
Parasite : *Eupelmus orientalis*(Crawford)
- Host : *Corchorus capsularis* Linn.(Tiliaceae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Crotalaria capensis* (Papilionaceae : Fabaceae)
Parasite : *Eupelmus orientalis*(Crawford)
- Host : *Cupressus funebris* Endl. (Capparidaceae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Cupressus torulosa* D. Don (Capparidaceae)
Parasite : *Eupelmus urozonus* Dalman
- Host : *Cyamopsis tetragonoloba* (Linn.)Taub.

(Papilionaceae : Fabaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Diospyros kaki* Linn. (Ebenaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Ephedra fragilis* (Gnetaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Ephedra nebrodensis* Tineo(Gnetacea)

Parasite : *Eupelmus urozonus* Dalman

Host : *Fagus sylvatica* Linn.(Fagaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Ficus benghalensis*Linn. (Moraceae)

Parasite : *Anastatus colemani* Crawford

Host : *Glycine max*Merrill (Papilionaceae : Fabaceae)

Parasite : *Anastatus japonicus* Ashmead

Host : *Grewia asiatica* Mast(Tiliaceae)

Parasite : *Neanastatus indicus* Shafee

Host : *Hibiscus esculentus* Linn.(Malvaceae)

Parasite : *Eupelmus pedatorius*(Crawford)

Host : *Inula viscosa* (Compositae : Astraceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Ischaemum ciliare*Retz.(Gramineaea : Poaceae)

Parasite : *Neanastatus trochantericus* Gahan

Host : *Juniperus excelsa*(Pinaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Juniperus phoeniciae* (Pinaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Juniperus thurifera* (Pinaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Kydia calycina* Roxb.(Malvaceae)
 Parasite : *Balcha indica* Mani & Kaul
Host : *Larix decidua* (Pinaceae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Larix polonica* (Pinaceae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Litchi chinensis* (Gaertn.) (Sapindaceae)
 Parasite : *Anastatus japonicus* Ashmead
Host : *Malus sylvestris* Linn.(Rosaceae)
 Parasite : *Eupelmus valsus* Narendran
 Eupelmus vindex
Host : *Mangifera indica* Linn.(Anacardiaceae)
 Parasite : *Mesocomys orientalis* Ferriere
Host : *Olea europaea* (Oleaceae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Oryza sativa*Linn. (Gramineae: Poaceae)
 Parasite : *Eupelmus australiensis* Girault
Host : *Pinus halepensis* Mill. (Pinaceae)
 Parasite : *Anastatus bifasciatus*(Geoffroy)
Host : *Pinus insignis* (Pinaceae)
 Parasite : *Anastatus bifasciatus*(Geoffroy)
Host : *Pinus nigra* Arnold Var (Pinaceae)
 Parasite : *Anastatus bifasciatus*(Geoffroy)
Host : *Pinus pinaster* Ait(Pinaceae)
 Parasite : *Anastatus bifasciatus*(Geoffroy)
Host : *Platycladus orientalis*(Cappridaceae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Prosopis spicigera* Linn.(Mimosaceae)
 Parasite : *Anastatus ramakrishnai*Mani

Host : *Prunus amygdalus*Batsch (Rosaceae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Prunus armeniaca*(Rosaceae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Prunus domestica*(Rosaceae)
Parasite : *Anastatus bifasciatus*(Geoffroy)

Host : *Prunus persica* (Rosaceae)
Parasite : *Anastatus bifasciatus*(Geoffroy)

Host : *Prunus spinosa* (Rosaceae)
Parasite : *Anastatus bifasciatus*(Geoffroy)

Host : *Quercus cerris* (Fagaceae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Quercus dentata* (Fagaceae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Quercus ilex* Linn.(Fagaceae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Quercus mongolica* (Fagaceae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Quercus pubescens* (Fagaceae)
Parasite : *Anastatus japonicus*Ashmead

Host : *Quercus suber* Linn. (Fagaceae)
Parasite : *Anastatus japonicus*Ashmead

Host : *Ricinus communis*Linn. (Euphorbiaceae)
Parasite : *Mesocomys orientalis* Ferriere

Host : *Robinia pseudoacacia* Linn. (Papilionaceae : Fabaceae)
Parasite : *Anastatus japonicus*Ashmead

Host : *Rosa carina* (Rosaceae)
Parasite : *Eupelmus urozonus* Dalman

Host : *Rosa rubiginosa* (Rosaceae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Rubus idaeus* Linn. (Rosaceae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Saccharum officinarum* Linn. (Poaceae)
 Parasite : *Eupelmus australiensis* Girault
Host : *Schleichera oleosa*(Lour) (Sapindaceae)
 Parasite : *Eupelmus tachardiae*(Howard)
Host : *Sesbana aculeate* Pers. (Papilionaceae: Fabaceae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Shorea javanica* (Dipterocarpaceae)
 Parasite : *Mesocomys orientalis*Ferriere
Host : *Shorea javanica* (Dipterocarpaceae)
 Parasite : *Mesocomys orientalis* Ferriere
Host : *Shorea sericea* (Dipterocarpaceae)
 Parasite : *Neanastatus longitarsis*
Host : *Sorghum halepense* Linn. (Poaceae)
 Parasite : *Eupelmus australiensis* Girault
Host : *Strychnos nux - vomica* Linn.(Loganiaceae)
 Parasite : *Metapelma strychnocolum*Mani&Kaul
Host : *Vigna unguiculata*(Linn.) Walp (Papilionaceae: Fabaceae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Vitis vinifera* Linn. (Vitaceae)
 Parasite : *Eupelmus urozonus* Dalman
Host : *Zelkova serrata* (Ulmaceae)
 Parasite : *Eupelmus urozonus* Dalman

INDETERMINED SPECIES

Host : *Acacia* sp. (Mimosaceae)

Parasite : *Anastatus acherontiae* Narayanan

Host : *Artemisia* sp. (Compositaceae: Asteraceae)

Parasite : *Eupelmus carinatus* Kieffer

Host : *Betula* sp. (Betulaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Castanea* sp. (Fagaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Celtis* sp. (Ulmaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Duranta* sp. (Verbanaceae)

Parasite : *Anastatus leithi* Walker

Host : *Fagus* sp. (Fagaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Phaseolus* sp. (Fabaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Phyllostachys* sp. (Graminaeae : Poaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Pinus* sp. (Pinaceae)

Parasite : *Anastatus bifasciatus*(Geoffroy)

Anastatus japonicus Ashmead

Host : *Polygonum* sp. (Polygonaceae)

Parasite : *Eupelmus australiensis* Girault

Host : *Populus* sp. (Saliaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Quercus* sp. (Fagaceae)

Parasite : *Anastatus japonicus* Ashmead

Host : *Rubus* sp. (Rosaceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Salix* sp. (Saliaceae)

Parasite : *Anastatus japonicus* Ashmead

Eupelmus urozonus Dalman

Host : *Sorghum* sp. (Gramineae: Poaceae)

Parasite : *Eupelmus australiensis* Girault

Host : *Tamarix* sp. (Tamaraceae)

Parasite : *Eupelmus urozonus* Dalman

Host : *Tephrosia* sp.

Parasite : *Eupelmus javae* Girault

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PLATES AND FIGURES



PLATE NO. 1. MALAISE TRAP



**PLATE NO. 2. YELLOW PAN TRAP
(MOERICKE TRAP)**

278 B



PLATE NO. 3. CALICUT UNIVERSITY CAMPUS

273 C



PLATE NO. 4. KOOTANAD, PALAKKAD DISTRICT



PLATE NO. 5. KOOTANAD, PALAKKAD DISTRICT

273 D

Fig. 1. KERALA – THE STUDY AREA

1. Thiruvananthapuram
2. Kollam
3. Pathanamthitta
4. Alapuzha
5. Kottayam
6. Idukki
7. Eranakulam
8. Thrissur
9. Palakkad
10. Malappuram
11. Kozhikode
12. Wyanad
13. Kannur
14. Kasaragod

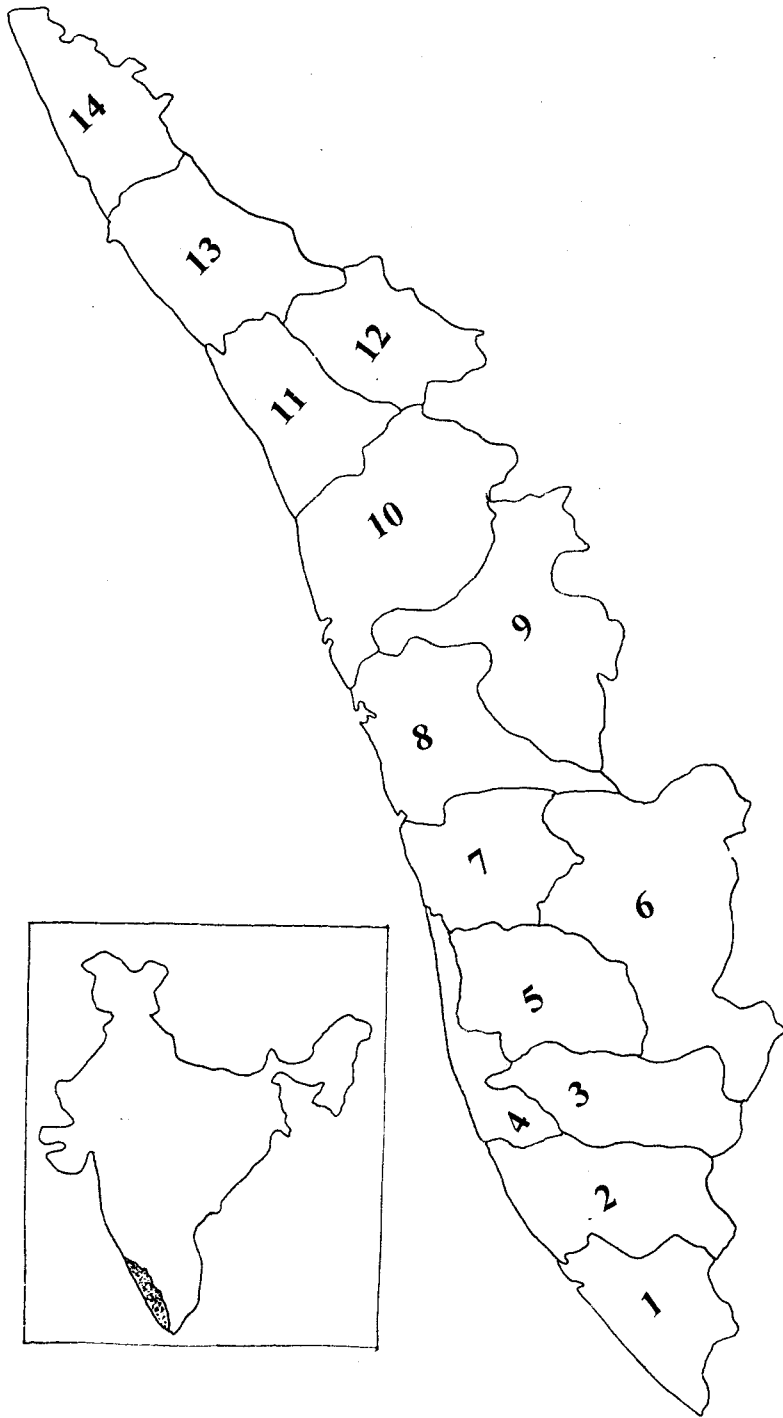
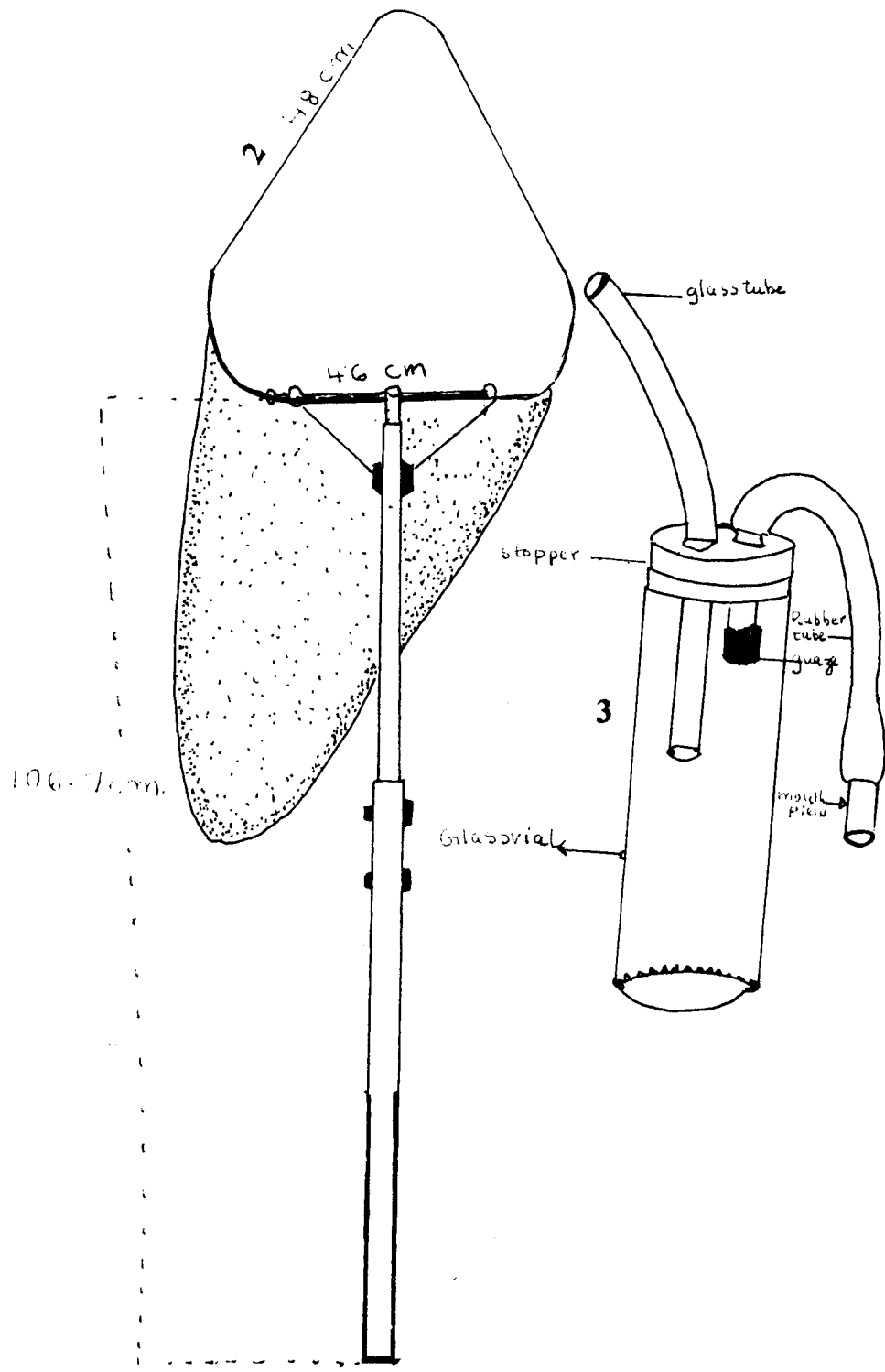


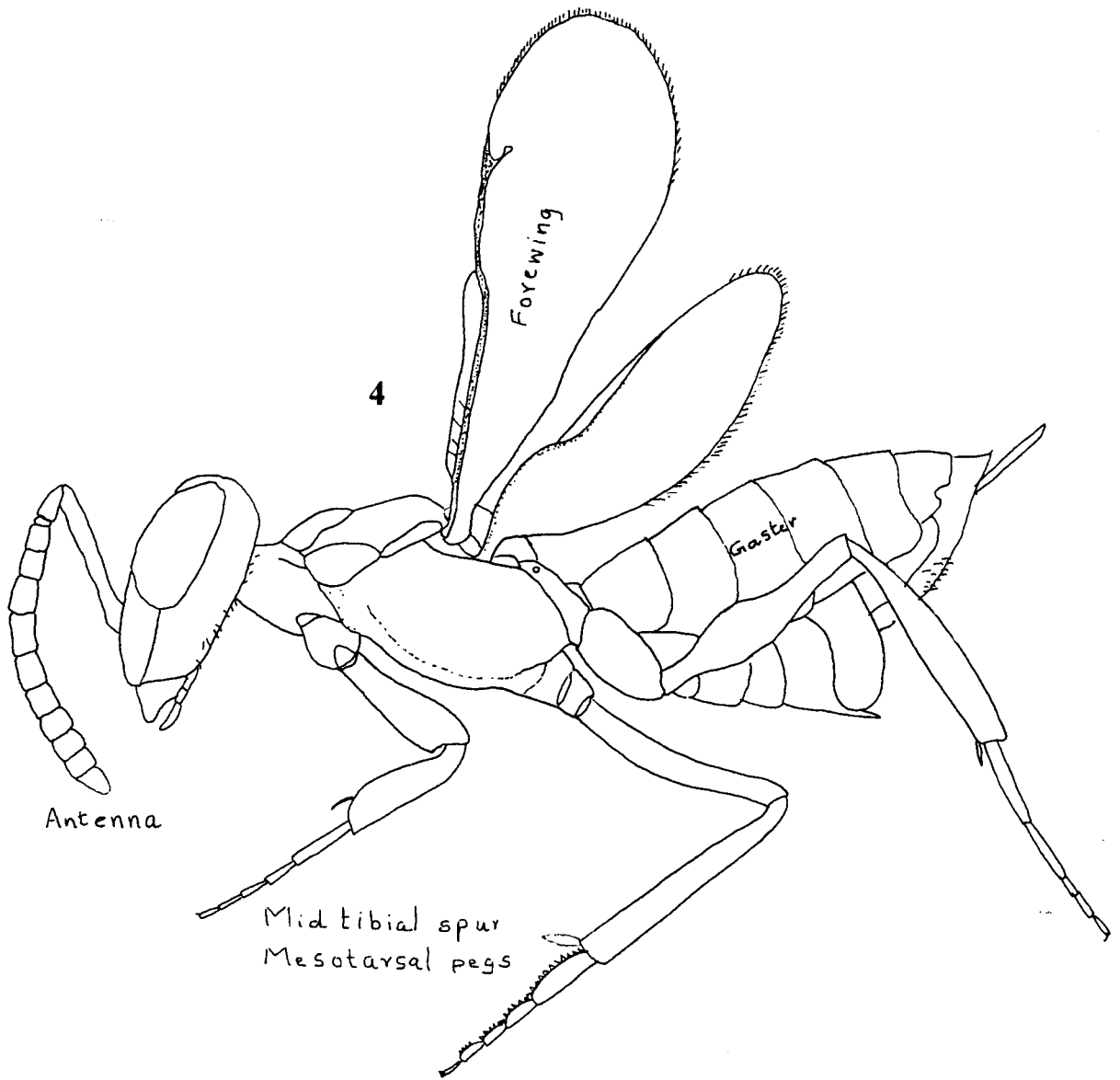
Fig. 2 . Sweep Net

Fig. 3. Aspirator



Figs. 4-13 . EUPELMID FEMALE

- Fig. 4. Female- Entire
- Fig. 5. Head- Front View
- Fig. 6. Head – Dorsal View
- Fig.7. Head- Lateral View
- Fig. 8. Antenna
- Fig. 9. Fore Wing
- Fig. 10. Midtibial spur
- Fig. 11. Mesosoma- Lateral View
- Fig. 12. Mesosoma- Dorsal View
- Fig. 13. Gaster- Dorsal View



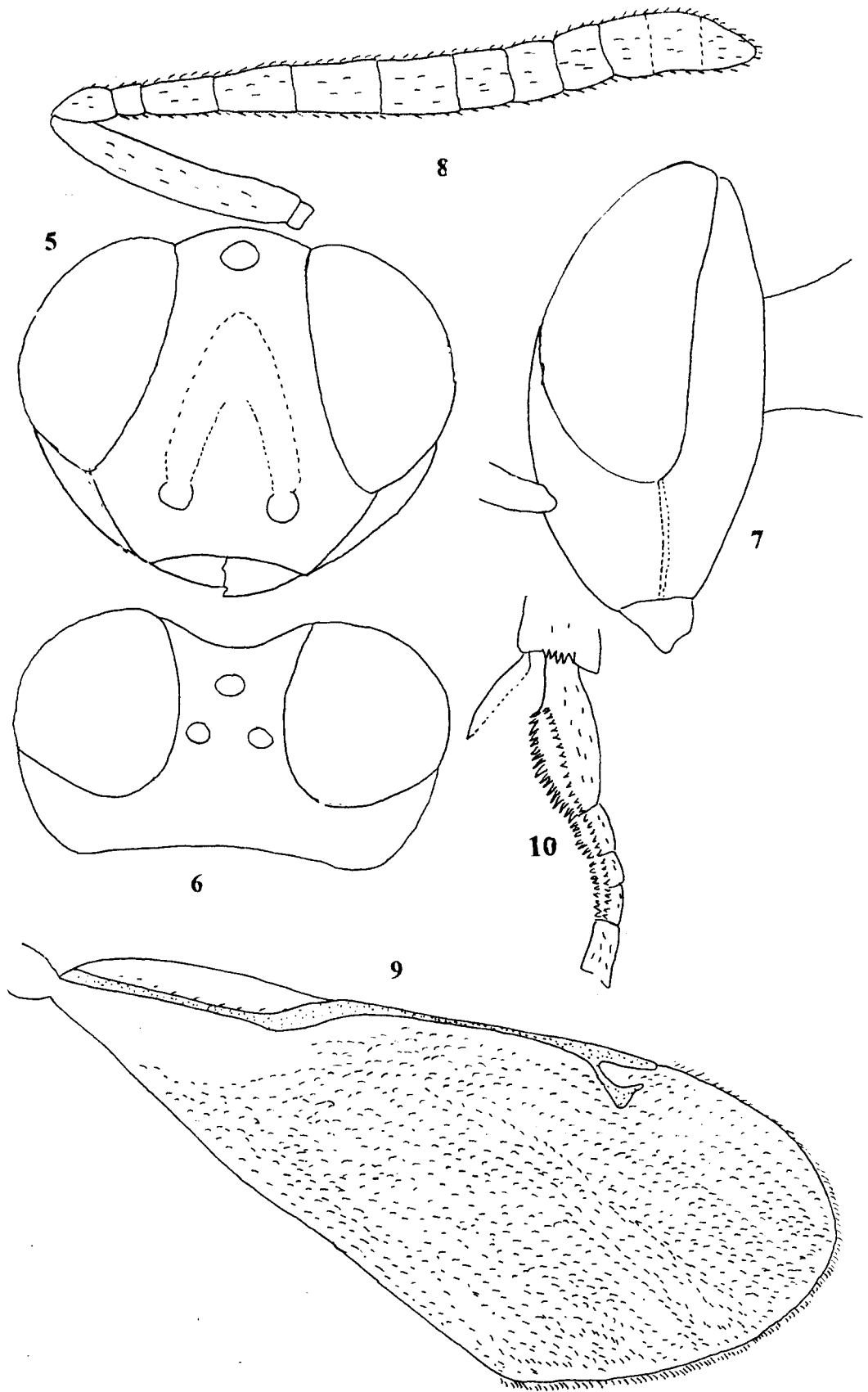
4

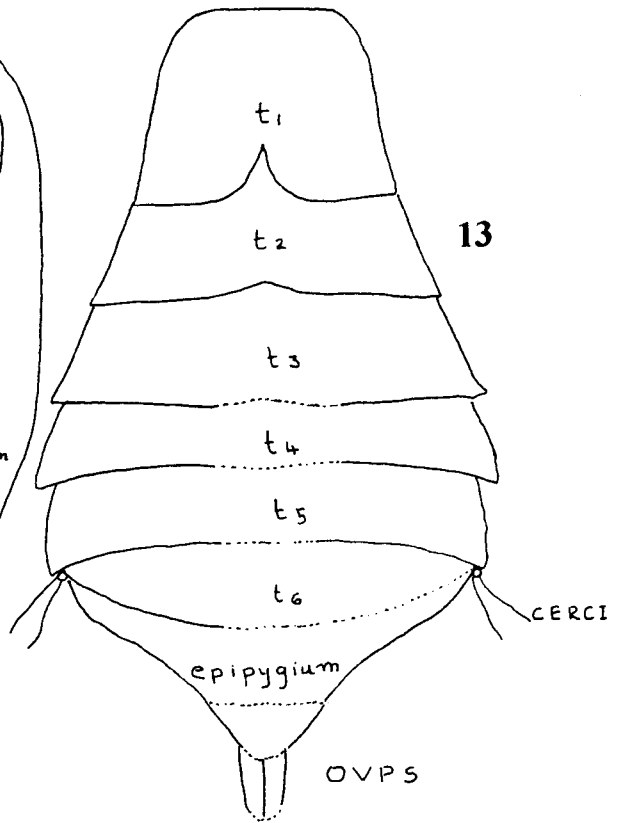
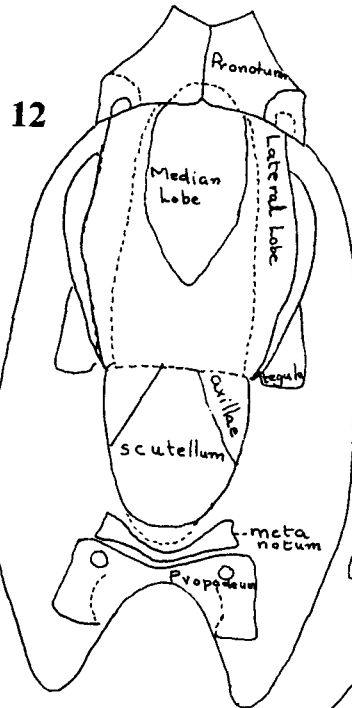
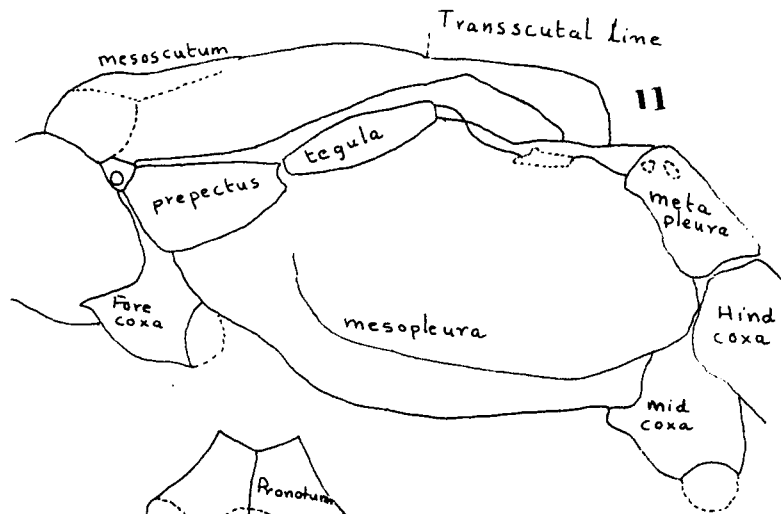
Forewing

