

Fauna of India



HYMENOPTERA SCOLIIDAE

**S. K. GUPTA
J. K. JONATHAN**

This volume deals with the family Scoliidae which belongs to Aculeate group of Hymenoptera. It forms one of the most important ectoparasitoid group of Hymenoptera. This group constitutes more than 17% of the world fauna. The member of this family are commonly known as hairy wasps, usually black in colour, marked with spots or bands of yellow, white or red. Their wings are usually with metallic iridescence. The vestiture varies from black, white to entirely golden or reddish. These wasps in length may range from 5 to 50 mm. This volume deals with two tribes of subfamily Scoliinae of the family Scoliidae. The other subfamily Proscoliinae is restricted to Greece and Armenia. The Scoliinae is represented by tribes: Campsomerini and Scoliini. As a result of this study 79 species/subspecies under 19 genera have been reported from Indian subregion. Of these, eight species and five subspecies are new to science.

This fauna volume will help in identification of various species, their distribution and relationship with other allied species. It is hoped that many of these may be economically exploited for the control of noxious insect pest species.

FAUNA OF INDIA AND THE ADJACENT COUNTRIES

HYMENOPTERA : SCOLIIDAE

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FOREWORD

This Fauna of India volume on Family Scoliidae (Hymenoptera : Aculeata) belong to an important group of insects, whose members are mostly beneficial to mankind. After the publication of Bingham's (1897) and Morley's (1913) volumes on Fauna of British India, this is the first volume in the series of fauna of India on Hymenoptera.

This volume is an up-to-date taxonomic revision of the Family Scoliidae from India and adjacent countries.

The authors have made extensive and intensive surveys of various parts of India to collect specimens of this family and also borrowed material from various institutions and museums from India and abroad. The types of most taxa were examined and their identity confirmed.

The present fauna volume deals with the taxonomic revision of 79 species and subspecies under 13 genera of family Scoliidae. Of these, eight species and five subspecies are new to science.

Besides taxonomic account of various taxa, keys to tribes, genera subgenera, species and subspecies have been provided for easy identification. The distribution tables, maps, illustrations of morphological characters are also given.

The members of this family are ectoparasitoides, on the larvae of Scarabaeidae : Coleoptera. It is hoped, this volume will assist scientific workers in identification of these economically important insects that may find use in the biological control of insect pests.

July, 2003
Kolkata

J.R.B. Alfred
Director
Zoological Survey of India

PREFACE

The present study is a critical taxonomic revision of the family Scoliidae (Hymenoptera : Aculeata). The family Scoliidae is a group of fossorial aculeate wasps of Solitary habits. The members of this family are commonly known as hairy wasps, usually black in colour, marked with spots or bands of yellow, white or red. Their wings are usually dark with a metallic iridescence. The vestiture varies from black, white to entirely golden or reddish. These wasps may range from 5 to 35 mm in length and may measure up to 50 mm.

This study is based on extensive survey and collection of study material from different parts of India, including A & N, Lakshadweep islands and material including types, available in the National Zoological Collection of Zoological Survey of India, Kolkata and its various Regional Stations. These collections were supplemented by borrowing types and unidentified material from a number of Indian and Foreign institutions and museums. In addition, specimens from Nepal, Myanmar, Sri Lanka, Pakistan, Bangladesh and Thailand were also available for this study to make the study complete.

John Christian Fabricius (1775) described 12 species of true scoliids in his volume 'Systema Entomologiae' Bingham (1897) in his Fauna of British India, Hymenoptera, volume I, gave a consolidated account of the Family Scoliidae from India, including Myanmar and Sri Lanka. Bingham's fauna volume contained an account of 53 species under the genera *Scolia*, *Elis* and *Liacos*.

The present study is based on the superfamily classification proposed by Brothers (1975) who emphasised an alignment of scoliidae with traditional Vespoid groups : Masaridae, Eumenidae and Vespidae. The family Scoliidae is considered here comprising two subfamilies: Proscoliinae Rasnitsyn and Scoliinae Latreille as redefined by Day *et.al* (1981). The Proscoliinae is represented by a single genus *Proscolia* Rasnitsyn, restricted to Greece and Armenia, the Scoliinae is divisible into two tribes, viz., Campsomerini and Scoliini. The members of these two tribes are distributed throughout world and are represent by about 35 genera and 450 species. As a result of this study a total of 79 species under 13 genera have been reported from the Indian subregion.

The members of the family Scoliidae are ectoparasitoides and parasitize mainly the larvae of Scarabaeidae (Coleoptera) in the soil. Because of their parasitic habits, it may be possible to exploit many of these for biological control of insect pests.

We are indebted to Dr. J.R.B. Alfred, Director, Zoological Survey of India, for providing necessary facilities to carry out this research work. We are thankful to Dr. G.S. Arora, Jt. Director (Retired) and Dr. Arun Kumar, Addl. Director, Northern Regional Station, ZSI, Dehra Dun.

We are grateful to persons and authorities of various Museums and Institutions in India and abroad (as detailed in the text) for generous loan of material, supply of literature and various informations to complete this study. We are thankful to Shri Rati Ram, P.P.O. for helping us in various ways.

S. K. Gupta

J. K. Jonathan

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INTRODUCTION

The family Scoliidae is a group of fossorial aculeate wasps of solitary habits. The members of this family are commonly known as hairy wasps, usually black in colour, marked with spots or bands of yellow, white or red. Their wings are usually dark with a metallic iridescence. The vestiture varies from entirely black or black mixed with white to entirely golden or reddish. These wasps vary in length, 5 mm to 35 mm, rarely measuring up to 50 mm.

The members of this family are dimorphic, the males and females differ in number of antennal segments, often in wing venation and body-form and colour. The members of this family are distinguished quite readily from other wasps by having wing membrane beyond the cells closely striolate and the meso- and metasternum form a flat plate overlying the bases of the middle and hind coxae.

The Scoliids are world-wide in distribution, their larvae are ectoparasitoids of coleopteran larvae of family Scarabaeidae; which are pests of forest and agriculture. The larvae of these wasps develop externally on the pest larvae mostly in the soil, though some are in decaying wood or in rotten vegetation. Both sexes frequently visit flowers to obtain nectar on which they subsist. Because of their parasitic habits, it may be possible to exploit them for biological control of insect pests.

Our knowledge about these wasps is very limited. Bingham (1897) made an attempt to provide an account of family Scoliidae and recorded 53 species of true scoliids. Betrem did a pioneering monographic work on the Indo-Australian genera and species of this family and recorded 66 species. However, this work was far from complete. Addition of more taxa, change in systematic position and classification in more natural groups were significant contributions made by several workers namely : Betrem and Bradley (1964); Bradley (1964-1974); Guiglia (1965), Krombein (1963-1978), Jonathan and Gupta (1993, 1995, 1998), and Gupta and Jonathan (1994, 1995 & 1997a).

The lack of properly conducted surveys in the past and in the absence of sufficient research material slowed down new research and also prevented the easy finding and understanding the complexity of these wasps. The present work was therefore, undertaken with the view to revise and consolidate our knowledge of family Scoliidae from Indian subregion.

This detailed study was made possible by the material collected by various survey parties of the Zoological Survey of India and material received from various institutions in India and abroad.

The family Scoliidae is known by two subfamilies viz., Proscoliinae and Scoliinae. The Proscoliinae is only known from Armenia and Greece by two species. The Scoliinae

is distributed throughout the World and is represented by large number of species. As a result of this study a total of 79 species under 13 genera have been recorded from the Indian subregion, of which eight species and five subspecies are new to science. The descriptions of previously not known sexes of eight species have been provided and four new combinations have been established.

The study contains descriptions of all the known Indian genera and species. Most of the descriptions are based on large series of specimens and their intra-specific variations have been discussed. The zoogeographical distributional tables, maps, illustrations, notes on biology and host records are also given to complete the study.

Notes on biology : The members of the family Scoliidae are ectoparasitoids and parasitize mainly the larvae of Scarabaeidae (Coleoptera) in the soil. However, the members of the genus *Microscolia* are considered to be the enemies of the scarabaeid larvae found in the decaying wood. *Microscolia parasitasiae* (Betrem) was reared from a scarabaeid larvae in the fallen palm tree. Krombein (1970) further noted that the males of *Microscolia hydrocephala* (Micha) were observed flying around decaying wood logs in Sri Lanka.

Life histories of about ten species have been described so far in the world. A few species have been successfully introduced for the control of scarabaeid pests. Iwata (1976), in his book entitled "EVOLUTION OF INSTINCT", summarised the published account on the biology of these wasps. These include host records for two species found in India, viz., *Capsomeriella annulata* (Fabricius) and *Megacompsomeris prismatica* (Smith) which have been recorded parasites of *Anomala* (three species) and *Phyllophaga diomphalis* Bates.

Both sexes frequently visit flowers for nectar on which they subsist. Males are often observed performing prenuptial flights in a more or less figure-8 pattern close to the ground. A large number of males of *Colpacampsomeris indica indica* (Saussure) were observed in prenuptial flight at Darugiri in Meghalaya, India, while females are usually observed flying low and very close to the ground, frequently landing and crawling on the ground in search of host larvae. The location selected for burrowing is always found to be above the host larvae and is traced mainly with the help of sense organs. The female burrows to a larva at the depth of 12-18 inches, paralyzes it completely by stinging in the anterior part of prothorax and gular region. It then carry it into a deep hole in the ground. An egg is laid on the abdominal venter anteriorly. The wasp egg hatches in about three days and consumes the host larvae in about a week. Then it spins a tough cocoon from which the adult wasp emerges in an average of five weeks.

Rearing in the laboratory has demonstrated that males and females are produced in equal numbers from eggs laid by the fertilized females. But only males develop from eggs laid by virgin female.

Some species have been imported and liberated in some countries, such as Australia, Philippines and U.S.A. for the control of Scarabaeid pests.

The Zanzibar wasp, *Scolia ruficornis* Fabricius was imported in New Britain from Africa for the control of rhinoceros beetle, *Ocrytes rhinoceros* L., a well known pest of coconut. The successful establishment of the wasp in that area has been reported.

REVIEW OF LITERATURE

John Christian Fabricius (1775) in his first volume on *Systema Entomologiae*, described 12 species of true scoliids, nine under genus *Scolia* and three under genus *Tiphia*. This contained description of *Tiphia collaris* [= *Campsomeriella* (C.) *collaris collaris* (Fabricius)], the first true Indian Scoliid from the Malabar coast. The subsequent publications of Fabricius (1781-1804) contained descriptions of 41 more species of scoliids, including seven species from India. Illiger (1802) added one species and Friedrich Klug (1805 & 1810) four species under genus *Scolia* from India.

Latreille (1802) coined the supergeneric name, *Scoliatæ* for scoliids. Other authors used almost identical names, differing more or less in spellings, but not formed according to the International code of Zoological Nomenclature. Cresson (1887), for the first time, used the name *Scoliidae*.

Guerin (1830) described a number of species and three subgeneric names, viz., *Campsomeris*, *Lacosi* and *Liacos*, under the genus *Scolia*. Most of the species described by Guérin were not collected during "Voyage de la coquille", but were put at his disposal by Pettit de la Saussaye. In most cases Pettit did not know from where these scoliids were collected, in Senegal or in India. Out of this collection, three species are now known to have come from India.

Lepeletier (1845) described 32 species of scoliids under the genera *Campomeris* Guérin and *Colpa* Dufour, containing two species from India. Burmeister's (1854) account of the genus *Scolia* contained a few new species from East Indies. Saussure (1863) in his publication on scoliids of North America erected two subgenera viz., *Triscolia* and *Discolia* under the genus *Elis*. These subgenera were based solely on the differences in the venation of fore wing.

Saussure & Sichel (1864) published a valuable catalogue "Catalogue specierum generis *Scolia*", which brought together all the described taxa with diagnostic characters and also reviewed Burmeister's monograph of 'Scoliae'. The entire group was broadly divided into two parts on the basis of wing venation. The first part contained the genera *Liacos* Guérin and *Scolia* Fabricius. The genus *Liacos* was further divided into subgenera *Triliacos* and *Diliacos*, and the genus *Scolia* into *Triscolia* and *Discolia*. The second part dealt with a single genus *Elis* Fabricius, which was divided into two subgenera, *Trielis* and *Dielis*.

Magretti (1892) published on a collection of scoliids from Myanmar, while Cameron (1892) added two new species from India. Bingham (1896) added descriptions of two species from the then British India. Bingham (1897) in his Fauna of British India, Hymenoptera, Volume I, gave a consolidated account of the Family Scoliidae from India, including Myanmar and Sri Lanka. Bingham's classification of family was based on Saussure and Sichel (1864) and various genera and subgenera were differentiated on the basis of differences in wing venation. The account of family Scoliidae in his fauna volume contained an account of 52 species under the genera : *Scolia*, *Elis* and *Liacos*, including descriptions of four new species. Dalla-Torre (1897) listed all the scoliids of the world under a single genus *Scolia* Fabricius. Nurse (1902, 1903) described two species from India, while Meado-Waldo et al., (1915) published some notes on synonymy.

Betrem (1927) while studying Indo-Australian species of Scoliidae, published three new genera under the genus *Scolia*. Betrem (1928) published a monograph on Indo-Australian Scoliidae. This was the first ever comprehensive account on the taxonomy of this family. The subgenera published earlier by him were redefined, and a new subgenus *Megacampsomeris* was established under the genus *Campsomeris*. This monograph contained 72 species and subspecies, including 32 new taxa, from India.

Betrem (1935) published an account of western Palaearctic scoliids and in 1941 published Scoliidae of China and Japan, adding three new subgenera, *Campsomeriella*, *Sericocampsomeris* and *Colpacampsomeris* under the genus *Campsomeris*.

Betrem (1964-68) visited various museums of Europe to study the types of Scoliidae in collaboration with Bradley. This had resulted in the publication of series of papers on the scoliid types of Burmeister, Smith and Klug. In the mean time Bradley (1964), with the help of notes from Betrem, published an account of scoliid types of Fabricius and Lepeletier.

Betrem & Bradley (1964) published an account of the genera viz., *Megascolia* Betrem, *Triscolia* Saussure and *Scolia* Fabricius. Betrem (1967) raised subgenus *Campsomeriella* Betrem to generic status with key to subgenera and species groups. Bradley (1972) published an account of the scoliid types in Berlin Museum and also published (1973, 1974) on the types of Guérin and Saussure & Schiel.

Betrem and Bradley (1972) brought out a monograph on African Campsomerinae. This monograph presented a supergeneric classification of Scoliidae by subdividing it into subfamilies viz., Campsomerinae and Scoliinae. The subgenera *Sericocampsomeris* Betrem and *Megacampsomeris* Betrem were also given generic status.

Brothers (1975) and Konigsmann (1978) reevaluated the relationships of Aculeata and emphasised an alignment of the family Scoliidae with the traditional vespid groups viz., Masaridae, Eumenidae and Vespidae.

Rasnitsyn (1977) described a new subfamily of Scoliidae, the Proscoliinae, based on a single male specimen, *Proscolia archaia* Rasnitsyn, 1977 from Armenia. Rasnitsyn treated the traditional Scoliidae as subfamily Scoliinae.

Krombein (1978) published a monographic account of the Scoliidae of Sri Lanka. This study was based on a rich material from Sri Lanka and gave a correct application of names misapplied by earlier workers. Day et al., (1981) redefined subfamilies Proscoliinae and Scoliinae of the family Scoliidae on the basis of series of specimens of both sexes from Greece. They discussed the relationships of Scoliidae with the allied groups in the light of the findings made by Brothers (1975).

Chhotani & Ray (1975) made records of some species of Scoliidae from Rajasthan, India, and Jonathan (1976) published additional records of Campsomerinae from India.

Gupta & Jonathan (1989) described a new species of the genus *Sericampsomeris* from India and Nepal, with notes on the known species of the genus.

Brothers and Carpenter (1993) published an account on the phylogeny of aculeate Hymenoptera comprising superfamilies Chrysidoidea and Vespoidea and also discussed Proscoliinae and Scoliinae in the light of recent advances made by various workers.

Gupta (1994 & 1995) recorded some species of scoliids from conservation areas and various parts of Western Himalaya. Gupta (1977a) also published an account of Scoliidae of the state of Delhi, India. Jonathan and Gupta (1993, 1995 and 1999) published scoliid fauna of the states of West Bengal, Meghalaya and Sikkim.

MATERIAL AND METHODS

(A) AREA OF STUDY : The area under study includes whole of India. In addition, fauna of Bangladesh, Nepal and Myanmar was also studied, to make the study complete and more meaningful.

(B) MATERIAL : This study is based on extensive survey and collections of scoliid wasps from various parts of India, and material including types available at Zoological Survey of India, Calcutta and various Regional Stations. These collections were supplemented by borrowing types and unidentified material from a number of Indian and Foreign Institutions.

The material of this family was also available from I.A.R.I., New Delhi and F.R.I. Dehra Dun. Personal collection of Kumar Ghorpade, Bangalore; P. S. Nathan's collection of S. India from Leiden Museum, Netherlands; Borge Petersen's collection of southern India, Copenhagen Museum, Denmark.

The material was also borrowed from Ottawa Museum, Canada and Sapporo Museum, Japan, representing fauna of Nepal. An interesting collection made by R. Malaise from Myanmar was available for study from Stockholm Museum, Sweden.

The following is the list of various Institutions/Museums which kindly loaned their collections.

1. Zoological Survey of India, M-Block, New Alipore, Calcutta-700 053, India.
2. Northern Regional Station, Zoological Survey of India, 218, Kaulagarh Road, Dehra Dun-248 195, India.
3. High Altitude Zoology Field Station, Zoological Survey of India, Jandev Niwas, Hospital Road, Solan-173 212 (H.P.), India.
4. Dept. of Entomology, Forest Research Institute, P.O. New Forest, Dehra Dun-248 066, India.
5. Dept. of Entomology, Indian Agricultural Research Institute, Pusa Road, New Delhi-110 001, India.
6. Division of Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India.
7. Dr. Kumar Ghorpade, 1861, Bethel Street, St. Thomas Town, Bangalore-560 084, India.
8. Zoologisk Museum, Universitets parken 15 DK 2100, Kobenhavn, Danmark.
9. Entomological Institute, Faculty of Agriculture, Hokkaido University, Sapporo, Japan.
10. Swedish Museum of Natural History, Section of Entomology, S-104 05 Stockholm, Sweden.
11. Natur Historiches Museum Wien, 2 Zoologische Abteilung (Insecten), Postfach 417 Burgring 7A-1014 Wien, P N 955 76 2 Z, Vienna.
12. Museum Fur Naturkwnde, Der Humbolt-Universitat Invalidenstrasse 43, Berlin N4, Germany.
13. Natural Museum For Natural Hisotry, Post bus 9 517, 2300 RA, Leiden, The Netherlands.
14. Biosystematic Research Institute, Ottawa, Ontario, Canada.
15. Berrice P. Bishop Museum, Honolulu, Hawaii, U.S.A.

Methods : The bulk of the material studied belonged to Museums and Institutes as listed above. However, additional representatives of the family were collected from different habitats. The specimens thus collected, were killed in a killing jar, set and pinned with records of locality and collection data and other useful ecological information for scientific study.

Male genitalia : It shows considerable variation in shape and size of aedeagus, parameres and volsellae, and the presence or absence and density of hair on certain

areas of parameres and volsellae. These characteristics were studied and found useful in distinguishing males of various species, which show insufficient morphological differences with those of other species. The male genitalia of one generic group shows considerable structural differences from that of other generic groups.

To study the male genitalia the dry specimen was relaxed for about 48 hours and the genital capsule was extracted with the help of a needle, while the abdomen was held steady by means of a pair of forceps. In this process the subgenital plate is also extracted, which is removed from the capsule and mounted dry on a tip of a triangular card, which is pinned along with the specimen. The genitalia is kept in 10% KOH solution overnight. Then it is thoroughly washed to remove all traces of KOH and dehydrated in alcohol and mounted dry on the tip of a card or canada balsam on a slide for study.

MORPHOLOGICAL CHARACTERS OF TAXONOMIC IMPORTANCE

(Figures 1-10)

The terminology used in this work to describe body structure of taxa, is as given by Bratlett (1912), Micha (1927), Betrem (1928, 1935, 1952 and 1972), Steinberg (1962) and Bradley (1959).

The terms used in the keys and the text are briefly described and illustrated in figures 1–10.

Head

Mandibles : Mandibles are curved and much larger than their maximum basal width, and bear more or less distinct teeth on their inner margin.

Clypeus : It is limited postero-medially by frontal area or supra-clypeal area and laterally by the scrobes and the eyes. The anterior margin is formed by a distinct flattened band known as anterior rim, and the central portion known as disc.

Frontal area or Supra-clypeal area : It is a small triangular sclerite and lies in between the clypeus and frontal spatium. It is demarcated at the base by a suture known as *clypeo-frontalis*.

Frontal spatium : It is delimited anteriorly by the posterior margin of frontal area and posteriorly by the anterior margin of front. The lateral margins are formed by the frontal laminae. The delimitation between frontal spatium and front is vague, when spatio-frontal suture is not defined.

Frontal laminae : These form the lateral margins of frontal spatium and probably the remnants of the thickened rim of the antennal sockets.

Scrobes : The scrobes are situated between the frontal laminae and the lower inner orbits of the eyes.

Antenna : A pair is implanted almost under the frontal laminae and consists of scapus and antennal flagellum. The flagellum is 12-segmented in the female and 13-segmented in the male.

Front : It is delimited posteriorly by the vertex and anteriorly by the upper margin of frontal spatium and the scrobes. In the males of the tribe Campsomerini there is a more or less triangular flat area in front of the anterior ocellus.

Frontal fissura : This longitudinal fissura is often impressed and extends from frontal spatium to anterior ocellus.

Ocular sinuses : The portions of the front which lie in the deep incisions of the eyes.

Ocellar triangle : The anterior ocellus and posterior ocelli form the ocellar triangle.

Post ocellar furrow : It is sometimes deeply impressed and often shallow to invisible.

Vertex : It is limited anteriorly by the post-ocellar furrow and posteriorly by the occipital carina, and passes at sides into temples, approximately above the upper ends of the eyes. Two impressed lines are often present, ending in small depressions known as pits, one at each side of post-ocellar furrow. The posterior portion of the vertex slopes downward behind and known as declivous portion of the vertex or *occiput*.

Occipital carina : It separates the anterior portion of the head from the posterior and may be weak to strong and often absent.

Temples : The temples occupy the areas between the eyes and the occipital carina, its lower portion is called *gena* or *cheek*.

Thorax

Pronotum : It is deeply encised posteriorly, becoming very narrow medially above. The horizontal lateral portions are known as *scapulae*. Each scapula has a more or less deep excavation in front of tegula.

Callosities : These are long elevations at the sides of pronotum near the anterior margin, and are bordered posteriorly by a broad to narrow groove.

Mesoscutum : The mesoscutum bears a weak suture anteriorly on each side. The parapsidal furrows arise from the posterior margin of mesoscutum, and are usually deep and distinct. The mesoscutum shows differences only in punctation.

Scutellum : It is a small median, moderately convex plate behind mesoscutum, posteriorly delimited by metanotum.

Metanotum : It is a small sclerite behind the scutellum.

Mesopleurum : The mesopleurum is elevated longitudinally forming a crest. The crest may be high and rounded or low and medially sharp. When high and rounded,

it is directed towards the middle of the upper margin of the mesopleurum and has a high elevation at its upper end, and thus a horizontal triangular area is formed near the implantation of the fore wings. The crest when low and medially sharp, is either directed towards the upper anterior corner of the mesopleurum or somewhat before it. When directed towards the upper anterior corner, the horizontal area at the upper end is small, and if it ends before the upper anterior corner, this area is not triangular or only slightly triangular.

The crest divides the mesopleurum into an anterior and a posterior half. Both the halves are further divided by a cross furrow that ends posteriorly in a pit, the *episternal scrobe*. The four areas thus formed are termed as : the upper anterior area, the lower anterior area, the upper posterior area, and the lower posterior area.

Metapleurum : It is a well developed flat sclerite, and divided into two parts by a horizontal suture, the upper plate and the lower plate. The upper margin of the upper plate bears a deep groove, the lower rim of which forms the transition to the vertical portion of the upper plate. The transition may be gradual or sharp, sometimes marked with a more or less distinct carina.

Propodeum : Morphologically the propodeum is the first abdominal tergite. The dorsal surface is divided into three areas by longitudinal sutures, the central area known as dorso-median area, and the lateral areas as dorso-lateral areas. The posterior surface is similarly tripartite by reason of the continuation of sutures of dorsal surface, and areas thus formed are known as postero-median area and postero-lateral areas. A pair of large spiracles lie on the outer anterior corners of dorso-lateral areas, and the areas in front of the spiracles are known as spiracular areas.

The lateral surface of the propodeum bears a carina. It runs from the horizontal suture of the metapleurum just below the spiracle and usually disappears at a short distance or sometimes extended throughout the length of the propodeum. The angle between the carina and the hind margin of metapleurum is the spiracular angle.

Wings : The surface of wings in archaic forms, is comparatively, more setose. The wings of males are usually more setose than the females of the same species. The number of submarginal cells and recurrent veins in the fore wing are of taxonomic importance. Sometimes the distribution of microtrichiae are also taxonomically important.

The names of the cells and veins used in the text are those used by Betrem (1972). The most important cells are : costal cell, marginal cell, submarginal cells, and median and submedian cells.

Legs : They are uniform in the entire family. The shape of the inner longer spur of hind tibia is of taxonomic importance.

Abdomen

The abdomen in female consists of six visible tergites and sternites, and seven in

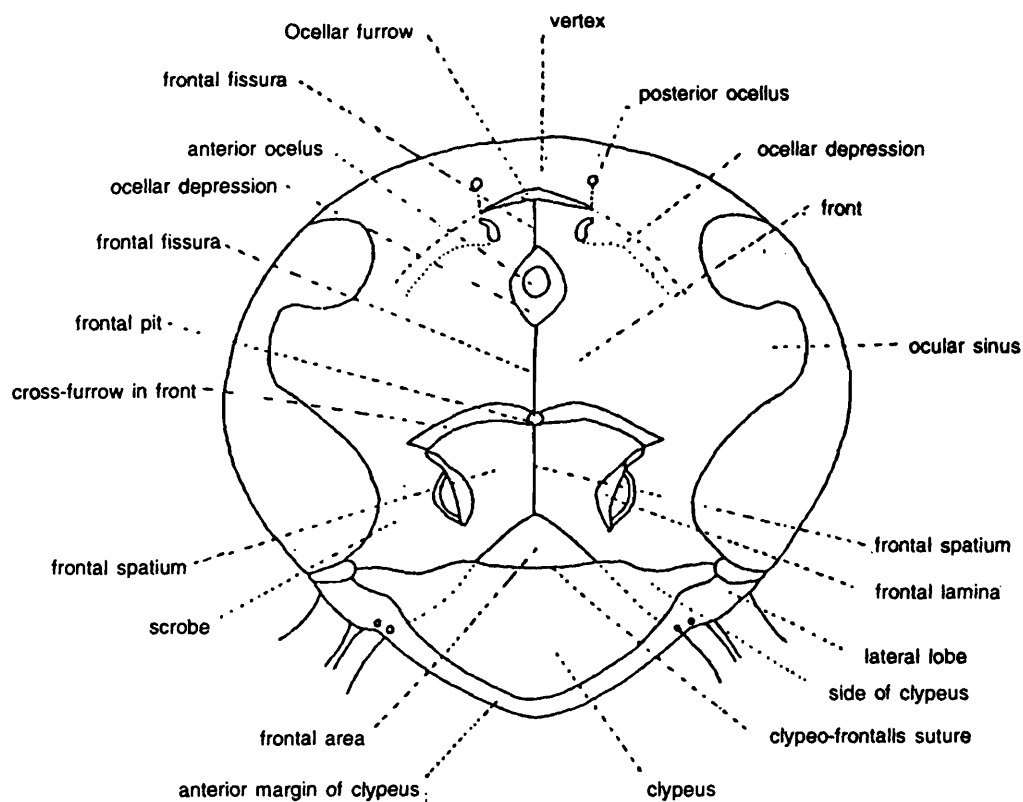


Fig. 1 : Anterior view of Head

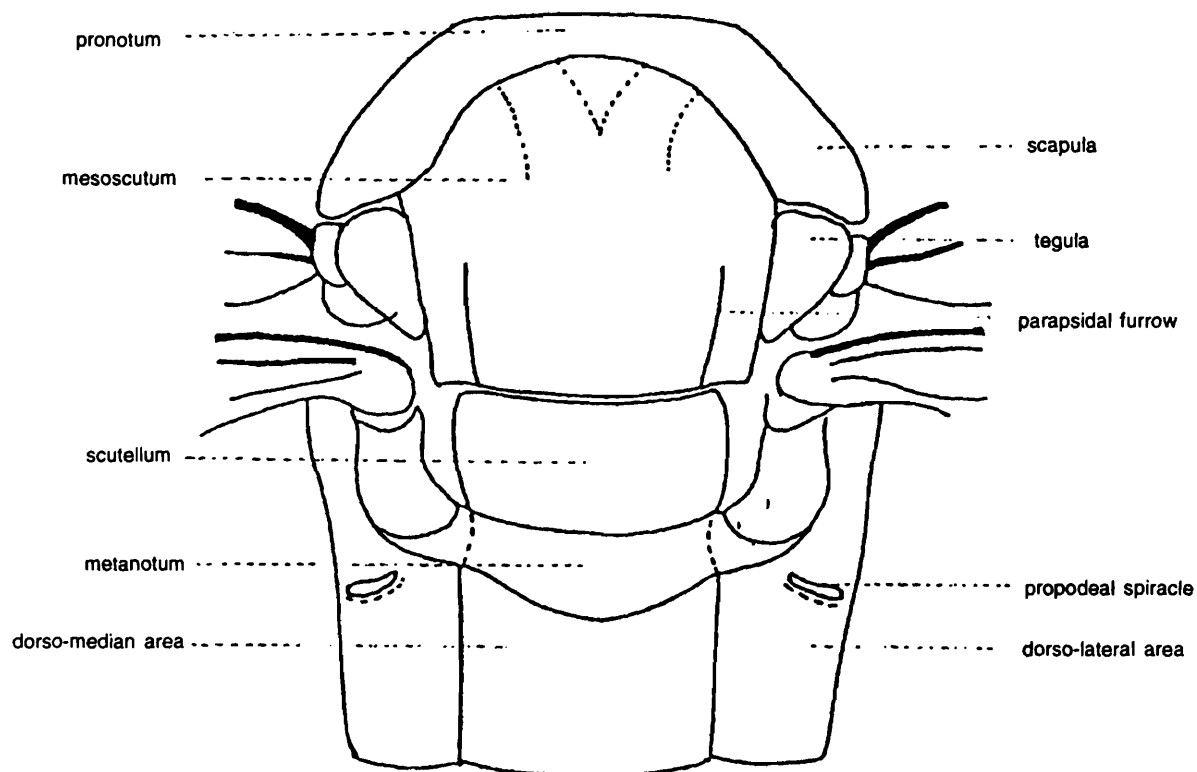


Fig. 2 : Dorsal view of Thorax

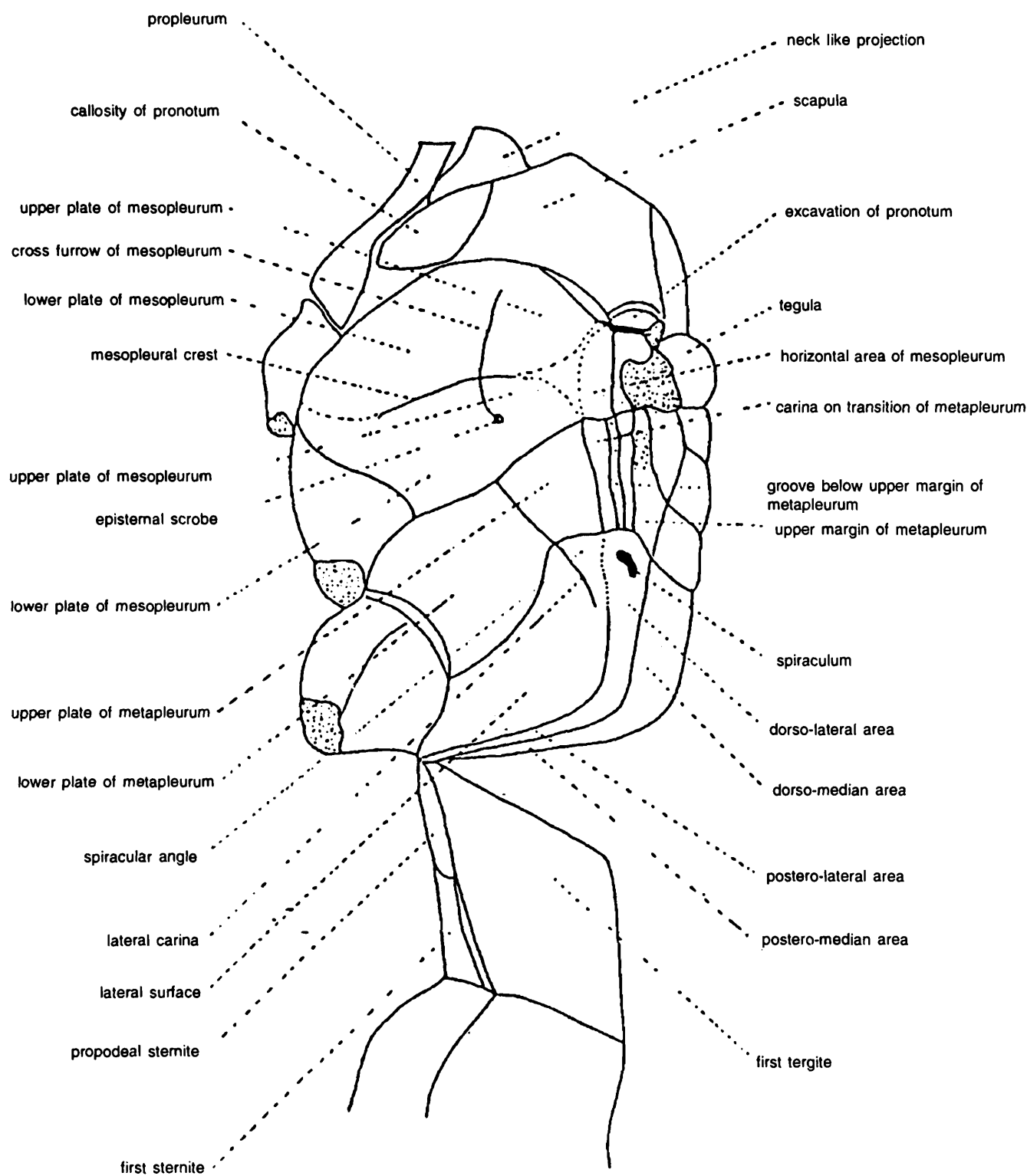


Fig. 3 : Lateral view of Thorax

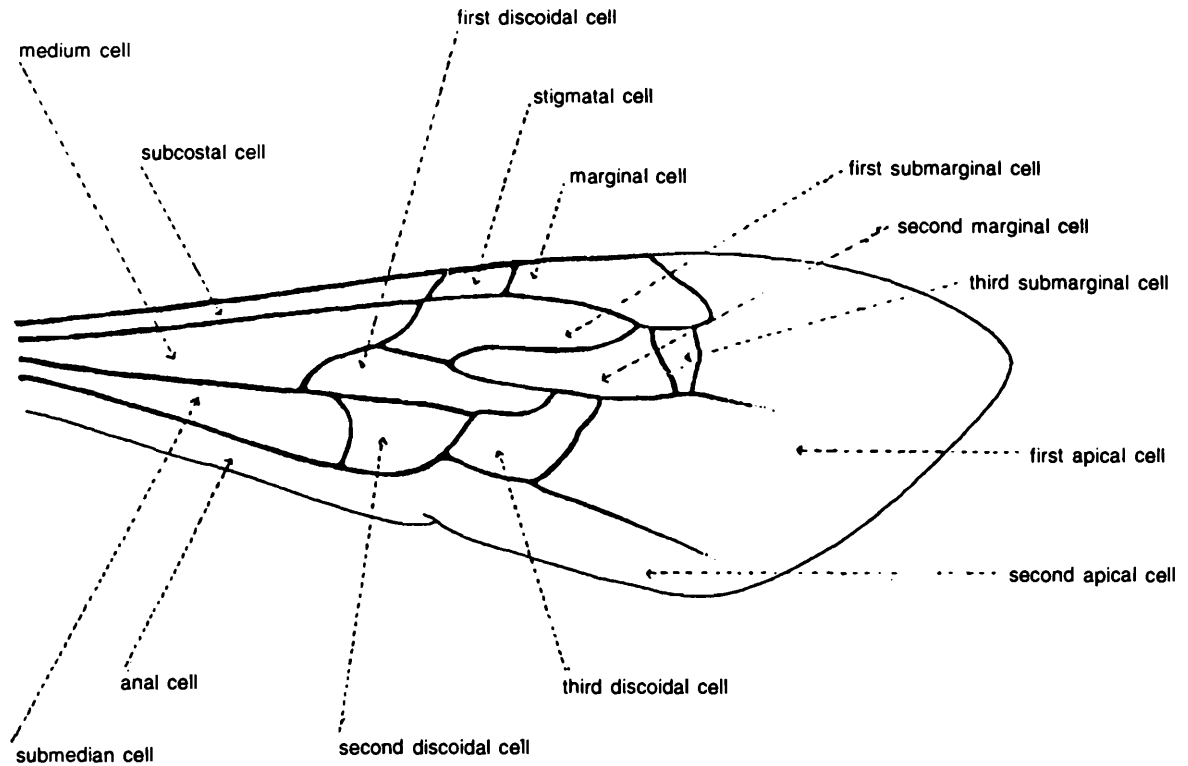


Fig. 4 : Cells of Fore wing

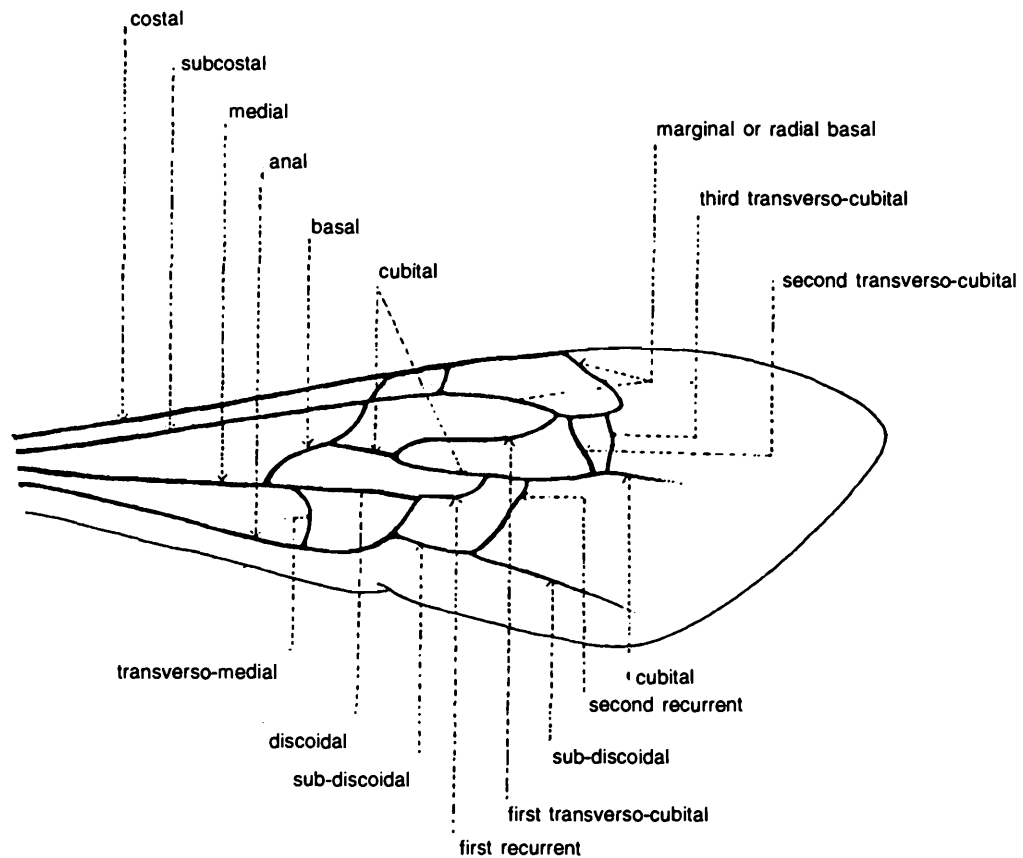
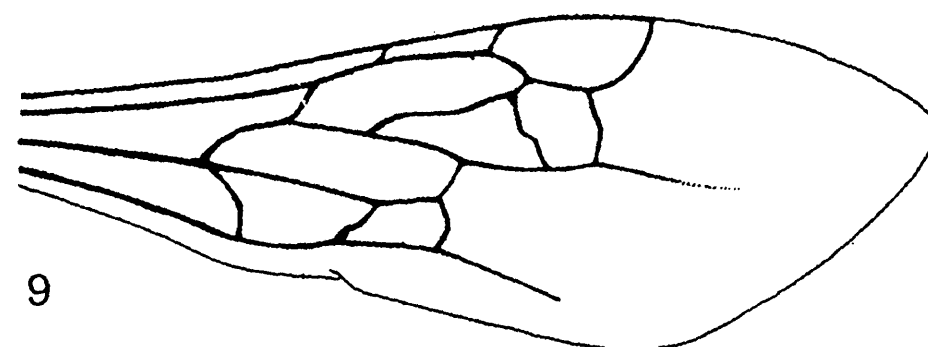
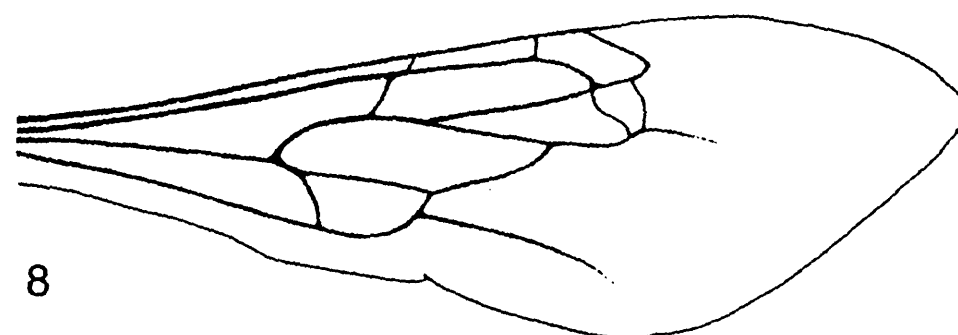
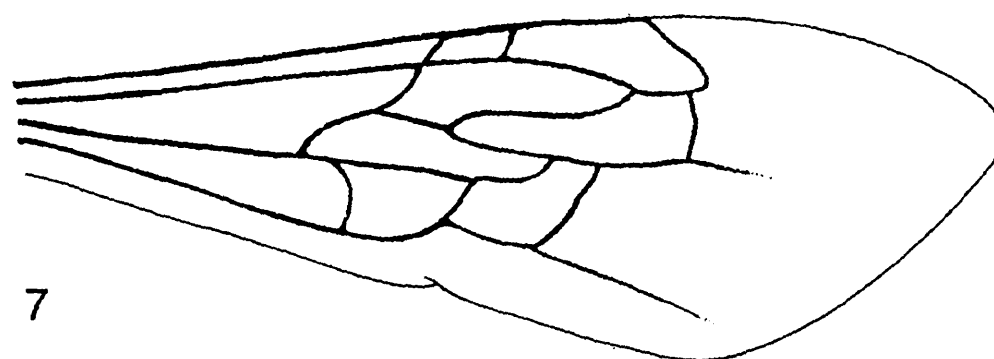
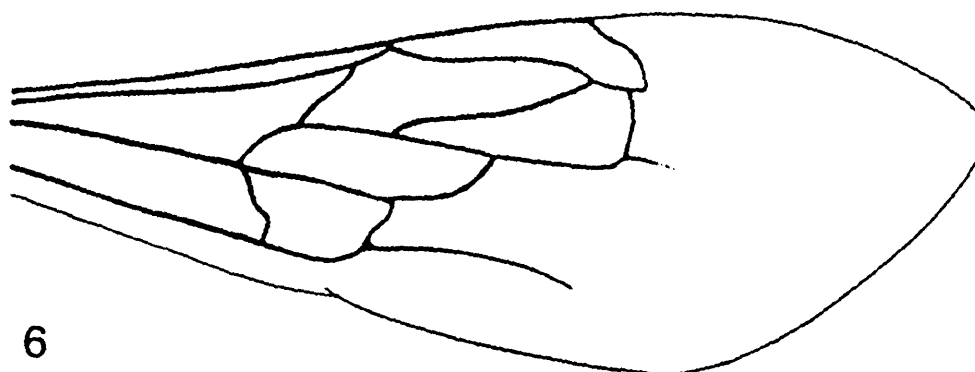


Fig. 5 : Veins of Fore wing



Figs. 6-9 : Fore wing venation in Scoliinae : 6, with one recurrent vein and two submarginal cells; 7, with two recurrent veins and two submarginal cells; 8, with one recurrent vein and three submarginal cells; 9, with two recurrent veins and three submarginal cell.