Gaster

Antenna

Mid tibial spur
Mesotarsal pegs





Figs. 14-19. *Calosota kottiyoorica* sp. nov . Female

Fig. 14. Head- Front View

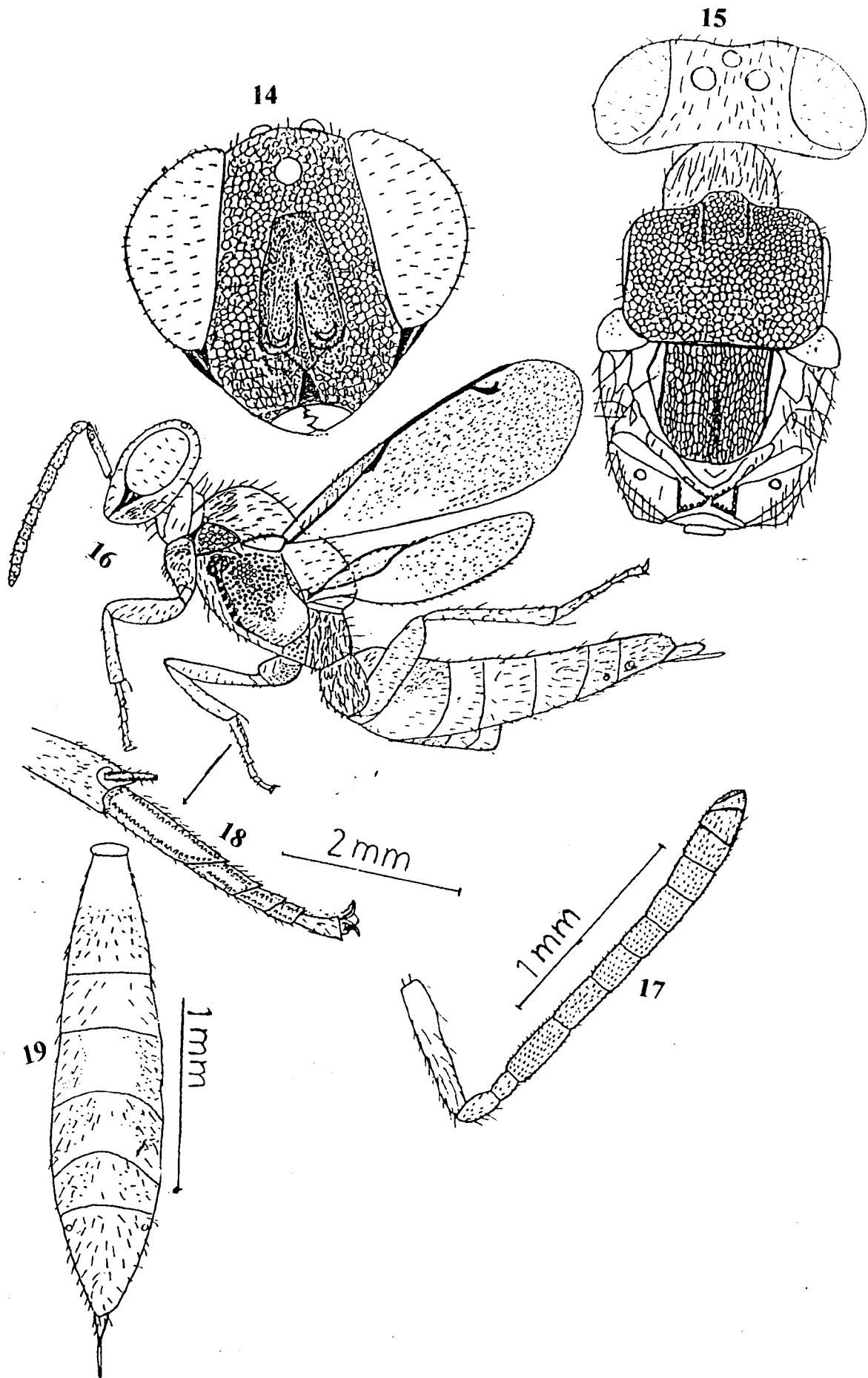
Fig. 15. Mesosoma

Fig. 16. Female- Entire

Fig. 17. Antenna

Fig. 18. Midtibial spur and Mesotarsus

Fig. 19. Gaster



Figs. 20-25. *Calosota shyama* Narendran, Female

Fig. 20. Head- Front View

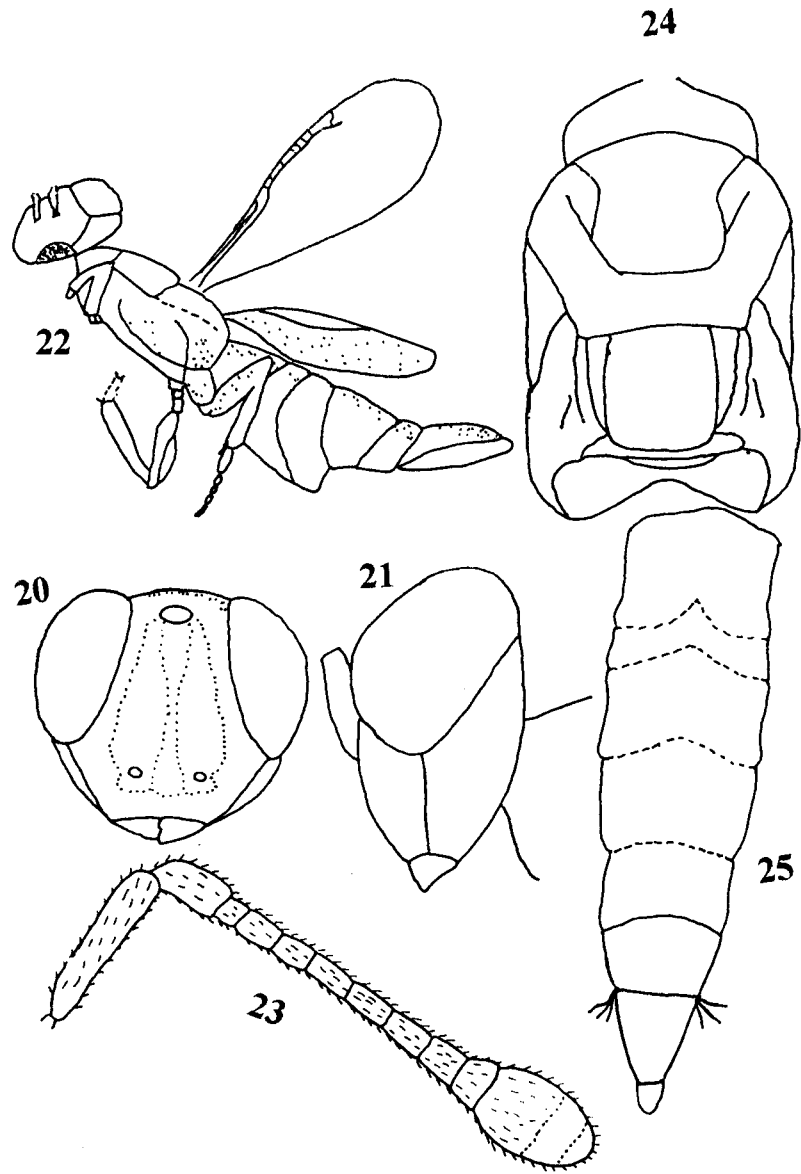
Fig. 21. Head- Lateral View

Fig. 22. Female- Entire

Fig. 23. Antenna

Fig. 24. Mesosoma

Fig. 25. Gaster



Figs. 26-32. *Anastatus abalus* sp. nov. Female

Fig. 26. Head-Front View

Fig. 27. Head- Dorsal View

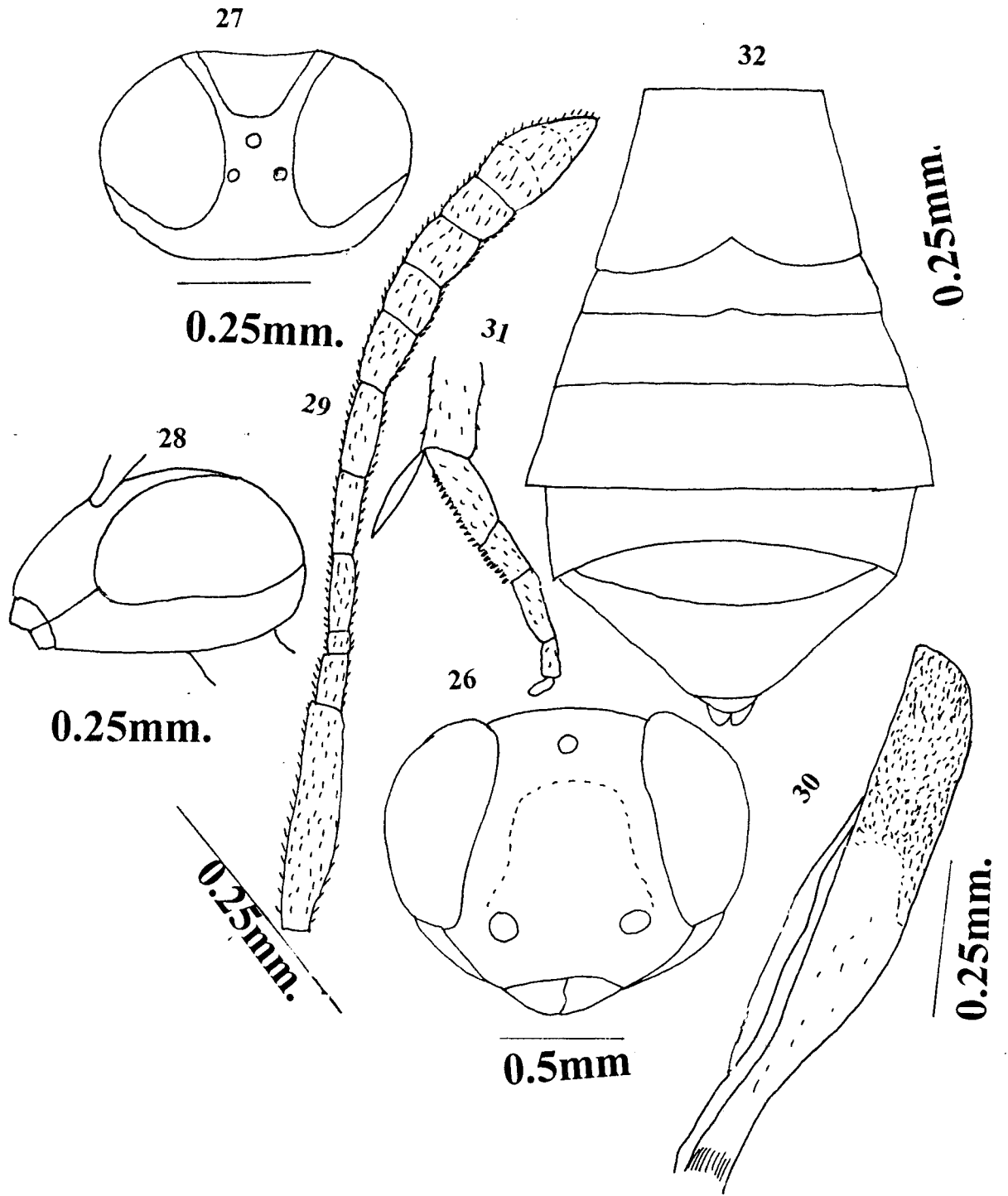
Fig. 28. Head- Lateral View

Fig. 29. Antenna

Fig.30. Fore Wing

Fig. 31. Midtibial spur and Mesotarsus

Fig. 32. Gaster



Figs. 33-39. *Anastatus abhinavi* sp.nov. , Female

Fig. 33. Head- Front View

Fig. 34. Head- Dorsal View

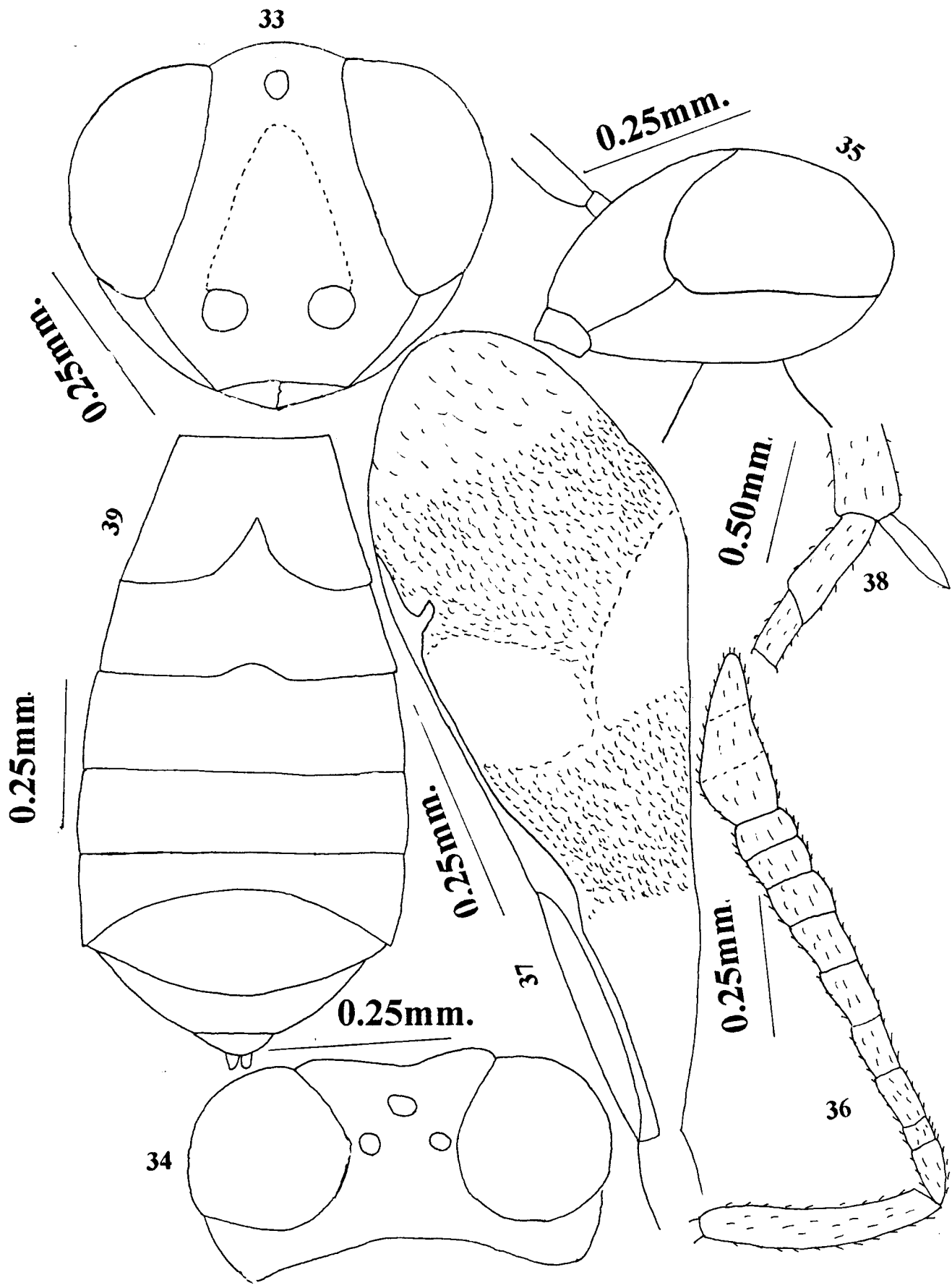
Fig. 35. Head- Lateral View

Fig. 36. Antenna

Fig. 37. Fore Wing

Fig. 38. Mid tibial spur and Mesotarsus

Fig. 39. Gaster



Figs. 40-46. *Anastatus acherontiae* Narayanan et. al. , Female

Fig. 40. Head- Front View

Fig. 41. Head- Lateral View

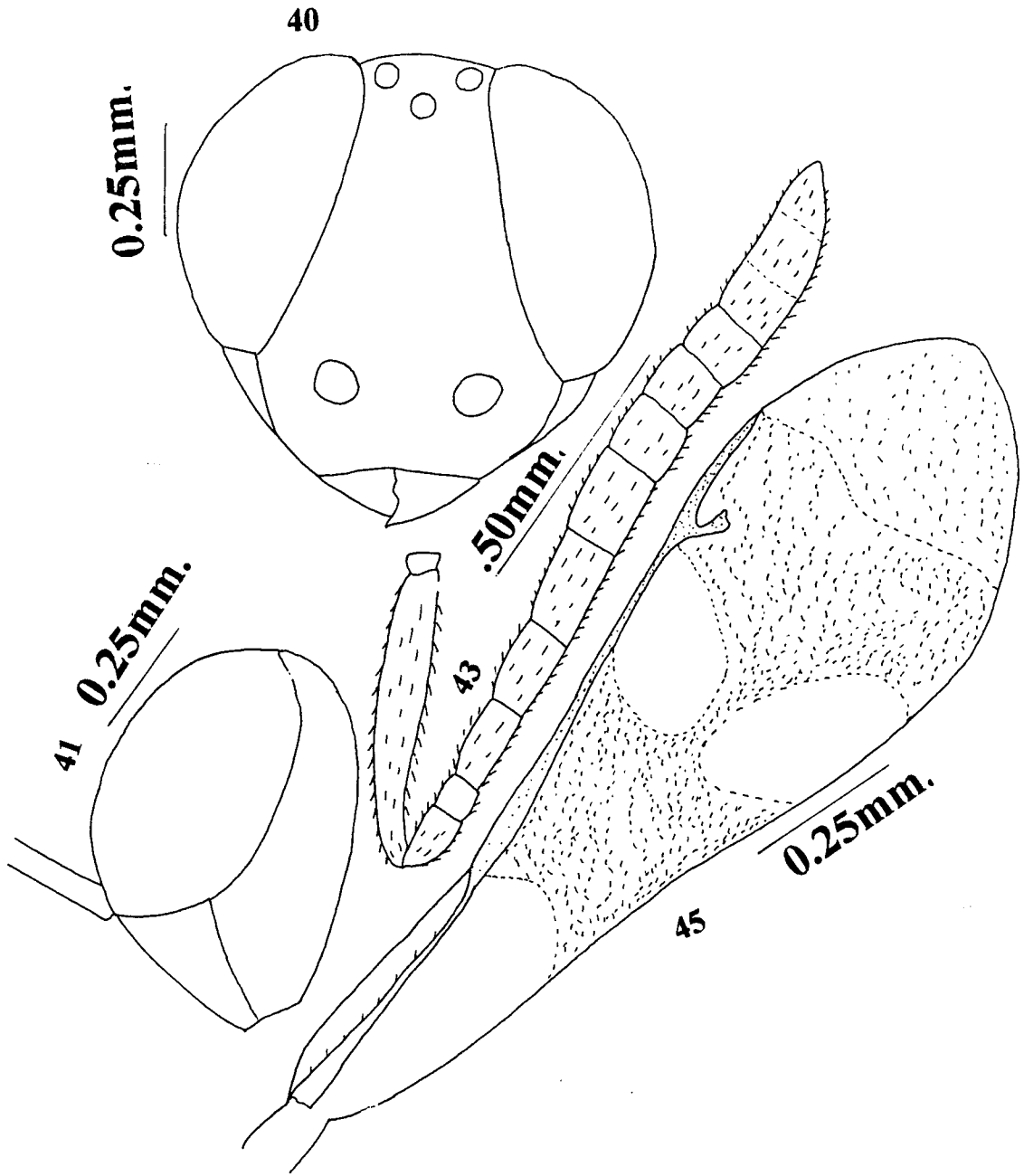
Fig. 42. Head- Dorsal View

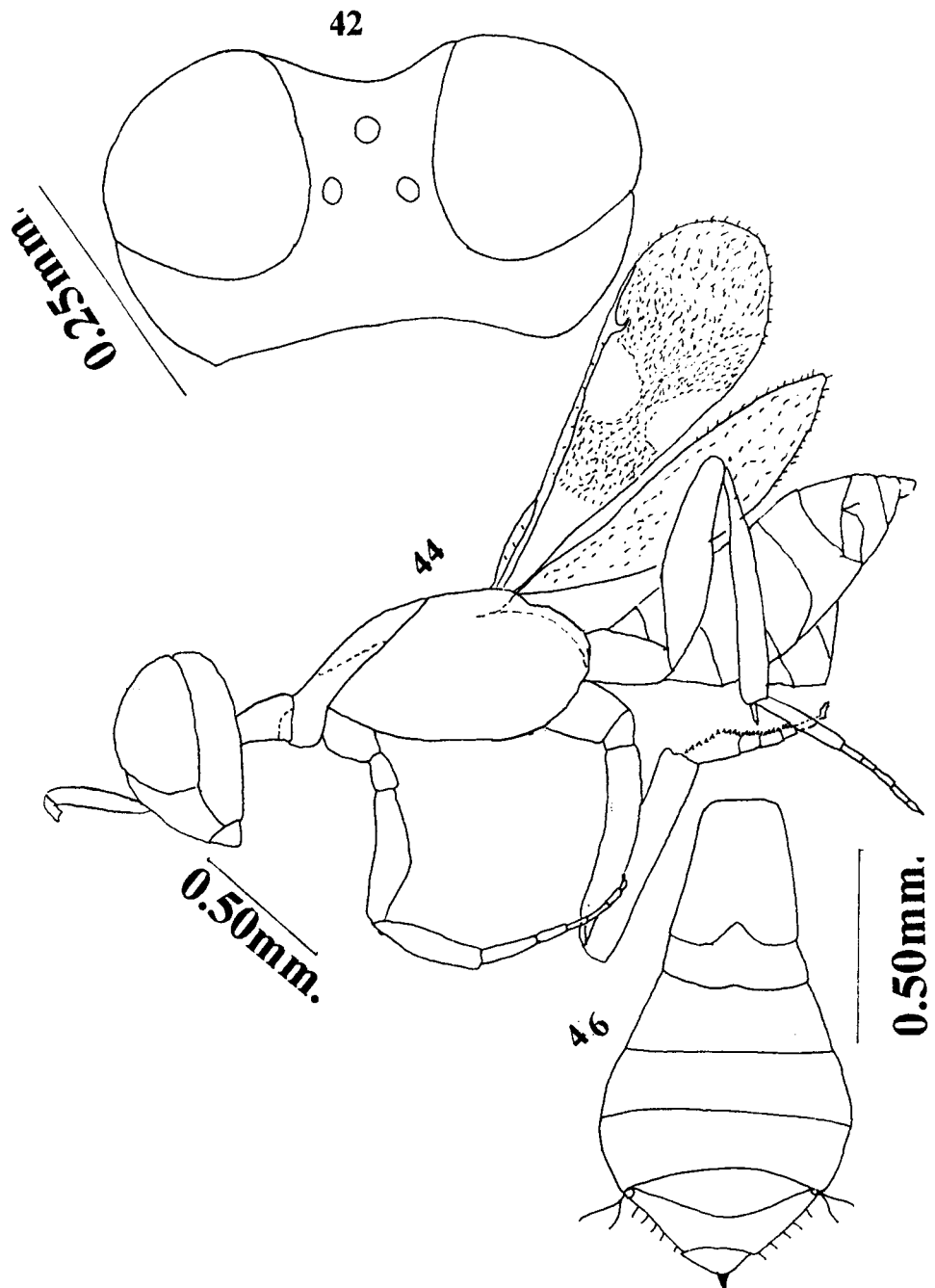
Fig. 43. Antenna

Fig. 44. Female –Entire

Fig. 45. Fore wing

Fig. 46. Gaster





Figs. 47- 53. *Anastatus apoorvus* sp. nov. , Female

Fig. 47. Head –Front View

Fig. 48. Head- Dorsal View

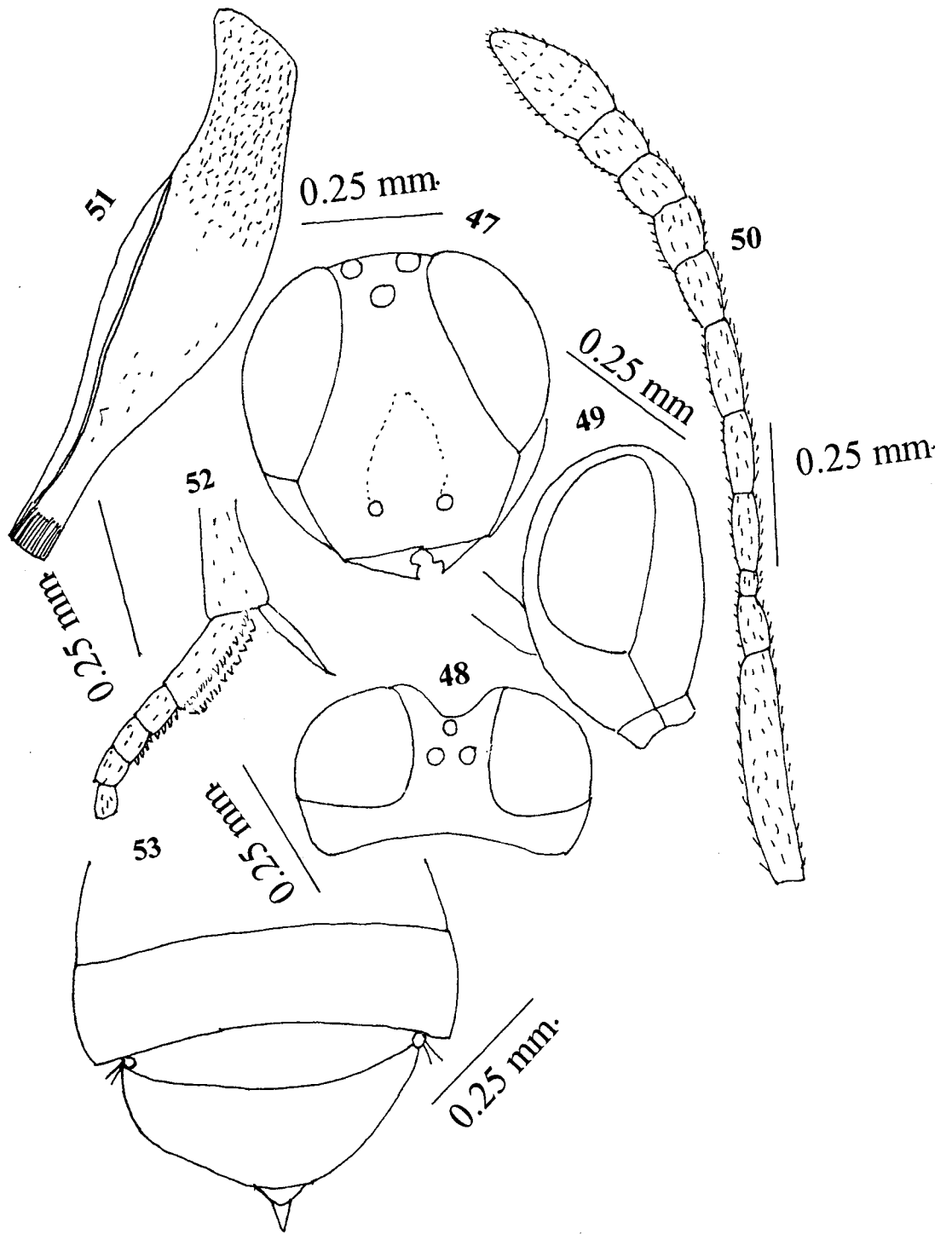
Fig. 49. Head – Lateral View

Fig. 50. Antenna

Fig. 51. Fore Wing

Fig. 52. Midtibial spur and Mesotarsus

Fig. 53. Gaster



Figs. 54-59. *Anastatus ashokai* sp. nov. , Female

Fig. 54. Head- Front View

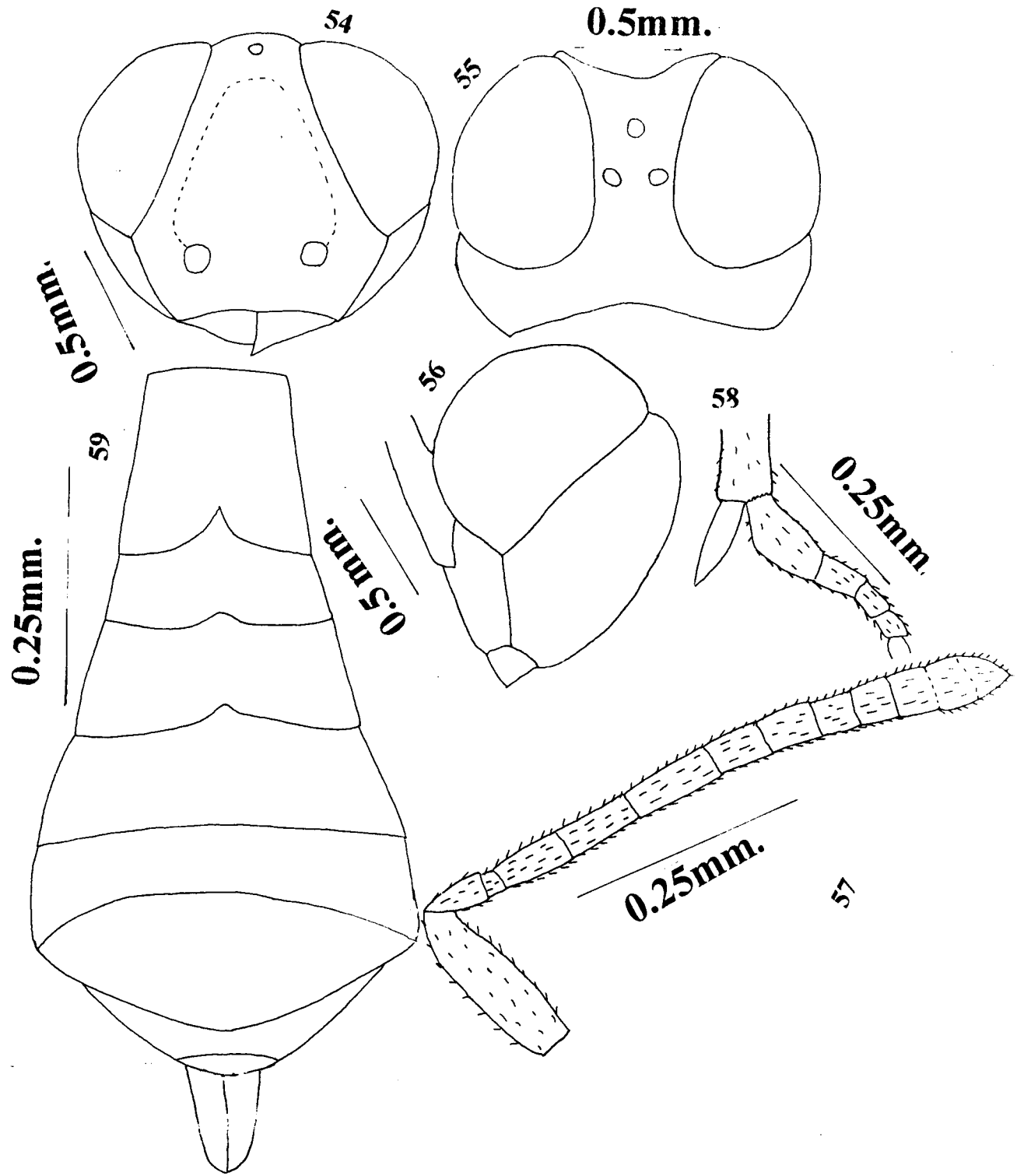
Fig. 55. Head- Dorsal View

Fig. 56. Head- Lateral View

Fig. 57. Antenna

Fig. 58. Mid tibial spur and Mesotarsus

Fig. 59. Gaster



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Figs. 60- 64. *Anastsatus bangalorensis* Mani & Kurien, Female

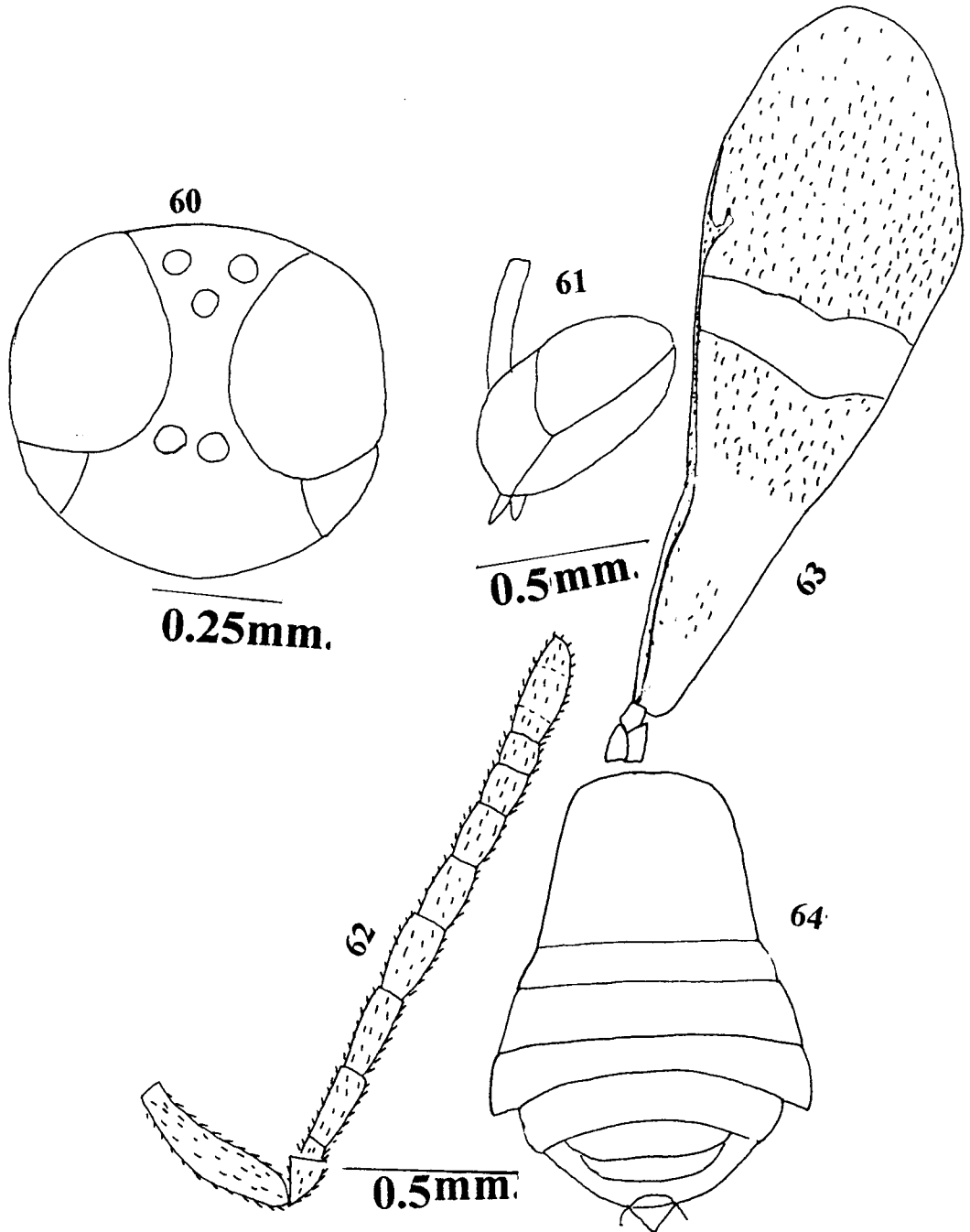
Fig. 60. Head- Front View

Fig. 61. Head- Lateral View

Fig. 62. Antenna

Fig. 63. Fore Wing

Fig. 64. Gaster



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Figs. 65-68. *Anastatus dentatus* Narayanan et. al. , Female

Fig. 65. Head- Front View

Fig. 66. Head- Dorsal View

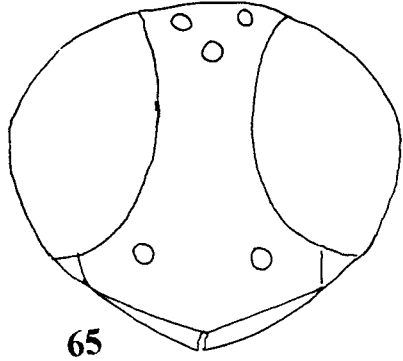
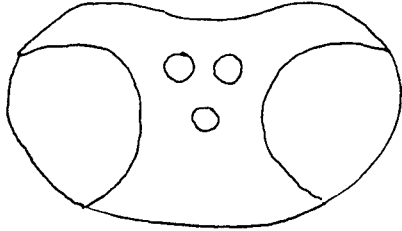
Fig. 67. Head- Lateral View

Fig. 68. Female- Entire

0.25mm.