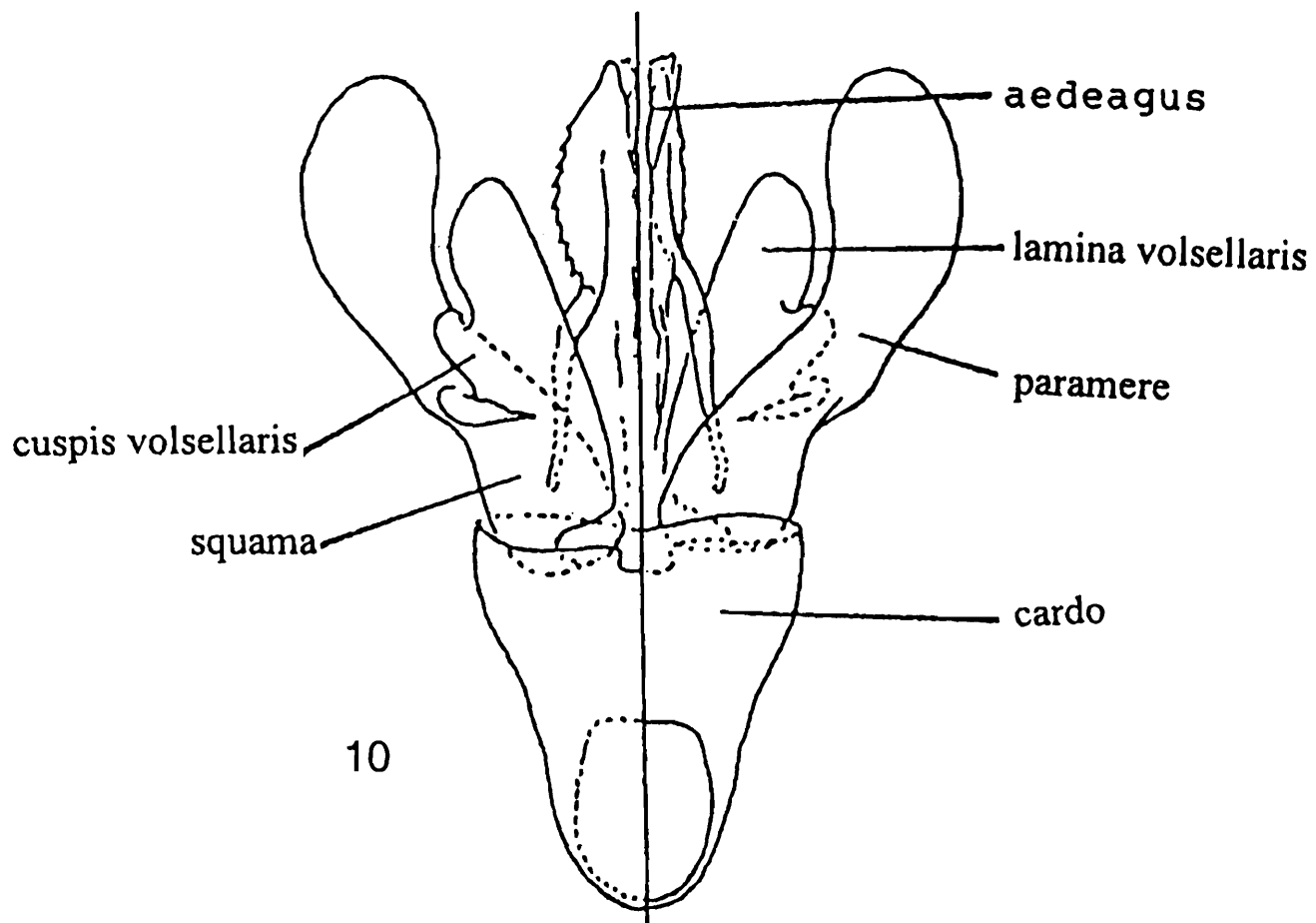


Fig. 10 : Male genitalia, ventral aspect at left, dorsal aspect at right.

males. The sixth tergite in the female is called as *epipygidium* and the sixth sternite is known as *hypopygidium*. The hypopygidium bears short thickened spines laterally. The eighth sternite, in the male, is more or less hidden under the seventh and bears apically three long spines projecting beyond the seventh sternite.

The first tergite usually bears a small to large median tubercle anteriorly, at the transition between horizontal and vertical surfaces, known as *antero-median tubercle*. Similar tubercle is sometimes present on second sternite also.

Male Genitalia

The male genitalia consists of the following parts :

Cardo : It is ring-like and completely encloses the bases of the parameres dorsally.

Squama : The base of each paramere is called squama.

Parameres : The parameres are the lateral continuation of the squama.

Volsellae : The volsellae are either a single piece or divided into two pieces, the basal and the apical portions known as *cusps volsellaris* and *lamina volsellaris* respectively.

Aedeagus : The two rods that form the aedeagus diverge proximally and are serrated ventrally.

THE PRESENT POSITION OF THE FAMILY SCOLIIDAE

The Hymenoptera is a well defined order of endopterygote insects and is traditionally divided into two suborders, the Symphyta (sawflies and wood wasps) and the Apocrita (wasps-waisted Hymenoptera).

The suborder Apocrita is characterised by the development of a constriction between the first and second abdominal segments and fusion of the first abdominal segment with the thorax to form the propodeum. While, the suborder symphyta may be recognised by the absence of a marked constriction between the first and second abdominal segments.

The suborder Apocrita is divided into two groups, Aculeata and Terebrantia (= Parasitica). The Aculeata is characterised mainly by the modification of ovipositor as a stinging apparatus and the Terebrantia comprises the remaining apocritans.

The group Aculeata is considered to contain about 21 families (seven according to Gauld *et al.*, 1988), which have, traditionally been grouped into six to eight superfamilies. The systems of Richards (1977), Fitton *et al.* (1978), Brown (1982), Brothers (1975) and Gauld *et al.* (1988), reflect the traditional arrangement in different ways, as shown in Table I.

Table-I

Richards (1977)	Fitton <i>et al.</i> (1978)	Brown (1982)	Brothers (1975)	Gauld & Barry Bolton (1988)
Bethyloidea	Chrysidoidea	Chrysioidea	Bethyloidea	Chrysidoidea
_____	_____	Tiphioidea	Vespoidea	Vespoidea
Scolioidea	Scolioidea	Scolioidea	_____	_____
_____	Formicoidea	Formicoidea	_____	_____
Pompiloidea	Pompiloidea	Pompiloidea	_____	_____
Vespoidea	Vespoidea	Vespoidea	_____	_____
Sphecoidea	Sphecoidea	Sphecoidea	Sphecoidea	Apoidea
Apoidea	Apoidea	Apoidea	—	—

Most of these superfamilies are readily distinguished by one or more unique characteristics.

The family Scoliidae along with various other solitary aculeate groups (Tiphidae, Mutillidae and Sapygidae), has been traditionally classified under a single superfamily Scolioidea. The Scolioidea appears to contain those aculeates which do not fall into any of the superfamilies. De Saussure (1892) considered the entire complex to be a single family (Heterogynes), while Ashmead (1900, 1903-1904) differentiated eight families. Krombein (1951), however, included six families in the Scolioidea of North America.

Brothers (1975) re-examined the phylogeny of the aculeate Hymenoptera and made proposals for a superfamily classification utilizing Bethyloidea, Sphecoidea and Vespoidea as three distinct lineages. One of the Brothers's most striking conclusion was the realignment of the Scoliidae with traditional vespoid groups : Masaridae, Eumenidae and Vespidae. The remaining traditional Scolioidea were variously apportioned to a family Bradynobaenidae and to a complex of related families *viz.*, Tiphidae, Sapygidae and Mutillidae (Table-II).

Table II. Classification of Aculeate Hymenoptera
(Proposed by Brothers, 1975)

Superfamily	Family	Subfamily
BETHYLOIDEA	Plumariidae	
	Bethylidae	
	Scolebythidae	
	Cleptidae	
	Chrysididae	
	Loboscelidiidae	
	Dryinidae	
	Sclerogibbidae	
	Embolemidae	
SPHECOIDEA (Spheciformes)	Ampulicidae	
	Sphecidae	
	Larridae	
	Mellinidae	
	Pemphredonidae	

Superfamily	Family	Subfamily
(Apiformes)	Astatidae	
	Philanthidae	
	Nyssonidae	
	Colletidae	
	Halictidae	
	Oxaeidae	
	Andrenidae	
	Melitiidae	
	Fideliidae	
	Megachilidae	
	Anthophoridae	
	Apidae	
VESPOIDEA (Vespiformes)	Tiphidae	Anthoboscinae
		Thyninae
		Myzininae
		Methochinae
		Tiphiinae
	Sapygidae	Brachycistidinae
		Fedtschenkiinae
		Sapyginae
	Mutillidae	
	Sierolomorphidae	
	Rhopalosomatidae	
	Pompilidae	Typhoctinae
		Chyphotinae
		Apterogyninae
		Bradynobaeninae
(Formiciformes)	Scoliidae	
	Masaridae	
	Eumenidae	
	Vespidae	
	Formicidae	

The characters which support realignment of Scoliidae with Vespidae *s.l.* include the closely coadapted pronotum and mesothorax, incised inner margin of eye and dorsally produced clypeus. The family Scoliidae, however, can be readily recognised by the tripartite propodeum, widely separated middle and hind coxae and radiating close striolations on outer wing membrane.

SYSTEMATIC ACCOUNT

Family SCOLIIDAE Latreille

1802. **Scolietae** Latreille, *Hist. Nat. crust. Ins.*, 3 : 345.

Small to large sized solitary aculeate wasps. Both sexes fully winged and sexually diamorphic. Males smaller and slender than females having 13 antennal segments. Females stockily built with extensive modification to a fossorial habit having 12 antennal segments. Both sexes strongly pubescent, with more or less deep punctation of integument.

Pronotum closely adapted to mesothorax reaching to tegula postero-laterally. Meso- and metathoracic sternites flattened. Fore coxae contiguous, middle and hind coxae widely separated. Fore tarsus with combspines, middle and hind tibiae externally with strong posteriorly directed spines. Claws simple and edentate. Wing membranes beyond closed cells longitudinally striolate, with densely corrugated appearances.

The group has largely been treated without recourse to formal suprageneric classification, except some early attempts by Ashmead (1903) and Schrottky (1910). Betrem (1972) initiated a division into two subfamilies, viz., Campsomerinae and Scoliinae.

Rasnitsyn (1977) placed all the traditional Scoliidae under the subfamily Scoliinae and erected a new subfamily Proscoliinae. The subfamily Proscoliinae was based solely on genus *Proscolia*, having a single species, *Proscolia archaica*, based on a single male. Day et al., (1981) described previously unknown female of *Proscolia* and also redefined Proscoliinae and Scoliinae as subfamilies of Scoliidae. Day in Day et al., (1981) also described one more species of the genus *Proscolia*, based on both the sexes from Greece. Rasnitsyn (1993) described Archaeoscoliinae as an extinct subfamily of scoliid wasps.

Key to the Subfamilies of SCOLIIDAE

1. Inner eye margin medially arcuate, not incised; middle tibia with two spurs; forewing with a clearly defined break or articulation between pterostigma and prestigma Subfamily PROSCOLIINAE

- Inner eye margin medially incised, reniform; middle tibia with a single spur; fore wing without a break or articulation between pterostigma and prestigma
Subfamily SCOLIINAE

The subfamily Proscoliinae is known by two species, one each from Armenia and Greece.

The subfamily Scoliinae is represented by a large number of species and is distributed throughout the World.

Subfamily SCOLIINAE Latreille

1802. **Scolietæ** Latreille, *Hist. nat. Crust. Ins.*, **3** : 345.

1977. **Scoliinae** Latreille : Rasnitsyn, *Zool. J.*, **66** : 522.

1981. **Scoliinae** Latreille : Day et al., *J. nat. Hist.*, **15** : 672.

Sexual diamorphism pronounced, male slightly small and slender than female, usually with different colouration.

Inner margin of eye medially incised, reniform. Mouthparts elongate, maxillary palps 6-segmented, labial palps 4-segmented, glossa and paraglossa produced. Mandible massive, sickle-shaped and lacking well marked subsidiary teeth in female, but in male with various subsidiary teeth along inner margin. Male antennal flagellum elongate, flagellar segments longer than broad. Radicle lies in same axis as scape. Male clypeus produced; antennae inserted at or above mid-line of head. Three ocelli present.

Thorax with anterior face of pronotum clearly differentiated as a vertical polished impunctate area. Antero-ventro-lateral corner of propodeum remote from endopharagmal pit, lateral carina lacking. Propodeum divided into three, by two well defined medio-lateral longitudinal sutures. Fore wing venation diamorphic between sexes, particularly in the region of pterostigma and marginal cell, antero-proximally with more or less strong setae. Pterostigma almost or completely desclerotized, not articulating with prestigma but contiguous with it. Vein *Ir* absent, vein *Rs* straight in that region. Claval furrow (= plical furrow) indistinct, penetrating only vein *Cua* at a fenestra. Hind wing without medial hamuli, venation reduced apically, veins *A* and *J* absent, *Cu-e* originating proximal to separation of *M* and *Cu*, free *Cu* present, plical lobe not indicated by a deep incision.

Legs usually slender, stout in female with femora and tibiae somewhat enlarged; arolia well developed; claws simple; fore tibia with single calcar, which is slightly curved and spatulate; middle tibia with one spur, femora without basal constriction; middle and hind femora each with posterior genual plate; hind coxa simple, hind tibia with two spurs.

Abdomen narrowly articulated with propodeum, first abdominal sternite strongly articulated with the propodeum and second sternite with first tergite. Hind margin

of tergites with rows of posteriorly directed setae. Female pygidium with dense, posteriorly directed spines, bordered by a lateral carina or tooth; last sternite with a posteriorly directed tooth on each side. Subgenital plate in male specialized, with three posteriorly directed, slightly trident-like spine.

The subfamily Scoliinae is predominantly tropical, however, widely distributed throughout the world. It includes some of the largest species of Hymenoptera.

According to Day *et al.*, (1981) since the family Scoliidae is divisible into two subfamilies, *viz.*, Proscoliinae and Scoliinae, the subfamilies Campsomerinae and Scoliinae (*sensu* Betrem, 1972) are now treated as tribes, *viz.*, Campsomerini and Scoliini.

Key to the Tribes of Scoliinae

1. Fore wing with two recurrent veins, second recurrent running from subdiscoidal to cubital vein (sometimes absent as in *Colpacampsomeris* Betrem and *Micromeriella* Betrem). First tergite without median basal tubercle, second and third tergites often with subapical row of setae bearing punctures. Mesopleural crest low, directed approximately to posterior corner of pronotum and without large horizontal area at upper corner. Volsella divided into basal and apical part by a transverse suture Tribe **Campsomerini**
- Fore wing with a single recurrent vein, second recurrent vein, when present, coalescing with first recurrent vein before it reaches cubital vein. First tergite often with median basal tubercle, second and third tergites never with subapical row of setae bearing punctures. Mesopleural crest directed towards the base of fore wing, forming a distinct, horizontal area. Volsella not divided by a suture into basal and apical parts Tribe **Scoliini**

I. Tribe Campsomerini Betrem

1903. *Elidinae* Ashmead, *Can. Ent.*, **35** : 7.

1910. *Scoliinae* Schrottky, *Deut. Ent. Zeits* : 201 (in part).

1972. *Campsomerinae* Betrem in Betrem & Bradley, *Mon. Ned. Ent. Ver.*, **6** : 25-26.

1981. *Campsomerini* Betrem : Day *et al.*, *J. nat. Hist.*, **15** : 672.

Sexual diamorphism well developed. Usually with extensive maculation of yellow or red spots or bands. Upper plate of mesopleurum without a distinct dorsal area, thorax widest at hind angles of pronotum, except in the genus *Tristimeris* Betrem, where the thorax is widest at the level of mesopleurum.

Fore wing usually with two recurrent veins, second recurrent vein running from subdiscoidal to cubital vein; second recurrent sometimes evanescent, as in the genus *Colpacampsomeris* Betrem and sometimes in the genus *Micromeriella* Betrem.

First abdominal tergite without basal tubercle; second and third tergites often with subapical rows of setae bearing punctures.

Male genitalia : Volsellae divided into apical and basal parts by a transverse suture.

Remarks : Almost all the older authors treated this tribe as a subgenus or genus under the name *Elis* or *Campsomeris*. Betrem (1928) treated the Indo-Australian species under *Campsomeris* and also erected subgenus *Megacampsomeris* for a section of Oriental species. Betrem (1941) erected three subgenera viz., *Colpacampsomeris*, *Sericocampsomeris* and *Campsomeriella* under the genus *Campsomeris*. Subsequently, Betrem in Bradley & Betrem (1967) erected three more subgenera, viz., *Phalerimeris*, *Tristimeris* and *Micromeris*. These subgenera were elevated to generic status by Betrem (1967-1974) through a series of publications based on the studies of their types, and the name *Micromeris* was changed to *Micromeriella*.