0.25mm.

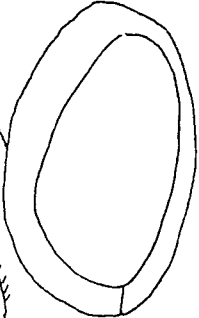
66



65

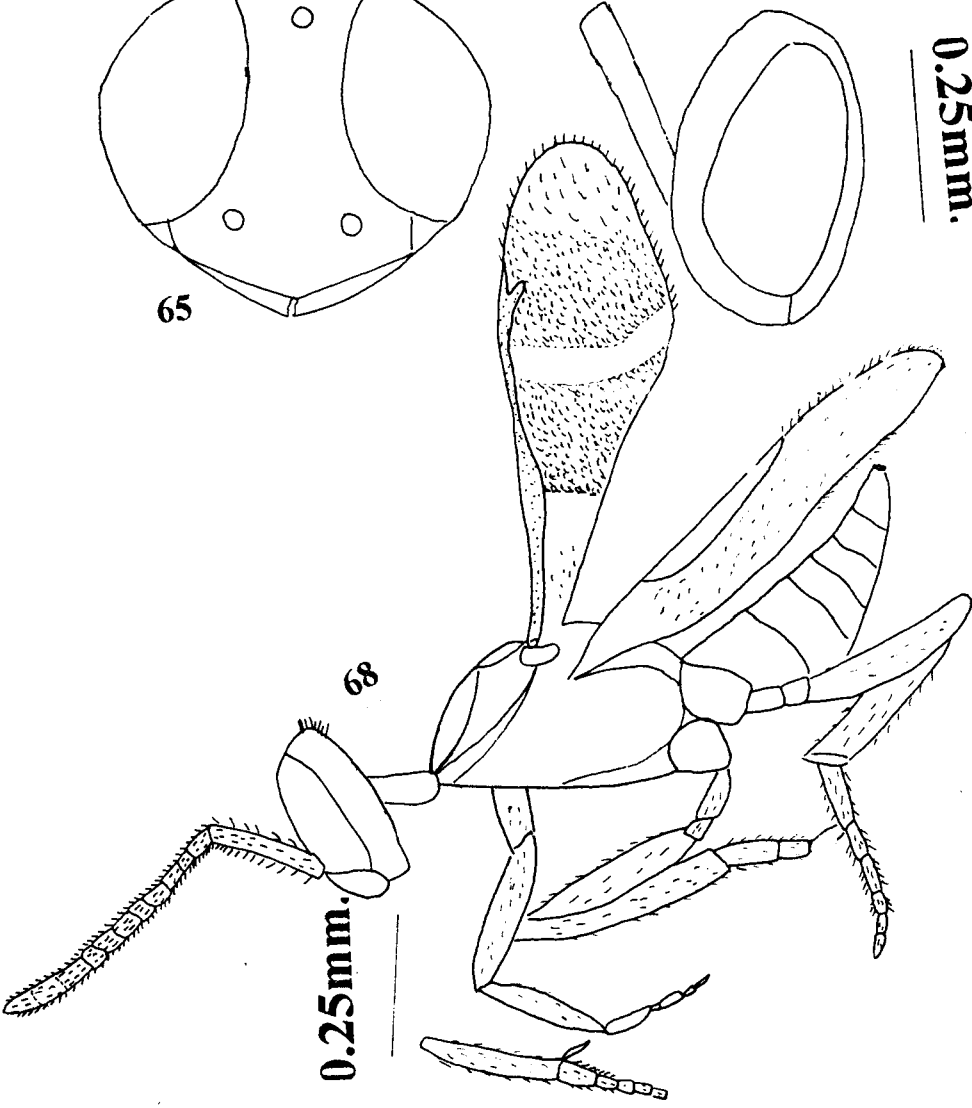
67

0.25mm.



68

0.25mm.



Figs. 69-75. *Anastatus excelsus* sp. nov. , Female

Fig. 69. Head- Front View

Fig. 70 . Head- Dorsal View

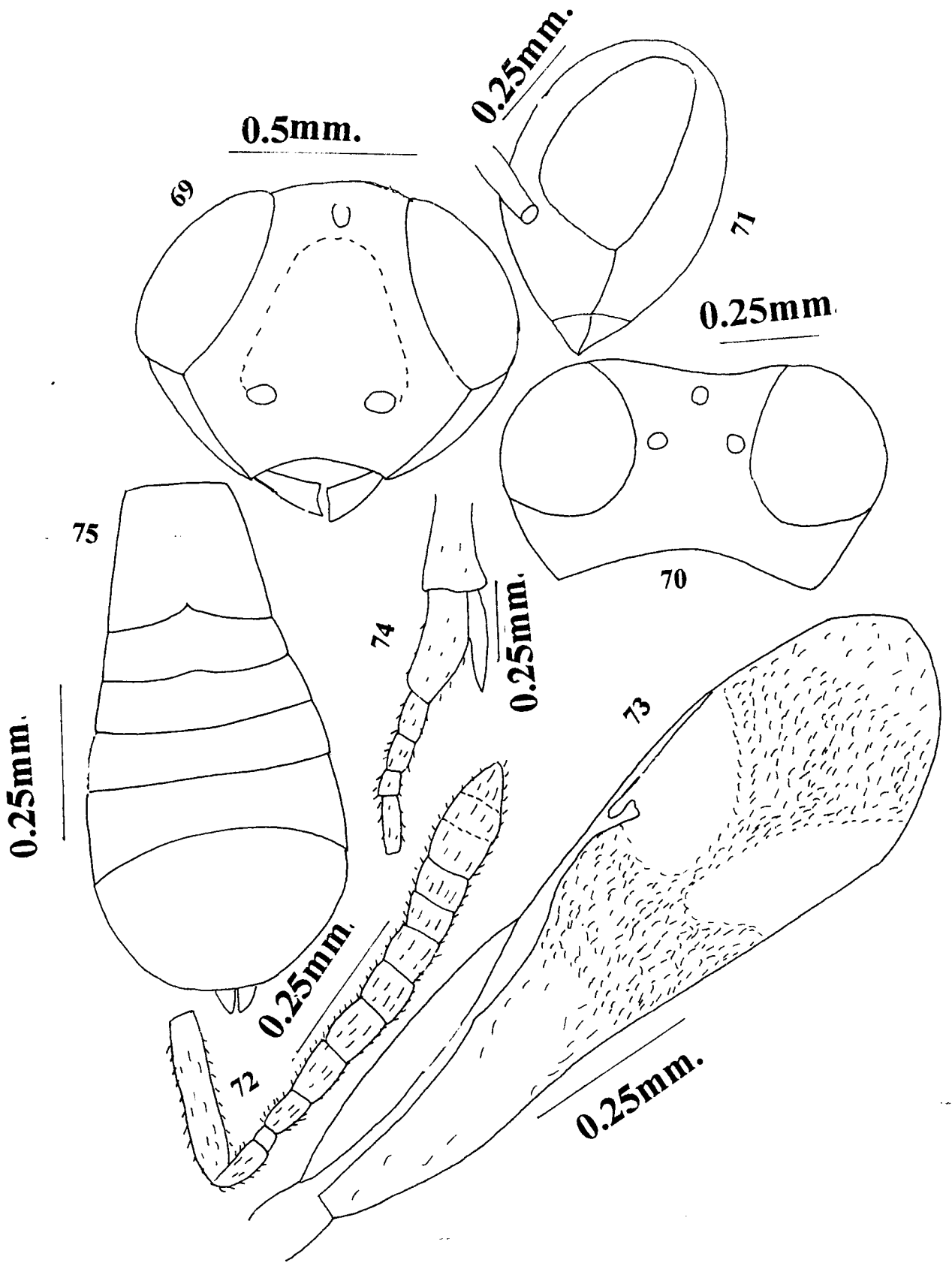
Fig. 71. Head- lateral View

Fig. 72. Antenna

Fig. 73. Fore Wing

Fig. 74. Mid tibial spur and Mesotarsus

Fig. 75. Gaster



Figs. 76- 80. *Anastatus galatus* sp. nov. , Female

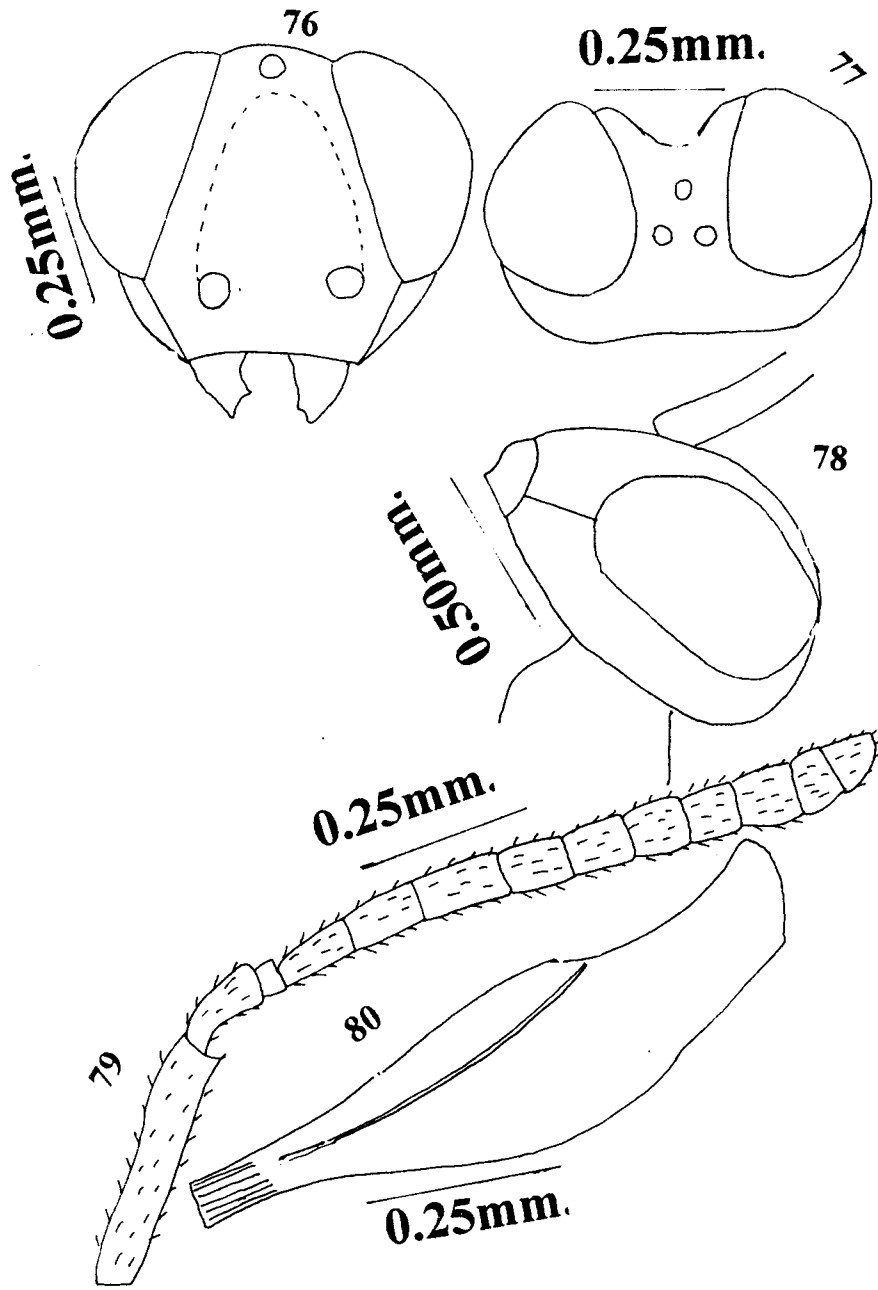
Fig. 76. Head- Front View

Fig. 77. Head- Dorsal View

Fig. 78. Head- Lateral View

Fig. 79. Antenna

Fig. 80. Fore Wing



Figs. 81-87. *Anastatus imatus* sp. nov. , Female

Fig. 81. Head- Front View

Fig. 82. Head- Dorsal View

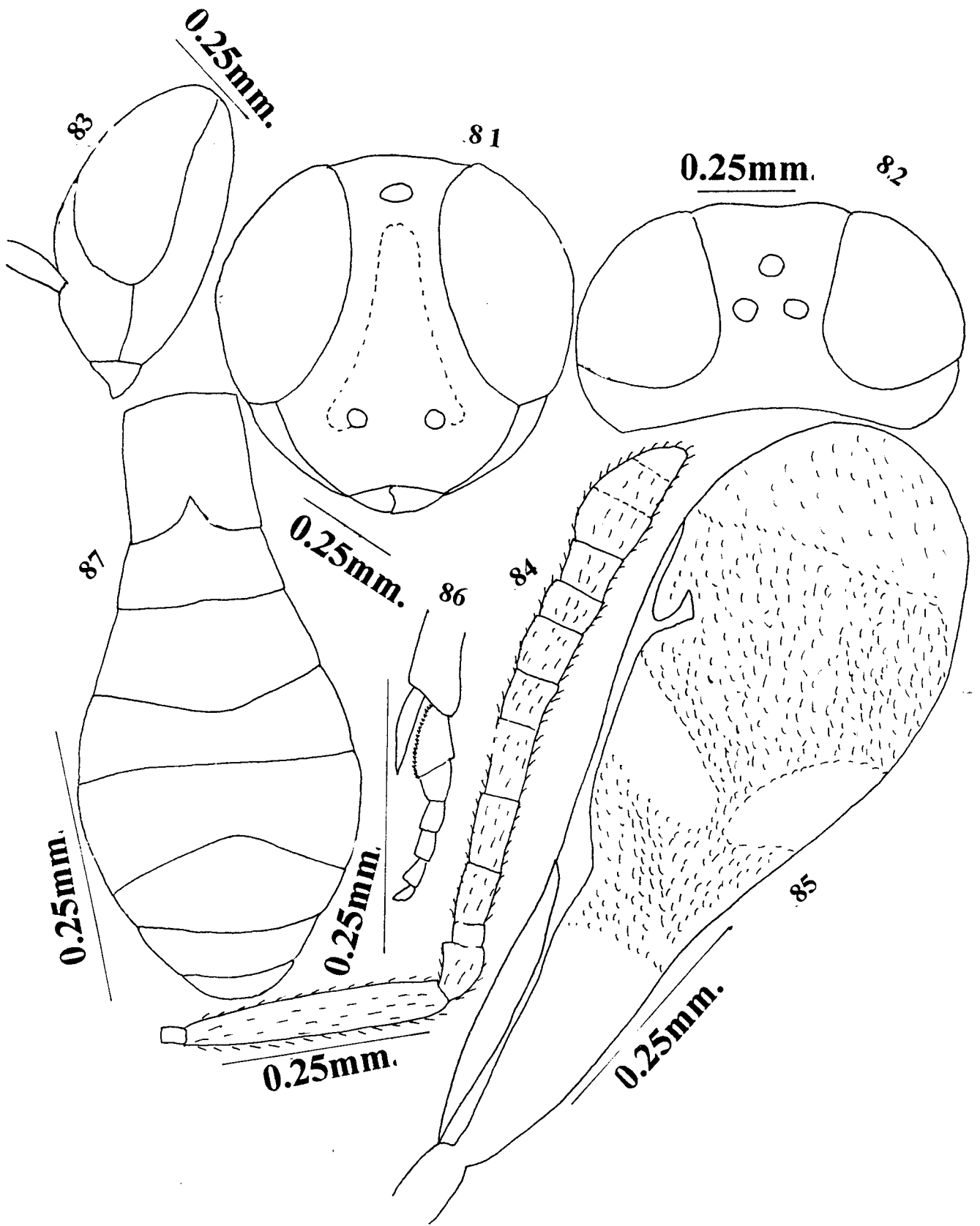
Fig. 83. Head- Lateral View

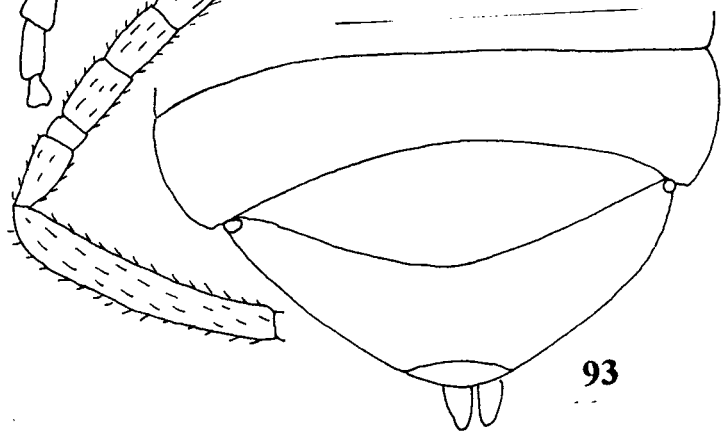
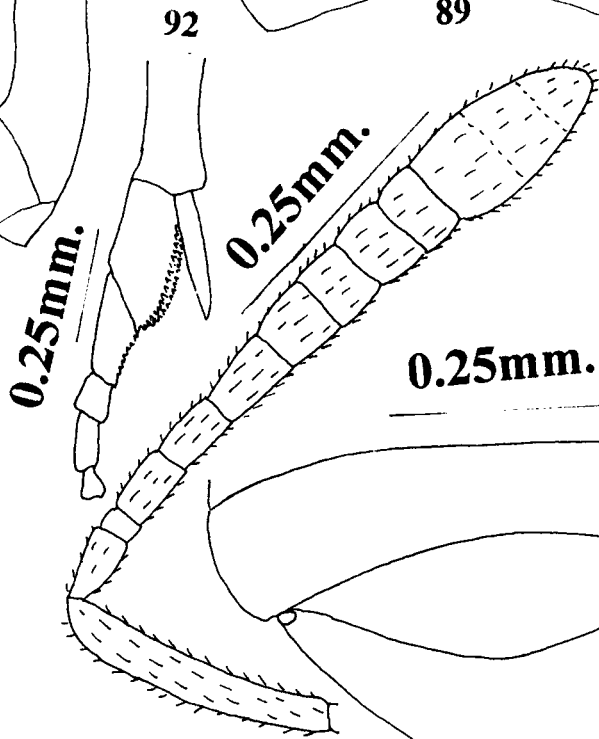
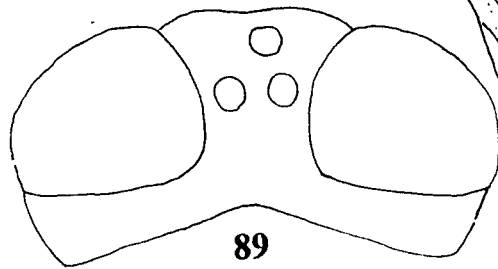
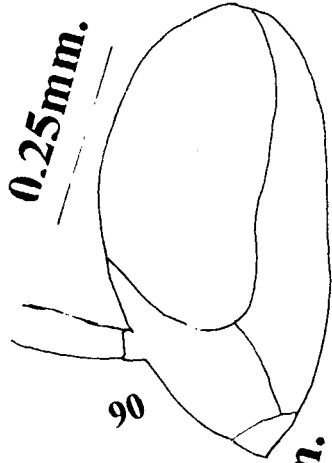
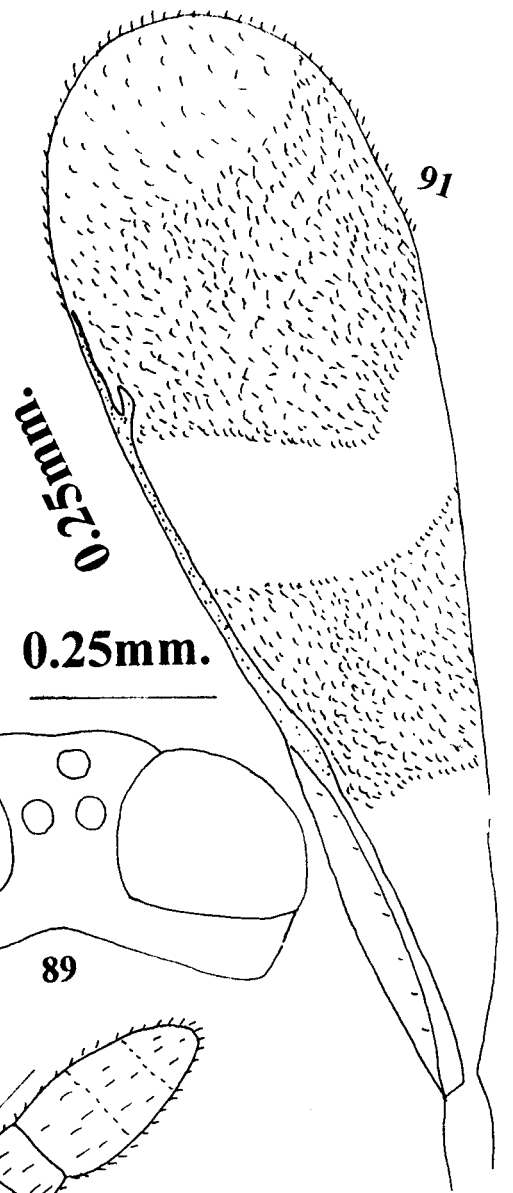
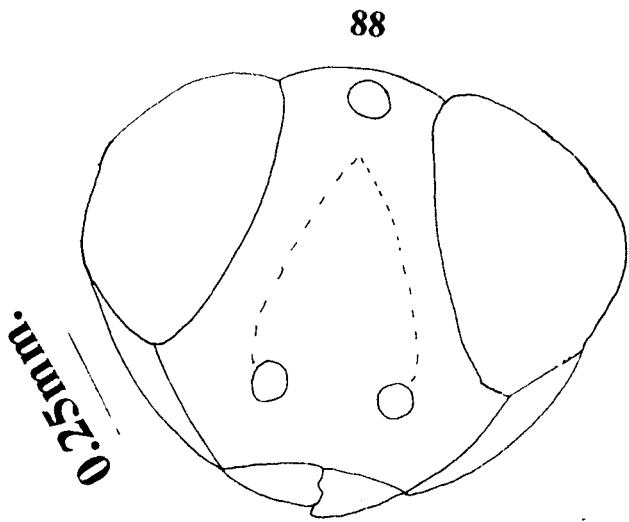
Fig. 84. Antenna

Fig. 85. Fore Wing

Fig. 86. Mid tibial spur and Mesotarsus

Fig. 87. Gaster





Figs. 88-93. *Anastatus leelae* sp. nov. , Female

Fig. 88. Head- Front View

Fig. 89. Head- Dorsal View

Fig. 90. Head- Lateral View

Fig. 91. Fore Wing

Fig. 92. Mid tibial spur and Mesotarsus

Fig. 93. Gaster- Apical Portion

Figs. 94-99. *Anastatus narendrani* sp. nov., Female

Fig. 94. Head- Front View

Fig. 95. Head- Lateral View

Fig. 96. Antenna

Fig. 97. Fore Wing

Fig. 98. Mid tibial spur and Mesotarsus

Fig. 99. Gaster

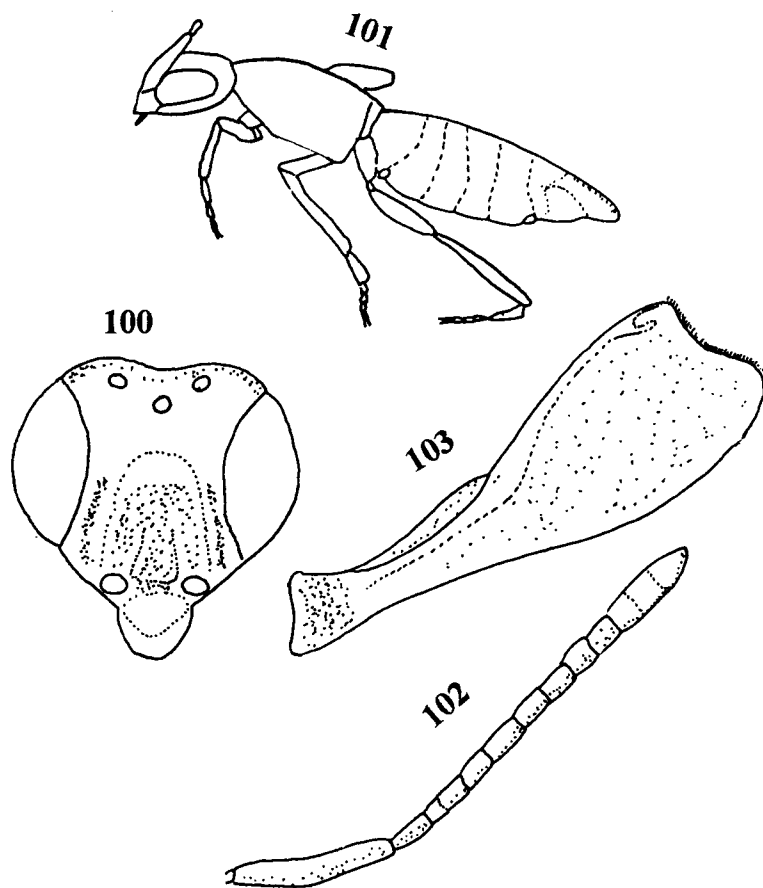
Fig. 100-103. *Calymmochilus nilamburicus* Narendran, Female