This tribe is distributed throughout the world and is represented by about 210 species under 24 genera. There are about 82 species belonging to eleven genera known from Indo-Australian Region. Of these, 25 species belonging to seven genera are represented in India, including four species and four subspecies described as new to science. The Indian genera can be distinguished by the following key :

Key to the Indian Genera of the Tribe Campsomerini

Female

1. Fore wing with a single recurrent vein; upper plate of metapleurum impunctate, with a more or less, sharp carina below the hind wing; longer spur of hind tibia strongly spatulate apically. Body 25-35mm in length 1. Genus *Colpacampsomeris* Betrem
- Fore wing with two recurrent veins, sometimes second recurrent faint or absent in small sized (9-15mm) species; upper plate of metapleurum impunctate or punctate, with or without carina below the base of hind wing; longer spur of hind tibia pointed to obtuse apically, rarely slightly spatulate 2
2. Second and the following tergites distinctly shiny; thorax, when viewed from above, broader at the level of mesopleurae than at the hind corners of the scapulae; upper plate of metapleurum punctate above, without any carina below the base of hind wings, transition between its vertical and dorsal areas straight; longer spur of hind tibia black, blunt apically. Integument entirely black; vestiture black, mixed with white; wings dark brown. Body about 20-30mm in length 2. Genus *Tristimeris* Betrem

- Second and the following abdominal tergites dull, except sometimes, with silken reflections; thorax, when viewed from above, broader at the hind corners of scapulae than at the level of mesopleurae 3
- 3. Fore wing usually with two recurrent veins, second recurrent rarely faint or absent; upper plate of metapleurum entirely impunctate, transition between its vertical and dorsal areas very gradual, without any carina below the base of hind wing; longer spur of hind tibia apically acute to slightly spatulate. Integument entirely black or sometimes marked posteriorly with yellow on some of the basal abdominal tergites. Vestiture sparse and white. Wings clear hyaline. Small sized species, body about 9-15 mm in length 3. Genus *Micromeriella* Betrem
- Fore wing always with two recurrent veins; upper plate of metapleurum impunctate, transition between its vertical and dorsal areas straight and marked with a carina below the base of hind wing, or upper plate of metapleurum above more or less punctate, transition between its vertical and dorsal areas straight, with or without a carina below the base of hind wing. Body 15-35 mm in length. 4
- 4. Upper plate of metapleurum impunctate, sometimes with fine, sparse punctures above, transition between its vertical and dorsal areas straight, marked with a entirely or partly distinct carina below the base of hind wing 5
- Upper plate of metapleurum punctate above, transition between its vertical and dorsal areas gradual to straight, usually straight anteriorly and gradual posteriorly 6
- 5. Lateral carina of propodeum abbreviated or extended up to spiracle; dorso-median area of propodeum triangularly protruded posteriorly, posterior surface impunctate to finely and sparsely punctate; vertex behind posterior ocelli impunctate; mesopleural crest not sharp or carina-like. Wings entirely fuscous to yellowish hyaline. Abdominal tergites mat 4. Genus *Campsomeriella* Betrem
- Lateral carina of propodeum extended beyond the spiracle; dorso-median area of propodeum not triangularly protruded posteriorly, posterior surface with close punctures, atleast above; vertex behind posterior ocelli with sparse to close punctures; mesopleural crest sharp, more or less like a carina. Wings usually dark brown. Abdominal tergites mat with silken reflections 5. Genus *Sericocampsomeris* Betrem
- 6. Front with a group of deep punctures in front of anterior ocellus; scapulae without shallow longitudinal grooves; lateral carina of propodeum extended beyond the spiracle; carina along the lateral margins of propodeal dorsum distinct, but not high; fore wing with first submarginal cell almost entirely setose. Basal abdominal tergites with yellow or reddish-brown apical bands 6. Genus *Phalerimeris* Betrem

- Front usually without a group of deep punctures in front of anterior ocellus; scapulae with shallow longitudinal grooves; lateral propodeal carina strong and high, and extended posteriorly up to the upper half of posterior surface of propodeum, and with a deep groove along the inner side on dorso-lateral area of propodeum; propodeal dorsum with long vestiture, dorso-median area posteriorly often with a tubercle in the middle; fore wing with second submarginal cell bare except setose above. Abdominal tergites usually black, sometimes basal tergites marked with yellow or reddish-yellow bands or spots. 7. Genus *Megacampsomeris* Betrem

Male

1. Fore wing with a single recurrent vein. Integument entirely black, genitalia with parameres slender and volsellae with small, sparse hair on the basal portion. Large sized species, body 22-28 mm in length 1. Genus *Colpacampsomeris* Betrem
- Fore wing with two recurrent veins; sometimes second recurrent vein faint or absent in small sized (5-15mm) species. Integument marked with yellow or reddish-yellow spots or bands, rarely entirely black 2
2. First sternite with smooth, triangular, raised area forming a ridge, the latter extended posteriorly up to the posterior margin and more elevated anteriorly forming a tubercle; ridge between the posterior ocelli deeply incised. Genitalia with parameres slender, basal part of volsellae with short, sparse hair 2. Genus *Tristimeris* Betrem
- First sternite usually flat, sometimes convex, but without any ridge or keel; ridge between the posterior ocelli not deeply incised 3
3. Second recurrent vein occasionally faint or absent; frontal spatium not distinctly defined posteriorly, sparsely punctate at least in the middle above, punctures mostly separated by the diameter of a puncture; scutellum and metanotum usually marked with yellow spots; basal abdominal tergites always with yellow apical bands, latter usually narrow in middle and broad at sides. Vestiture white; wings hyaline. Genitalia with parameres slender, basal part of volsella with small, sparse hair. Small sized species, body 5-15 mm in length 3. Genus *Micromeriella* Betrem
- Fore wing always with two recurrent veins; frontal spatium more or less distinct posteriorly, with close punctures, latter mostly separated by less than the diameter of a puncture 4
4. Head much broader than high in frontal view; frontal spatium distinctly defined posteriorly by a somewhat curved groove, surface impunctate posteriorly in the

- middle; front largely impunctate and with a large, flat, triangular area in front of anterior ocellus; declivity of vertex very sloping and the temples receding; anterior slope of second sternite not steep but distinct, apical sternites usually with dense erect setae known as copulatory brushes. Genitalia with parameres slender, angular in circumference and their apices thickened, basal part of volsellae not with dense hair 4. Genus **Campsomeriella** Betrem
- Head not broader than high in frontal aspect; front without a large impunctate area in front of anterior ocellus; declivity of the vertex not strongly sloping and temples not receding; apical sternites without dense erect setae. Genitalia with parameres slender but not angular in circumference and their apices not thickened, basal part of volsellae with sparse to dense hair 5
5. Anterior ocellus usually large and placed in a broad and shallow pit; integument entirely black, or marked with yellow or reddish bands or spots; vestiture predominantly black or white, or black mixed with white, sometimes apical abdominal segments with reddish setae; wings hyaline to fuscous. Genitalia with parameres short and slender, basal part of volsellae with short hair. Body 20-26 mm in length 5. Genus **Sericocampsomeris** Betrem
- Anterior ocellus relatively small and usually placed in a small shallow pit; integument usually marked with yellow or reddish-yellow spots or bands, rarely entirely black; apical abdominal segments always with black setae. Wing hyaline sometimes with a subapical fuscous mark 6
6. Basal part of volsellae with short sparse hair, distance between the bases of these hair more than their own diameter 6. Genus **Phalerimeris** Betrem
- Basal part of volsellae with long dense hair, distance between the bases of these hair less than their own diameter 7. Genus **Megacampsomeris** Betrem

1. Genus **Colpacampsomeris** Betrem

1941. *Campsomeris* subgenus *Colpacampsomeris* Betrem, *Notes Ent. Chinoise*, **8** (4) : 101-102.
Type-species : *Scolia indica* Saussure, 1855.
1967. *Campsomeris* subgenus *Colpacampsomeris* Betrem : Betrem in Bradley & Betrem, *Bull. Brit. Mus. (Nat. Hist.) Ent.*, **20** (7) : 308.
1974. *Colpacampsomeris* Betrem : Betrem in Bradley, *Revue suisse Zool.*, **81**(2) : 445
(*Colpacampsomeris* Betrem raised to generic status).

Type-Species : *Scolia indica* Saussure, 1855 (Original designation).

Female : Large sized, about 26-35 mm in length. Integument entirely black; vestiture black, except apical fringes of abdominal segments red or golden, or entirely golden. Wings dark brown or yellowish hyaline.

Anterior rim of clypeus broader medially than at sides; disc of the clypeus impunctate medially, transition between the middle and lateral portions gradual; frontal spatium contiguously punctate; front and vertex impunctate; vertex subpolished; anterior ocellus in a pit; depressed areas laterad of posterior ocelli not prominent; occipital carina complete on upper part of head; temporal groove weak.

Pronotum with deep and dense punctures, and with a moderately broad impunctate posterior margin; callosities broad, deeply punctate, without any finely punctate area posteriorly; cavities in front of tegulae shallow, limited by distinct carina or sharp margin; dorsal area of mesopleurum contiguously punctate, its transition to the vertical area straight, without any median elevation; anterior area of mesopleurum broadly impunctate anteriorly, posterior area largely impunctate; mesopleural crest not sharp; upper plate of metapleurum impunctate, transition between its vertical and dorsal areas very sharp, carina-like; metanotum impunctate; fore wing with a single recurrent vein, closed cells practically without any setae; longer spur of hind tibia strongly spatulate.

Lateral carina of propodeum extended beyond the spiracles, carina broadened and flattened in front of spiracle; spiracular angles and areas impunctate; dorso-median area comparatively long, deeply punctate, its transition with posterior area limited by a carina, dorso-lateral areas densely punctate, without any impunctate area; posterior surface deeply and densely punctate.

Second and third abdominal tergites mat, broadly impunctate in the middle, with apical and subapical rows of punctures; second and third sternites broadly impunctate in the middle.

Male : Smaller and slender than female. Integument entirely black. Vestiture entirely black, or white mixed with black, or entirely golden. Wings dark brown or yellowish hyaline; fore wing with a single recurrent vein; longer spur of hind tibia slightly spatulate.

Male genitalia : Parameres slender, basal part of the volsellae with small sparse hair.

This genus is widely distributed in Oriental Region where it ranges from Sri Lanka through India, Bangladesh and Myanmar to Malaya and South Vietnam. Saussure (1880) recorded it from Turkestan also. It is known only by its type, *viz.*, *Colpacampsomeris indica* (Saussure). In addition, a new species is described here from Karnataka, India.

The genus can be easily differentiated from other genera of the tribe Camsomerini by having the front and vertex impunctate in female, by the presence of a single recurrent vein in the fore wing in both sexes and body 26 to 35 mm in length.

Key to Species of *Colpacampsomeris*

Female

1. Vestiture black, except decumbent setae on the apices of most of the abdominal segments reddish or golden. Wings entirely dark brown 1. *indica* (Saussure)
- Vestiture entirely golden. Wings basally yellowish hyaline with apical 0.33 infumated 2. *peterseni*, sp. nov.

Male

1. Vestiture entirely black, or black mixed with white. Wings brownish 1. *indica* (Saussure)
- Vestiture entirely golden. Wings yellowish hyaline, with apical 0.33 slightly infumated. 2. *peterseni*, sp. nov.

1. *Colpacampsomeris indica* (Saussure)

This widely distributed polytypic species ranges from Sri Lanka through India and Bangladesh to Myanmar, Malaya and South Vietnam. Saussure (1880) recorded it from Turkestan. Betrem in Bradley & Betrem (1967) reported three subspecies *viz.*, *indica indica* (Saussure) from northern India, Bangladesh and Myanmar; *indica eliformes* (Saussure) from Sri Lanka; *indica salvazei* (Betrem) from Malaya. Krombein (1978) in his work on scoliid fauna of Sri Lanka observed that the population from southern India represented an undescribed subspecies, which is described here as *indica deccanensis*, sp. nov. These subspecies are mainly differentiated by the extent of red or golden vestiture on abdominal segments in the female and the extent of white and black vestiture in the male. The subspecies from the Indian subregion can be distinguished by the following key :

Key to the Subspecies of *Colpacampsomeris indica*

Female

1. Decumbent setae on pygidium black. Southern India.(b) *indica deccanensis*, subsp. nov.
- Decumbent setae on pygidium bright or golden 2
2. Occiput with pale erect setae and first tergite antero-laterally with both red and black setae. northern India, Bangladesh and Myanmar.(a) *indica indica* (Saussure)
- Occiput and first tergite antero-laterally with entirely black setae. Sri Lanka.(c) *indica eliformes* (Saussure)

Male

1. Vestiture either entirely black or with white hair only on head, elsewhere black. southern India.(b) *indica deccanensis*, subsp. nov.
- Vestiture black mixed with, more or less, white hair on almost entire body.....2
2. Vestiture predominantly white all over the body including legs. northern India, Bangladesh and Myanmar(a) *indica indica* (Saussure)
- Vestiture black except the apical fringes of the second to fourth abdominal segments entirely or largely white. Sri Lanka(c) *indica eliformes* (Saussure)

(a) *Colpacampsomeris indica indica* (Saussure)

1855. *Scolia (Lacosi) indica* Saussure, *Mem. Soc. Phys. Hist. nat. Geneve*, **14** : 46, fig., 10; Female, "Indes Orientales" (Lectotype in Paris Museum).
1855. *Scolia ignita* Smith, *Cat. Hym. Brit. Mus.*, **3** : 101; Female, Silhet (Type in British Museum).
1864. *Scolia (Discolia) indica* Saussure : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 119. Female, Silhet [Synonymised *S. ignita* under *S. (Discolia) indica*].
1892. *Scolia (Discolia) indica* Saussure : Cameron, *Mem. Proc. Manch. Lit. Phil. Soc.* (4) **5** : 106.
1897. *Scolia (Discolia) indica* Saussure : Bingham, *Fauna British India Hym.*, **1** : 84. Female, India : North Bengal, U.P. (Kumaon). Myanmar.
1897. *Scolia indica* Saussure : Dalla Torre, *Cat. Hym.*, **8** : 165.
1911. *Scolia indica* Saussure : Turner, *Ann. Mag. nat. Hist.*, (8) **8** : 619 (Synonymised *S. eliformes* under *S. indica*).
1928. *Campsomeris (Dielis) indica* (Saussure) : Betrem, *Treubia*, **9** (suppl.) : 116-117. Female, Male, from northern India.
1928. *Campsomeris (Dielis) assamensis* Betrem, *Treubia*, **9** (suppl.) : 111 : Male, India, Khasi Hills (Holotype in Schulthess Colln.). (Synonymised by Betrem in Bradley & Betrem, 1967).
1941. *Campsomeris (Colpacampsomeris) indica* (Saussure) : Betrem, *Notes Ent. Chinoise*, **8** : 101. (*Colpacampsomeris* erected as a new subgenus).
1941. *Capmsomeris (Colpacampsomeris) indica assamensis* Betrem : Betrem, *Notes Ent. Chinoise*, **8** (4) : 102.
1947. *Campsomeris (Colpacampsomeris) indica* (Saussure) : Betrem, *Tijdschr. Ent.*, **88** : 414.
1967. *Campsomeris (Colpacampsomeris) indica indica* (Saussure) : Betrem in Bradley & Betrem, *Bull. Brit. Mus. (Nat. Hist.) Ent.*, **20** (7) : 308. [type study of *Scolia ignita* Smith; synonymised *Campsomeris (Dielis) assamensis* Betrem].
1974. *Colpacampsomeris indica indica* (Saussure) : Betrem in Bradley, *Revue. suisse. Zool.*, **81** : 445. (*Colpacampsomeris* raised to generic status, Female lectotype designated by Bradley).

This subspecies is widely distributed in the Himalayan ranges of India and also occurs in Bangladesh and Myanmar.

Female : Length 25-35 mm. Integument entirely black. Vestiture black, except apices of second to fifth abdominal segments with bright red or golden-red setae, pygidium also similarly clothed. Wings dark brown with strong blue reflections.

Clypeus impunctate in the middle, at sides with coarse and close punctures; frontal spatium contiguously punctate; frontal furrow weakly impressed, extending up to anterior ocellus, the latter in a shallow pit; front and vertex almost entirely impunctate, declivous portion of the vertex also impunctate.

Pronotum broadly impunctate along its posterior margin, the rest with coarse, deep and mostly contiguous punctures; mesoscutum with large impunctate area in the middle, elsewhere with coarse, deep and close punctures, the punctures along the anterior margin dense; scutellum with coarse and relatively sparse punctures, usually impunctate posteriorly in the middle; metanotum impunctate; mesopleurum broadly impunctate along its anterior and posterior margins, anterior area with close punctures along the crest, posterior area impunctate above, with relatively smaller and sparser punctures below; metapleurum impunctate; propodeum at its dorso-medium area usually with a small to large longish impunctate area in the middle, elsewhere with moderate sized punctures, mostly separated by half the diameter of a puncture, dorso-lateral areas without any impunctate area anteriorly, punctures relatively smaller and closer; lateral surface impunctate along its lower margin, elsewhere with coarse and contiguous punctures, posterior surface densely punctate.

Second and third abdominal tergites mat, broadly impunctate in the middle.

Male : Length 22-28 mm. Integument black. Vestiture predominantly white, mixed with black. Wings relatively light brown, anterior margin of fore wing dark with blue reflections.

Distribution : India : Arunachal Pradesh (Siang Dist. : old Siang, Peyring vill.), Himachal Pradesh (Chobu, Kangra, Solan), Meghalaya (Garo Hills : Darugiri; Khasi hills), Sikkim and Uttar Pradesh (Ranikhet, Devasthal, Sinkot; Uttarakashi dist. : Ramola). *Elsewhere* : Bangladesh and Myanmar.

(b) *Colpacampsomeris indica deccanensis*, subsp. nov.

(Figure 11)

1897. *Scolia indica* Saussure : Bingham, *Fauna Brit. India, Hym.*, 1 : 84 (Material from Travancore, Kerala).
1897. *Scolia eliformes* Saussure : Bingham, *Fauna British India, Hym.*, 1 : 89 (Male from southern India only).
1928. *Campsomeris (Dielis) indica* (Saussure). Betrem, *Treubia*, 9 (suppl.) : 116-117 (Male, Female from Malabar).

This subspecies is distributed in southern India and ranges from Kerala through Karnataka to Maharashtra. This subspecies is chiefly recognised by having black setae on pygidium in female. The vestiture in the males is either black or on head and first pair of legs white and elsewhere almost entirely black including the apical fringes of abdominal tergites and sternites.

Female : Length 35 mm. Integument entirely black. Vestiture black except the apices of second to fifth tergites and sternites with reddish-golden setae, pygidium normally clothed with black setae, rarely with red setae. Wings dark brown with strong blue reflections.

Male : Length 27 mm. Integument and vestiture entirely black or sometimes head with white vestiture. Wings lighter than female, fore wing anteriorly dark, with weak blue reflections.

Male genitalia as in figure 11.

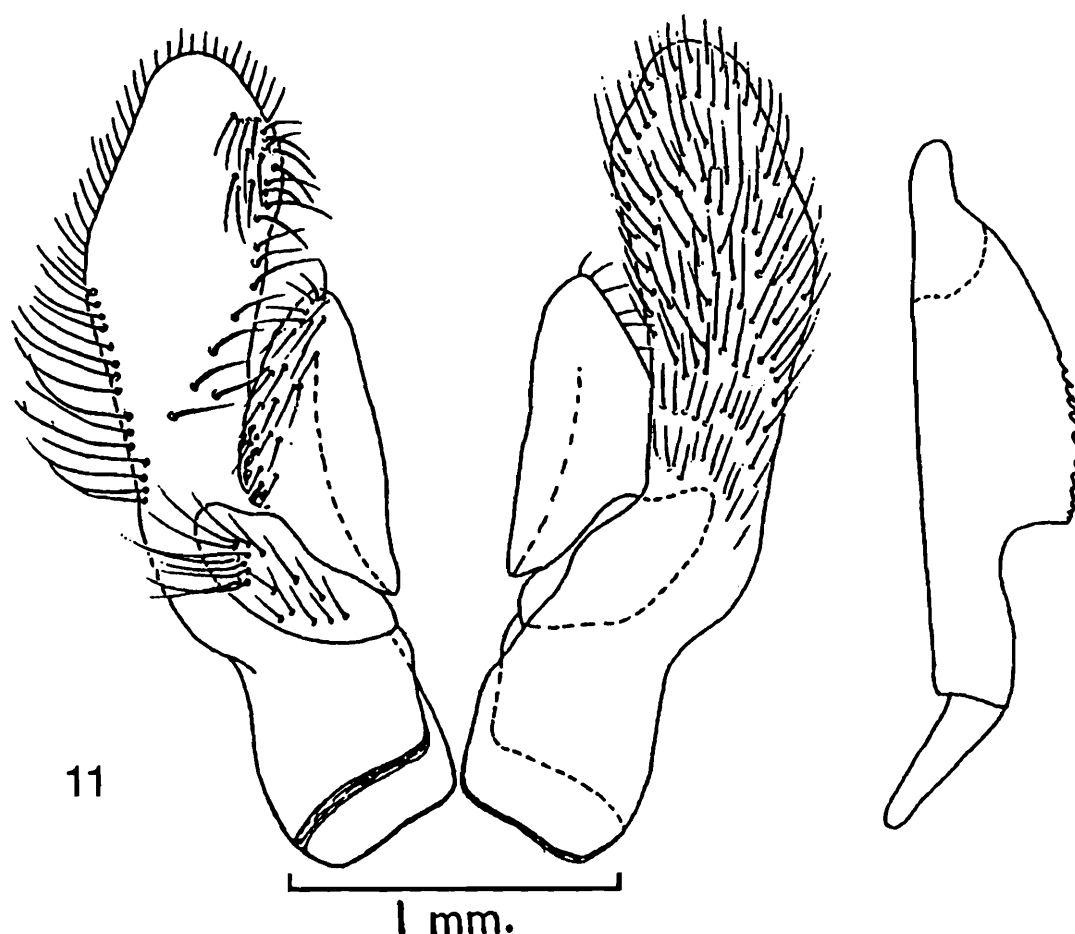


Fig. 11 : *Colpacampsomeris indica deccanensis*, sp. nov. Male genitalia : Ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right.