Fig. 100. Head- Front View

Fig. 101. Female-Entire

Fig. 102. Antenna

Fig. 103. Fore Wing



Figs. 104-109. *Coryptilus indicus* Gibson, Female

Fig. 104. Head- Front View

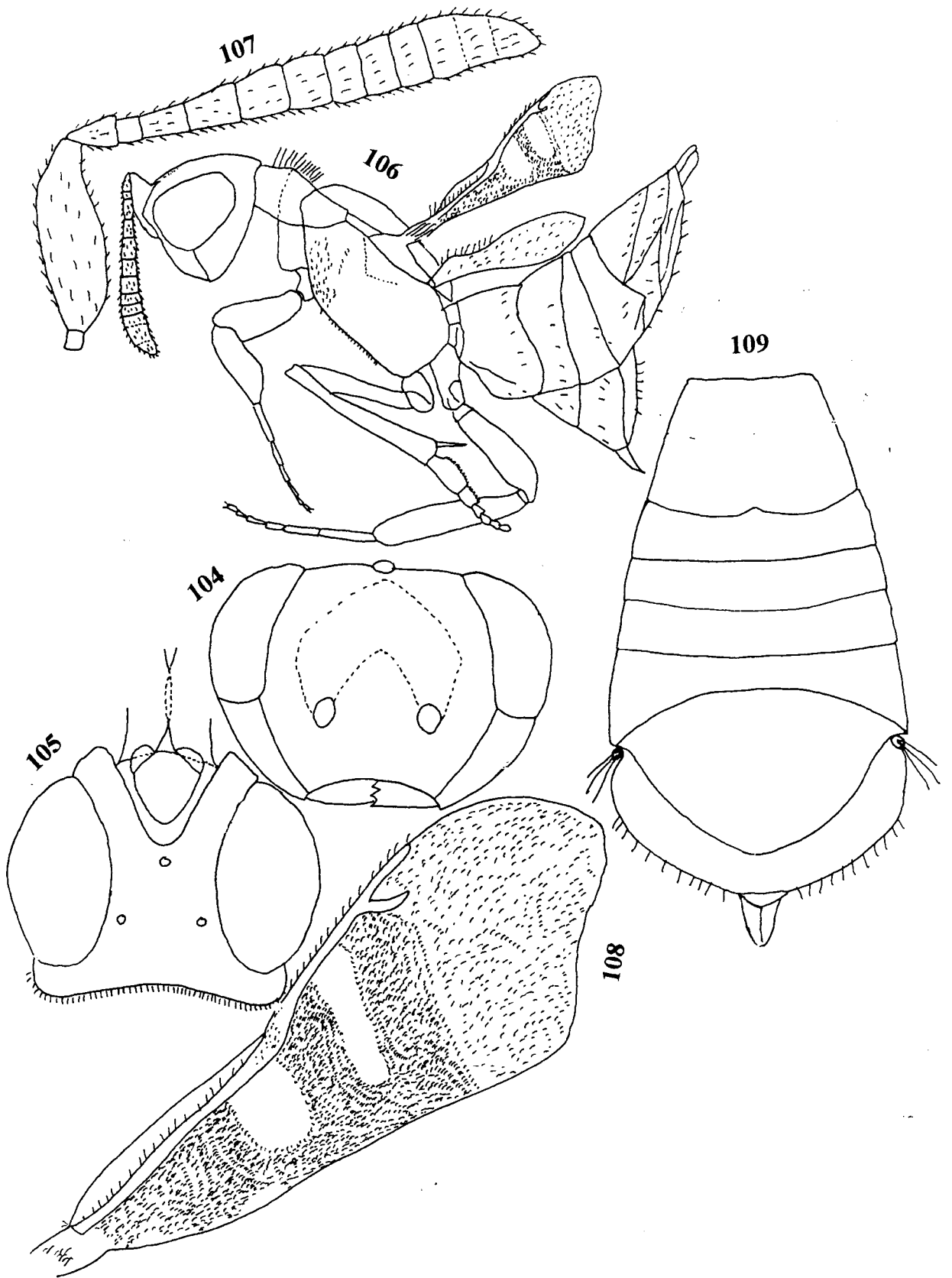
Fig. 105. Head- Dorsal View

Fig. 106. Female- Entire

Fig. 107. Antenna

Fig. 108. Fore Wing

Fig. 109. Gaster



Figs. 110-116. *Eupelmus amphitus* Walker , Female

Fig. 110. Head- Front View

Fig. 111. Head- Dorsal View

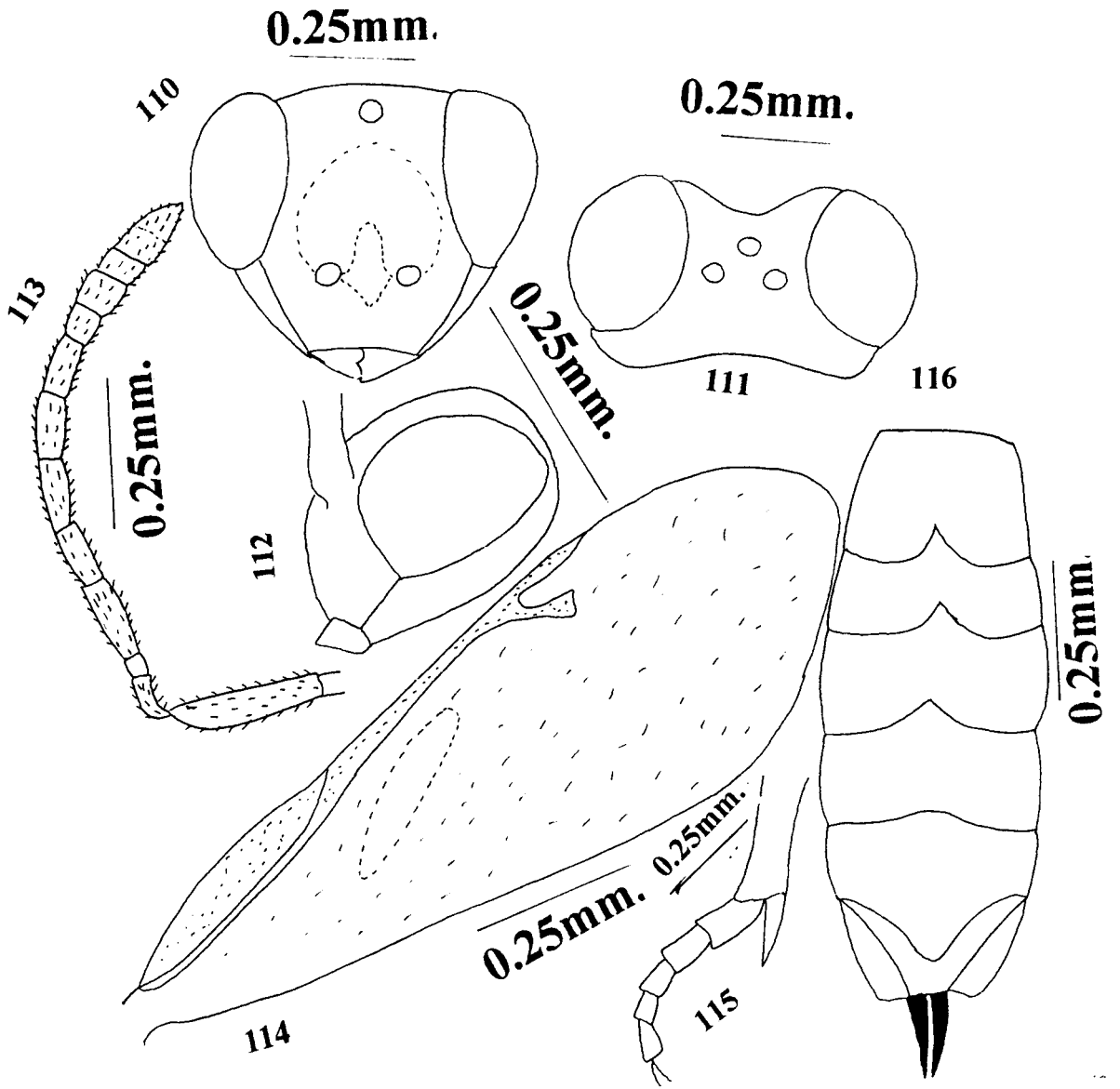
Fig. 112. Head- Lateral View

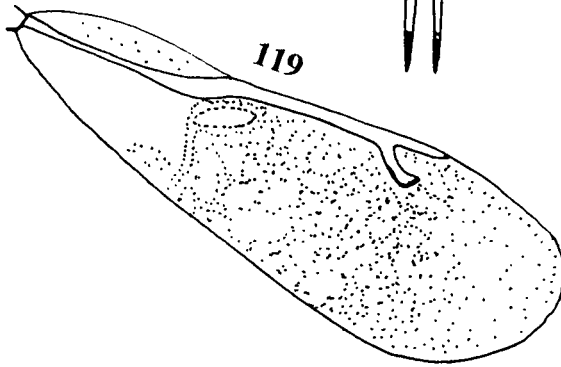
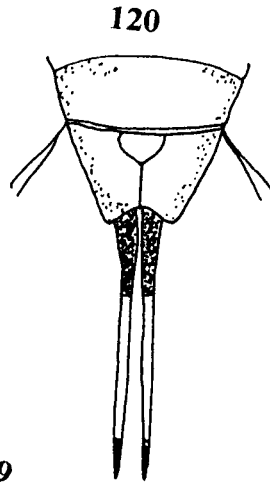
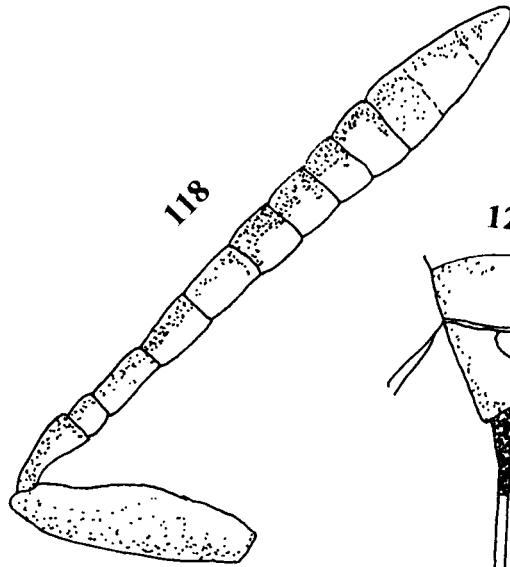
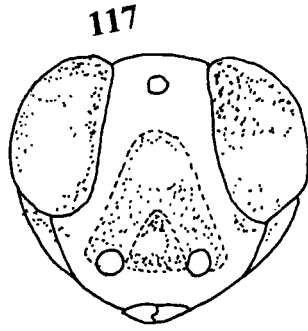
Fig. 113. Antenna

Fig. 114. Fore Wing

Fig. 115. Mid tibial spur and Mesotarsus

Fig. 116. Gaster





Figs. 121-127. *Eupelmus australis* Girault, Female

Fig. 121. Head- Front View

Fig. 122. Head- Dorsal View

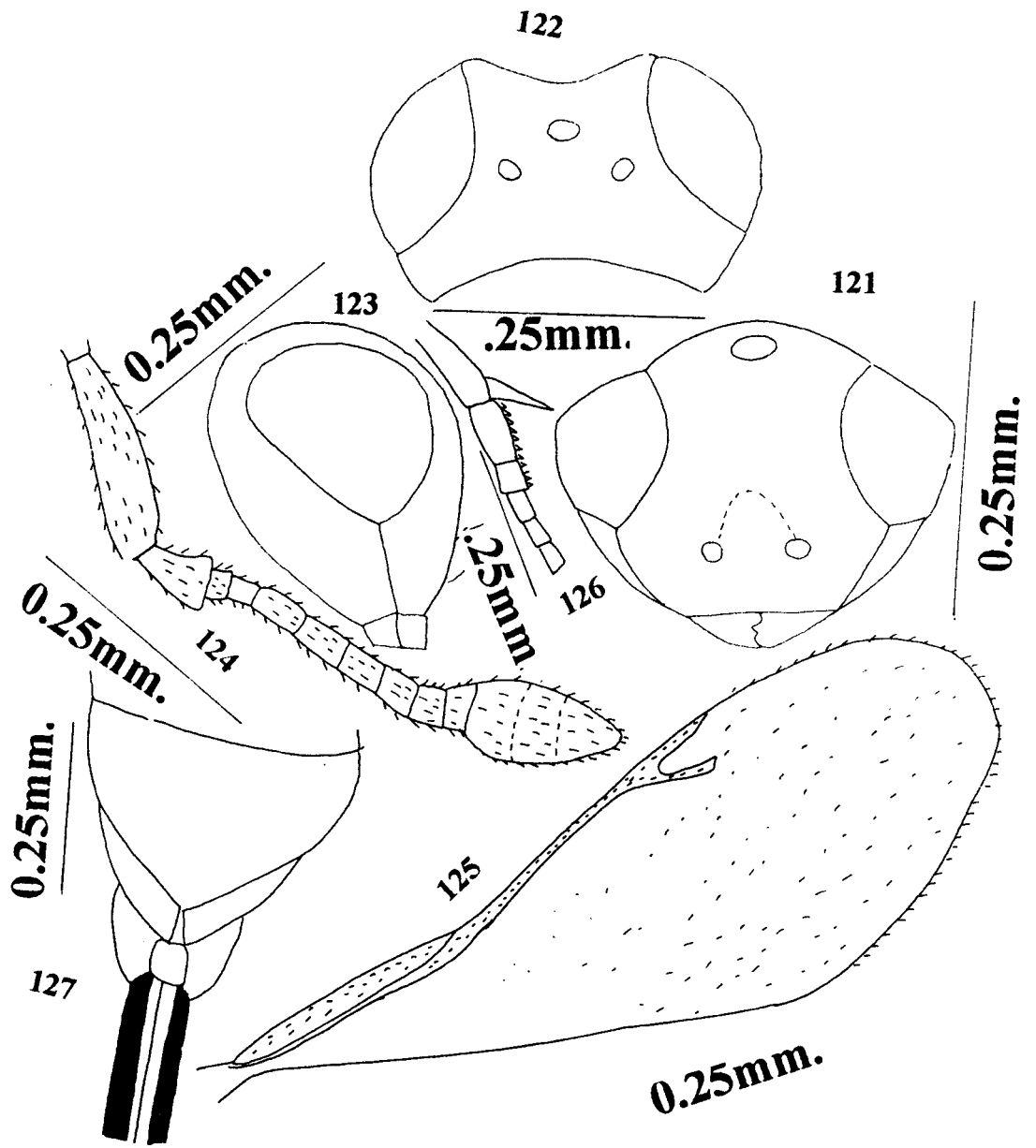
Fig. 123. Head- Lateral View

Fig. 124. Antenna

Fig. 125. Fore Wing

Fig. 126. Mid tibial spur and Mesotarsus

Fig. 127. Gaster



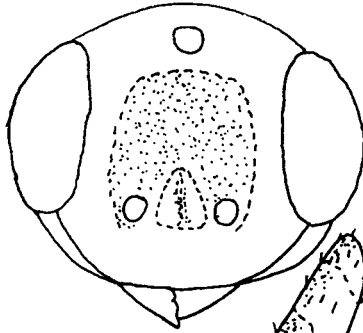
Figs. 128- 130. *Eupelmus bonus* Narendran, Female

Fig. 128. Head- Front View

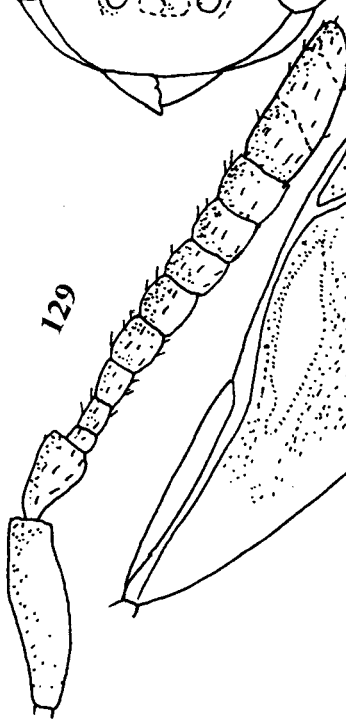
Fig. 129. Antenna

Fig. 130. Fore Wing

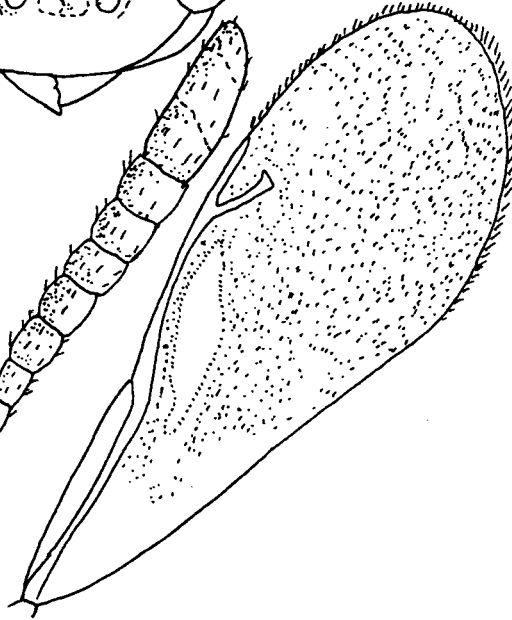
128



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Figs. 131-137. *Eupelmus catoxanthae* Ferriere, Female

Fig. 131. Head- Front View

Fig. 132. Head- Dorsal View

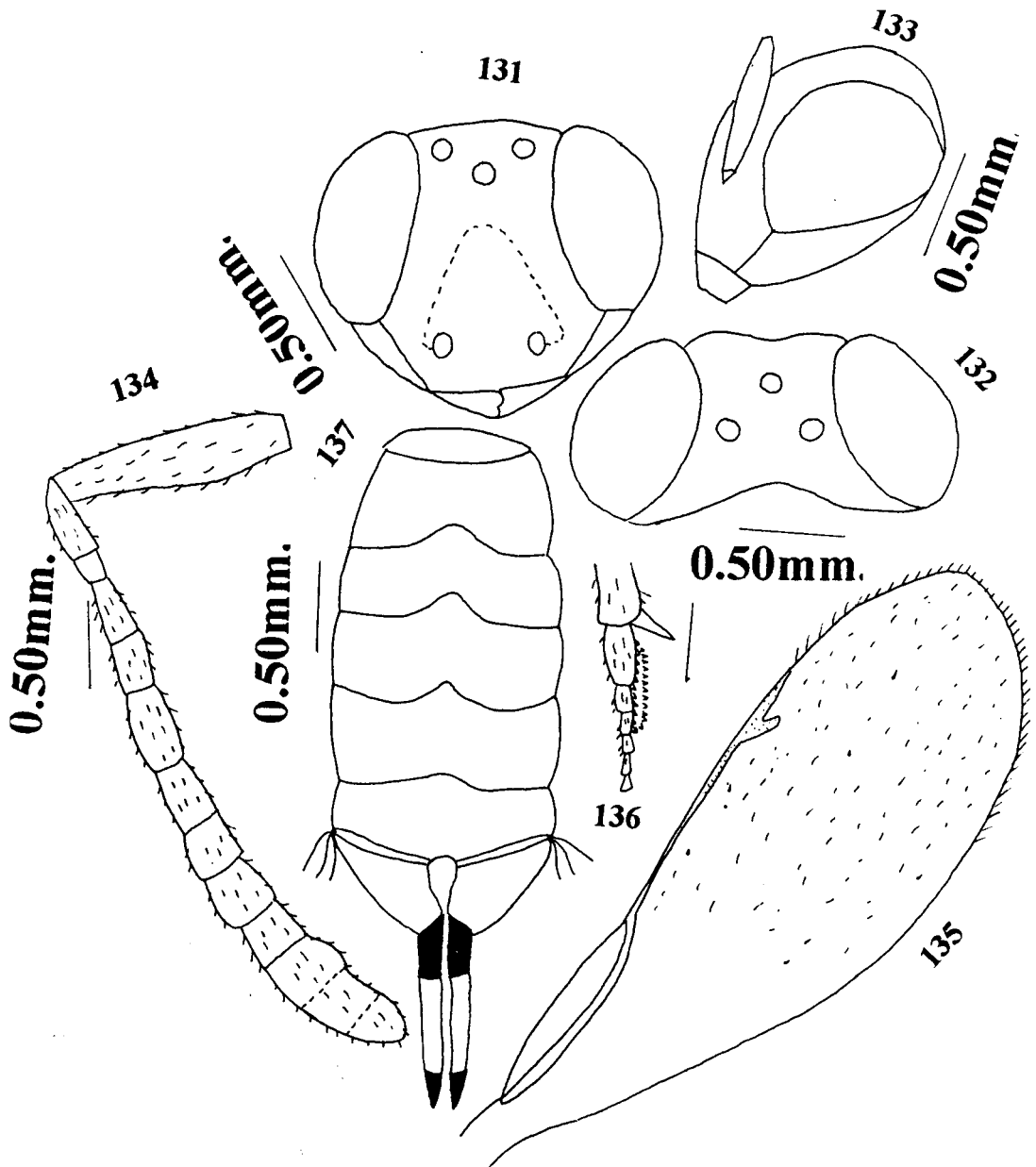
Fig. 133. Head- Lateral View.

Fig. 134. Antenna

Fig. 135. Fore Wing

Fig. 136. Mid tibial spur and Mesotarsus

Fig. 137. Gaster

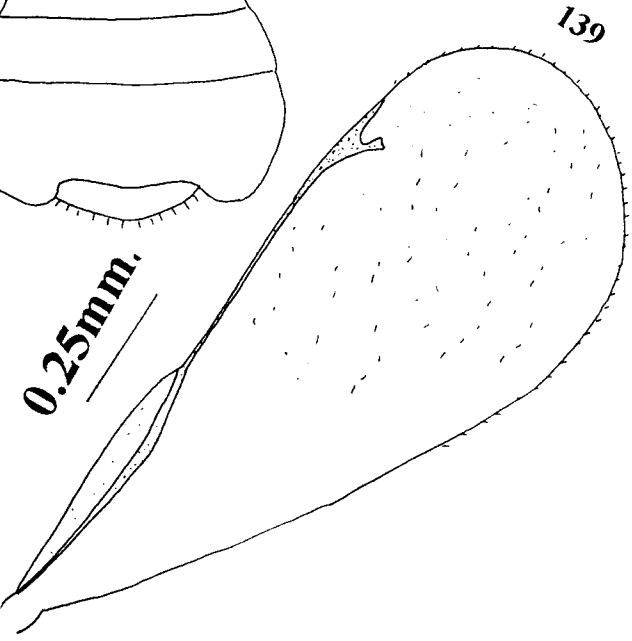
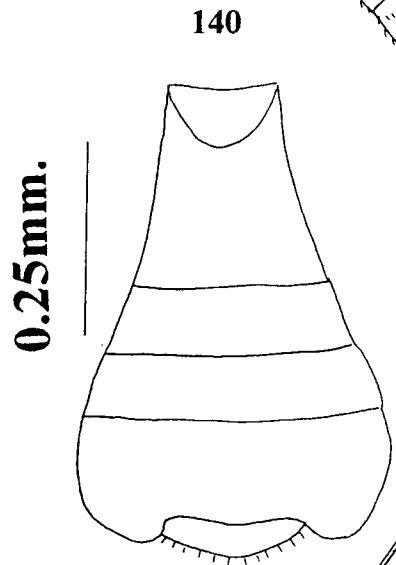
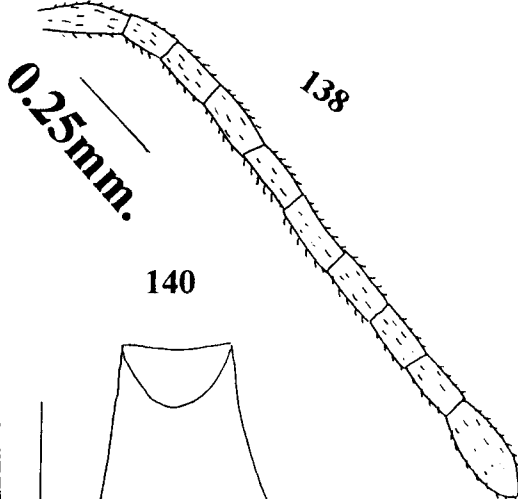


Figs. 138- 140. *Eupelmus catoxanthae* Ferriere, Male

Fig. 138. Antenna

Fig. 139. Fore Wing

Fig. 140. Gaster



Figs. 141- 144. *Eupelmus caudatus* sp. nov. , Female

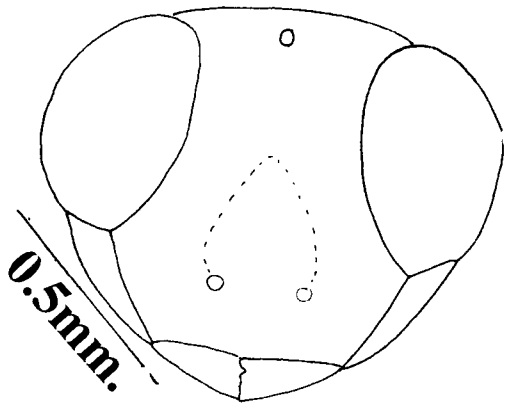
Fig. 141. Head- Front View

Fig. 142. Antenna

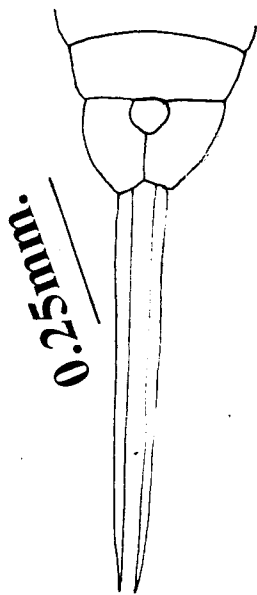
Fig. 143. Fore Wing

Fig. 144. Gaster- Apical Portion

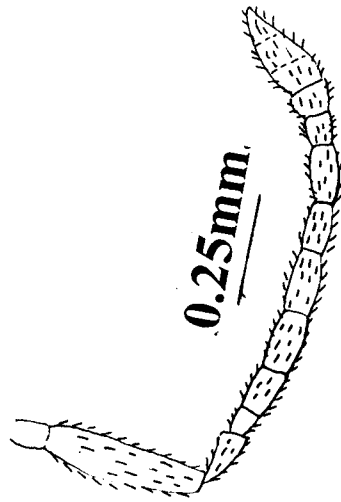
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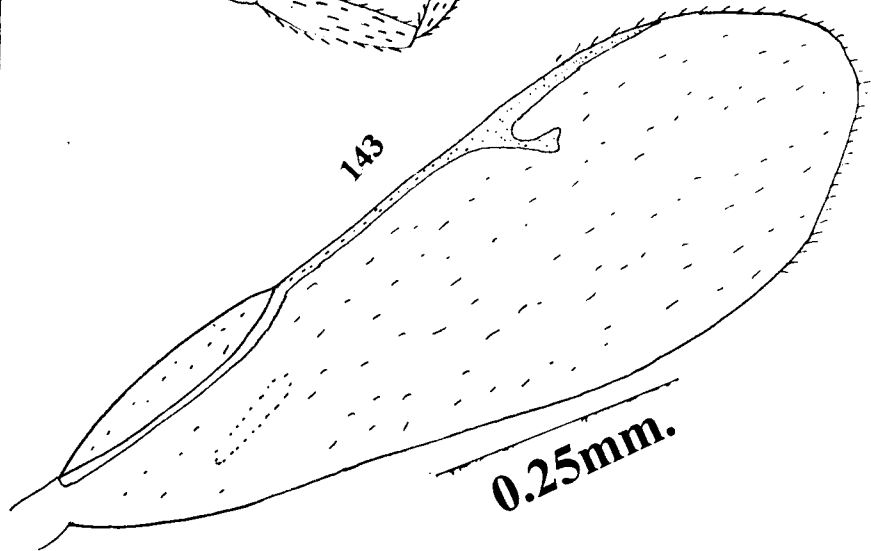
144



142



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Figs. 145- 148. *Eupelmus curiosus* Narendran, Female

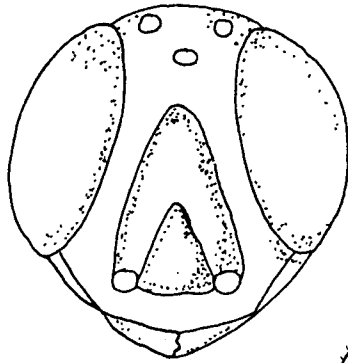
Fig. 145. Head- Front View

Fig. 146. Antenna

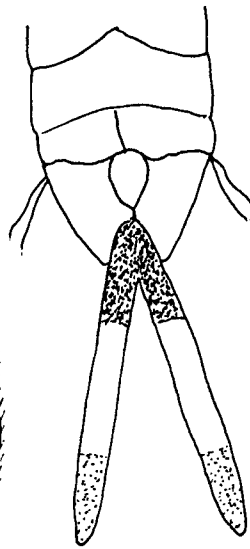
Fig. 147. Fore Wing

Fig. 148. Gaster- Apical portion

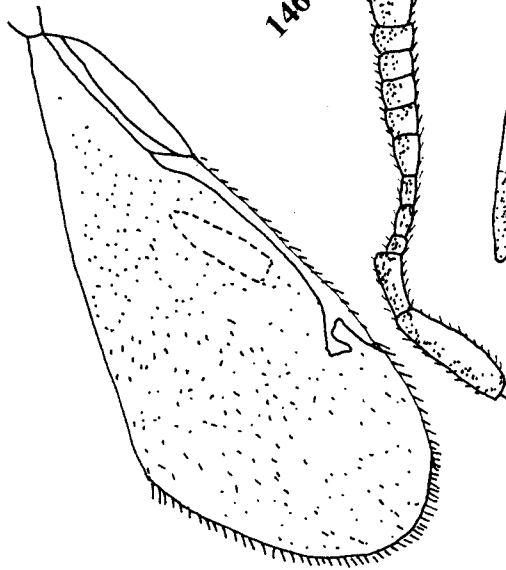
145



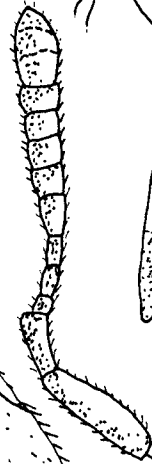
148



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Figs. 149-152. *Eupelmus ignotus* Narendran, Female

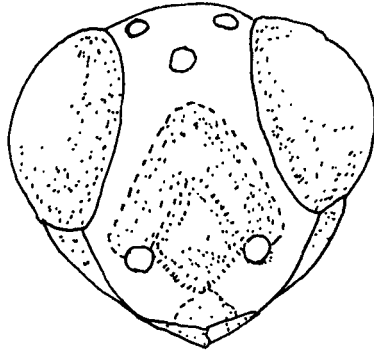
Fig. 149. Head- Front View

Fig. 150. Antenna

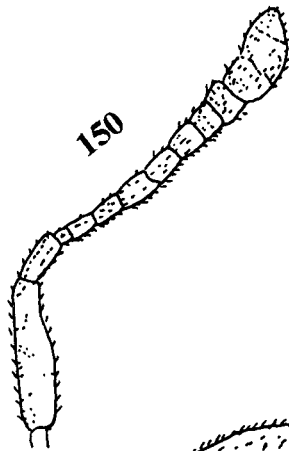
Fig. 151. Fore Wing

Fig. 152. Gaster- Apical Portion

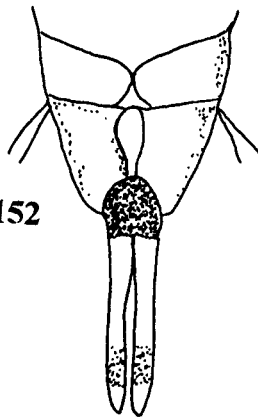
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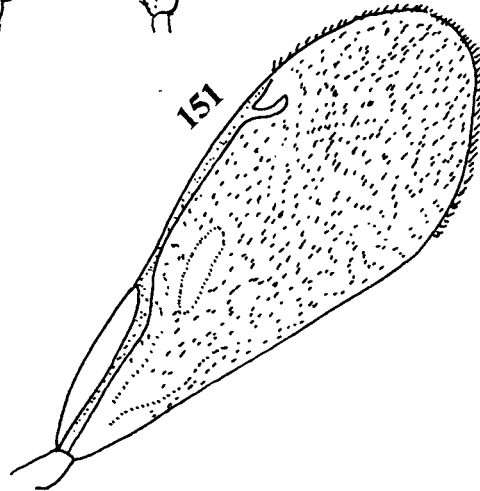
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152



151



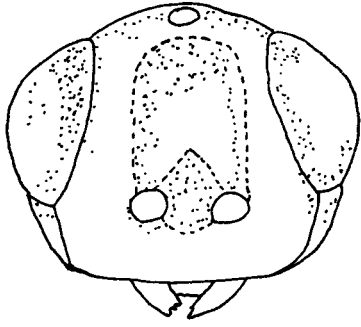
Figs. 153-155. *Eupelmus indicus* Narendran, Female

Fig. 153. Head- Front View

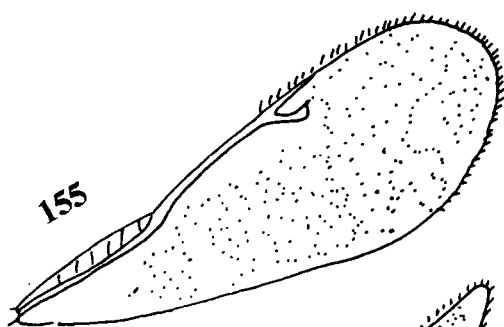
Fig. 154. Antenna

Fig. 155. Fore Wing

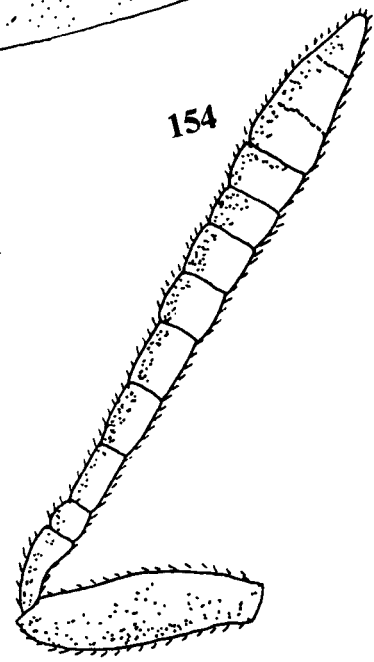
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Figs. 156- 162. *Eupelmus javae* Girault, Female