Holotype ♀ Female and *Allotype* Male, India : Karnataka : Chikmagalur dist. : Mudigere, 900 m, 2-10.xi. 1977, Colln. Zool. Mus. Copenhagen Expd. (Regd. No. 8851/H3 and 8852/H3 Z.S.I., Calcutta). Paratypes 4 Females, 14 Males. India : Karnataka : Mudigere, 5 Males, data same as of holotype; Kodagu dist. : Ponnampet, 2 Males, 18.iv.1979, P.P. Girish. Kerala : Cannanore dist. : Tellichery, 3 Females, x. 1977, T.R.S. Nathan (ZSI, Calcutta, Regd. Nos. 8853-8862/H3). Maharashtra : Kolhapur dist.; Kolhapur, 1 Female, x.1985, S.M. Patil (Ghorpade colln., Bangalore).

Distribution : India : Karnataka, Kerala and Maharashtra.

2. *Colpacampsomeris peterseni*, sp. nov.

(Figures 12, 13)

This brightly coloured species is described here from Karnataka, India. The female is large and stout and male is small and slender. Both sexes, however, can be easily differentiated from that of its only congener by the abundance of golden vestiture covering the entire body.

Female : Length 31 mm. Integument black. Vestiture entirely golden. Wings yellowish hyaline with apical 0.33 infumated.

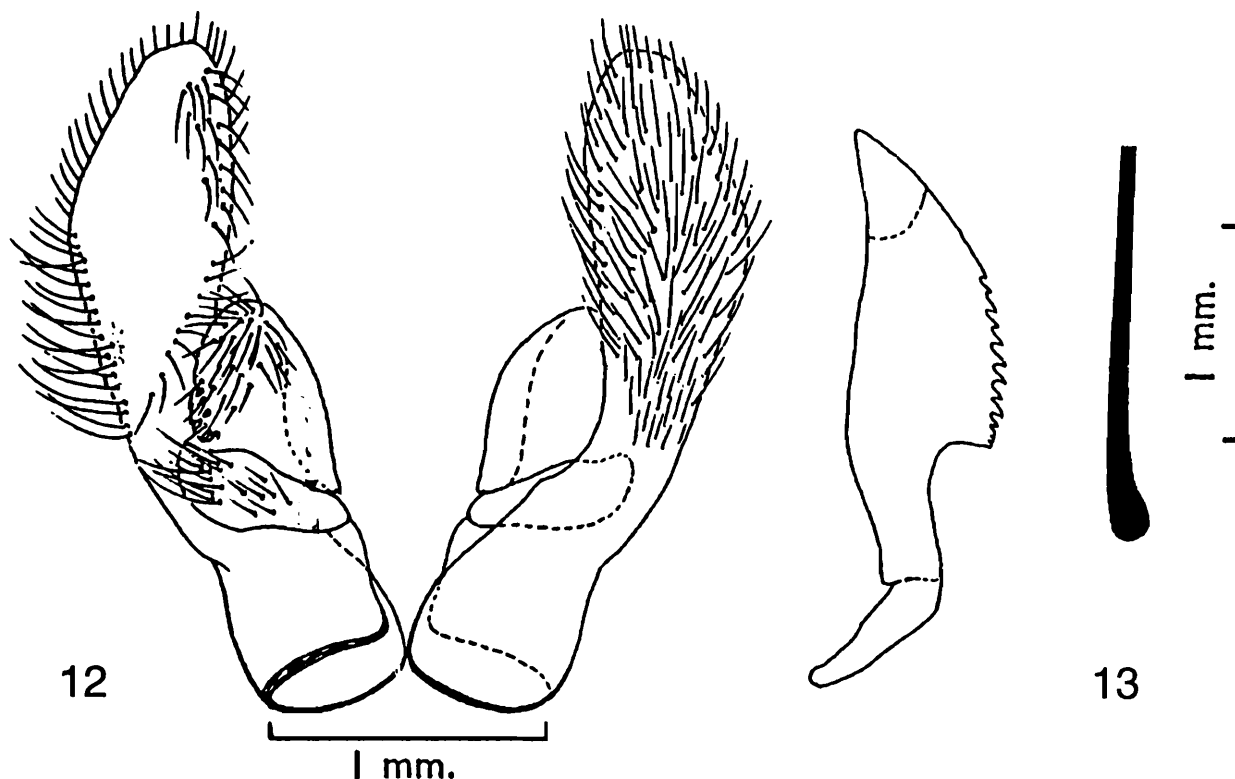
Clypeal disc impunctate in the middle, at sides with close, coarse punctures; frontal spatium contiguously punctate; frontal furrow extending up to the anterior ocellus, the latter in a shallow pit; front and vertex impunctate.

Pronotum broadly impunctate along its posterior margin, rest of the surface with coarse, deep and coalescent punctures, giving an appearance of a honey-bee comb; mesoscutum with a large impunctate area in the middle, elsewhere with coarse and close punctures; scutellum largely impunctate except for a few scattered punctures at sides; metanotum impunctate; mesopleurum broadly impunctate along its anterior and posterior margins, upper plate at posterior half of the anterior area with contiguous punctures, posterior area impunctate, lower plate at its anterior area with contiguous puncture, posterior area with small and sparse puncture below; metapleurum entirely impunctate; dorsum of propodeum with contiguous punctures, lateral surface impunctate at the anterior corner, elsewhere with subcontiguous punctures, posterior surface contiguously punctate, the longer hind tibial spurs strongly spatulate.

Male : Length 27 mm. Integument black. Vestiture entirely golden. Wings basally yellowish hyaline, its apical 0.33 slightly brownish.

Male genitalia as in figures 12, 13.

Holotype : Female, India : Karnataka : Chikmagalur dist. : Mudigere, 900m, 2-10.xi.1977, Zool. Mus. Copenhagen Expd. (ZSI, Calcutta, Reg. No. 8849/H3). *Allotype* Male, India : Karnataka : Chikmagalur dist. : Sringeri, 4.x.1985, N.V.M. Reddy (ZSI, Calcutta, Regd. No.8850/H3). *Paratype* 1 Male, India : Karnataka : Chikmagalur dist. : Sringeri, 4.x.1985, N.V.M. Reddy (Ghorpade Colln., Bangalore).



Figs. 12-13 : *Colpacampsomeris peterseni*, sp. nov. 12, Male genitalia : Ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right; 13, Longer spur of female hind tibia.

Distribution : India : Karnataka.

Etymology : This species is named in honour of late Dr. Borge Petersen, Zoologiske Museum, Copenhagen, who lead the Expedition to southern India.

2. Genus *Tristimeris* Betrem

1966. *Campsomeris* subgenus *Tristomeris* Betrem in Bradley & Betrem, *Beitr. Ent.*, **16** : 74 (nomen nudum).
1967. *Campsomeris* subgenus *Tristimeris* Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 315. (nomen nudum, to accommodate *Campsomeris bradleyi* Betrem).
1974. *Tristimeris* Betrem in Bradley, *Revue suisse Zool.*, **81** (2) : 457 (introduced as new genus : Type species : *Campsomeris javana* Lepeletier, 1845).

Type-species : *Campsomeris javana* Lepeletier, 1845 (Original designation).

Female : Moderate sized, about 20-30 mm in length. Integument entirely black. Vestiture usually black, sometimes black mixed with white or predominantly white. Wings dark brown.

Anterior rim of clypeus broader medially than at the sides; frontal spatium and lower front densely punctate, upper front impunctate in the middle; frontal furrow deep, extending up to anterior ocellus; vertex polished, impunctate except narrowly along the orbits, declivous portion of the vertex largely impunctate; ocellar pits prominent; occipital carina complete on upper part of the head; temporal groove indistinct.

Pronotum densely punctate, its posterior margin broadly impunctate at sides; callosities broad with a few deep and coarse punctures, groove behind them broad and limited by a distinct declivity above, lower margin of scapula behind the groove more or less impunctate; cavities before tegulae shallow but distinctly limited by sharp margins; dorsal area of mesopleurum large and densely punctate, raised medially, its transition to vertical area straight, anteriorly apex higher than the posterior lobe of pronotum; thorax when viewed from above broader across mesopleurae than at the hind corners of pronotum, mesopleural crest raised and sharp, carina-like in the middle; upper plate of metapleurum punctate above, transition between its vertical and dorsal areas without any carina; longer spur of hind tibia, blunt or sharp; fore wing with two recurrent veins and two submarginal cells.

Lateral carina of propodeum extending beyond the spiracles; spiracular angles and areas impunctate; dorso-median area of propodeum with deep and close punctures, its transition to posterior surface sharp, carina-like, dorso-lateral areas densely punctate except for a small to large impunctate area anteriorly, its transition to the vertical surface sharp and marked by a carina, posterior surface closely punctate.

The second and third abdominal tergites shiny, broadly impunctate in the middle.

Male : Smaller and slender than the female. Black, maculated with yellow on clypeus, scrobes, pronotum, scutellum, metanotum, legs and abdominal segments. Vestiture predominantly white except black on apical abdominal segments.

Frontal spatium densely punctate, not distinctly defined posteriorly; frontal furrow indistinct on front; ridge between the posterior ocelli divided; first sternite with a smooth, triangular raised area forming a longitudinal ridge.

Male genitalia : Parameres slender, basal portion of volsella with sparse setae.

This genus is widely distributed in the Oriental region and ranges from Philippines, westwards through Sulawesi and East-Indies to Myanmar. It is recorded here for the first time from Andaman & Nicobar Is., India.

The genus can be easily distinguished, from other genera of the tribe Campsomerini from Indian subregion, by having, in female, second and third tergites shiny, and the thorax when viewed from above, broader across mesopleurae than at the hind corners of pronotum. The males, though similar to those of other genera having yellow maculations on most of the body parts, can however, be distinguished by having

scutellum and metanotum almost entirely yellow and the first sternite with a prominent longitudinal keel in the middle.

The genus is known by two species, viz., *T. javana* (Lepeletier) widely distributed and ranging from Palawan in Philippines through East Indies to Myanmar and Andaman & Nicobar Islands in India, and *T. bradleyi* (Betrem) from Sulawesi.

1. *Tristimeris javana* (Lepeletier)

This species is distributed in the south east Asia and ranges from Palawan westwards through East Indies to Myanmar. It is also recorded here from Andaman & Nicobar Islands, India.

Betrem (1928) recorded two subspecies, viz., *T. javana javana* (Lepeletier) from Malaysia, Indonesia and Myanmar, and *T. javana sitolensis* (Betrem) from Nias Island. In addition one new subspecies is described here from Andaman & Nicobar Islands, India. These subspecies are mainly differentiated by the extent of black and white vestiture in the female. The differences in the males of different subspecies have not been established. The following key to the known and new subspecies from south-east Asia is based on females only.

Key to the Subspecies of *Tristimeris javana*

Female

1. Vestiture entirely black. Nias Island. (not discussed in the text)
.....*javana sitolensis* (Betrem)
- Vestiture black mixed with white 2
2. Vestiture black except apical fringes of basal abdominal segments black, mixed with white. Ranging from Sabah and Brunei to Myanmar. (not discussed)
.....*javana javana* (Lepeletier)
- Vestiture predominately white except black on last three abdominal segments. Andaman & Nicobar Islands, India.*javana albopilosa*, subsp. nov.

(a) *Tristimeris javana albopilosa*, subsp. nov.

(Figures 14, 15)

This subspecies is described here from Andaman & Nicobar Islands. The female is distinguished by having erect vestiture on head and thorax predominantly white. The males, however, do not exhibit notable differences with other subspecies.

Female : Length 24 mm. Integument black. Vestiture white except black on the last three abdominal segments. Tomentum on back of head and thorax silvery. Wings dark brown with purplish reflections.

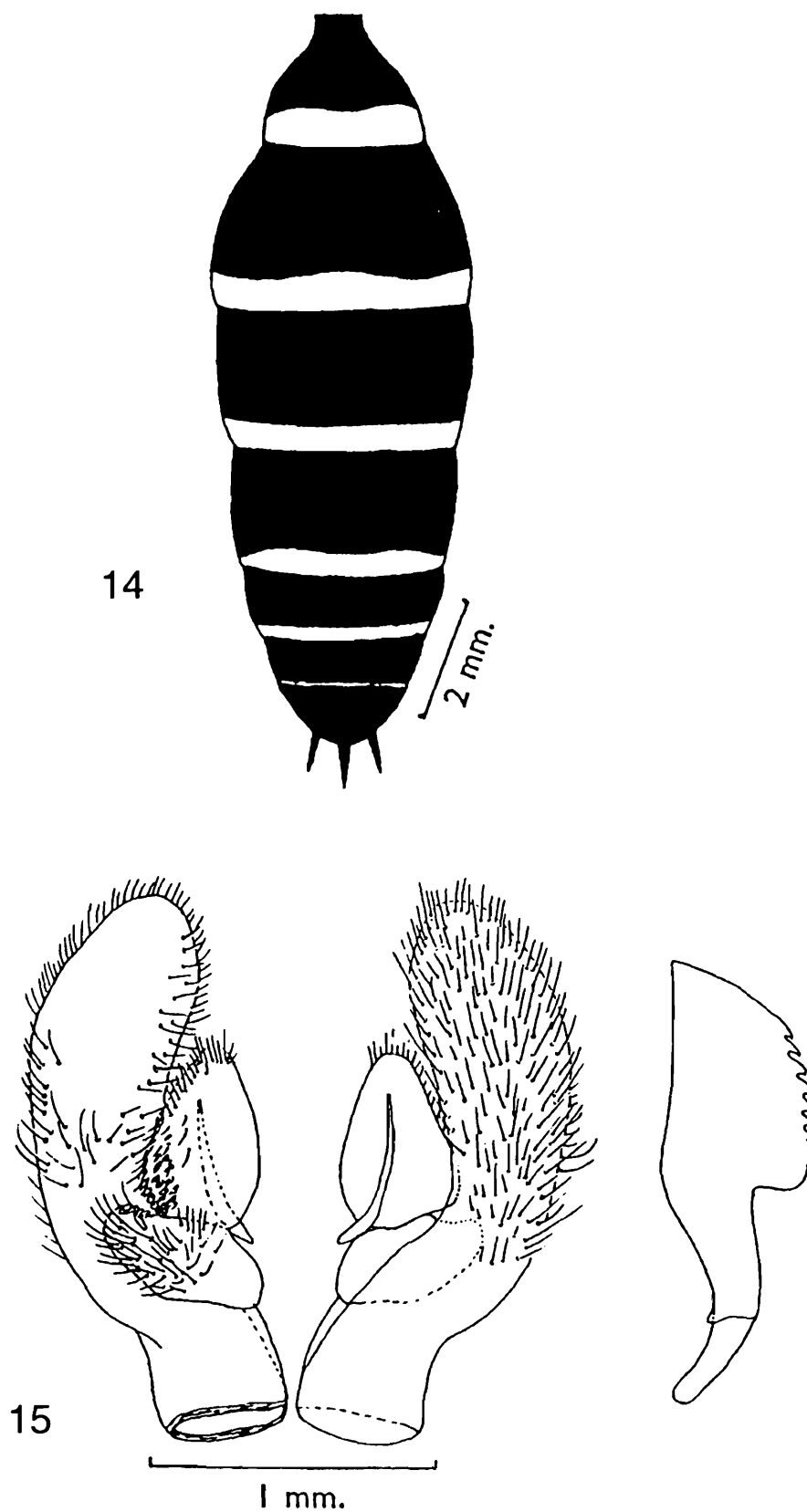
Clypeus impunctate in the middle, at sides contiguously punctate, anterior part of the disc longitudinally striated in the middle; frontal area, frontal spatium and lower front contiguously punctate; upper front impunctate in the middle, at sides along the eye margins with a group of dense punctures, frontal fissura prominent and extending up to post-ocellar furrow; anterior ocellus in a shallow pit, post-ocellar furrow prominent; areas laterad of posterior ocelli depressed, ocellar pit present; vertex impunctate except for a few punctures along inner eye margin, its declivous portion with a few scattered punctures; occipital carina obliterated above; temporal groove very weak.

Scapulae subcontiguously and coarsely punctate, broadly impunctate at sides along posterior margin; mesoscutum broadly impunctate in the middle, anteriorly and at sides with subcontiguous to close, coarse punctures; scutellum with small subcontiguous to sparse punctures, impunctate along the posterior margin; metanotum with similar but dense punctures; mesopleurum broadly impunctate anteriorly and posteriorly, anterior area densely punctate along the crest, posterior area with sparse punctures below; upper plate of metapleurum punctate along its upper margin, lower plate with fine sparse punctures at its lower half; dorso-median area of propodeum with small close punctures, the distance between most punctures less than the diameter of a puncture, dorso-lateral areas with an impunctate area above along inner margin, rest of the surface with small, close to dense punctures, lateral surface with sparse to scattered shallow punctures, posterior surface largely punctate.

First to third abdominal tergites shiny with sparse punctures.

Male : Length 16 mm. Black, abdomen with faint blue reflections. Pale yellow markings are as follows : mandibles at the basal half, clypeus wholly except for a black area behind the anterior margin, a small mark on scrobe not extending up to the lower margin of ocular sinus, a small spot on gena, callosities wholly, scapulae broadly along posterior margin, small marks on mesoscutum postero-laterally; a narrow anterior band on scutellum, a small spot on metanotum posteriorly, fore coxa in front, a small elongated spot on the fore femur below, all the femora above (second and third femora narrowly), middle tibiae above; first three tergites with narrow apical bands, the band on second tergite broadly emarginated in the middle, narrow apical bands on second and third sternites, the band on second sternite narrowly and that on third broadly interrupted in the middle. Erect vestiture white except on last three abdominal segments black, tomentum on thorax silvery.

Frontal spatium densely punctate, not distinctly defined posteriorly; frontal fissura shallow, indistinct on front; front sparsely punctate; anterior ocellus in a shallow pit; ridge between posterior ocelli divided; ocellar triangle not densely punctate, areas laterad of posterior ocelli depressed; declivous portion of vertex sparsely punctate, the punctures becoming denser along occipital carina.



Figs. 14-15 : *Tristimeris javana albopilosa*, subsp. nov. 14, dorsal aspect of male abdomen; 15, male genitalia, ventral aspect at left, dorsal in middle and aedeagus in profile at right.

Thorax sparsely punctate. First sternite with a triangular impunctate area; raised medially forming a keel-like structure.

Male genitalia as shown in figure 15.

Holotype Female, India : Andaman Islands, no date, (Z.S.I., Calcutta, Regd. No. 8864/H3). *Allotype* Male, India : Nicobar Islands, without Further date (Z.S.I., Calcutta). *Paratype* 1 Male, India : Nicobar Islands, without further data (Z.S.I., Calcutta, Regd. No. 8865/H3).

Distribution : India : Andaman & Nicobar Islands.

3. Genus *Micromeriella* Betrem

1964. *Campsomeris* subgenus *Micromeris* Betrem in Bradley, *Ann. Mus. civico. Stor. Nat. Genova*, **75** : 186, 188, 189 (Nomen nudum).

1967. *Campsomeris* subgenus *Micromeris* Betrem : Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 294, des. Type-species : *Scolia marginella* Klug, 1810.

1972. *Micromeriella* Betrem, *Mon. Ned. Ent. Ver.*, **6** : 166, des. and key (new name for *Micromeris* Betrem, the latter preoccupied in Mollusca vide Conard, 1866).

Type-species : *Scolia marginella* Klug, 1810 (Original designation).

Female : Small sized, about 8-16 mm in length. Integument black rarely with yellow apical bands on basal abdominal tergites. Vestiture white and sparse. Wings clear hyaline, fore wing yellowish anteriorly, first submarginal cell setose only along its upper margin, second recurrent vein sometimes faint or absent.

Anterior rim of the clypeus broader medially than at sides; front impunctate medially; vertex impunctate; temporal groove present but shallow; occipital carina complete above. Cavities before tegulae deep and limited by sharp margins; callosities narrow and punctate, the areas behind these large and impunctate; transition between the dorsal area and vertical portion of mesopleurum gradual, slightly elevated medially; upper plate of metapleurum impunctate, its transition to the dorsal area very gradual; lateral carina of propodeum extending up to or beyond spiracles; transition of dorso-lateral area of propodeum to its vertical area rounded, marked with small carina apically, posterior surface of propodeum impunctate or with fine and sparse punctures; spiracular angles and areas smooth; spurs white, longer spur of hind tibia spatulate to almost acute. Basal abdominal tergites mat and sparsely punctate.

Male : Smaller and slender than the female; scutellum and metanotum usually marked with yellow; basal abdominal tergites always with yellow apical bands and sternites with similar bands or postero-lateral spots; vestiture white; wings clear hyaline.

Frontal spatium not distinctly marked posteriorly, sparsely punctate, the distance between the punctures more than the diameter of a puncture.

Male genitalia : Parameres slender and volsellae sparsely setose.

This genus is widely distributed in whole of Africa, southeastern Palaearctic, Orient and Moluccas. Betrem and Bradley (1972) recorded ten species from Africa, of which one species, viz., *M. hyalina* (Klug) ranges from Africa to Pakistan.

Only one polytypic species, viz., *M. marginella* (Klug) is distributed in Oriental region and also occurs in Moluccas. This species differs from *M. hyalina* by having, in female, vertex entirely impunctate, front impunctate except for some punctures anterior to lateral ocelli and a row of punctures along inner orbits. Whereas in *M. hyalina* the vertex including its declivous portion is sparsely punctate and the front with a distinct sparsely punctate area between ocellar triangle and orbits.