Fig. 156. Head- Front View

Fig. 157. Head- Dorsal View

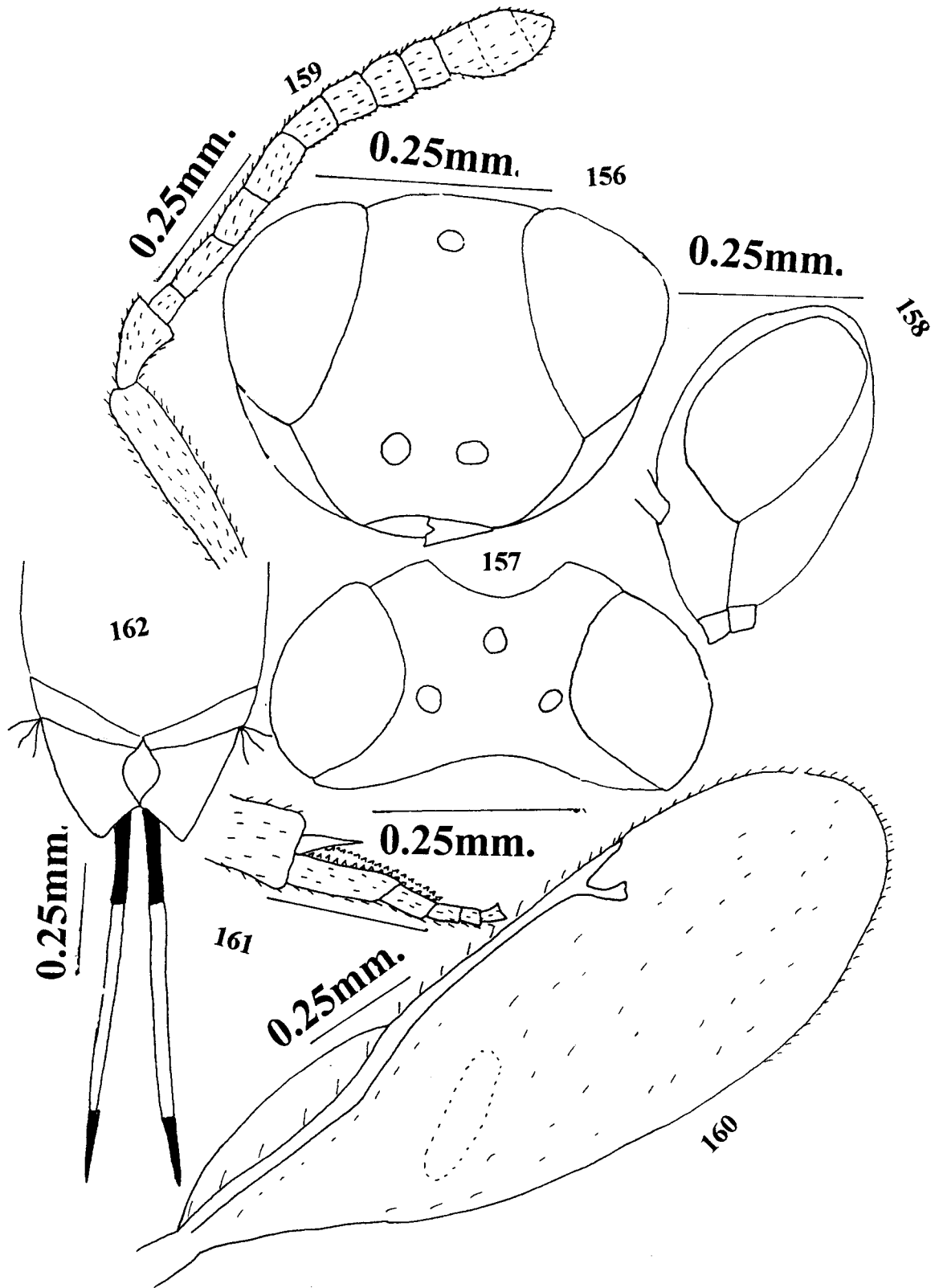
Fig. 158. Head- Lateral View

Fig. 159. Antenna

Fig. 160. Fore Wing

Fig. 161. Mid tibial spur and Mesotarsus

Fig. 162. Gaster- Apical Portion



Figs.163- 166. *Eupelmus keralicus* Narendran, Female

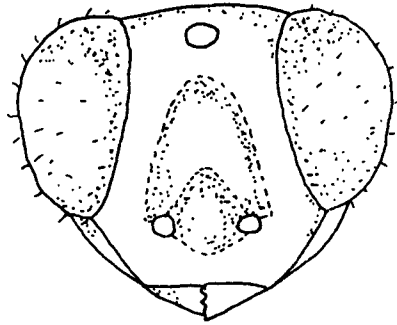
Fig. 163. Head- Front View

Fig. 164. Antenna

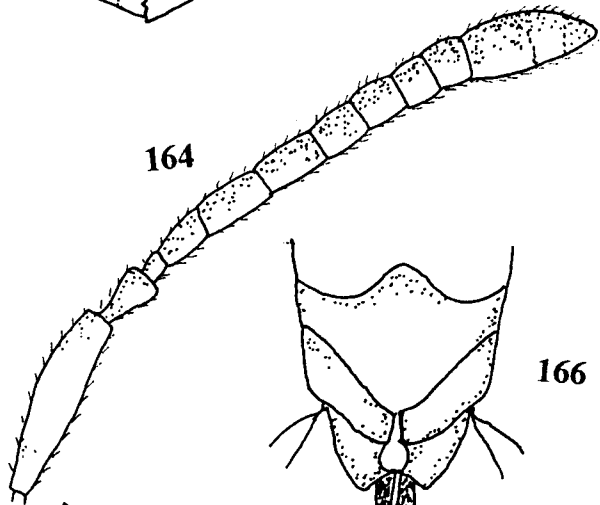
Fig. 165. Fore Wing

Fig. 166. Gaster- Apical Portion

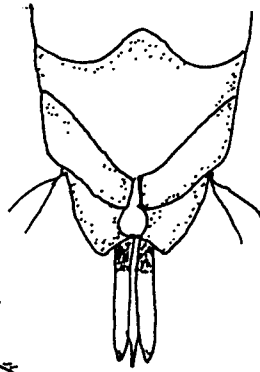
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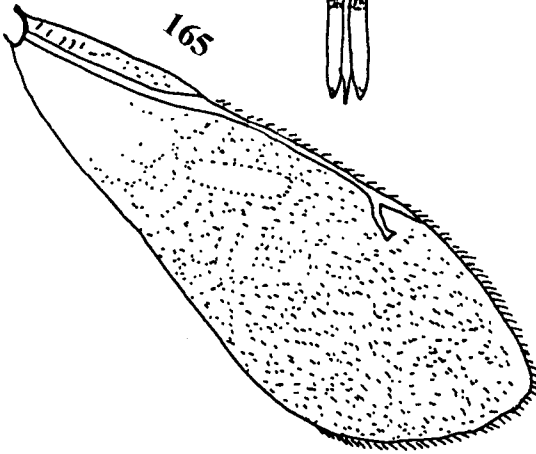
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Figs. 167- 170. *Eupelmus licinus* Narendran, Female

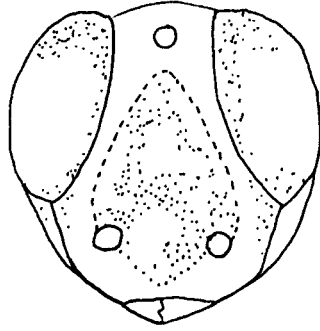
Fig. 167. Head - Front view

Fig. 168. Antenna

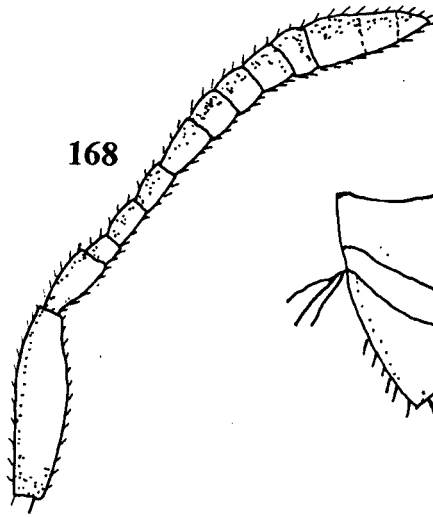
Fig. 169. Fore Wing

Fig. 170. Gaster- Apical Portion

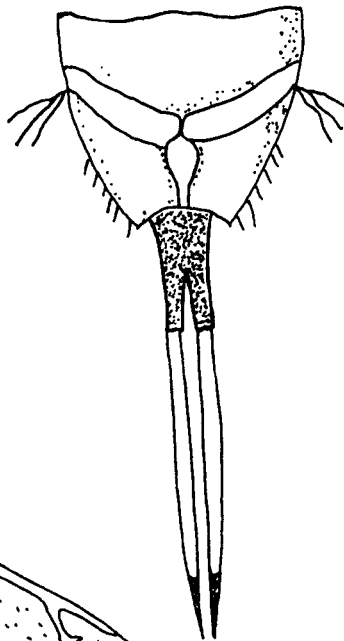
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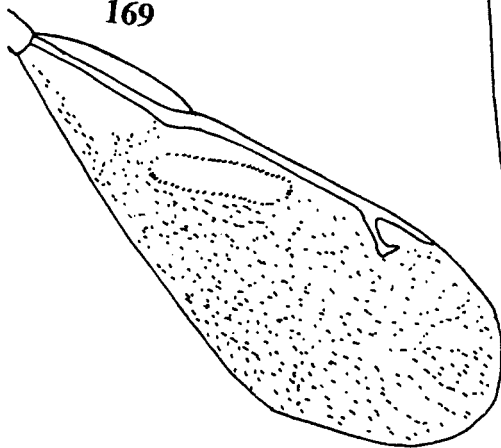
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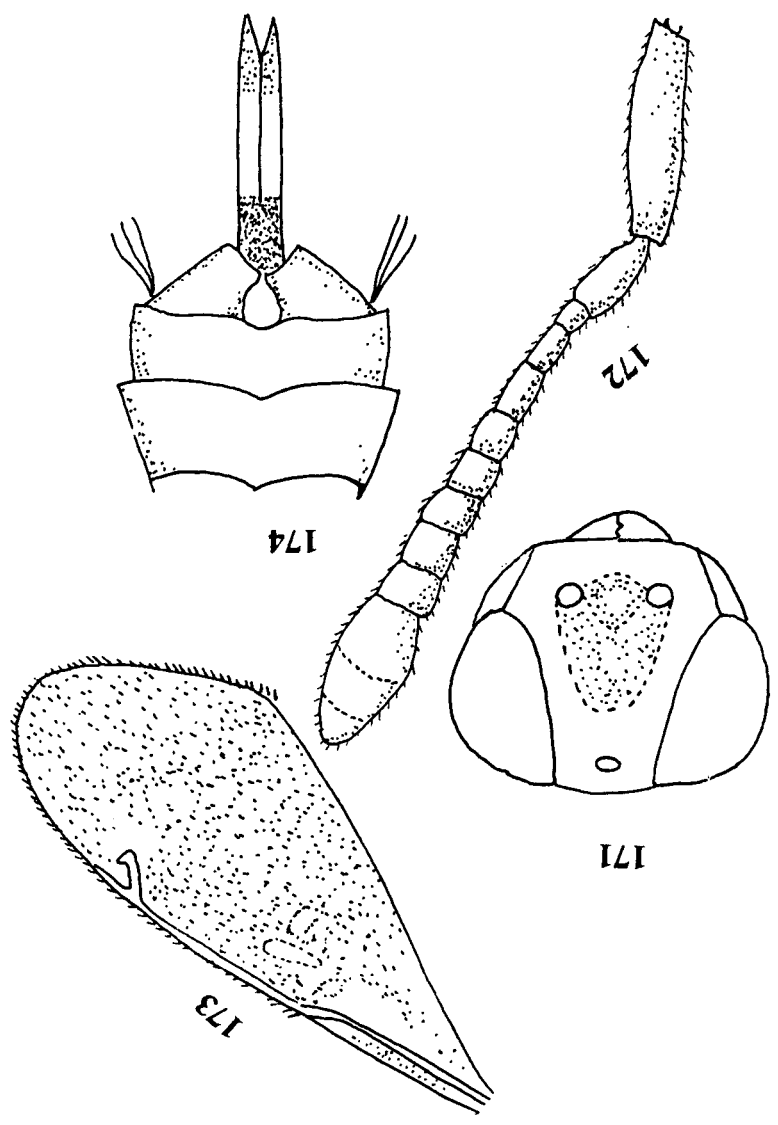


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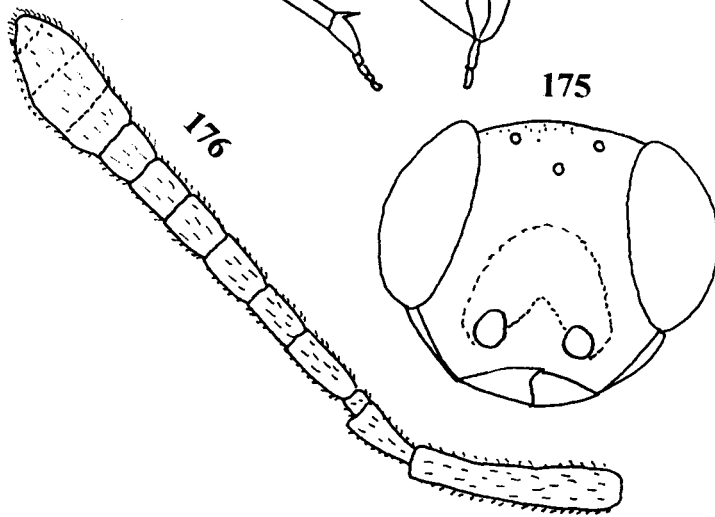
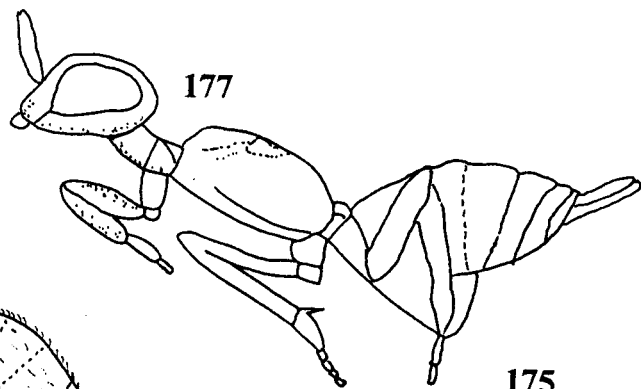


Figs. 175- 177. *Eupelmus nirupama* Narendran, Female

Fig. 175. Head- Front View

Fig. 176. Antenna

Fig. 177. Female- Entire



Figs. 178- 183. *Eupelmus pedatoria*(Ferriere), Female

Fig. 178. Head- Front View

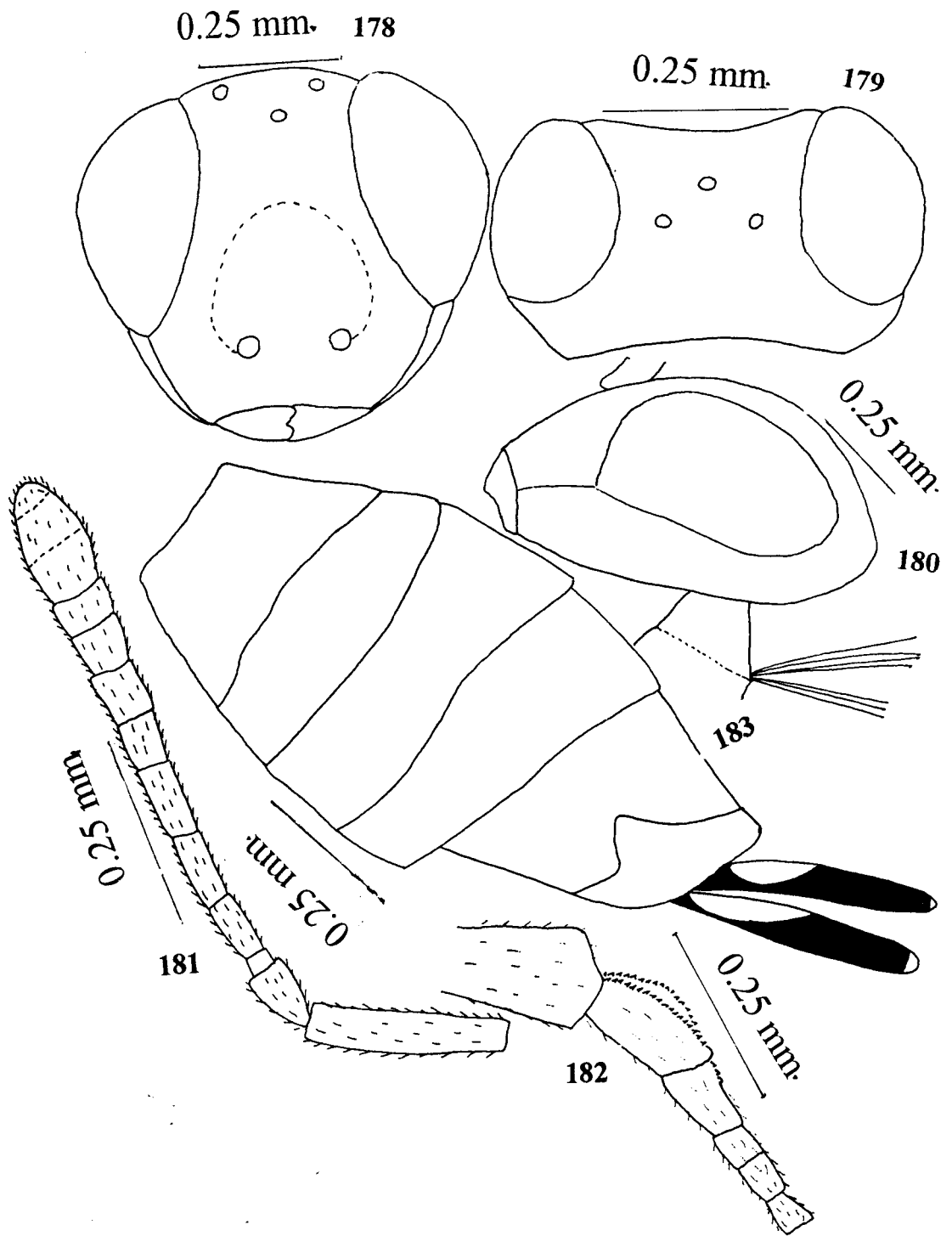
Fig. 179. Head- Dorsal View

Fig. 180. Head- Lateral View

Fig. 181. Antenna

Fig. 182. Mid tibial spur and Mesotarsus

Fig. 183. Gaster



Figs.184-187.*Eupelmus rexonus* Narendran, Female

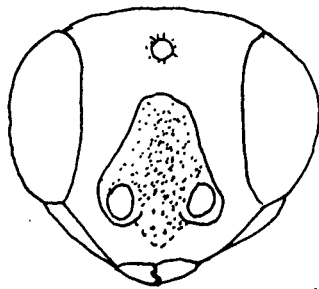
Fig.184. Head - Front View

Fig. 185. Antenna

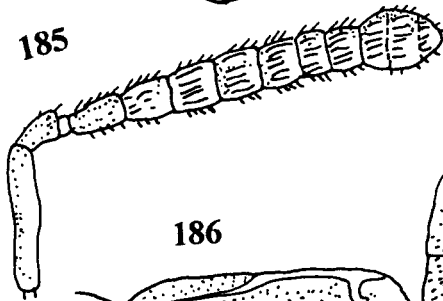
Fig. 186. Fore Wing

Fig. 187. Gaster

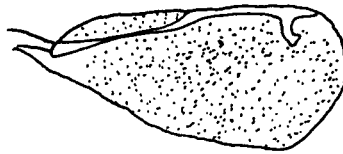
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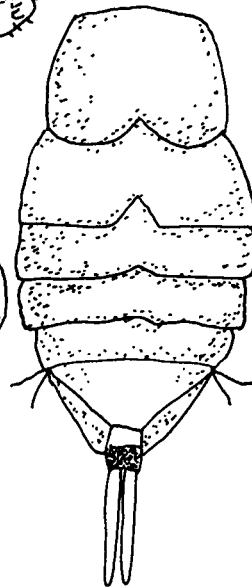
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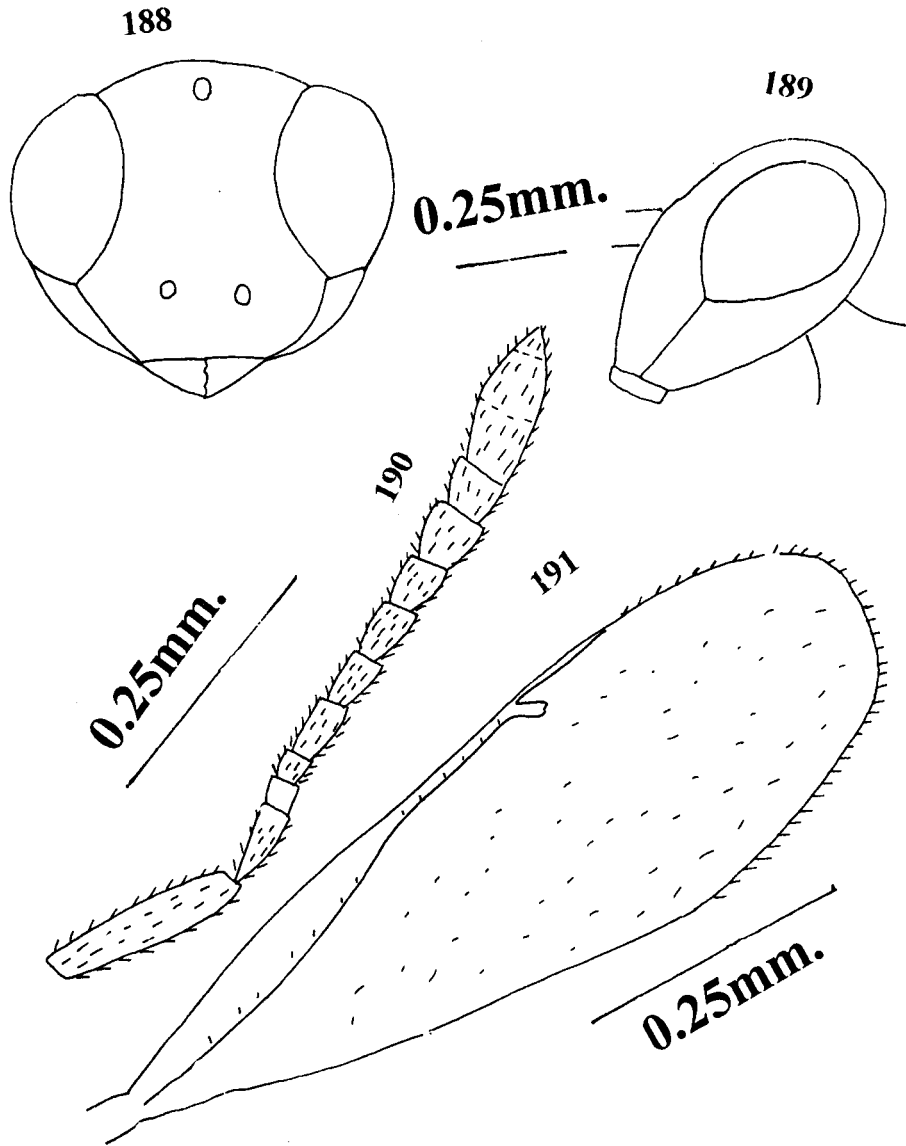
Figs. 188- 191. *Eupelmus tachardiae*(Howard), Female

Fig. 188. Head- Front View

Fig. 189. Head- Lateral View

Fig. 190. Antena

Fig. 191. Fore Wing



Figs. 192-198. *Eupelmus testaceiventris* Motschulsky, Female

Fig. 192. Head- Front View

Fig. 193. Head- Dorsal View

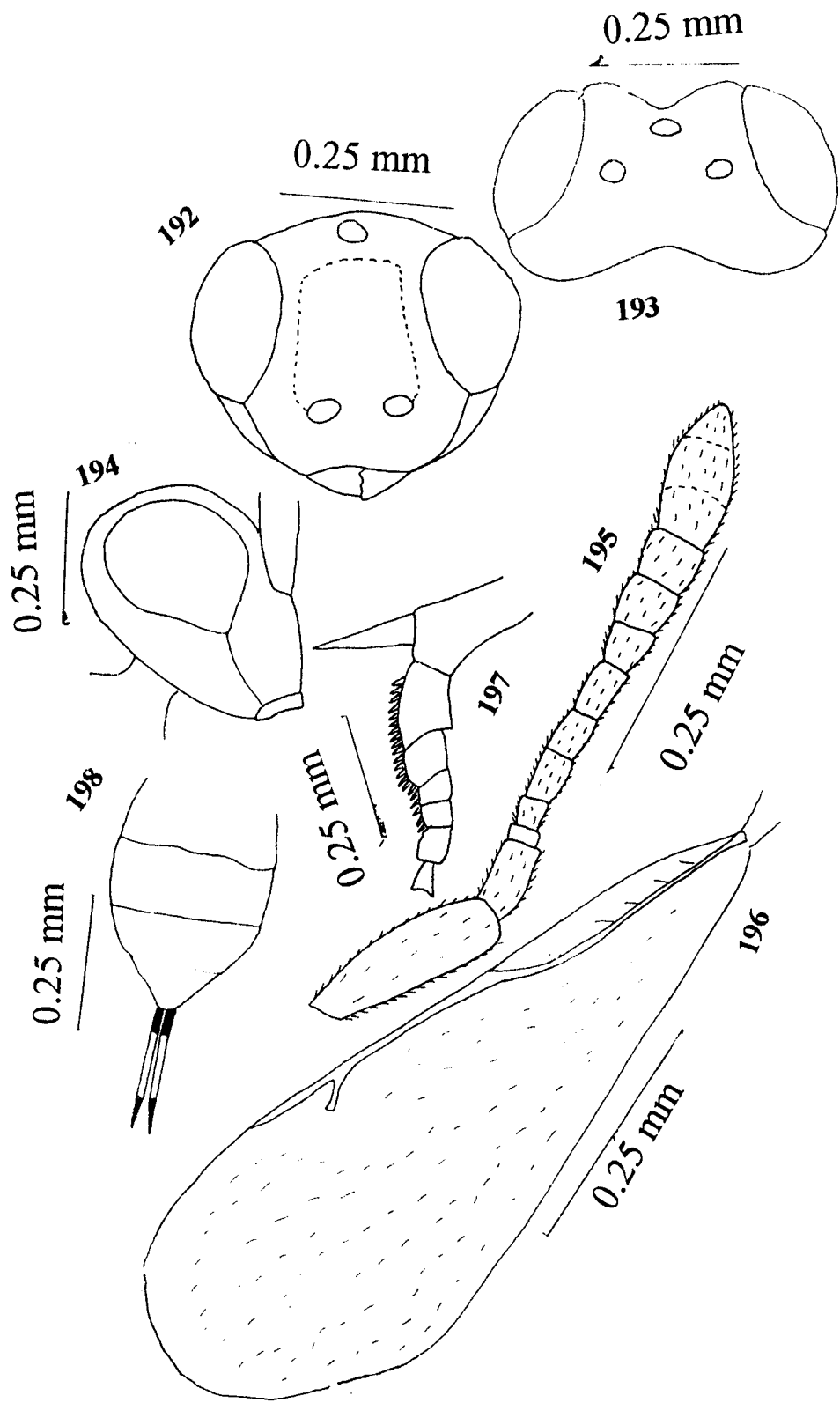
Fig. 194. Head- Lateral View

Fig. 195. Antenna

Fig. 196. Fore Wing

Fig. 197. Mid tibial spur and mesotarsus

Fig. 198. Gaster - Apical Portion



Figs. 199- 205. *Eupelmus vermai* Bhatnagar, Female

Fig. 199. Head- Front View

Fig. 200. Head- Dorsal View

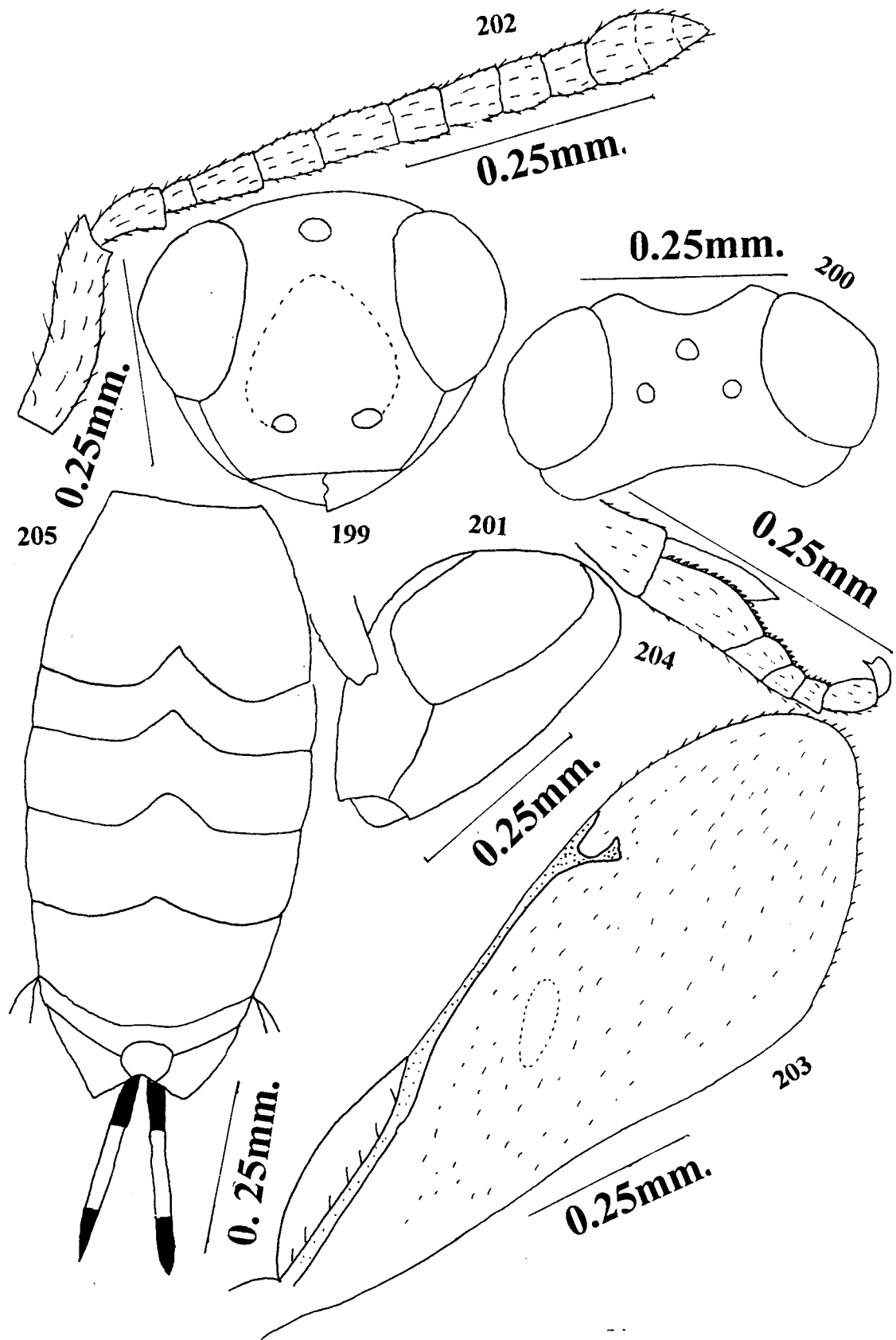
Fig. 201. Head- Lateral View

Fig. 202. Antenna

Fig. 203. Fore Wing

Fig. 204. Mid tibial spur and Mesotarsus

Fig. 205. Gaster



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Figs. 206-209. *Eupelmus zandanus* Narendran, Female

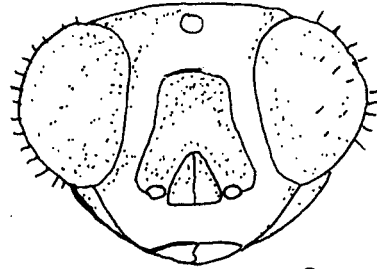
Fig. 206. Head- Front view

Fig. 207. Antenna

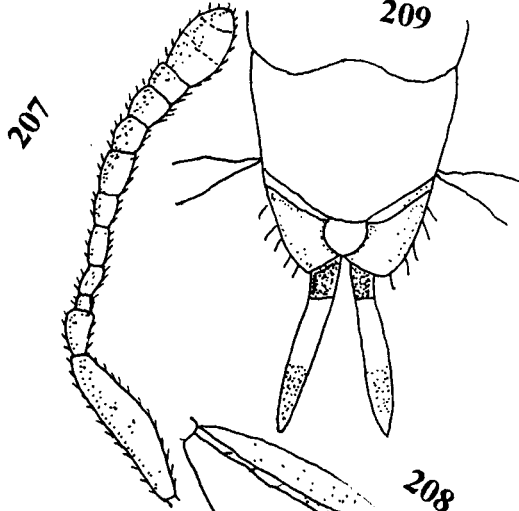
Fig. 208. Forewing

Fig. 209. Gaster- Apical Portion

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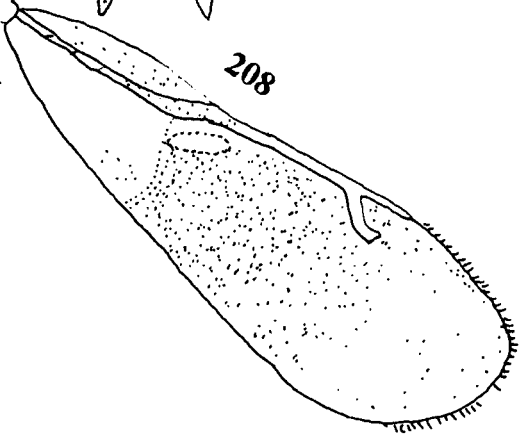


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207

208



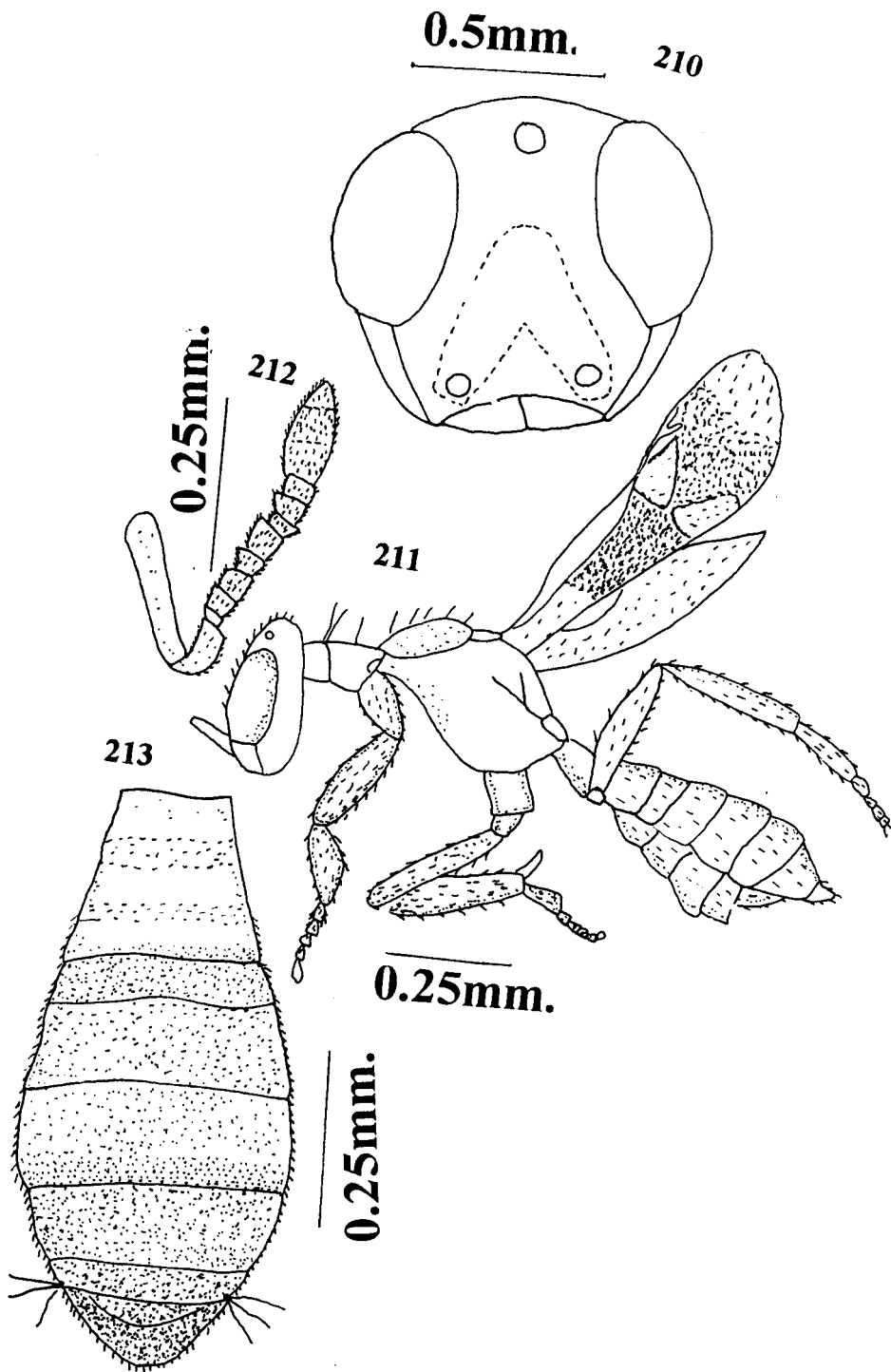
Figs. 210-213. *Mesocomys atulyus* Narendran, Female

Fig. 210. Head- Front View

Fig. 211. Female- Entire

Fig. 212. Antenna

Fig. 213. Gaster



201

12

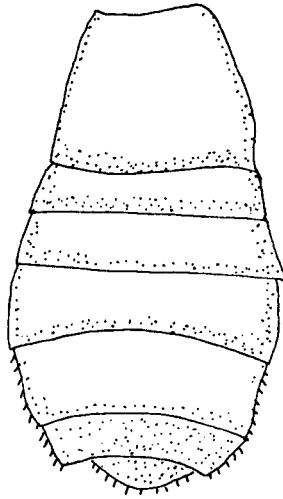
Figs. 214- 215. *Mesocomys atulyus* Narendran, Male

Fig. 214. Antenna

Fig. 215. Gaster

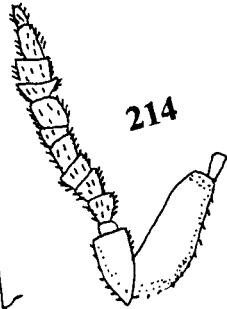
215

0.25mm.



0.25mm.

214



Figs. 216- 219. *Mesocomys manii* sp. nov. , Female

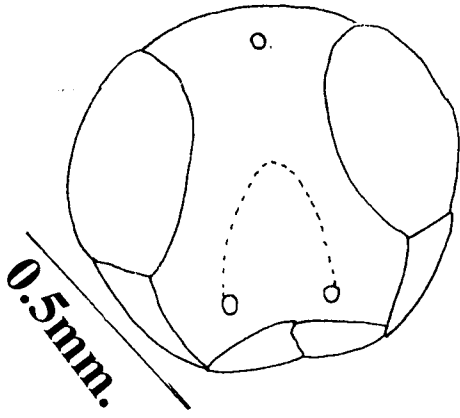
Fig. 216. Head - Front View

Fig. 217. Antenna

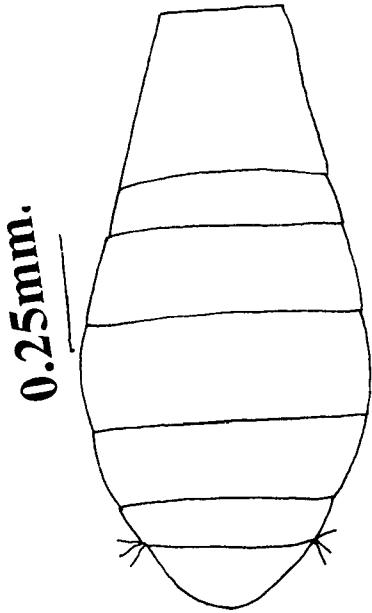
Fig. 218. Fore Wing

Fig. 219. Gaster

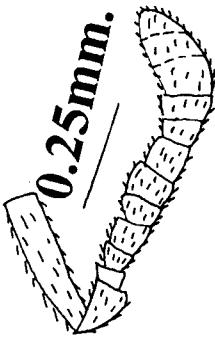
216



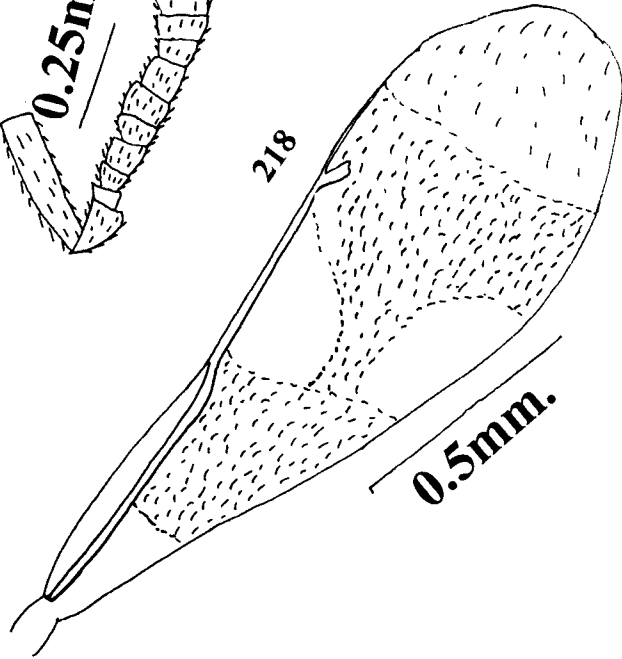
219



217



218



Figs. 220-224. *Mesocomys orientalis* Ferriere, Female

Fig. 220. Head- Front View

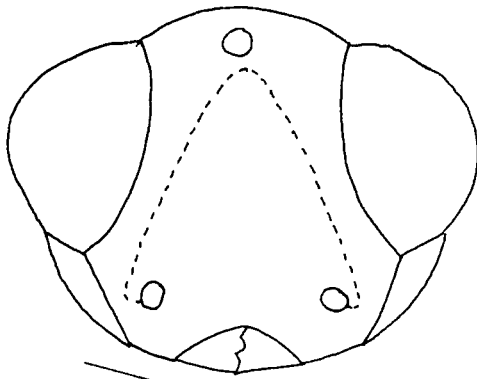
Fig. 221. Head- Dorsal View

Fig. 222. Head- Lateral View

Fig. 223. Antenna

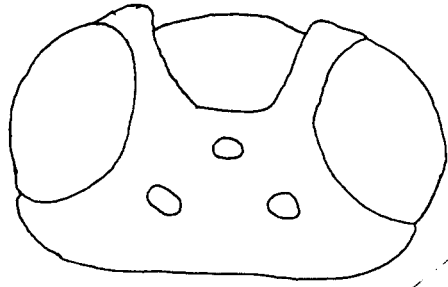
Fig. 224. Fore Wing

220



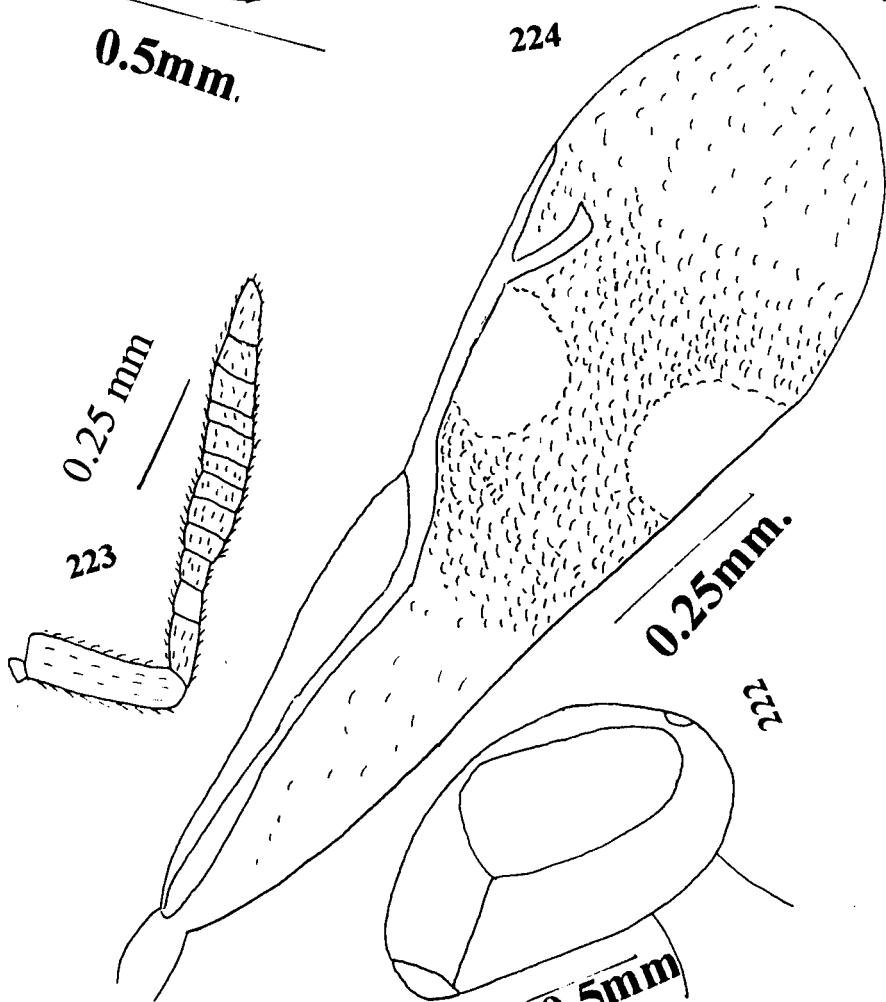
0.5mm.

221



0.25mm.

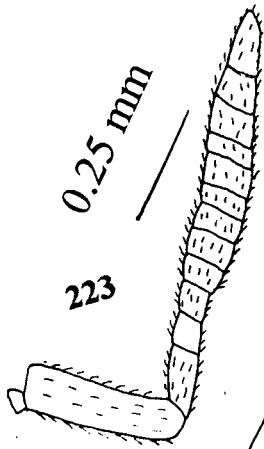
224



0.25mm.

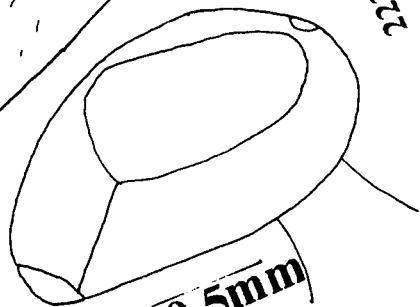
0.25 mm

223



222

0.5mm



Figs. 225-231. *Reikosiella crisagatra* Narendran, Female

Fig. 225. Head- Front View

Fig. 226. Head- Dorsal View

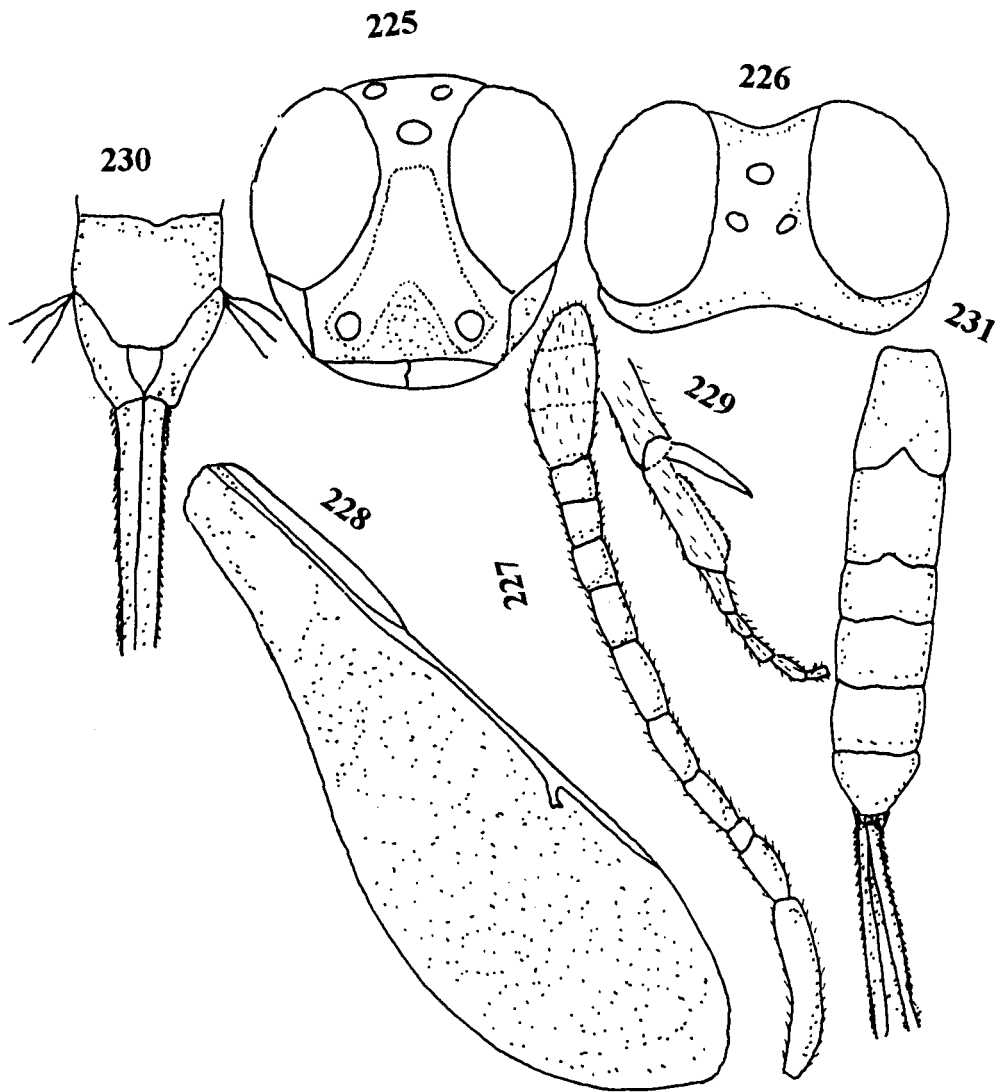
Fig. 227. Antenna

Fig. 228. Fore Wing

Fig. 229. Mid tibial spur and Mesotarsus

Fig. 230. Gaster-Apical Portion

Fig. 231. Gaster



Figs. 232- 236. *Reikosiella gibsoni* Anil and Narendran, Female

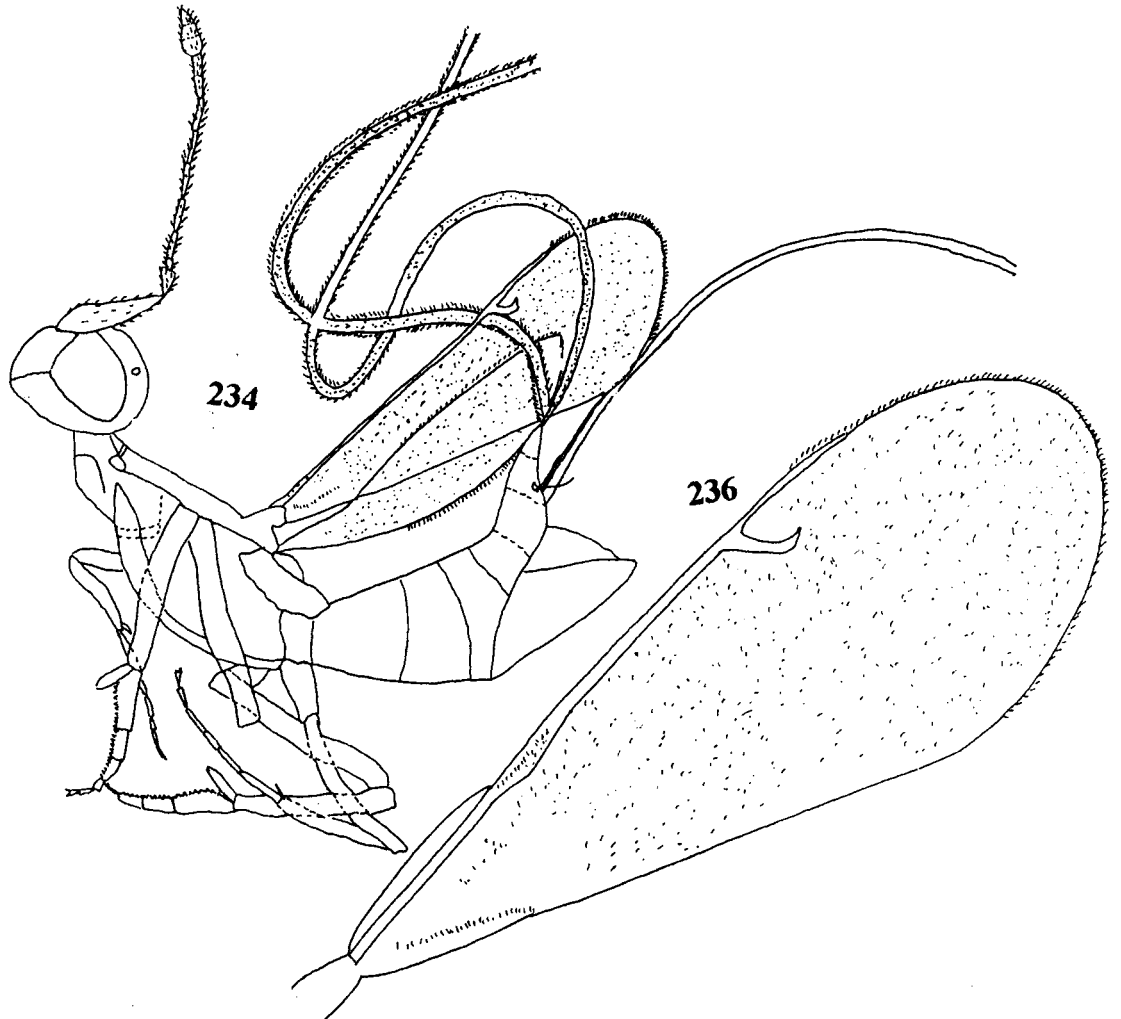
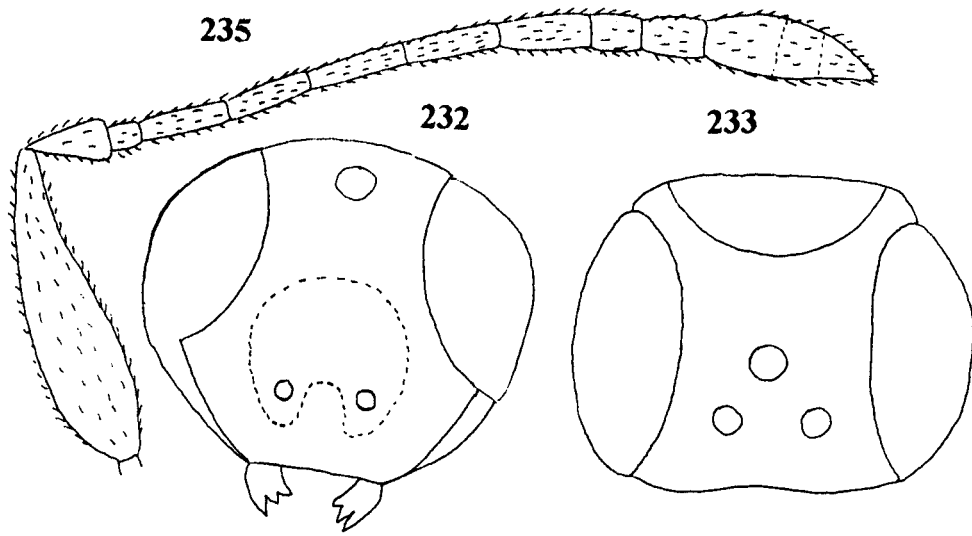
Fig. 232. Head- Front View