1. *Micromeriella marginella* (Klug)

This polytypic species is widely distributed in the Oriental region and also occurs in Moluccas, where it ranges from Sri Lanka through India, Thailand and East Indies to Philippines, Moluccas and Taiwan. Seven subspecies have been recorded, viz., *m. marginella* (Klug) from Indian subregion, *m. thainana* (Tsuneki) from Thailand, *m. billitonensis* (Tullgren) from Malaya, Java and Billiton, *m. bariensis* (Tsuneki) from Bari Island, *m. modesta* (Smith) from Philippines, *m. formosana* (Betrem) from Taiwan and *M. terminata* (Smith) from Moluccas. These subspecies are differentiated mainly by the extent of yellow maculation on the body in males and by the presence or absence of yellow apical bands on basal abdominal tergites in females.

The present study, based on a series of specimens from India, reveals that yellow maculation on the body of males is variable within the population, and the females with apical yellow bands on basal abdominal tergites also occur in the population where the females have otherwise entirely black integument.

The only typical subspecies *M. m. marginella* is distributed in the Indian subregion.

(a) *Micromeriella marginella marginella* (Klug)

(Figures 16, 17)

- 1810. *Scolia marginella* Klug, *Beitr. Naturk.*, 2 : 214. Male, India-Orient (Type in Berlin Museum).
- 1858. *Elis (Campsomeris) hirsuta* Saussure, *Ann. Soc. Ent. Fr.*, (3) 6 : 234. Female, India : Tranqueber (Type in Copenhagen Museum).
- 1864. *Elis (Dielis) hirsuta* Saussure : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 216, Female, India.
- 1864. *Elis (Dielis) marginella* (Klug) : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 186, Male, India.
- 1892. *Elis hirsuta* Saussure : Saussure, *Hym. in Grandidier Hist. Madagascar*, 20, note.

1897. *Elis hirsuta* Saussure : Bingham, *Fauna British. India, Hym.*, 1 : 98-99; Female, India, West Bengal, Calcutta.
1897. *Scolia hirsuta* (Saussure) : Dalla-Torre, *Cat. Hym.*, 8 : 163.
1897. *Scolia marginella* Klug : Dalla-Torre, *Cat. Hym.*, 8 : 169.
1928. *Campsomeris (Campsomeris) marginella marginella* (Klug) : Betrem, *Treubia*, 9 (suppl.) : 135-136. Female, Male, India, Maharashtra, West Bengal; Sri Lanka.
1928. *Campsomeris (Campsomeris) marginella formosana* var. *flavocincta* Betrem, *Treubia*, 9 (suppl.) : 136. Female, Calcutta (Holotype in Leiden Museum). **New Synonymy.**
1941. *Campsomeris (Campsomeriella) marginella marginella* (Klug) : Betrem, *Notes Ent. Chinoise*, 8 (4) : 90. India; Sri Lanka.
1968. *Campsomeris (Micromeris) marginella marginella* (Klug) : Bradley & Betrem, *Deuts. Ent. Zeits.*, 15 : 329-330 (Notes on holotype).
1972. *Micromeriella marginella* (Klug) : Betrem, *Mon. Ned. Ent. Ver.*, 6 : 119; (*Micromeriella* new name for *Micromeris*).
1974. *Micromeriella marginella marginella* (Klug) : Bradley, *Revue. suisse Zool.*, 81 (2) : 443 (notes on the synonymy of *E. hirsuta* Saussure with typical *M. m. marginella*).
1975. *Campsomeris marginella* (Klug) : Chhotani & Ray, *Rec. zool. Surv. India*, 71 : 26, Female, Male, Rajasthan, India.
1976. *Campsomeris (Micromeris) marginella*, Jonathan et. al., *News. zool. Surv. India*, 2 (3) : 113. Female, Male; southern India.
1978. *Micromeriella marginella marginella* (Klug) : Krombein, *Smithsonian Contrb. Zool.*, 238 : 19-20. Female, Male, Sri Lanka.

This subspecies is widely distributed in India. The collection data suggests that it breeds through out the year in areas of scanty to heavy rainfall and occurs from sea-level to an altitude of 1000m.

It is the smallest member of the Indian Campsomerini and can be distinguished by having, in female, clear wings with yellowish anterior margin and sparse white vestiture, except sometimes on the last two abdominal segments, black. The male can be distinguished by its small size, yellow apical bands on first five abdominal tergites and sparsely punctate frontal spatium. The genitalia is characterised by slender parameres and sparsely setose volsellae.

Betrem (1928) described var. *flavopicta* under subspecies *marginella formosana* on the basis of a female from Calcutta, having yellow apical bands at sides on the first and second tergites. Since they are not geographically isolated and the occurrence of this type of colour-form is not uncommon in the population having an entirely black integument, therefore, it is considered a synonym.

Female : Length 9-16 mm. Integument black, sometimes mandibles, anterior rim of clypeus and antennal flagellum reddish-brown, rarely narrow apical yellow bands on basal two to three abdominal tergites. Erect vestiture white and sparse, usually white fringes at the apices of first four tergites, sometimes fifth tergite also with similar fringes, pygidium sometimes with reddish setae.

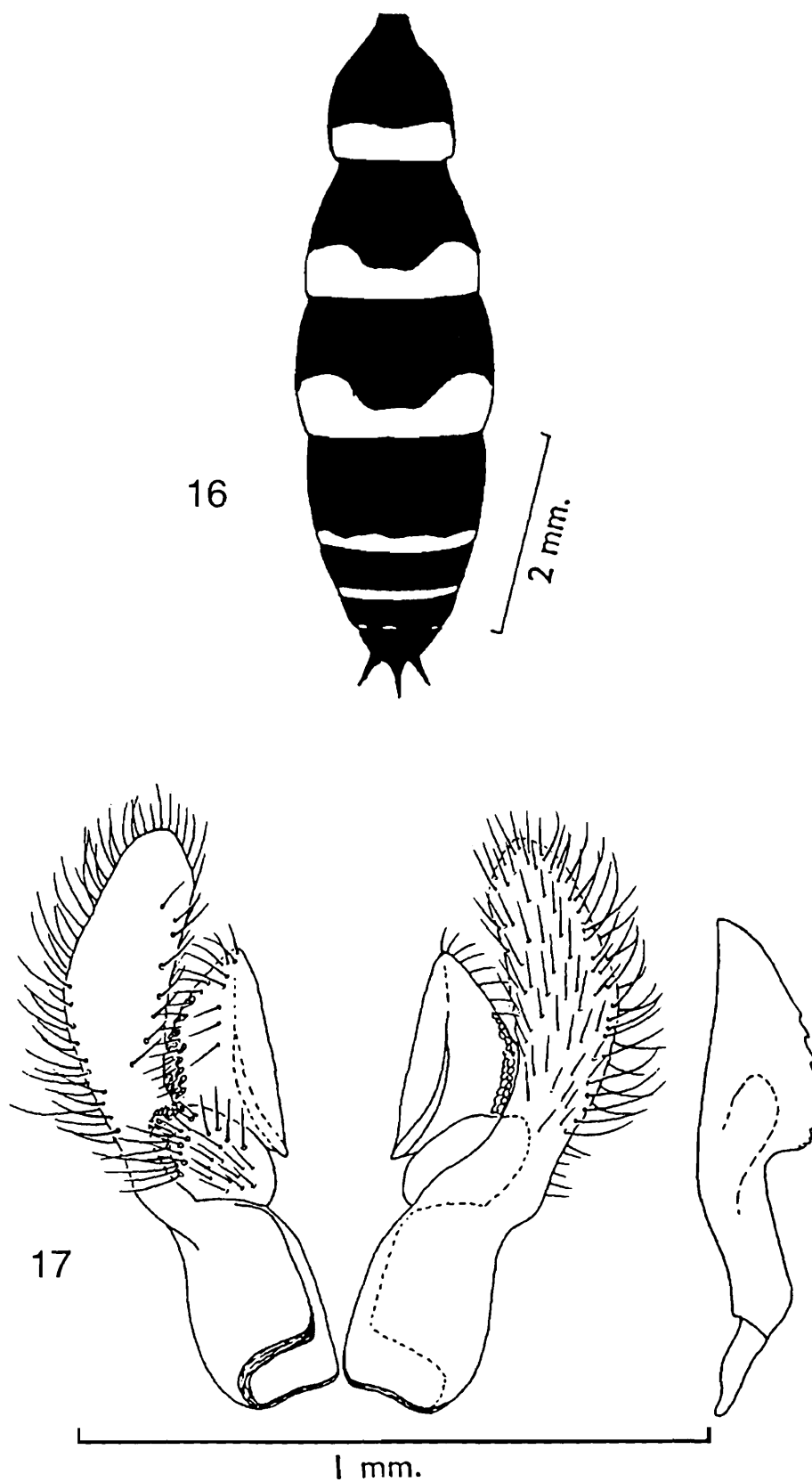
Clypeus impunctate in the middle, at sides with coarse and close punctures; frontal spatium with coarse and close punctures; frontal furrow indistinct; anterior ocellus in a shallow pit; front impunctate and subpolished, in front of anterior ocellus and around ocellar triangle with close punctures; vertex with a few scattered punctures, except for a row of close punctures along eye margin, its declivous portion with scattered punctures.

Scapulae largely subcontiguously punctate; mesoscutum impunctate in the middle, anteriorly with close and at sides with relatively sparse punctures; scutellum impunctate; metanotum impunctate in the middle, at sides with close punctures; mesopleural crest with a single row of punctures, upper plate at its dorsal area and posterior one-third of anterior area with dense punctures, posterior area impunctate, lower plate broadly impunctate anteriorly and posteriorly, in the middle with small and sparse punctures; metapleurum impunctate; dorso-median area of propodeum with close punctures, dorso-lateral area with small and sparse punctures and with an impunctate area anteriorly along the inner margin, vertical surface broadly impunctate along the metapleural suture, elsewhere densely punctate, posterior surface sparsely punctate.

Abdominal tergites mat, first tergite impunctate in the middle, anteriorly and at sides with close punctures, second tergite impunctate in the middle, anteriorly with sparse punctures, posteriorly with a subapical row of close punctures.

Male : Length 6-12 mm. Integument black, sometimes antennal flagellum red; the following yellow : mandibles at their bases, clypeus with a small to large mark in the middle, small to large mark on callosities, pronotum except at its anterior margin, scutellum and metanotum, first coxae below, sometimes small spots on second and third coxae, extensive linear marks above on all the femora, first and second tibiae wholly and third usually with a linear mark or sometimes wholly, first tarsus usually, second metatarsus, sometimes all the three tarsi, apical bands on first to fifth or sixth tergites, the bands on second and third tergites broad and deeply emarginate in the middle, in small specimens these bands are narrow, second to fourth or sixth sternites with narrow apical bands, the band on fourth sometimes interrupted in the middle. Erect vestiture white, tomentum silvery. Wings clear hyaline.

Clypeus impunctate in the middle, at sides with coarse and close punctures; frontal spatium sparsely punctate, not distinctly marked posteriorly; front and vertex with sparse punctures.



Figs. 16-17 : *Micromeriella marginella marginella* (Klug) : 16, dorsal aspect of male abdomen; 17, male genitalia, ventral aspect at left, dorsal in middle and aedeagus in profile at right.

Scapulae with close punctures; mesoscutum sparsely punctate, interspaces between the punctures more than two to three times the diameter of a puncture; scutellum and metanotum with fine and scattered punctures; mesopleurum with sparse punctures, interspaces between the punctures more than their diameter; metapleurum impunctate; dorso-median area of propodeum with close punctures; vertical surface broadly impunctate along the metapleural suture, posteriorly with sparse punctures; posterior surface sparsely punctate.

Male genitalia as in figure 17.

Distribution : India : Andhra Pradesh (Cudappah), Bihar (Pusa, Chhapra, Purnea, Dhanbad), Delhi, Gujarat (Mehsana, Deesa, Palampur), Rajasthan (Sambhar Lake, Gudha), Karnataka (Bangalore, Dharwar, Hanovar, Allalsandra), Kerala (Palghat), Maharashtra (Helvak, Taloshi, Tambi, Pune), Orissa (Sambalpur), Pondichery (Karaikal), Tamil Nadu (Coimbatore, Anamalai Hills, Nilgiri Hills), Uttaranchal (Dehra Dun, Motichur) and West Bengal (Siliguri, Damelim, Kolkata). *Elsewhere* : Sri Lanka.

4. Genus *Campsomeriella* Betrem

1941. *Campsomeris* subgenus *Campsomeriella* Betrem, *Notes Ent. Chinoise*, 8 (4) : 86. Type-species : *Scolia thoracica* Fabricius, 1787.

1967. *Campsomeriella* Betrem, *Ent. Ber.*, 27 : 25-29. Female, Male; redes. (*Campsomeriella* Betrem raised to generic status; *Rodriguimeris* and *Annulimeris* erected as new subgenera under *Campsomeriella*; key to species and higher taxa and list).

Female : Medium sized, about 10-23 mm in length. Integument entirely black; vestiture yellowish-brown and black, white and black, or entirely white. Wings entirely dark brown to yellowish hyaline.

Anterior rim of the clypeus usually much broader medially than at the sides of the median area. Front and vertex entirely or largely impunctate. Occipital carina complete on upper part of the head; temporal groove usually deep, sometimes shallow or just indicated.

Impunctate posterior margin of the pronotum broad laterally; cavities in front of tegulae large and margined by distinct carinae or sometimes by sharp margins; the groove behind callosity finely punctate, narrow or broad, limited by distinct declivity above; lower margin of scapula behind this groove broadly impunctate; dorsal area of mesopleurum large, transition to vertical portion straight, not raised medially and the anterior apex not higher than the posterior lobe of pronotum, mesopleural crest at its lower portion not sharp; upper plate of metapleurum usually impunctate, sometimes with fine, sparse punctures above, its transition to dorsal area sharp, carina-like, lower plate usually with fine, sparse punctures.

Lateral carina of propodeum usually not extended up to the spiracle; dorso-median area of propodeum not densely punctate, triangularly protruded posteriorly; dorso-lateral area usually with a large impunctate area anteriorly along inner margin; spiracular areas and angles impunctate; posterior surface impunctate or with fine, sparse puncture. Longer spur of hind tibia straight, not spatulate apically, often somewhat blunt to obtuse, black, white or testaceous. First submarginal cell more or less setose.

Second and third abdominal tergites mat, broadly impunctate in the middle and with apical and subapical rows of punctures.

Male : Smaller and slender than the female. Integument black, variously marked with yellow or reddish-yellow.

Head, when viewed from front, much broader than high; frontal spatium densely punctate, distinctly limited posteriorly by a somewhat curved groove, narrowly impunctate along posterior margin in the middle; front medially impunctate, except for a few punctures; in front of anterior ocellus a flat and large area, extending from anterior ocellus to frontal spatium; the depression laterad of posterior ocelli distinct; the posterior declivity of vertex very sloping; temples very receding.

First sternite somewhat longer than broad, almost flat, only weakly elevated medially at the base; anterior slope of second sternite distinct, but not steep; two or three apical sternites with dense erect setae in the middle, known as copulatory brushes, these setae absent in subgenus *Annulimeris*.

Male genitalia : Parameres slender, angular in circumference, their apices usually thickened.

This genus is distributed in Ethiopian, southern Palaearctic, Oriental, and Australian regions (except Australia), and also occurs in China, Japan and Korea.

Out of 15 species known under this genus, five species are represented in Indo-Australian Region, and only three species are represented in Indian subregion. Besides, one new species is described here from India.

Betrem (1967) established *Annulimeris* and *Rodriguimeris* as new subgenera under the genus *Campsomeriella*. The subgenus *Rodriguimeris* contained two species from the Islands Northeast of Madagascar. The subgenus *Annulimeris* was divided into two sections, viz., *Annulimeris* s. str. and *Madonimeris* Betrem and were represented by *C. (A.) annulata* (Fabricius) and *C. (A.) madonensis* (Buysson) from Oriental and Ethiopian Regions respectively. The subgenus *Campsomeriella* contained two sections viz., *Hirtimeris* Betrem, represented in Indo-Australian Region, and *Campsomeriella* represented in Ethiopian and Oriental regions. Betrem and Bradley (1972) treated *Madonimeris* Betrem as one of the subgenera under *Campsomeriella*. The subgenera *Campsomeriella* Betrem and *Annulimeris* Betrem, are widely distributed in the

Indo-Australian Region and also occur in China, Japan and Korea. These can be differentiated by the following key :

Key to the Subgenera of *Campsomeriella*

Female

1. Lateral carina of propodeum abbreviated, not extending up to spiracles; impunctate area behind callosities usually large; spurs of hind tibiae black or testaceous. Ethiopian, southern Palaearctic and Indo-Australian Regions Subgenus *Campsomeriella* Betrem
- Lateral carina of propodeum not abbreviated, extending somewhat beyond the spiracles; impunctate area behind callosities small; spurs of hind tibiae white. Oriental Region, China, Japan and Korea. Subgenus *Annulimeris* Betrem

Male

1. Two or three apical abdominal sternites usually with densely punctate areas with copulatory brushes Subgenus *Campsomeriella* Betrem
- Apical abdominal sternites without densely punctate areas and copulatory brushes Subgenus *Annulimeris* Betrem

Subgenus *Campsomeriella* Betrem

1941. *Campsomeris* subgenus *Campsomeriella* Betrem, *Notes Ent. Chinoise*, **8** (4) : 86-87.
Type-species : *Scolia thoracica* Fabricius, 1787.
1967. *Campsomeriella* subgenus *Campsomeriella* Betrem : Betrem, *Ent. Ber.*, **27** : 26-29 (key to the natural groups and list of species).
1972. *Campsomeriella* subgenus *Campsomeriella* Betrem : Betrem and Bradley, *Mon. Ned. Ent. Ver.*, **6** : 272-305 (revision of species from Ethiopian and southern Palaearctic Region).

Type-species : *Scolia thoracica* Fabricius, 1787 (original designation).

Female : Black, sometimes the basic black colour of integument is replaced by brown. Vestiture reddish-brown and black, white and black, sometimes entirely white. Wings entirely dark brown or more or less hyaline. Spurs of middle and hind tibiae black or testaceous.

Transition of disc of clypeus to its lateral areas gradual or with a more or less distinct ridge. Lateral carina of propodeum abbreviated, short, not extended up to spiracles; dorso-median area triangularly protruded apically; postero-median area impunctate or punctate above only.

Male : Apical bands on abdominal tergites (usually red in Ethiopian and southern Palaearctic species) mostly yellow in Indo-Australian species, sternites mostly black,

sometimes median sternites with postero-lateral marks; two or three apical sternites usually with densely punctate areas with dense copulatory brushes.

This subgenus is widely distributed in Ethiopian, southern Palaearctic and Indo-Australian Regions, except in Australia.

Out of thirteen known species, seven are distributed in Ethiopian and southern Palaearctic Regions and six in Indo-Australian Region. In India two species have been recorded, viz., *C. (C.) collaris* (Fabricius) and *C. (C.) rubricata* (Nurse). In addition, one new species, viz., *C. (C.) rajasthanensis*, is described here from Rajasthan in India.

These can be differentiated by the following key :

Key to the Species of *Campsomeriella* (*Campsomeriella*)

Female

1. Vestiture white, fulvous or reddish on most of the head and thorax, and black on abdomen. Wings dark brown. Widely distributed in the Oriental Region 1. *collaris* (Fabricius)
- Vestiture entirely dusky white. Wings yellowish hyaline, fore wing slightly dark outside the cells. India 2. *rajasthanensis*, sp. nov.

Male

1. Vestiture white except black on apical two to three abdominal segments; abdominal tergites with narrow to broad yellow apical bands. Widely distributed in the Oriental Region 1. *collaris* (Fabricius)
- Vestiture hoary grey except fulvous red on red integument of the abdomen; abdominal tergites with broad and narrow dark red apical bands. India 3. *C. rubricata* (Nurse)

1. *Campsomeriella* (*Campsomeriella*) *collaris* (Fabricius)

(Figures 19, 20)

This polytypic species is widely distributed, and ranges from Sri Lanka eastward through Indian subregion, Thailand and Southeast Asia to Sulawesi, Philippines Taiwan and China. It is recorded here for the first time from Andaman & Nicobar Islands, India.

Betrem and Bradley (1972) observed that *C. collaris* (Fabricius) is more closely allied to *C. thoracica* (Fabricius). The latter occurs in Ethiopian Region and southern Palaearctic extending up to Pakistan. *C. (C.) collaris*, however, can be distinguished by having, in female, the vertex entirely impunctate except near the occipital carina, and the disc of the clypeus bearing neither any ridge nor angulation at the transition of its median and lateral areas.

Five subspecies have been recorded, viz., *collaris collaris* (Fabricius) from Indian subregion; *collaris quadrifasciata* (Fabricius) from Myanmar through Southeast Asia to North Sulawesi, and southern China; *collaris sauteri* (Betrem) from Taiwan; *collaris mcgregory* (Cockerell) from Balabac, Philippines; and *collaris injubata* (Petersen) from Ursula Island, Philippines. In addition, one new subspecies, viz., *C. collaris insularis* is described from Andaman & Nicobar Islands, India.