Fig. 233. Head- Dorsal View

Fig. 234. Female- Entire

Fig. 235. Antenna

Fig. 236. Fore Wing



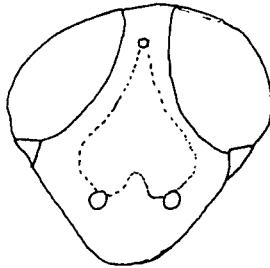
15

Figs. 237-238. *Reikosiella luxa* Narendran, Female

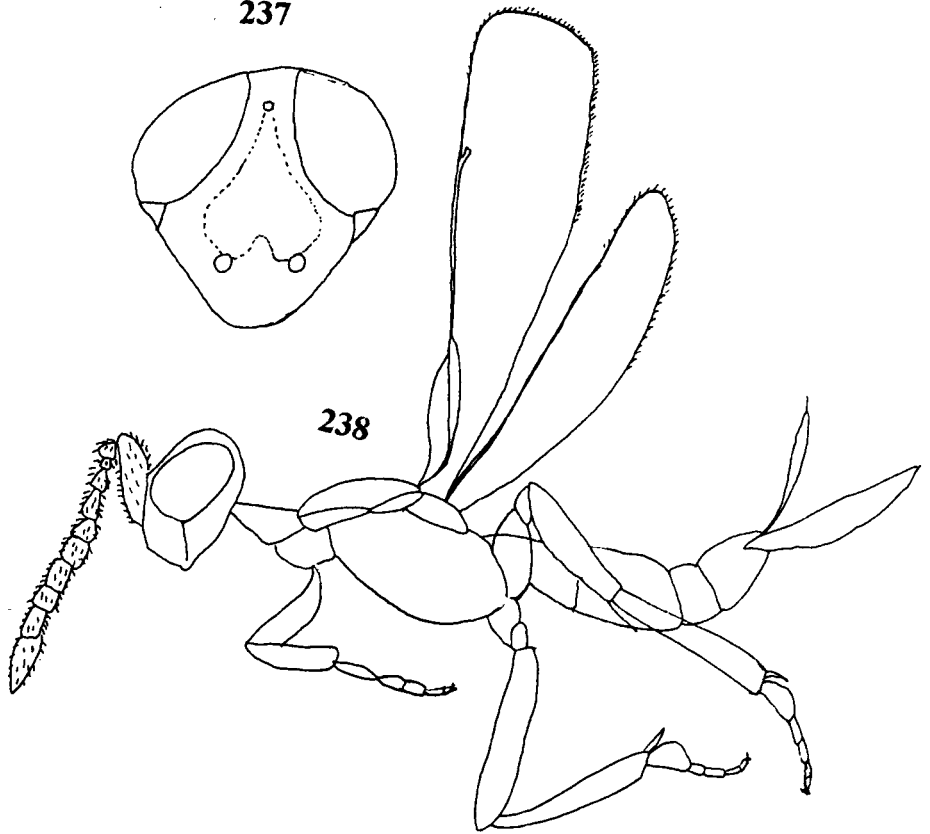
Fig. 237. Head- Front View

Fig. 238. Female- Entire

237



238



117

118

Figs. 239- 245. *Reikosiella (Hirticauda) quilonica* (Narendran) comb.nov.,

Female

Fig. 239. Head- Front View

Fig. 240. Head – Dorsal View

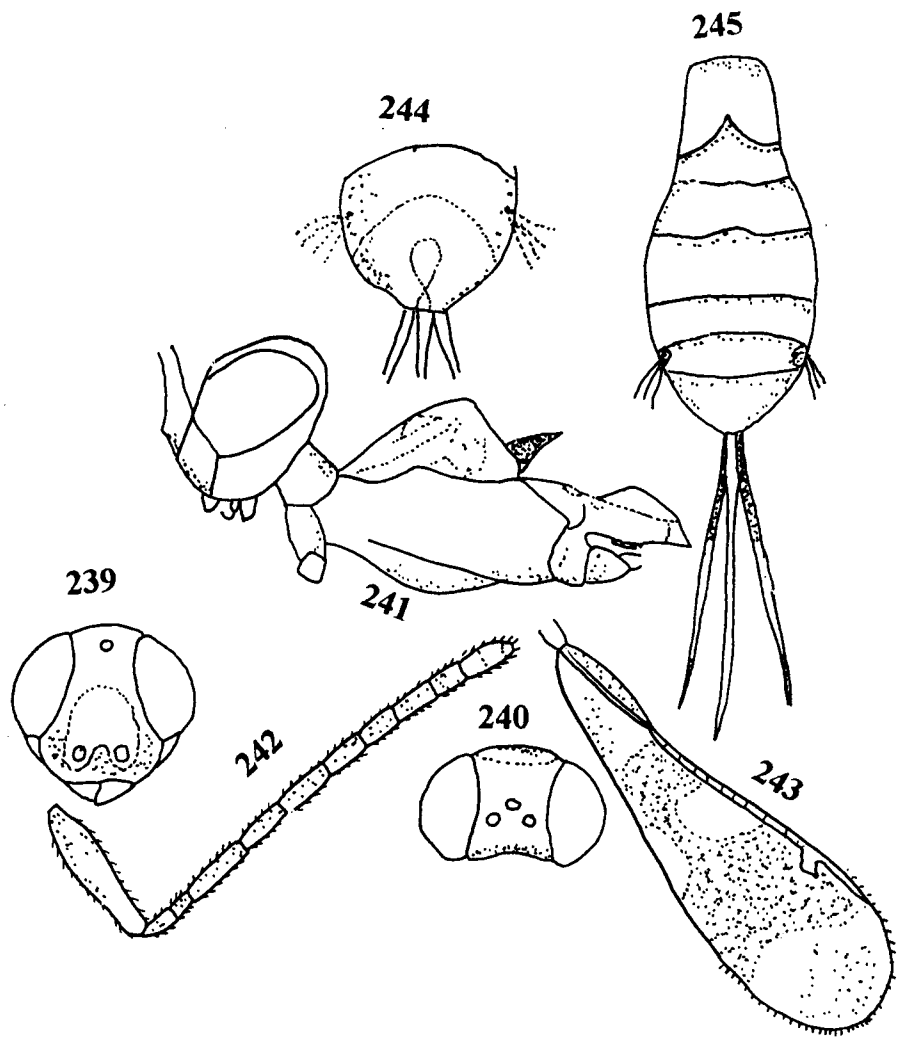
Fig. 241. Female- Lateral View

Fig. 242. Antenna

Fig.243. Fore Wing

Fig. 244. Gaster- Apical Portion

Fig. 245. Gaster



Figs. 246- 251. *Tineobius brachartoniae* Gahan, Female

246. Head- Front View

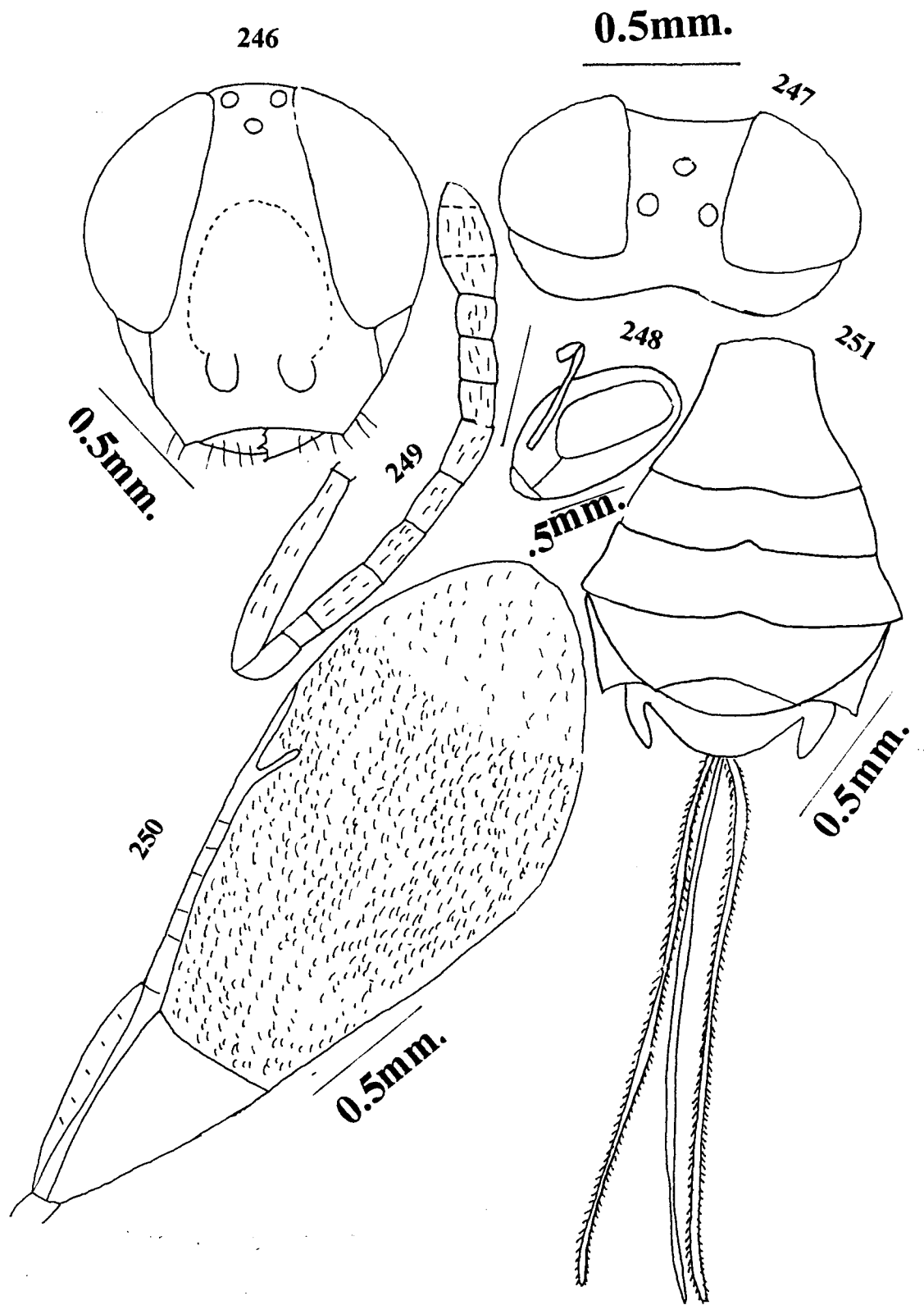
247. Head- Dorsal View

248. Head- Lateral View

249. Antenna

250. Fore Wing

251. Gaster



Figs. 252-257. *Xenanastatus distinctus* sp. nov. , Female

Fig. 252. Head- Front View

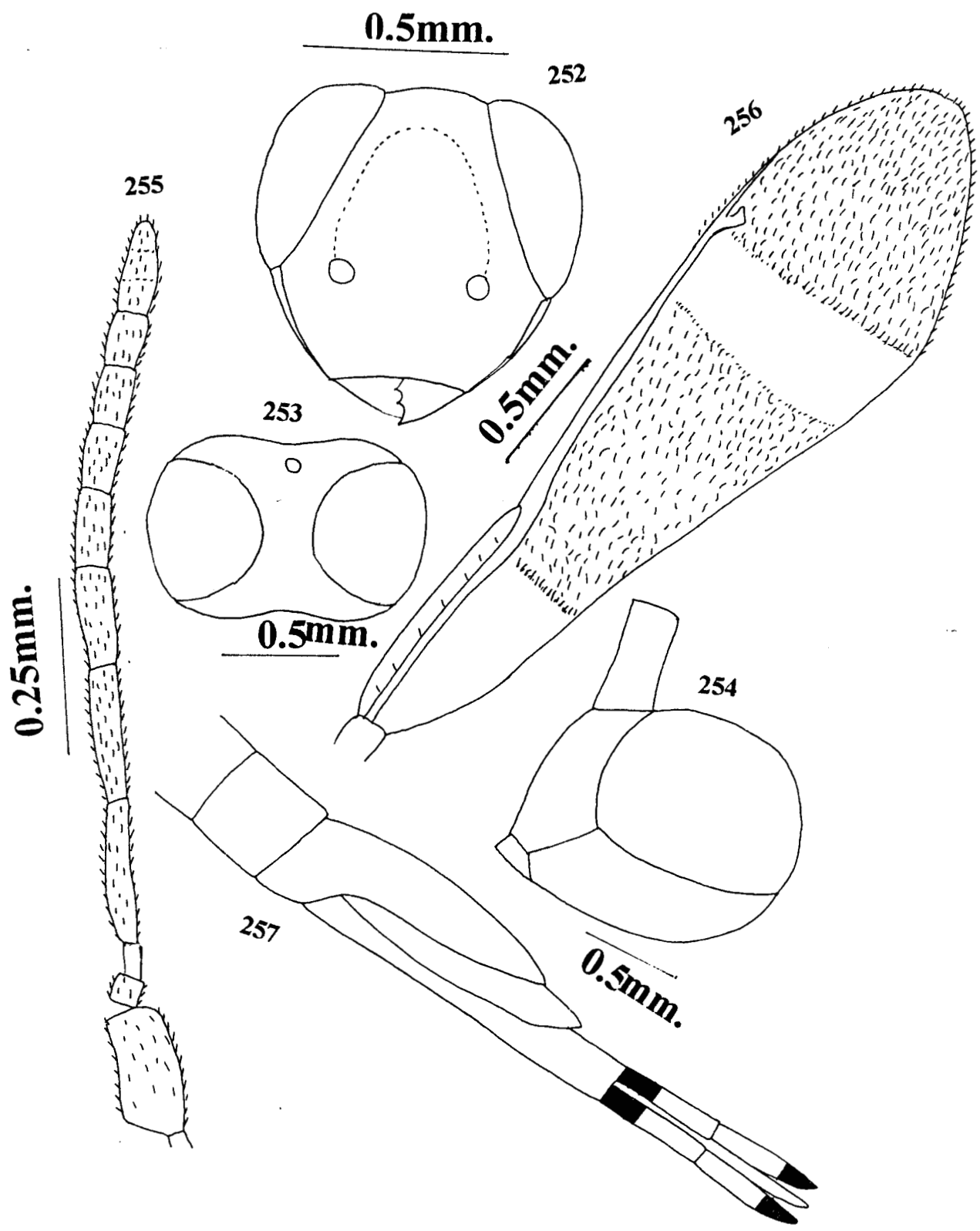
Fig. 253. Head- Dorsal View

Fig. 254. Head- Lateral View

Fig. 255. Antenna

Fig. 256. Fore Wing

Fig. 257. Gaster- Apical Portion



Figs. 258-262. *Xenanastatus keralicus* Narendran, Female

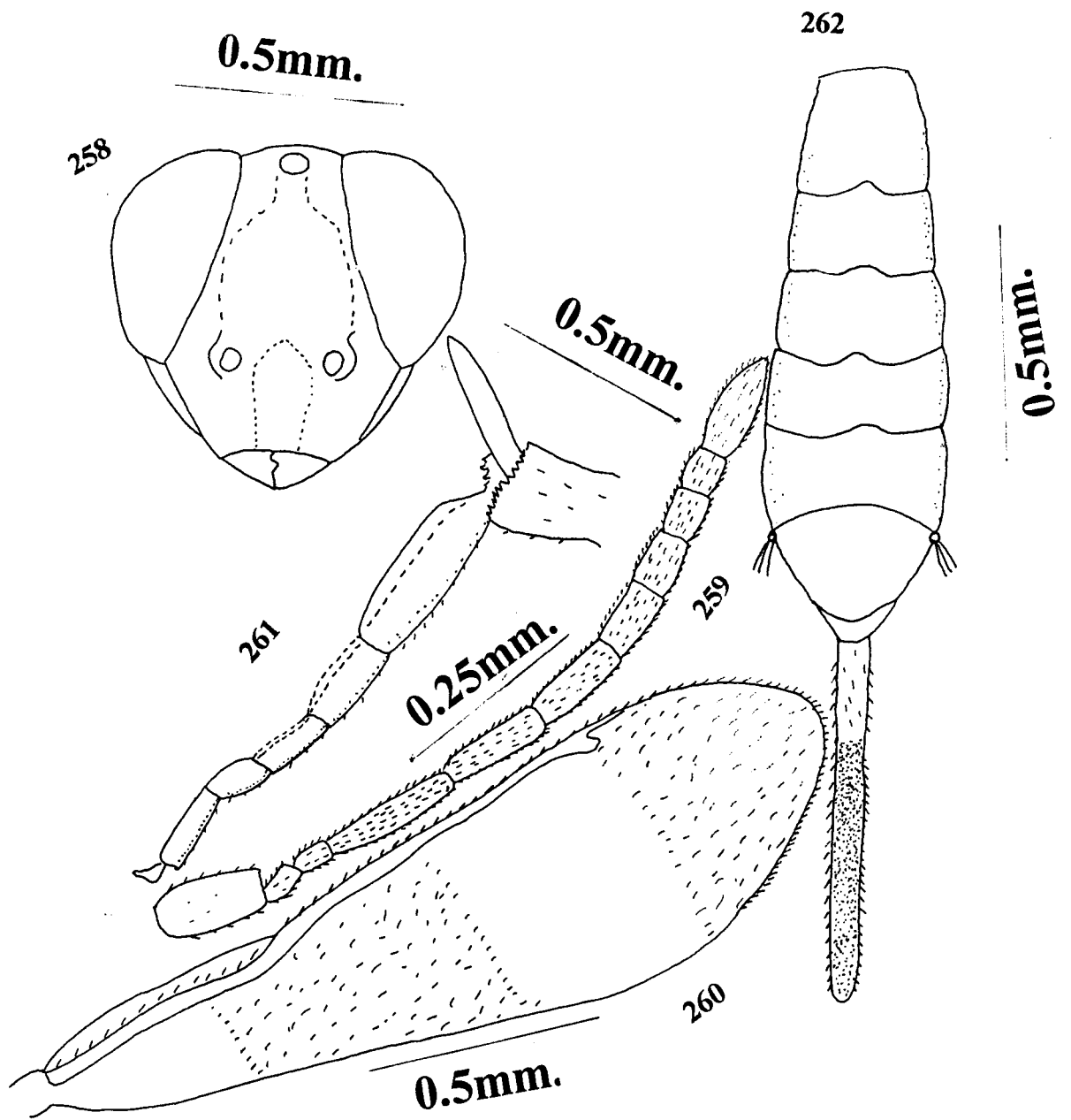
Fig. 258. Head- Front View

Fig. 259. Antenna

Fig. 260. Fore Wing

Fig. 261. Midtibial spur and Mesotarsus

Fig. 262. Gaster



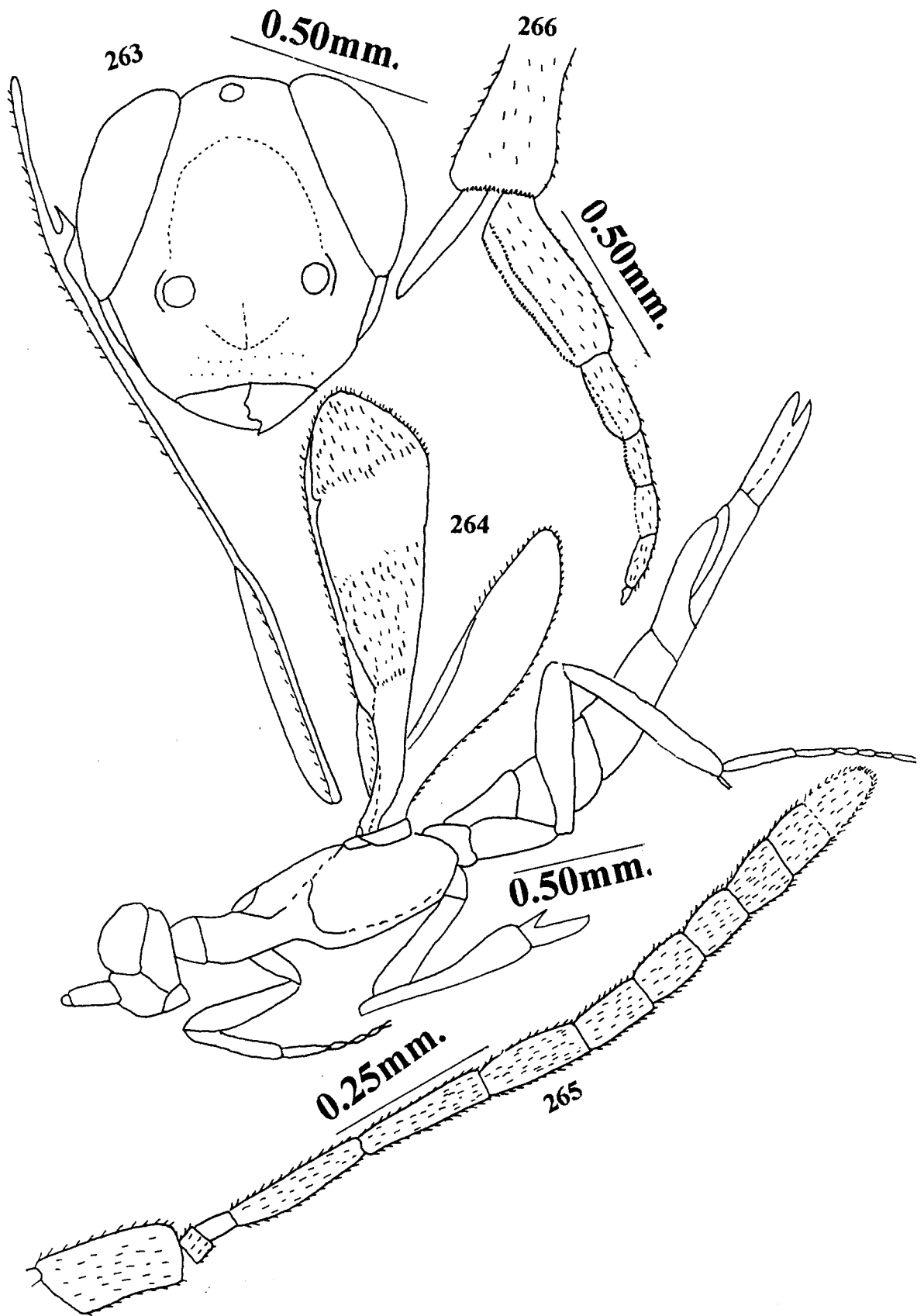
Figs. 263- 266. *Xenanastatus padus* Narendran, Female

Fig. 263. Head- Front View

Fig. 264. Female- Entire

Fig. 265. Antenna

Fig. 266. Midtibial spur and Mesotarsus

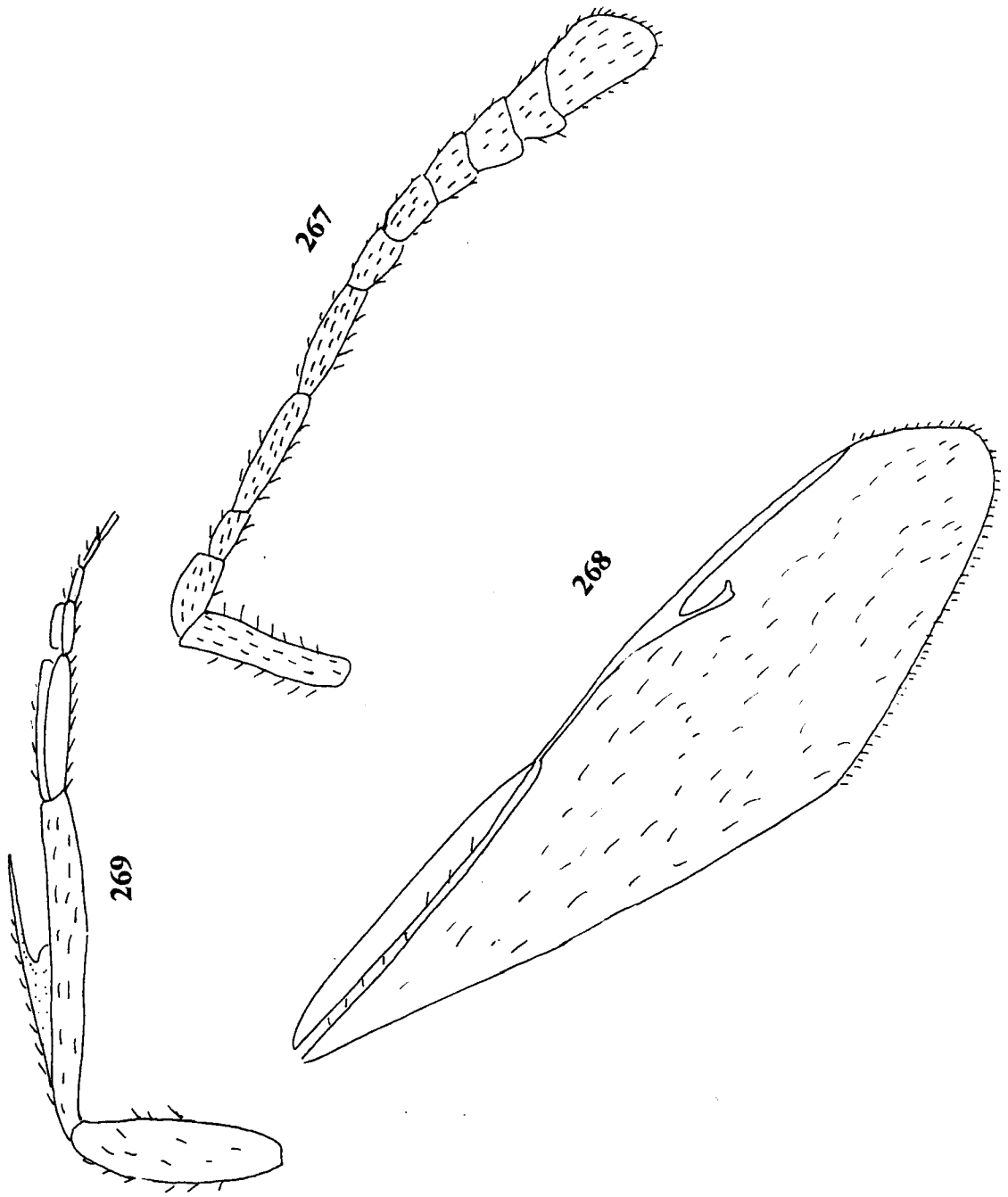


Figs. 267- 269. *Metapelma strychnocolum* Mani & Kaul, Female

Fig. 267. Antenna

Fig. 268. Fore Wing

Fig. 269. Mid tibial spur and mesotarsus



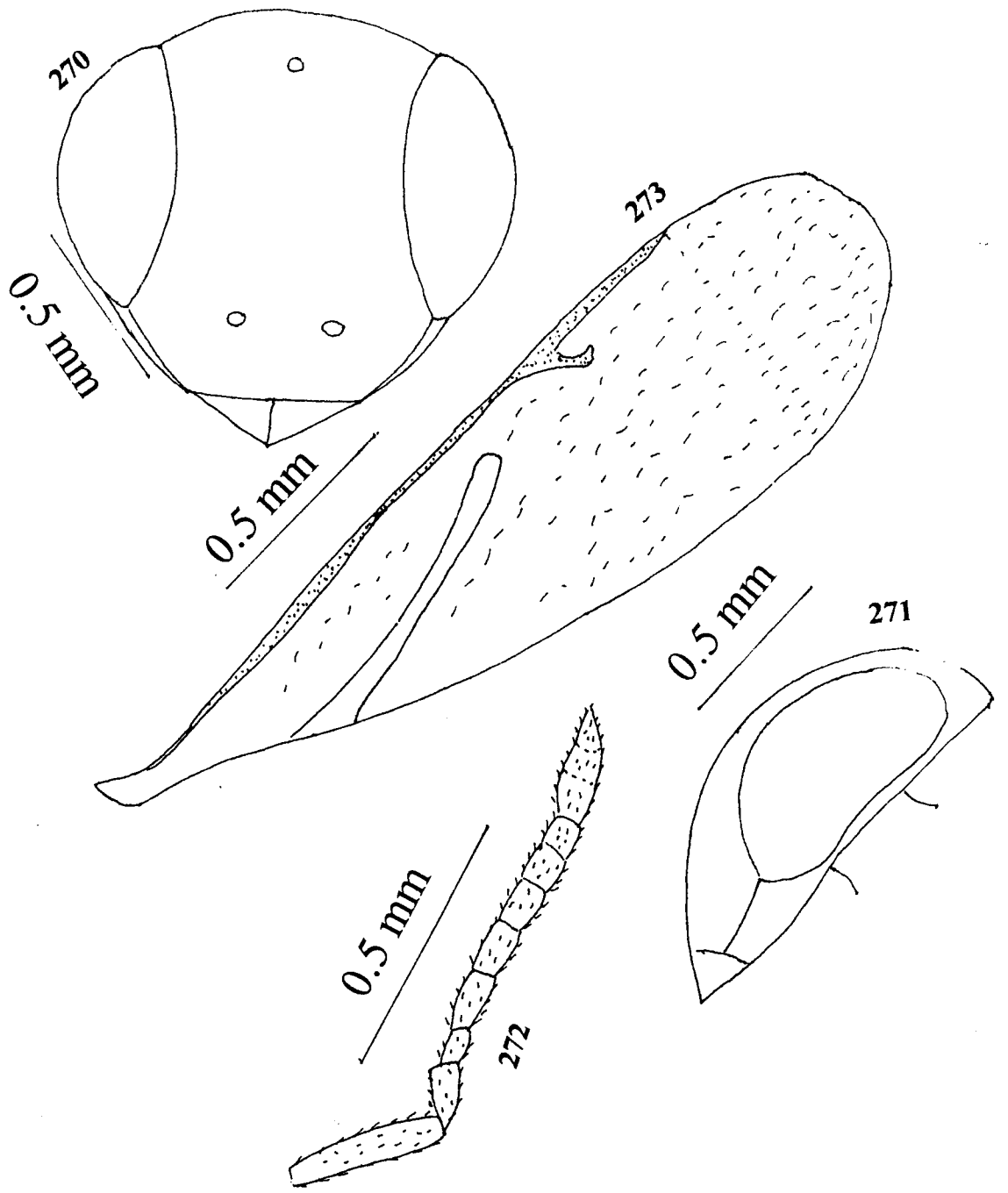
Figs. 270- 273. *Neanastatus bifurcatus* sp. nov., Female

Fig. 270. Head- Front View

Fig. 271. Head- Lateral View

Fig. 272. Antenna

Fig. 273. Fore Wing



Figs. 274- 279. *Neanastatus cinctiventris* Girault, Female

Fig. 274. Head- Front View

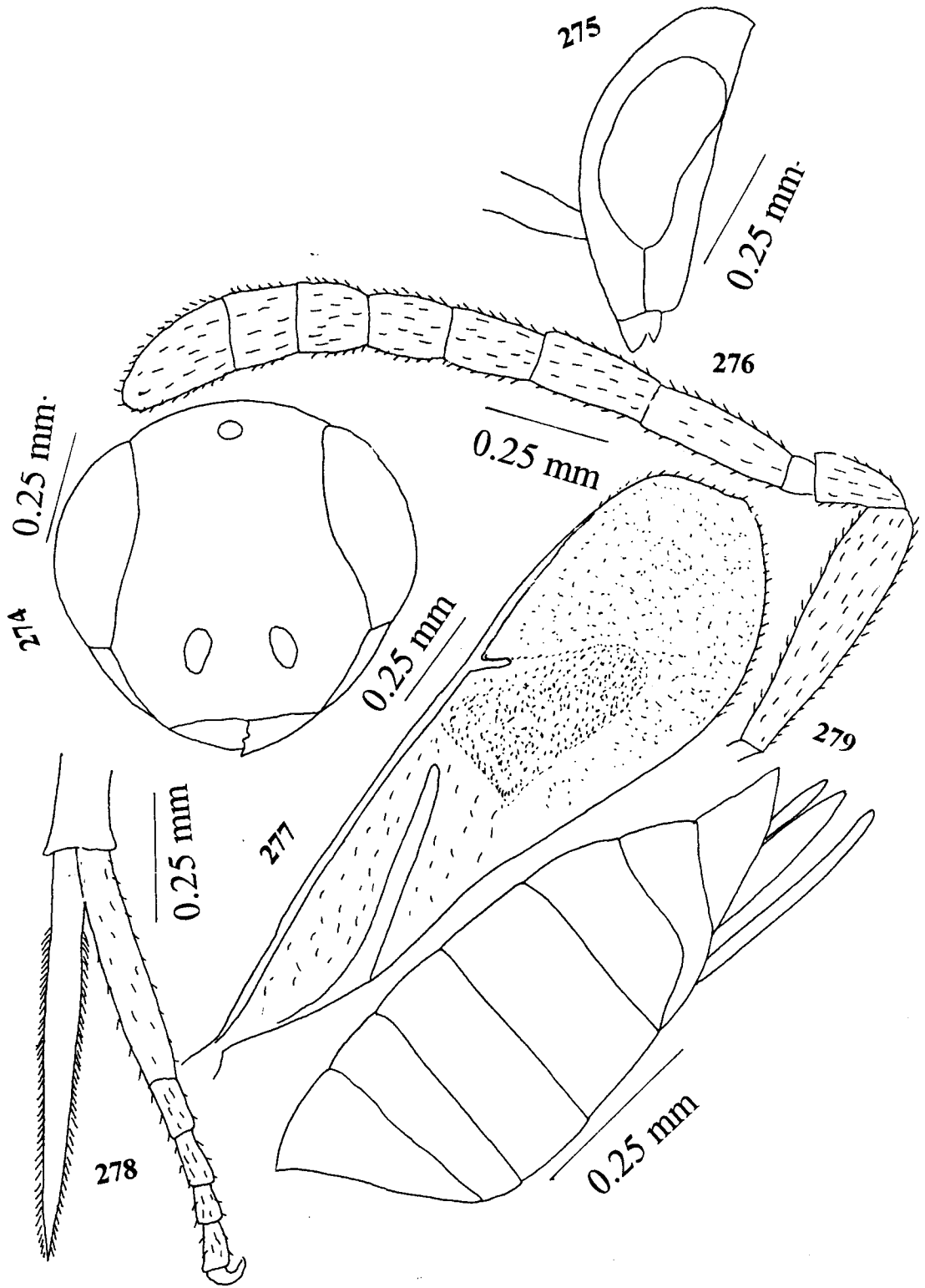
Fig. 275. Head- Lateral View

Fig. 276. Antenna

Fig. 277. Fore Wing

Fig. 278. Midtibial spur and Mesotarsus

Fig. 279. Gaster



Figs. 280- 285. *Neanastatus reksonus* Narendran, Female

Fig. 280. Head- Front view

Fig. 281. Head- Lateral view

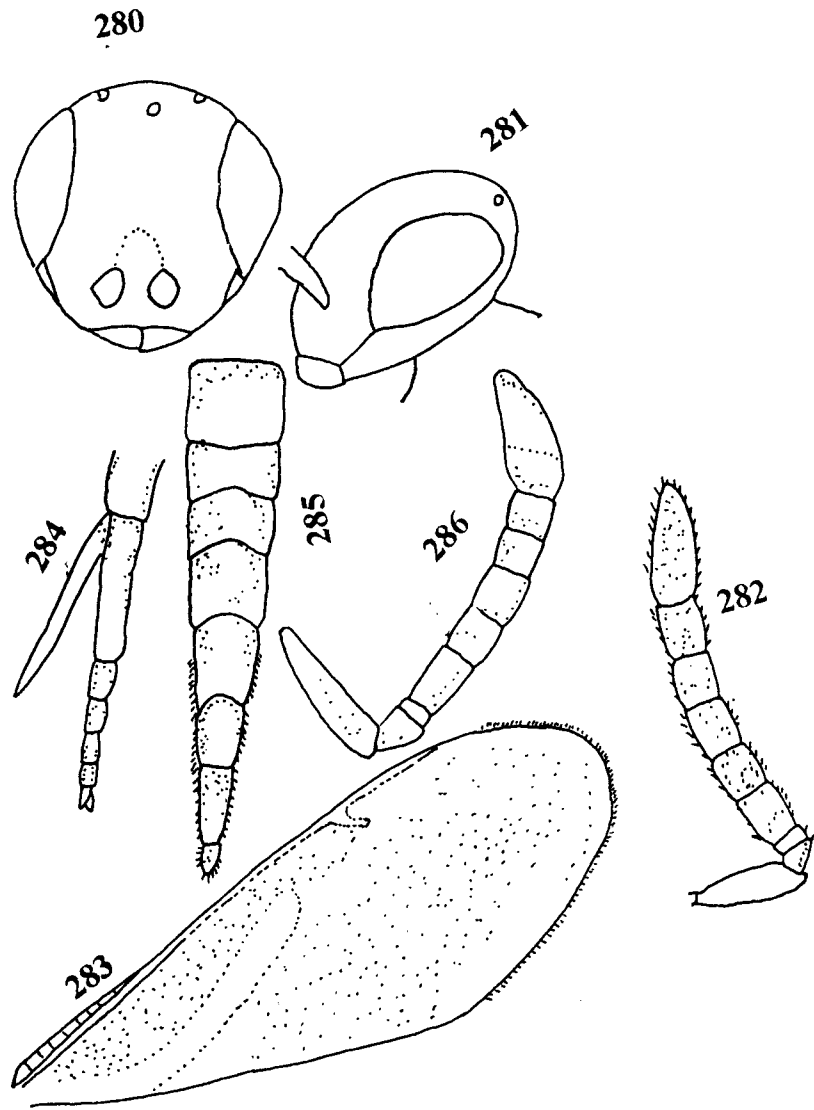
Fig. 282. Antenna

Fig. 283. Fore Wing

Fig. 284. Midtibial spur and Mesotarsus

Fig. 285. Gaster

Fig. 286. Antenna- Male



Figs. 287- 290. *Neanastatus scaposus* sp. nov.

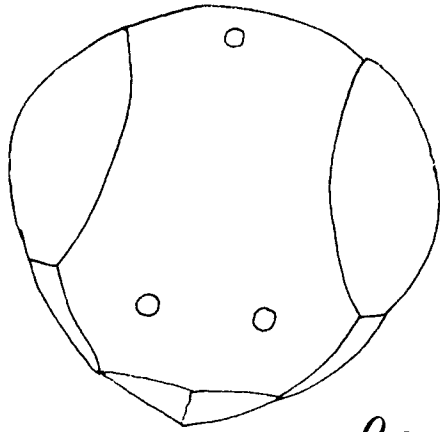
Fig. 287. Head- Front View

Fig. 288. Head- Lateral View

Fig. 289. Antenna

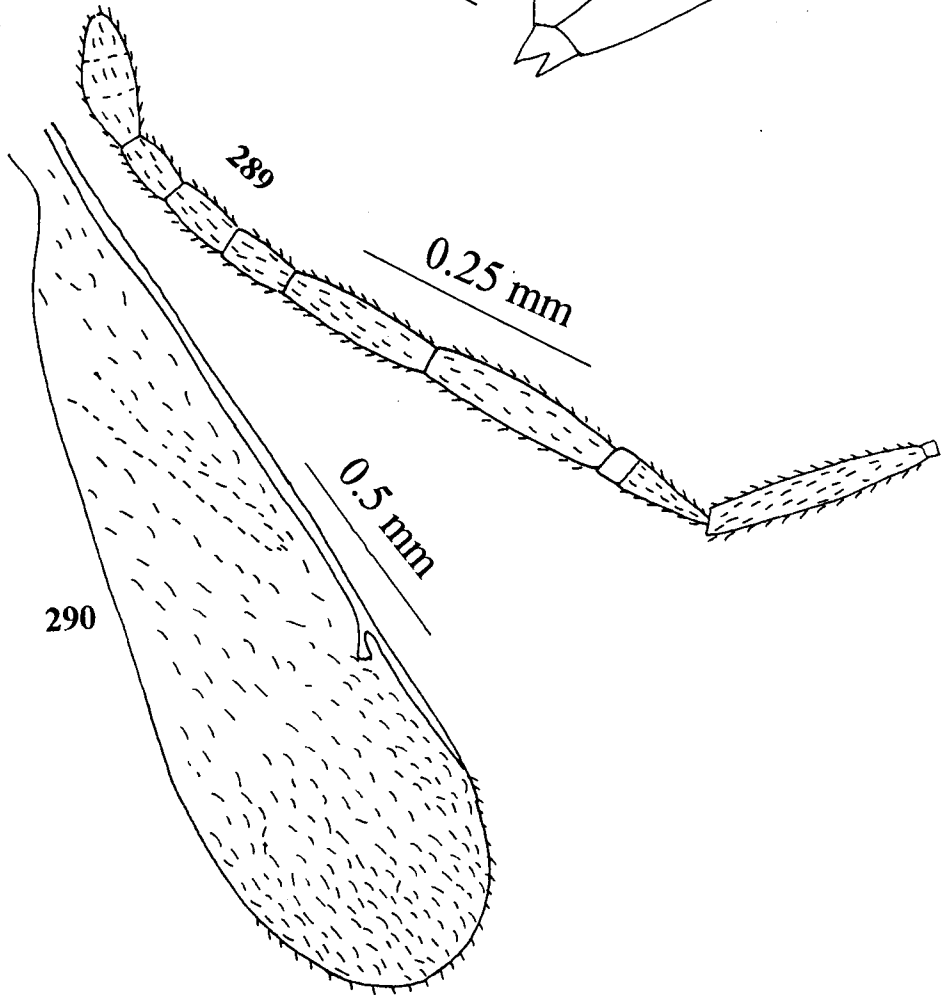
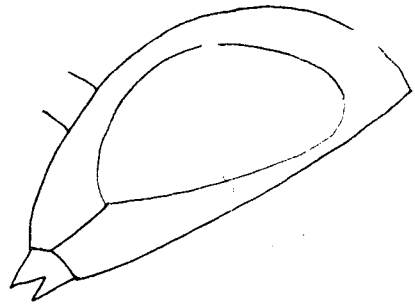
Fig. 290. Fore Wing

287



0.25 mm.

288



289

0.25 mm

290

0.5 mm

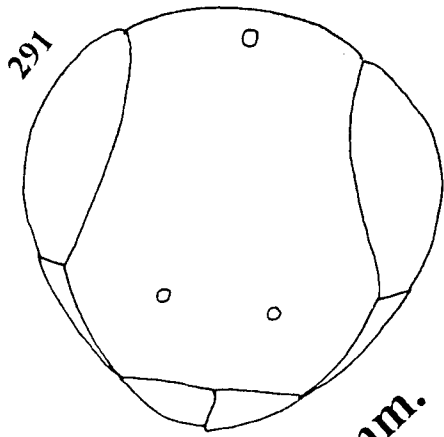
Figs. 291- 294. *Neanastatus sheelae* sp. nov. , Female

Fig. 291. Head- Front View

Fig. 292. Head- Lateral View

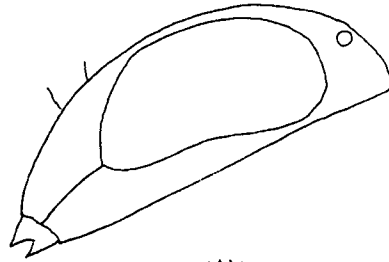
Fig. 293. Antenna

Fig. 294. Fore Wing

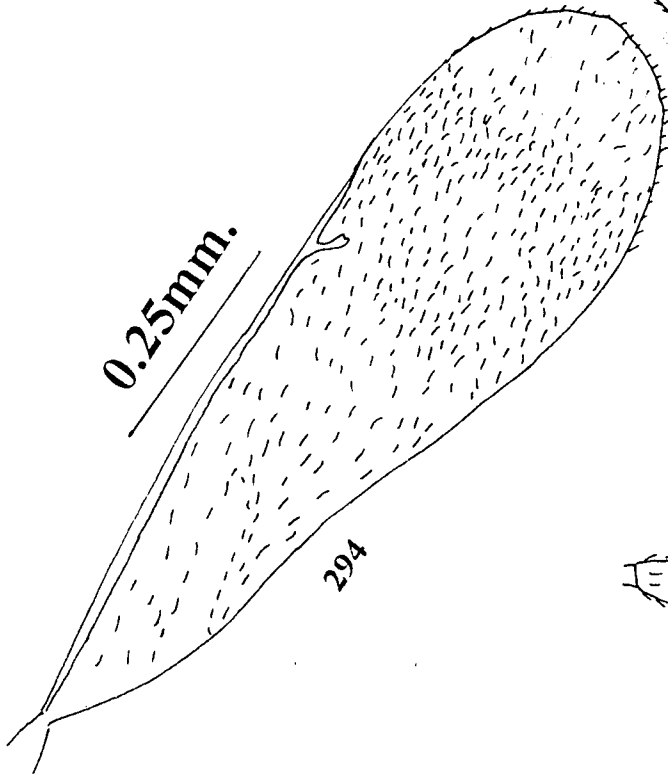


0.25mm.

292

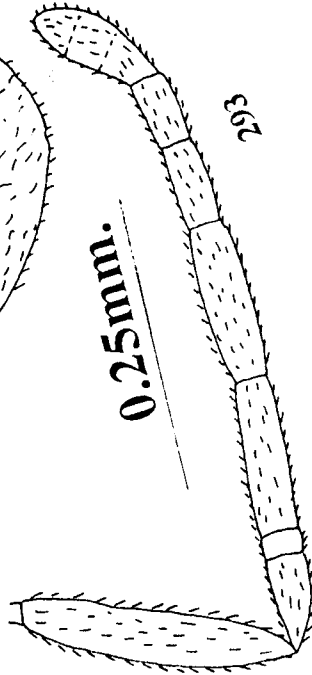


0.25mm.



0.25mm.

293



Figs. 295-300. *Neanastatus trochantericus* Gahan, Female

Fig. 295. Head- Front View

Fig 296. Antenna

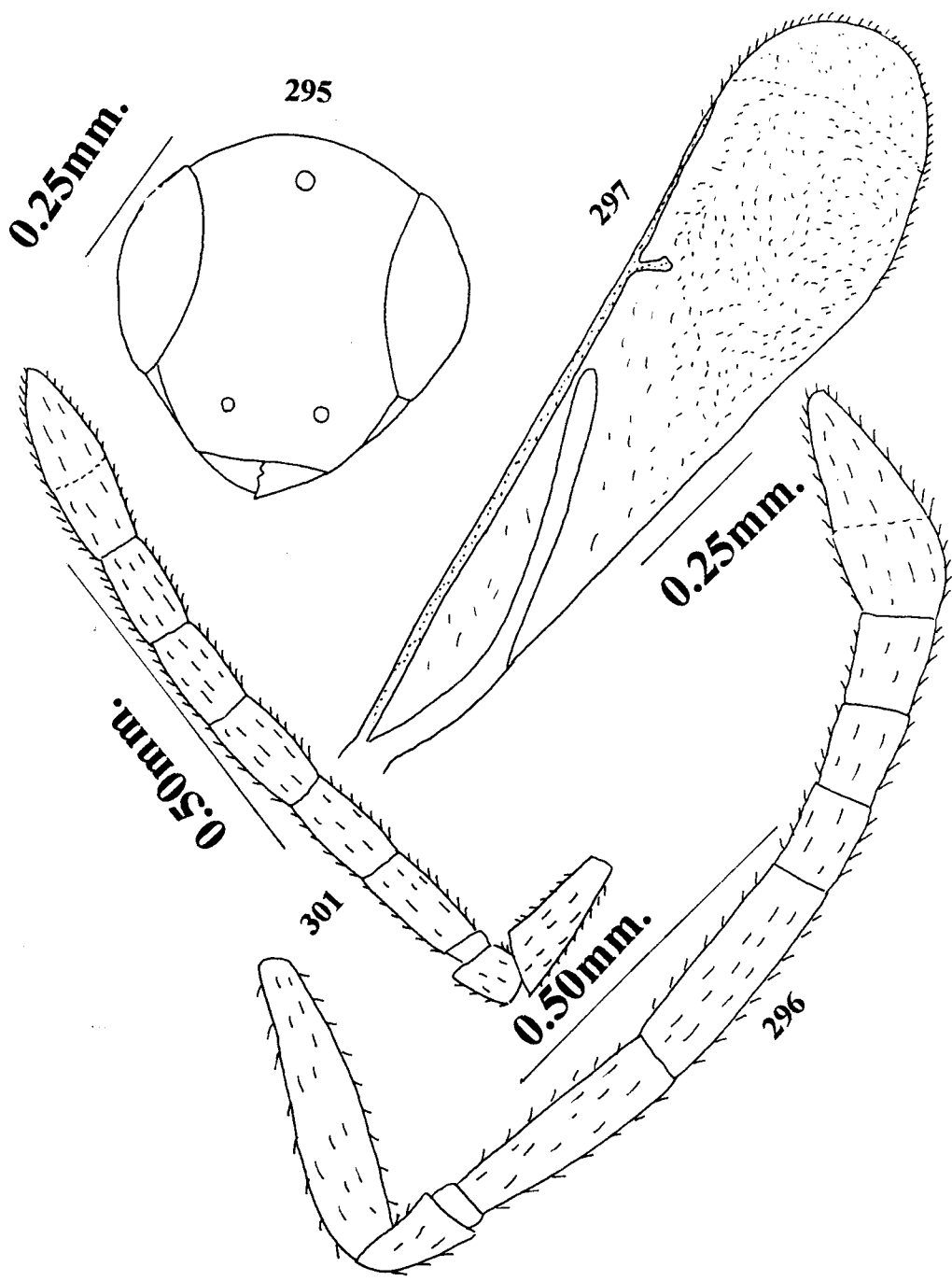
Fig. 297. Fore Wing

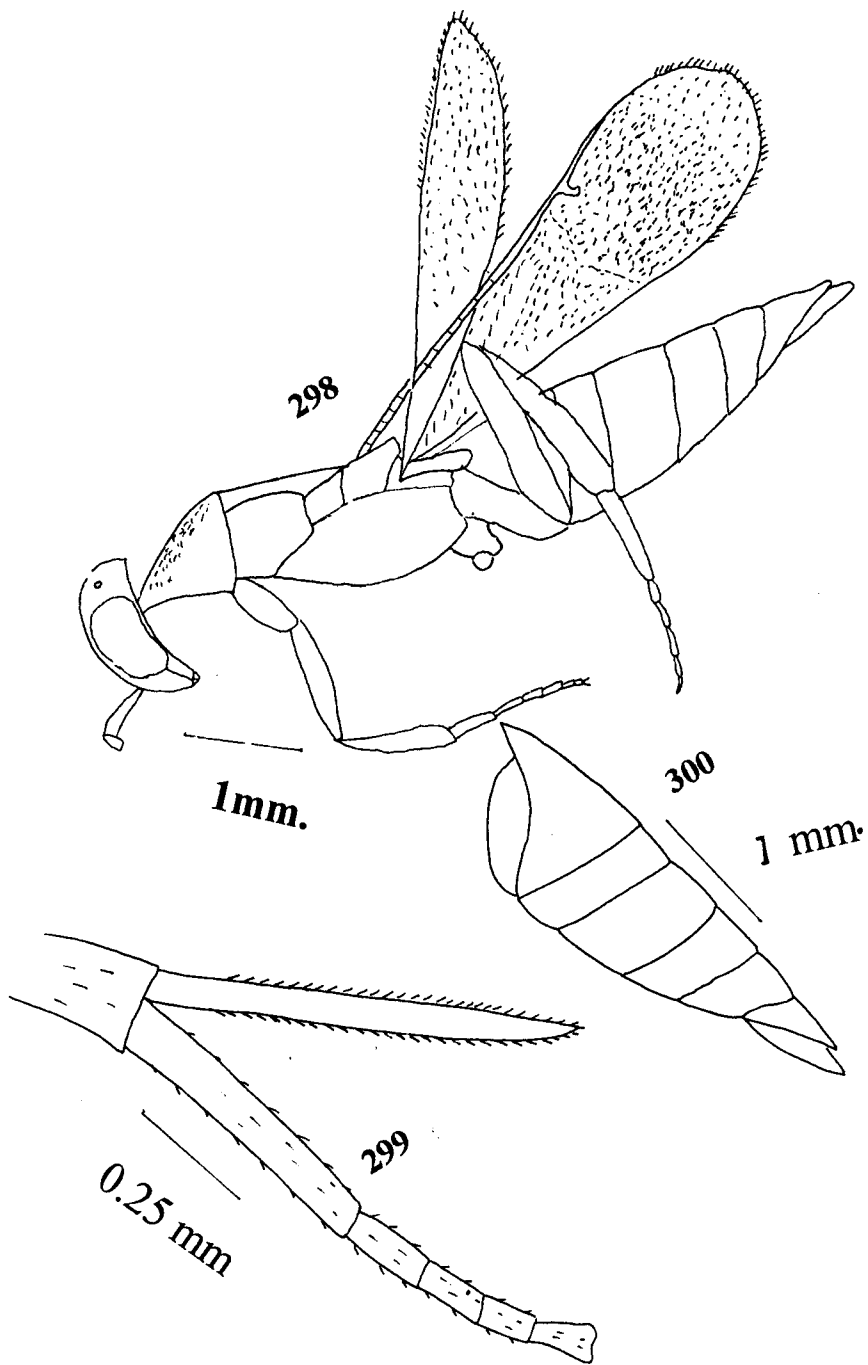
Fig. 298. Female- Entire

Fig. 299. Midtibial spur and Mesotarsus

Fig. 300. Gaster

Fig. 301. Male- Antenna





Figs. 302- 306. *Neanastatus turneri* Ferriere, Female

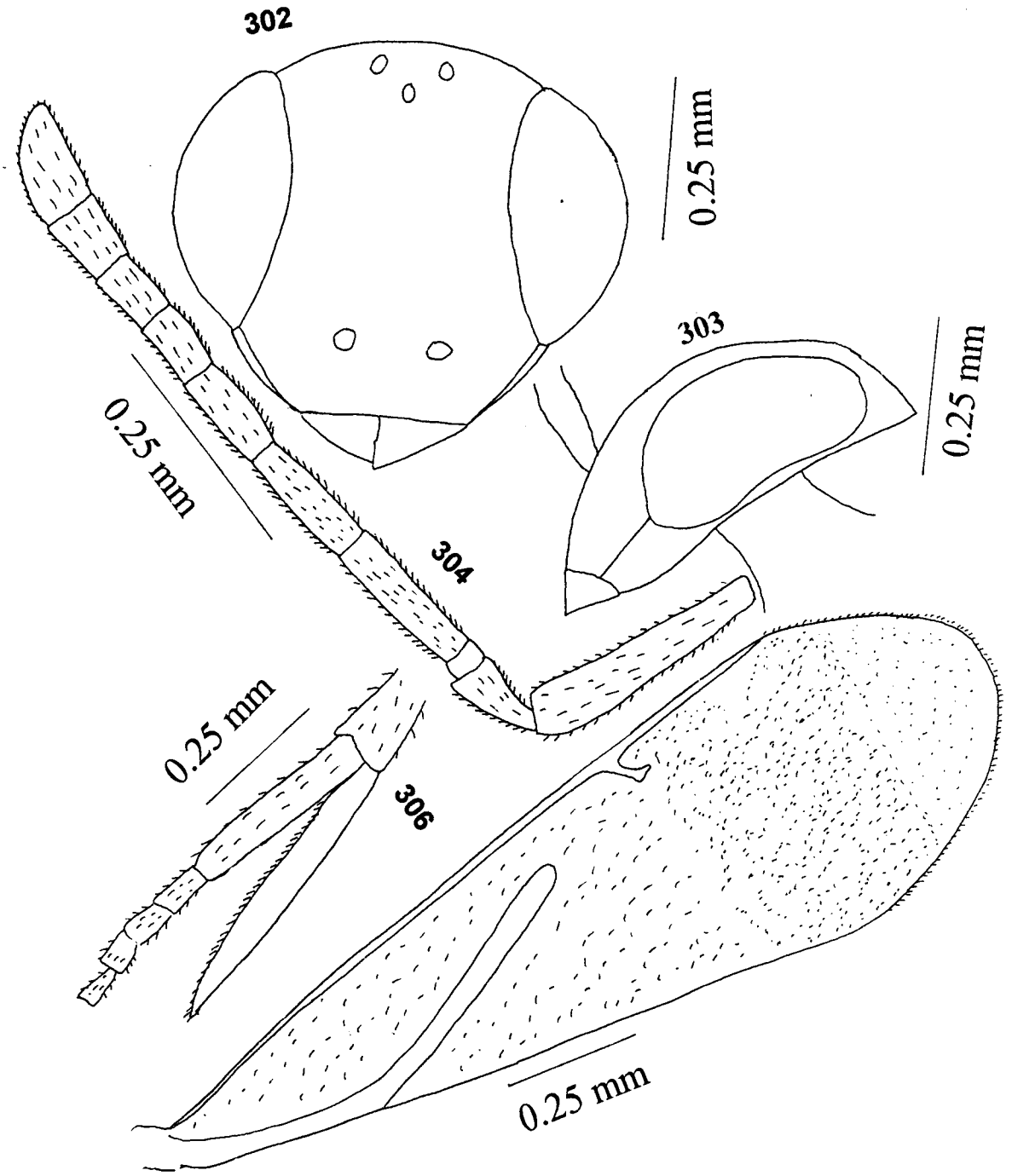
Fig. 302. Head- Front View

Fig. 303. Head- Lateral View

Fig. 304. Antenna

Fig. 305. Fore Wing

Fig. 306. Midtibial spur and Mesotarsus



PUBLICATIONS

CHECKLIST OF EUPELMIDAE (HYMENOPTERA: CHALCIDOIDEA) FROM THE INDIAN SUBCONTINENT

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University of Calicut, Kerala - 673 635

ABSTRACT

Checklist of the genera and species of Eupelmidae (Hymenoptera: Chalcidoidea), so far reported from the Indian subcontinent, is provided. There are seventeen genera with sixtyfive valid species .

Key words: Eupelmidae, Checklist, Hymenoptera, Indian subcontinent, Synonymy.

INTRODUCTION

Family Eupelmidae comprises about ninety nominal genera and nine hundred described species (Gibson, 1993). Eupelmids are seen distributed all over the continents. The family name Eupelmidae was introduced by Walker (1833). Ashmead and Girault (1915) treated Eupelmids as a subfamily of Encyrtidae. According to Boucek(1988) Eupelmids developed from some primitive ancestors of Pteromalidae. Members of Eupelmidae shows similarities with Encyrtidae and Tanaostigmatidae. From the known biologies of Eupelmids it is very well understood that the members are primary or secondary parasitoids of numerous insects including Lepidoptera, Heteroptera and Diptera. *Eupelmus urozonus* (Dalman) and *Macroneura pedatoria* Ferriere are parasitic on cotton-stem weevil *Pemphres*. Boucek (1979) reported a new species *Anastatus* (*Cladanastatus*) *umae* which parasites the ootheca of cockroaches in India. The species *Anastatus mirabilis* W. and R. is known as "Back-rolling wonder" since it has the habit of tumbling

about after jumping before gaining a foot hold (Riley, 1874). The diverse host relationships of Eupelmids as well as their hosts which in turn are important insect pests, adds to the economic importance of Eupelmid fauna. The family Eupelmidae contains three subfamilies: Calosotinae, Metapelmatinae, Eupelminae.

Islam & Hayat (1985) and Mani(1988) revised the Indian genera of Eupelmidae. Narendran (1984) and Narendran & Anil (1991) also studied on the Indian Eupelmidae.

ARRANGEMENT OF THE CHECKLIST

In the checklist, Eupelmid genera known so far from the Indian subcontinent are grouped under separate subfamilies. The subfamilial classification by Boucek is followed. Under each subfamily the genera are listed in alphabetical order. Name of the genus is followed by the author and year. Under each genus, species are listed in alphabetical order. Name of the species is followed by its distribution in the Indian subcontinent. In the distribution, name of the country is followed by the state, available localities, type of the habitat and host-data available from the region. Valid names of Eupelmidae are given in bold italics.

DISTRIBUTION

The present checklist deals with sixtyfive species pertaining to seventeen genera and three subfamilies of Eupelmidae known so far from the Indian subcontinent. Geographically the checklist covers the so called Indian subcontinent including Pakisthan, India, Nepal, Bangladesh, Bhutan, Myanmar and Srilanka..

CHECKLIST OF EUPELMIDAE OF INDIAN SUBCONTINENT

SUBFAMILY CALOSOTINAE

GENUS *BALCHA* Walker
indica (Mani & Kaul 1973)
Thaumasura indica Mani&Kaul
India (Uttarpradesh)
Host: *Pterocarpus marsupium*

GENUS *CALOSOTA* Curtis
shyama Narendran 1996
India (Kerala)
Host: Unknown

SUBFAMILY EUPELMINAE

GENUS *ANASTATUS* Motschulsky
acherontiae Narayanan et.al.;1960
India (Delhi, Punjab, Kerala)
Host: Eggs of *Acherontiae* Styx

amarus (Subharao, 1957)
India (Delhi, Bihar)
Hosts: *Tessaratomya javanica*
Hymenia recurvalis
Apanteles delhiensis through
Hymenia recurvalis

bangalorensis Mani & Kurien 1953
 India (Karnataka, Kerala)
 Host: Pentatomid eggs

bifasciatus (Geoffroy 1785)
 India (Kashmir)
 Host: *Cinara schmitscheki*
Psylla pruni

coimbatorensis Girault
 India (Tamilnadu)
 Hosts: *Polyptychus dentatus*
Oxya velox

colemani Crawford 1912
 India (Bihar, Karnataka,
 Tamilnadu, Uttarpradesh)
 Hosts: *Degonetus serratus*
Placosternum dama
Tessaratomya javanica
Tetroda histeroides
Kerria lacca

dentatus Narayanan et al. 1960
 India (Delhi, Bihar, Kerala)
 Hosts: *Halys dentata*
Tessaratomya javanica

echidna Motschulsky 1863
 Srilanka
 Host: Unknown

japonicus Ashmead 1904
disparis Ruschka 1921
 India (Himachalpradesh)
 Host: *Porthetria dispar*

kashmirensis Mathur 1956
 India (Himachalpradesh, Jammu
 & Kashmir)
 Hosts: *Lymantria obfuscata*
Porthetria dispar

leithi (Walker 1872)
Eupelmus leithi Walker 1872
 Srilanka
 Host: *Duranta* sp.

madagascarensis Risbec 1952
umae Bouček 1979
 India (Andrapradesh, Karnataka)
 Hosts: *Neostylopyga rhombifolia*
Periplaneta americana

mantoidae Motshulsky 1859
 Srilanka
 Host: Mantid ootheca

ramakrishnai (Mani, 1935)
Neanastatus ramakrishnai Mani
 , 1935
 India (Maharashtra, Tamilnadu,
 West Bengal)
 Hosts: *Homoeocerus prominulus*
Cordius obscurus
Halys dentata

tenuipes Bolivar 1925
 India (Karnataka, Rajasthan,
 Uttarpradesh, West Bengal)
 Host: *Periplaneta Americana*

yasumatsui Shafee 1973
 India (Karnataka)
 Host: *Acacia arabica*

GENUS *AUSTRALOODERA*
 Girault
quilonica Narendran 1996
 India (Kerala)
 Host: Unknown

GENUS *CALYMMOCHILUS*
 Masi
nilamburicus Narendran 1996
 Host: Unknown

GENUS *EUPELMUS* Dalman
amorphococci Ashmead 1925
 Srilanka
 Host: *Amorphococcus mesuae*

amphitus Walker 1846
 India (Kerala, Maharashtra)

australiensis (Girault 1913)
 India (Karnataka)

- australis*** Girault 1915
India (Kerala)
- atus*** Narendran 1995
India (Kerala)
Host: Unknown
- bonus*** Narendran 1995
India (Kerala)
Host: Unknown
- carinatus*** Kieffer 1905
India (West Bengal)
Host: Cecidomyiid galls on
Artemisia
- catoxanthae*** Ferriere 1941
India (Kerala)
Host: Unknown
- curiosus*** Narendran 1995
India (Kerala)
Host: Unknown
- ignotus*** Narendran & Anil 1998
India (Kerala)
Host: Unknown
- indicus*** Narendran & Anil 1998
India (Kerala)
Host: Unknown
- javae*** Girault 1917
Sri Lanka, India
(Kerala, Meghalaya)
Host: *Aximopsis javensis*
- kashmiricus*** Narendran 2001
India (Jammu & Kashmir)
Hosts: *Malus sylvestris*
Scolytus sp.
- licinus*** Narendran 1995
India (Kerala)
Host: unknown
- longicarpus*** Girault 1915
India
Host: unknown
- malabaricus*** Narendran 1995
India (Kerala)
Host: Unknown
- nirupama*** Narendran 1996
India (Kerala)
Host: Unknown
- orientalis*** Crawford 1913
India (Karnataka)
Host: Unknown
- pedatorius*** Ferriere 1939
India
Host: Unknown
- retrosus*** Narendran 1995
India (Kerala)
Host: Unknown
- rexonus*** Narendran 1995
India (Kerala)
Host: Unknown
- tachardiae*** Howard 1896
Sri Lanka, Pakistan, India
(Uttar Pradesh)
Host: *Taachardiaphagus tachardiae*
- tenuicornis*** Kieffer 1905
India (Uttar Pradesh, West Bengal)
Host: *Lasioptera textor*
- terminale*** Hafiz 1938
India (West Bengal)
Host: Lasiolepidid eggs
- testaceiventris*** Motschulsky 1863
India (Kerala)
Host: Unknown
- urozonus*** Dalman 1820
India (Gujarat, Tamil Nadu, West Bengal)
Host: *Apion corchori*
Asphondylia sps.
Hypolixus truncatulus
Pempheres affinis
- vermai*** (Bhatnagar) 1952
India (Uttar Pradesh)
Host: Unknown

zandanus Narendran 1995
India (Kerala)
Host: Unknown

GENUS EUSANDALUM

Ratzeburg
gardneri Mani & Kaul 1973
India ((Uttarpradesh)

GENUS MESOCOMYS Cameron

atulyus Narendran 1996
India (Kerala)
Host: Egg clusters of *Antheraea*
sp. (Lepidoptera: Saturniidae)

orientalis Ferriere 1935
Bangladesh, Burma, India. (Kerala,
Uttarpradesh)
Host: *Trabala vishnoui*

GENUS REIKOSIELLA Yoshimoto

crisagatra Narendran 1996
India (Kerala)
Host: unknown

gibsoni Anil & Narendran 1991
India (Kerala)
Host: unknown

luxa Narendran 1996
India (Kerala)
Host: unknown

GENUS TINEOBIUS Ashmead

brachartoniae Gahan 1927
Srilanka, India (Kerala)
Host: *Psyche vitrea*

indica Ferriere 1938
Pakistan
Host: On Lac

GENUS XENANASTATUS Boucek

padus Narendran 1998
India (Kerala)

keralicus Narendran 1998
India (Kerala)
Host: Unknown

SUBFAMILY METAPELMATINAE

GENUS METAPELMA Westwood

albisquamulatum Enderlin 1912
Srilanka

compressipes Cameron 1909
Indonesia, India (Karnataka)
Host: *Xylotreces sp.*

indica Girault?
India?
Host: *Dinoderus sp.*

mesandamana Mani & Kaul 1973
India (Middle Andaman)
Host: unknown

obscurata Westwood 1874
India, ?
Host: unknown

strychnocola Mani & Kaul 1973
India (Tamilnadu)
Host: unknown

taprobane Westwood 1874
Srilanka, India
Host: unknown

GENUS NEANASTATUS Girault

cinctiventris Girault 1913
India (Madhya Pradesh, Orissa,
Tamilnadu, Kerala)
Host: *Orseola oryzae*

indicus Shafee 1973
India (Uttarpradesh)
Host: gall forming *psyllids*

proximus Ferriere 1938
Hosts: *Eumarchalia gennadi*
Dactylethra candida

pulchricorpus (Girault 1914)
India (Tamilnadu) Host: galls

reksonus Narendran 1996
India (Kerala)
Host: Unknown

trochantericus Gahan 1919
India (Tamilnadu, Kerala)
Host: Galls

turneri Ferriere 1938
India (Kerala)
Host: Unknown

ACKNOWLEDGEMENTS

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