These subspecies are distinguished by the difference in the colour of erect vestiture on head and thorax in female, and/or by the difference in the yellow maculations in male. The subspecies from India can be distinguished by the following key :

Key to the Subspecies *C. (C.) collaris*

Female

1. Vestiture on occiput, scapula and mesoscutum white except rarely reddish in the population from eastern Himalaya and Nepal; wings dark brown with deep blue reflections. Sri Lanka; India (mainland and Lakshadweep); Nepal and Bangladesh(a). *collaris collaris* (Fabricius)
- Vestiture on occiput, scapulae and mesoscutum white, or often dusky white to reddish; wings dark brown with coppery reflections. Andaman and Nicobar Islands, India(b). *collaris insularis*, subsp. nov.

Male

1. Scapulae, scutellum and metanotum marked with yellow; apical yellow bands on basal abdominal tergites, particularly on first and second, very broad, covering more than half of the surface area(a). *collaris collaris* (Fabricius)
- Scapulae, scutellum and metanotum without any yellow marks; apical yellow bands on basal abdominal tergites narrow, not covering more than third of the surface area(b). *collaris insularis*, subsp. nov.

(a) *Campsomeriella (Campsomeriella) collaris collaris* (Fabricius)

1775. *Tiphia collaris* Fabricius, *Syst. Ent.*, : 354; Female, coast of Malabar (type in Copenhagen Museum).
1781. *Tiphia collaris* Fabricius : Fabricius, *Spec. Ins.*, 1 : 451; Female, Malabar.
1798. *Tiphia thoracica* Fabricius, *Spec. Ins. Suppl.* : 254; Female, coast of Malabar.
1804. *Tiphia thoracica* Fabricius : Fabricius, *Syst. Piez.* : 235; Female, Malabar.
1895. *Colpa parvula* Lepeletier, *Hist. nat. Ins. : Hym.*, 3 : 584; Female, Indes (type probably lost).
1897. *Elis (Dielis) thoracica* (Fabricius) : Bingham, *Fauna British India, Hym.*, 1 : 99; Female not Male, Kumaon, Sikkim, Bangalore, Madras.

1897. *Elis (Dielis) fimbriata* (Burmeister) : Bingham, *Fauna British India Hym.*, **1** : 99-100; Female from Sikkim and Sri Lanka.
1901. *Elis thoracica* (Fabricius) : Cameron, *In Gardiner : Fauna Mal. Lac.*, **1** : 55; Female, Minicoy Island, Lakshadweep.
1916. *Elis thoracica* (Fabricius) : Ayar, *J. Bombay nat. Hist. Soc.*, **24** : 547.
1928. *Campsomeris (Campsomeris) collaris* (Fabricius) : Betrem, *Treubia*, **9** (suppl.) : 126-128; Female, Male, (specimens from India and Sri Lanka only).
1937. *Campsomeris (Campsomeris) collaris* (Fabricius) : Betrem, *Proc. R. Ent. Soc. London*, (B) **6** : 97, Male, Key.
1941. *Campsomeris (Campsomeriella) collaris* (Fabricius) : Betrem, *Notes Ent. Chinoise*, **8** (4) : 89 (*Campsomeris collaris* placed under new subgenus *Campsomeriella*).
1947. *Campsomeris collaris collaris* (Fabricius) : Betrem, *Tijdschr. Ent.*, **88** : 413 (nominotypical subspecies restricted to Sri Lanka and India).
1964. *Colpa pravula* Lapeletier : Bradley, *Ann. Mus. civico Stor. Nat. Genova*, **75** : 192 [*C. parvula* synonymised under *Campsomeris (Campsomeriella) collaris collaris*].
1964. *Campsomeris (Campsomeriella) collaris collaris* (Fabricius) : Bradley, *Spolia zool. Mus. haun.*, **21** : 12 (note on holotype).
1965. *Campsomeris (Campsomeriella) collaris collaris* (Fabricius) : Guiglia, *Verh. Naturf. Ges. Basel*, **76** : 318. Sri Lanka.
1967. *Campsomeriella (Campsomeriella) collaris collaris* (Fabricius) : Betrem, *Ent. Ber., Amst.*, **27** : 29. (*Campsomeriella* raised to generic rank, and *collaris* placed in subgenus *Campsomeriella*, section *Campsomeriella*).
1975. *Campsomeris (Campsomeris) collaris* (Fabricius) : Chhotani & Ray, *Rec. zool. Surv. India*, **71** : 25, Female, Rajasthan, India.
1976. *Campsomeriella (Campsomeriella) collaris* (Fabricius) : Jonathan et al., *Newsl. zool. Surv. India*, **2** (3) : 114, Female, Male, India : Arunachal Pradesh, Meghalaya, West Bengal, Bihar, Orissa, Uttar Pradesh, Gujarat, Maharashtra, Kerala and TamilNadu.
1978. *Campsomeriella (Campsomeriella) collaris collaris* (Fabricius) : Krombein, *Smithsonian Contr. Zool.*, 283 : 18-19; Sri Lanka.

This typical subspecies is widely distributed in the Indian subregion, where it ranges northward from Sri Lanka to Arunachal Pradesh and Rajasthan in India, and also occurs in Nepal and Bangladesh. It is one of the most common and abundant scoliids of India, occurring in all the ecosystems and in areas of low to very heavy rainfall from sea level to some 1430m elevation.

Krombein (1978) observed that typical *C. collaris collaris* occurs only in Sri Lanka and southern India. The present studies, based on a large number of specimens from almost all states of India and Nepal, reveal that typical *C. collaris collaris* occurs in Sri Lanka, India, Nepal and Bangladesh.

It can be distinguished from its allied subspecies, *C. collaris quadrifasciata* (Fabricius) by having, in female, vestiture on occiput, pronotum and anteriorly on mesoscutum white rather than fulvous or reddish, except in specimens from Assam and Nepal. The males differ in having yellow marks on scrobes, scutellum and metanotum.

Female : Length 14-27 mm. Black. Vestiture black except clypeus and front usually with intermixed cinereous setae, occiput and scapula with dense erect and mesoscutum with decumbent white setae on anterior half; tomentum silvery on mesoscutum. The white vestiture is very rarely replaced by fulvous or reddish as observed in the specimens from Assam and Nepal. Wings dark brown with deep blue reflections.

Anterior rim of clypeus broader medially than at the sides of median lobe; clypeus impunctate in the middle, at sides with subcontiguous punctures; frontal area, frontal spatium and lower part of front with mostly subcontiguous punctures; upper front and vertex impunctate except for a few scattered punctures; frontal fissura extending up to anterior ocellus; anterior ocellus in a shallow pit; posterior ocelli margined posteriorly by a well marked groove; areas laterad of posterior ocelli depressed; occipital carina complete above; temporal groove absent.

Scapulae with a broad impunctate posterior margin, scapulae with small, contiguous punctures; cavities before tegulae with carina; areas behind callosities large and finely punctate; mesoscutum anteriorly and at sides with coarse, close punctures, elsewhere sparsely punctate; scutellum and metanotum with coarse, sparse punctures; anterior area of mesopleurum with medium sized, close punctures, posterior area largely impunctate except for some small sparse punctures at lower half of its lower area; upper plate of metapleurum impunctate except for a few fine, scattered punctures along upper margin, lower plate with fine, scattered punctures at its lower two-thirds; upper third impunctate; dorso-lateral areas impunctate anteriorly and posteriorly, in the middle with small, dense punctures, lateral surface sparsely punctate, posterior surface impunctate; longer spur of hind tibia black, obtuse apically.

Abdominal tergites mat; second and third tergites broadly impunctate in the middle, anteriorly with fine, scattered punctures, posteriorly with a row of subapical punctures.

Male : Length 11-19 mm. Integument black, abdomen with faint blue reflections. The following are bright to pale lemon-yellow : clypeus except for a median triangular black mark; mandibles at basal half; pronotum anteriorly in the middle; a narrow stripe adjacent to tegula; a narrow stripe, usually interrupted in the middle, on scutellum anteriorly; a small antero-median spot on metanotum; a spot on each callosity; stripe on apical half of all femora; outer surface of all tibiae; outer surface of first and last fore tarsal segments; usually almost entire dorsal surface of first tergite, about apical two-thirds of second, apical half of the third and fourth, rarely paired small transverse spots on fifth tergite, second and third sternites sometimes

with paired minute postero-lateral spots. Erect vestiture glittering white except black on apical three abdominal segments, sixth and seventh sternites with long, dense black setae, tomentum on head and thorax silvery. Wings hyaline, very lightly infumated, with weak yellowish reflections.

Male genitalia as in figure 20.

Distribution : Andhra Pradesh (Naguldevpadu), Arunachal Pradesh (Tamen, Dhapabum), Assam (Dehangi, Rangia), Bihar (Katihar, Purnea, Rajmahal, Hazaribagh, Hazipur, Islampur, Pusa), Delhi (Delhi Univ. Campus), Goa (Margaon, Mapucha), Gujarat (Mehsana, Dwarka), Haryana (Faridabad, Gurgaon), Himachal Pradesh (Solan), Karnataka (Bangalore, Chikmangalore, Shimoga, Kodagu), Kerala (Trivandrum, Travancore, Walayar), Madhya Pradesh (Jabalpur, Shahdol), Maharashtra (Karwar, Lonawala, Malhapur), Meghalaya (Dainadubi, Rongram, Barapani, Dawki), Orissa Keonjhar, Angul, Balugaon, Chilka Lake, Satpara), Rajasthan (Sambhar Lake, Gudha, Jodhpur), Sikkim, Tamil Nadu (Anamalai Hills, Coimbatore, Palni Hills, Nilgiri Hills), Tripura (Agartala, Garjee, Ambassa, Kailasahar, Belonia, Kathalia), Uttaranchal (Nainital, Almora, Chamoli, Uttarkashi, Dehradun, Hardwar, Pauri, Saharanpur), Uttar Pradesh (Allahabad, Pilibhit, Bahraich) and West Bengal (Mongpong, Bijanbari, Sukhana, Teesta Bridge, Shantineketan, Calcutta, Sundarbans). *Elsewhere* : Nepal and Sri Lanka.

(b) *Campsomeriella (Campsomeriella) collaris insularis*, subsp. nov.
(Figure 18)

1976. *Campsomeris (Dielis)* sp. : Jonathan et al., *News. zool. Surv. India*, **2** : (3) : 113. Male, Gt. Nicobar, India.
1976. *Campsomeris (Dielis) javana* (Lepelletier) subsp., Jonathan et al., *News. zool. Surv. India*, **2** (3) : 113 (Male from Great Nicobar misidentified).
1976. *Campsomeris (Megacampsomeris) prismatica* (Smith) : Jonathan et al., *News. zool. Surv. India*, **2** (3) : 112 (Male from Great Nicobar and South Andaman misidentified).
1976. *Campsomeriella (Campsomeriella) collaris* (Fabricius) : Jonathan et al., *News. zool. Surv. India*, **2** (3) : 114 (Female from Great Nicobar and South Andaman only).
1976. *Campsomeriella (Campsomeriella) quadrifasciata* (Fabricius) subsp. : Jonathan et al., *News. zool. Surv. India*, **2** (3) : 114. Female, Great Nicobar, India.

This subspecies is described on the basis of a series of specimens of both the sexes from Great Nicobar, Car Nicobar and South Andaman, India. The male of this subspecies is easily distinguished by having the pronotum, scutellum and metanotum without any yellow maculation, and the apical yellow bands on abdominal tergites very narrow.

The above mentioned colour pattern, probably, led the earlier workers to misidentify the males under different taxa. The presence of dense, erect and black setae on apical

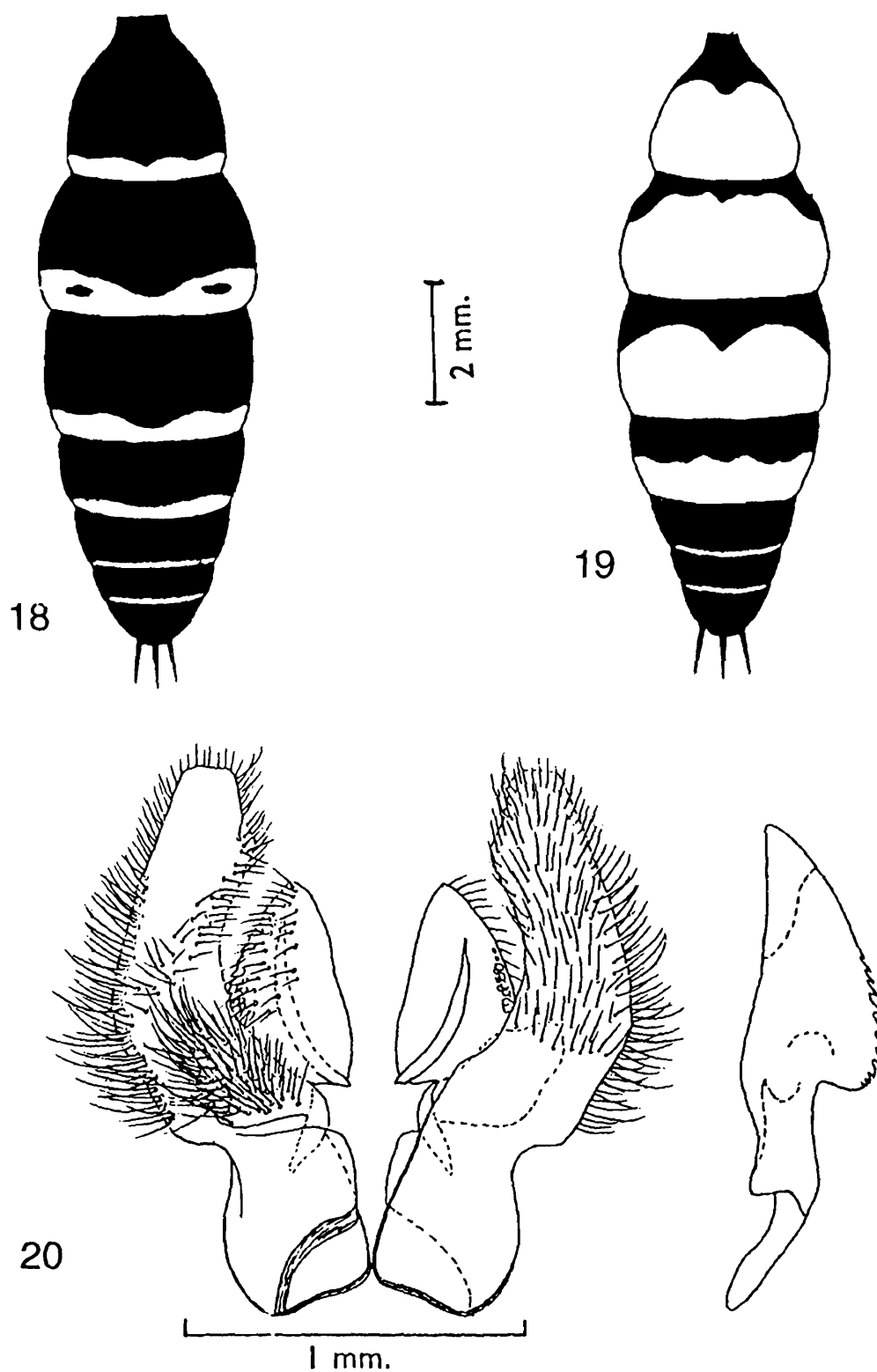


Fig. 18 : *Campsomeriella (C.) collaris insularis*, subsp. nov. Dorsal aspect of male abdomen.

Figs. 19-20 : *Campsomeriella (C.) collaris* (Fabr.) : 19, dorsal aspect of male abdomen; 20, male genitalia, ventral aspect at left, dorsal at right and aedeagus in profile view.

abdominal sternites, a flat area in front of anterior ocellus, and characteristic genitalia, can readily distinguish the males of the subgenus *Campsomeriella* (*Campsomeriella*).

The female shows affinities to both *C. collaris collaris* and *C. collaris quadrifasciata* in having white, fulvous or reddish erect setae on occiput, pronotum and anterior of mesoscutum.

Female : Length 18 mm. Integument black. Vestiture black except white on head anteriorly and fulvous erect setae on pronotum and anterior of mesoscutum. Wings dark brown with coppery reflections.

Male : Length 17 mm. Black, the following bright to pale lemon-yellow : mandibles at basal half, clypeus except for a large black area in the middle, a tiny spot on each callosity, somewhat elongated spot on the apices of all femora, outer surface of all tibiae, fore tarsus with outer surface of first and last tarsal segments, narrow apical bands on first to fourth tergites. Erect vestiture glittering white except black mixed with white on last two abdominal segments, that on sixth and seventh sternites very dense, tomentum on head and thorax silvery. Wings lightly infumated with weak yellow reflections.

Holotype Female, India : Andaman & Nicobar Islands : Great Nicobar : Dogma River, Casurina Bay, 18.iv.1966, Daniel & Bhowmick (Z.S.I., Calcutta, Reg. No. 8804/H3). *Allotype* Male, data as of holotype (Z.S.I., Calcutta, Reg. No. 8805/H3). *Paratypes* 10 Females, 33 Males. India : Andaman & Nicobar Islands : Great Nicobar : Dogma River, Casurina Bay, 3 Female, 4 Male, 18.iv.1966, 25 Kms. from Casurina Bay, 1 Female, 4.iv.1966; Campbell Bay, 2 Male, 4.iii.1966, all by Daniel & Bhowmick; South Bay, 1 Female, 9 Male, 3-20. viii. 1984; Swaroop Nullah, 27 kms. on N.S. Road, 2 Female, 1 Male, 20-23. viii. 1984, S. Saha; Car Nicobar : Sawai, 1 Male, 24.xii.1972; Kakana, 11 Female, 27.xii.1972, K.S. Pradhan & G.S. Arora. South Andaman, Wright Myo, Mannarghat, 3 Female, 1 Male, 28.iii.1964, B.S. Lamba. Port Blair, Corbyns Caves, 3 Male, 20-25.ii.1979, J.K. Jonathan. Neil Island Reserve Forest, 1 Male, 8.iv.1970. B.K. Tikader (Z.S.I., Calcutta, Reg. No. 8806-8848/H3).

Distribution : India : Andaman & Nicobar Islands.

Remarks : Female paratypes are 18-23 mm in length; vestiture on occiput, pronotum and anterior of mesoscutum sometimes dusky white or reddish. Male paratypes are 13-18 mm in length; sometimes third tibia black; apical yellow bands on abdominal tergites vary in width.

2. *Campsomeriella* (*Campsomeriella*) *rajasthanensis*, sp. nov. (Figure 21)

1975. *Campsomeris annulata* (Fabricius) : Chhotani & Ray, *Rec. zool. Surv. India*, **71** : 25. F, M; India : Rajasthan, Bangadh, Gudha, Jhapog, Lithorana, Korsina, Nawa, Phulera and Sambhar Lake [misidentified as *C. annulata* (Fabricius); and females misidentified as males].

This species is described here on the basis of series of females from Rajasthan, India, collected in areas of scanty to low rainfall.

Superficially, it resembles *C. annulata* (Fabricius) in having erect vestiture on head and thorax, and decumbent setae on abdominal tergites, white. It can be easily distinguished by having the longer spur (Fig. 21) of hind tibiae testaceous and obtuse apically rather than white and pointed apically, and lateral propodeal carina abbreviated rather than extending up to spiracles.

The male not known.

Female : Length 24 mm. Black. Basic black colour of the integument is mostly repalced by dark brown. Erect vestiture on the head and thorax, and decumbent setae on the apices of all the abdominal segments dirty white. Pygidium also clothed with similar setae. Wings yellowish hyaline, apical third of the fore wing slightly dark brown.

Clypeus impunctate in the middle, at sides with contiguous punctures, anteriorly striated; frontal area and frontal spatium contiguously punctate; front impunctate in the middle, at sides with sparse punctures, punctures closer along eye margin; frontal fissura weak, distinct only on frontal spatium; anterior ocellus in a shallow pit; vertex impunctate except for a few punctures along upper innner eye margin, its declivous protion with small, sparse punctures; temples impunctate; temporal groove deep.

Pronotum densely punctate, impunctate hind margin narrow; mesoscutum with medium sized, close punctures along anterior margin, elsewhere sparsely punctate, with a small impunctate area posteriorly in the middle; scutellum with moderately small punctures mostly separated by the diameter of a puncture; metanotum with small, sparse punctures; mesopleurum at its anterior area with dense punctures above and sparse to close punctures below, posterior area impunctate in the middle, with dense punctures above and small, close punctures below; upper plate of metapleurum impunctate, lower plate impunctate except for a few small, scattered punctures; dorso-médian area of propodeum with medium sized, sparse punctures, dorso-laterally with impunctate rectangular areas anteriorly, elsewhere with small, close punctures, lateral surface with small, shallow, sparse punctures, posterior surface largely with small, shallow, and sparse punctures.

Abdominal tergites mat; first tergite impunctate in the middle, anteriorly and posteriorly sparsely punctate; second and third tergites with apical and subapical rows of small, close punctures, sparsely punctate at anterior half, elsewhere impunctate.

Holotype Female, India; Rajasthan; Jaipur district : Korsina, 31.v.1958, T.G. Vazirani (Z.S.I., Calcutta Reg. No. 8744/H3). *Paraytpe* 59 Females. India : Rajasthan : Nagaur district : Bangadh, 3 Females, 5.v.1958; Nawa, 5 Females, 10.v.1958;

Lithorana, 1 Female, 16.v.1958; Gudha, 23 Females, 2-20.v.1958; Jaipur dist., : Korsina, 12 Females, 14-31.v.1958; Jhapog, 3 Females, 30.v.1958; Phulera, 1 Female, 16.v.1958; Sambhar Lake, 10 Females, 13.v.1958, all above T.G. Vazirani and 1 Female, 16.xi.1957, A.K. Mukherjee (Z.S.I., Calcutta, Reg. No.8745-8803/H3).

Distribution : India : Rajasthan.

Remarks : All the types above were misidentified as *C. annulata* (Fabricius) by Chhotani and Ray (1975). The specimens determined as males were actually females.

3. *Campsomeriella (Campsomeriella) rubricata* (Nurse), comb. nov.

1903. *Elis rubricata* Nurse, *Ann. Mag. Nat. Hist.*, (7) 11 : 402. Male, Deesa (holotype in British Museum).

1928. *Campsomeris (Campsomeris) thoracica eriophora* (Klug) : Betrem, *Treubia*, 9 (suppl.) : 126. Male.

1972. *Campsomeriella (Campsomeriella) thoracica thoracica* (Fabricius) : Betrem & Bradley, *Mon. Ned. Ent. Ver.*, 6 : 281-283. Male.

Turner (1911), Betrem (1928), and Jonathan *et al.* (1976) identified the males from Karachi, Lyallpur and Khewra (Pakistan), as *thoracica eriophora*. These males resemble *Elis rubricata* in having similar integument and vestiture, particularly red apical bands on abdominal tergites and red vestiture on apical abdominal segments. The female of *C. thoracica* is, hitherto, unknown from Pakistan and Deesa, India. Since, the males of allied species in genus *Campsomeriella* are similar, and another species, known by females only, viz., *C. rajasthanensis*, sp. nov., occurs in areas near to Deesa, therefore, it is justified to recognise *Elis rubricata* Nurse as a distinct species.

Male : Length 15 mm. Black. The following pale yellow : clypeus except a large triangular spot in the middle, a line on fore and middle tibiae above. The following dark red : an obscure narrow apical band on first tergite; broad apical bands on second and third tergites; fourth, fifth and sixth tergites entirely, seventh tergite apically (the band on third tergite emarginate in the middle). Vestiture hoary grey, except fulvous-red on dark red maculated areas of abdomen, long and dense on head and thorax, completely covering the surface. Wings clear hyaline, nervures testaceous, costal margin of fore wing faintly yellow, tegula pale testaceous.

Clypeus transverse anteriorly, convex, smooth and shiny in centre. Head and thorax smooth and shiny; fore wing with two submarginal cells; propodeum short, the sides rounded posteriorly.

First abdominal segment long, subpetiolate and constricted.

Distribution : India : Gujarat (Deesa). *Elsewhere* : Pakistan.

Subgenus *Annulimeris* Betrem

1967. *Campsomeriella* subgenus *Annulimeris* section *Annulimeris* Betrem, *Ent. Ber.*, **27** : 29.
Type-species : *Tiphia annulata* Fabricius, 1793.

1972. *Campsomeriella* subgenus *Annulimeris* Betrem : Betrem & Bradley, *Mon. Ned. Ent. Ver.*, **6** : 305 (section *Annulimeris* Betrem, 1967 and section *Madonimeris* Betrem, 1967 elevated to the status of subgenera).

Type-species : *Tiphia annulata* Fabricius, 1793 (Original designation).

Female : Black. Vestiture entirely white, except black on the last abdominal segment. Wings hyaline in basal half, apical half dark brown.

Temporal groove deep; callosity with a small impunctate area behind, this area sharply defined above by a declivity; spurs of hind tibiae white, longer spur pointed apically; lateral carina of propodeum extending somewhat beyond the spiracle; postero-median area of propodeum impunctate.

Male : Clypeus, scutellum, metanotum and abdominal segments with yellow marks or bands; sternites usually with postero-lateral yellow marks; apical sternites without copulatory brushes.

Betrem (1967) treated *Annulimeris* and *Madonimeris* as sections of subgenus *Annulimeris*. Subsequently, Betrem & Bradley (1972) treated *Annulimeris* and *Madonimeris* as separate subgenera. The subgenus *Madonimeris* is distributed in Africa.

This subgenus is represented by a single species, viz., *Campsomeriella (Annulimeris) annulata* (Fabricius), which is widely distributed in Indo-Malayan subregion, and also occurs in China, Taiwan, Japan and Korea.

4. *Campsomeriella (Annulimeris) annulata* (Fabricius)

This species is widely distributed in the Oriental Region, where it ranges eastward from northern India through Southeast Asia to Sulawesi, and also occurs in China, Japan and Korea. It is recorded here, for the first time from Nepal.

Tsuneki (1972) recorded two subspecies, viz., *annulata annulata* (Fabricius) from Taiwan, Korea and Japan; and *annulata sakaguchii* (Uchida) from Amami-Oshima and Ishigaki Islands of Ryukyu, Japan. The subspecies, *a. sakaguchi*, from Ryukyu is distinguished by having, in female, vertex behind post-ocelli almost without punctures, fringes on first to fourth abdominal tergites orange-yellow and fore wing strongly darkened beyond radial cell. The population from Indian subcontinent belongs to nomino-typical subspecies.

The only subspecies viz., *C. (A.) annulata annulata* (Fabricius) which occurs in India is detailed below :

(a) *Campsomeriella (Annulimeris) annulata annulata* (Fabricius)
(Figures 22, 23, 24))

1793. *Tiphia annulata* Fabricius, *Ent. Syst.*, **2** : 225. Female, China. (Type in Copenhagen Museum).
1804. *Tiphia annulata* Fabricius : Fabricius, *Syst. Piez.*, : 234. Female. China.
1845. *Campsomeris servillei* Lepeletier, *Hist. nat. Ins., Hym.*, **3** : 501. Female. Java (type in Spinola Colln., University of Turin, Italy).
1855. *Scolia annulata* (Fabricius) : Smith, *Cat. Hym. British Mus.*, **3** : 100 (*Campsomeris servillei* synonymised).
1864. *Elis (Dielis) annulata* (Fabricius) : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 196.
1873. *Elis (Dielis) annulata* (Fabricius) : Smith, *J. Linn. Soc. Zool.*, **11** : 351,
1892. *Elis (Dielis) annulata* (Fabricius) : Magretti, *Ann. Mus. civico Stor. Nat. Genova*, **12** : 245-246. Female, Myanmar.
1897. *Elis (Dielis) annulata* (Fabricius) : Bingham, *Fauna British India, Hym.*, **1** : 96. Female, not Male, Myanmar, northern India, China, Japan, Malaya.
1901. *Elis aglaea* Cameron, *Proc. zool. Soc. London*, **2** : 19. Male, Malaya.
1911. *Elis annulata* (Fabricius) : Matsumura, *Thous. Ins. Japan*, **3** (suppl.) : 126, Female, pl. 40, fig. 16.
1921. *Campsomeris annulata* (Fabricius) : Rohwer, *Phil. J. Sci.*, **19** : 88, Female not Male.
1926. *Elis annulata* (Fabricius) : Uchida, *Ins. World*, **29** : 333.
1926. *Elis annulata* (Fabricius) : Uchida, *Ins. Mats.*, **1** : 46.
1927. *Campsomeris annulata* (Fabricius) : Clausen & King, *Bull. U. S. Dept. Agri.*, 1429 : 31-33 (noted as parasites of *Popillia japonica*).
1928. *Campsomeris (Dielis) annulata* (Fabricius) : Betrem, *Treubia*, **9** (suppl.) : 94-95. Female, Male; India : Sikkim, Kashmir, Lucknow; Bangladesh : Golabathan; Java; Sumatra; South Sulawesi; China; Japan; Quelpart Island and Korea.
1931. *Elis annulata* (Fabricius) : Matsumura, *6000 Ill. Ins. Japan* : 26, Female, fig. 132.
1932. *Elis annulata* (Fabricius) : Matsumura, *Ill. comm. Ins. Japan* : 14. Female, pl. 4, fig. 8.
1932. *Campsomeris annulata* (Fabricius) : Yanno, *Icon. Ins. Japan* : 31. Female, fig. 617.
1933. *Campsomeris annulata* (Fabricius) : Uchida, *J. Fac. Agr. Hokkaido Imp. Univ.*, **32** (2) : 256. Female not Male (noted as parasite of *Popillia japonica*, *P. diomphilia* Bates, *P. atrocerulea*, and *Anomala* sp.).

1937. *Campsomeris annulata* (Fabricius) : Betrem, *Proc. R. Ent. Soc. London*, (B) **6** : 93. Male, Key.
1964. *Campsomeris (Phalerimeris) annulata* (Fabricius) : Bradley, *Spolia zool. Mus. Haun.*, **21** : 9 (a note on type, lectotype Female of *Tiphia annulata* Fabricius, designated).
1964. *Campsomeris (Phalerimeris) annulata* (Fabricius) : Bradley, *Ann. Mus. civico Stor. Nat. Genova*, **75** : 193 (lectotype Female, of *Campsomeris servillei* Lepeletier, designated).
1967. *Campsomeriella (Annulimeris) annulata* (Fabricius) : Betrem, *Ent. Ber.*, **27** : 25-29 (*Campsomeriella* raised to generic status; *annulata* placed under section *Annulimeris* of new subgenus *Annulimeris*).
1972. *Campsomeris (Campsomeriella) annulata annulata* (Fabricius) : Tsuneki, *Etizenia*, No. **62** : 18-19. Female, Male; Taiwan, Japan, and Korea.
1976. *Campsomeriella (Annulimeris) annulata* (Fabricius) : Jonathan *et al.*, *Newsl. zool. Surv. India*, **2** (3) : 113 (male from Shimla only).
1979. *Campsomeriella (Annulimeris) annulata* (Fabricius) : Krombein, *Cat. Hym. North Mexico*, **2** : 1317 (remarks on the liberation in New Jersey for the control of *Popillia japonica* Newm).

The female of this subspecies can be easily recognised by having black integument, conspicuous white vestiture, except black on the last abdominal segment, and wings hyaline with apical third of the fore wing dark brown.

Female : Length 14-23 mm. Integument black, except spurs of middle and hind tibiae, white and pointed (Fig. 23). Erect vestiture and decumbent setae on abdominal segments white except on the last abdominal segment, black; tomentum on the sides of the thorax silvery. Wings hyaline, fore wing dark brown at apical third.

Clypeus impunctate in the middle, at sides with contiguous punctures, anteriorly striated; frontal area and frontal spatium with coarse, contiguous punctures; front impunctate in the middle, along the eye lobe with some coarse, close punctures; frontal fissura extending up to anterior ocellus; anterior ocellus in a shallow pit; vertex impunctate, its declivous portion with moderately large, close punctures, punctures small along occipital carina; temples impunctate; temporal groove very deep.

Scapulae densely punctate, posterior margin broadly impunctate at sides; mesoscutum with coarse, deep punctures, punctures close anteriorly and at sides, sparse elsewhere, with a large impunctate area posteriorly in the middle; scutellum with coarse, close to sparse punctures; metanotum impunctate except for one or two rows of close punctures along anterior margin; mesopleurum broadly impunctate along anterior and posterior margins, elsewhere with moderately large close punctures except for small, scattered punctures below posteriorly; upper plate of metapleurum impunctate except for a few small punctures along upper margin, lower plate with very small, scattered punctures, broadly impunctate along upper and posterior margins;

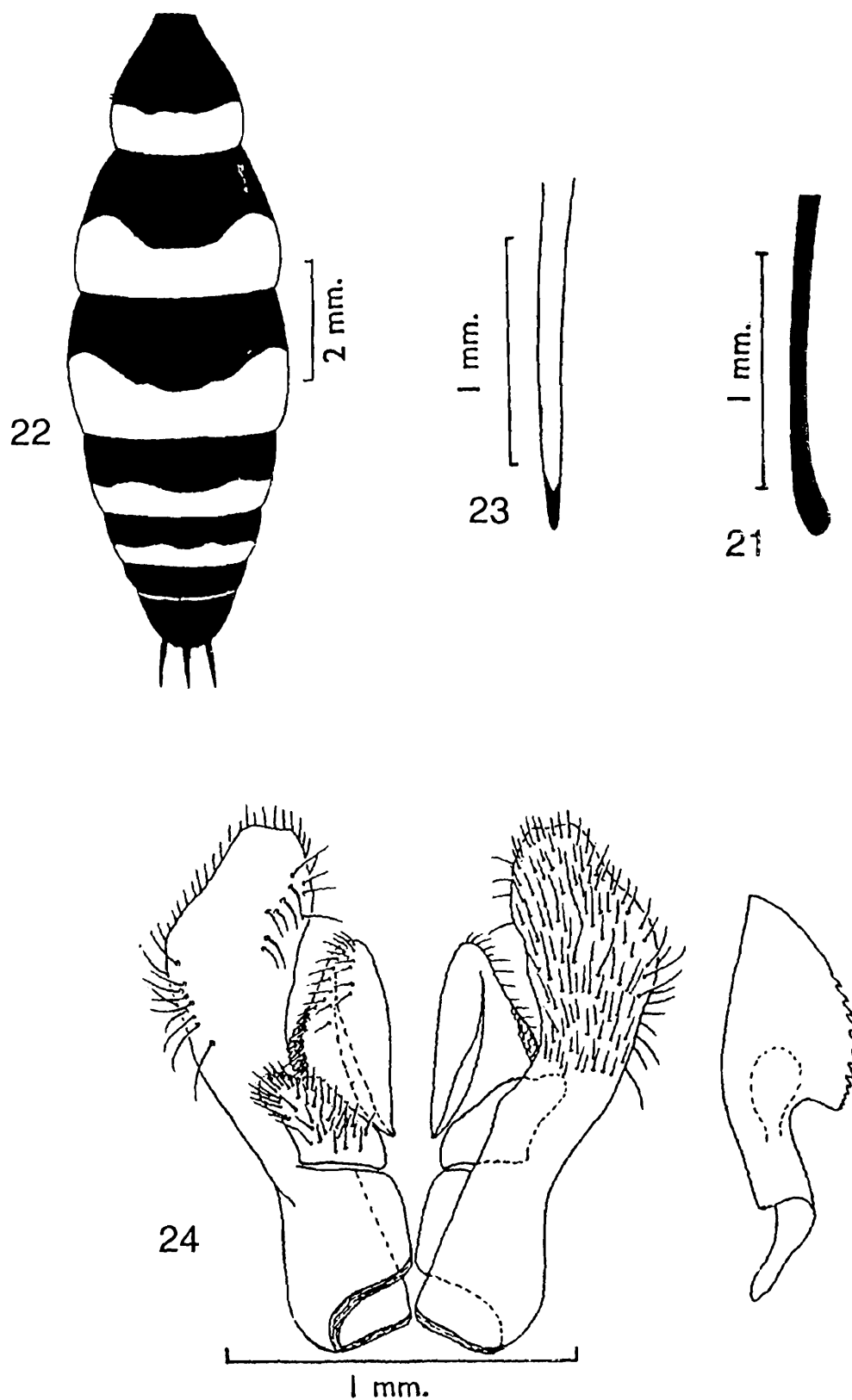


Fig. 21 : *Campsomeriella* (C.) *rajasthanensis*, sp. nov. : Longer spur of female hind tibia.

Figs. 22-24: *Campsomeriella* (Annulimeris) *annulata annulata* (Fabricius) : 22, dorsal aspect of male abdomen; 23, longer spur of female hind tibia; 24, male genitalia, ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right.

dorso-median area of propodeum with medium sized punctures mostly separated by the diameter of a puncture, sometimes with a narrow, impunctate longitudinal stripe in the middle, dorso-lateral area with relatively small, close punctures, punctures shallow and sparse to scattered along posterior margin, with a large impunctate area anteriorly, vertical surface with small, shallow, sparse to scattered punctures, postero-median area impunctate.

Abdominal tergites mat; first tergite impunctate in the middle, sparsely punctate anteriorly and along the posterior margin, except for a apical row of close punctures; second and third tergites broadly impunctate in the middle, anteriorly with fine, scattered punctures, posteriorly with distinct apical and subapical rows of small, close punctures.

Male : Length 12-19 mm. Black, the following yellow : mandibles at the base; clypeus broadly at sides; scrobe rarely; callosity; pronotum broadly posteriorly; a moderately broad stripe, narrowly interrupted in the middle, anteriorly on the scutellum; disc of the metanotum almost wholly; a small apical stripe on inner side of first femur; apical half on the outer side of all femora; outer surface of first and second tibiae; outer surface of first and the last fore tarsal segments; apical bands on first to fifth abdominal tergites, that on the first narrow and covering one-fourth of the surface, that on second and third broad and covering about half of the surface, broadly emarginate anteriorly in the middle, that on fourth and fifth narrow; apical narrow bands on second to fourth sternites, widely interrupted in the middle.

Abdomen with blue reflections. Antennal flagellum rarely reddish-brown. Erect vestiture white except on two apical abdominal segments, black; tomentum on head and thorax silvery. Wings lightly infumated with weak yellowish reflections. Male genitalia as in figure 24.

Distribution : India : Arunachal Pradesh (Kameng, Pijuli, Subansiri, Ziro), Assam (Jorhat, Dibrugarh), Bihar (Sabralpur, Hazipur, Pusa), Himachal Pradesh (Lahul-Spiti, Jispa, Shimla), Jammu & Kashmir (Jhelum Valley), Manipur (Erioshimba, Kangchup), Meghalaya (Shillong, Dainadubi, Songsak), Sikkim (Rangpo), Tripura (Ambassa), Uttaranchal (Lakhimpur, Dudhwa N. P., Mohand, Dehradun, Rishikesh, Chilla, Uttarkashi, Bhowali), and West Bengal (Bijanbari, Darjeeling, Singla). *Elsewhere* : China, Indonesia, Japan, Korea, Malayasia, Myanmar, Nepal and Taiwan.

5. Genus *Sericocampsomeris* Betrem

1941. *Campsomeris* subgenus *Sericocampsomeris* Betrem, *Notes Ent. Chinoise*, 8 (4) : 91-92. des. Type-species : *Scolia quadriguttulata* Burmeister, 1854.

1972. *Sericocampsomeris* Betrem : Betrem & Bradley, *Mon. Ned. Ent. Ver.*, 6 : 12 (*Sericocampsomeris* Betrem raised to generic status; *Scolia quadriguttulata* Burmeister, 1854 synonymised under *Scolia stygia* Illiger, 1802).

1989. *Sericocampsomeris* Betrem : Gupta & Jonathan, *Ann. Entomol.*, **7** (2) : 53-57.

Type-species : *Scolia stygia* Illiger, 1802. (Original designation).

Female : Large sized species, about 23-38 mm in length. Integument black, abdominal tergites mat with silken reflection, second to last tergites usually marked with small to large yellow or reddish-brown spots. Vestiture black and white or reddish-brown. Wings usually dark brown with violet reflection, rarely yellowish hyaline.

Anterior rim of the clypeus broader medially than at the sides of median area; frontal spatium densely punctate; front swollen, mostly impunctate in the middle; frontal furrow usually deep, extending up to anterior ocellus; vertex usually with scattered punctures, rarely densely punctate; occipital carina complete on upper part of the head; temporal groove shallow.

Scapulae densely punctate, posterior margin relatively narrow, impunctate callosities large, densely punctate, groove behind them narrow and not limited by a distinct declivity above, lower margin of scapula behind these groove broadly impunctate; cavities before tegulae shallow, limited by carinae; transition between dorsal area and vertical surface of mesopleurum straight, not raised above the level of upper margin of metapleurum, its crest raised and sharp like a carina, especially on the lower portion; upper plate of metapleurum impunctate, its transition to dorsal area sharp, but not marked by a high carina; lateral carina of propodeum extending beyond the spiracle, spiracular angles and areas impunctate, dorso-median area closely punctate, dorso-lateral areas usually with a rectangular impunctate space anteriorly in the inner side, its transition to the vertical surface sharp. Fore wing with two recurrent veins and two submarginal cells, first submarginal cell bare. Hind tibial spurs black, longer spur blunt or obtuse, not spatulate.

Second and third abdominal tergites mat with silken reflection.

Male : Smaller and slender than the female, about 20-28 mm in length. Integument black, usually abdominal tergites and sternites with reddish or yellow spots or bands, sometimes clypeus, pronotum, scutellum, metanotum and legs also marked with yellow. Vestiture black mixed with white, sometimes reddish-brown on abdominal segments. Wings dark brown to yellowish hyaline.

Frontal spatium densely punctate, usually not distinctly defined posteriorly; frontal fissura extending up to anterior ocellus, the latter relatively large and situated in a broad and shallow pit. Fore wing with two submarginal cells and two recurrent veins.

Male genitalia : Parameres slender, with fine setae on the inner side; volsellae not densely setose.

This genus is widely distributed in the Oriental Region, where it ranges from Sri

Lanka through India, Nepal, Myanmar, Malaysia, Sumatra, Java, Kalimantan to Sulawesi and Philippines, and also occurs in Vietnam and southern China.

Betrem (1941) placed ten species under subgenus *Sericocampsomeris*. Gupta & Jonathan (1989) recorded eight known and described one new species under this genus. In addition, *Elis bella* Bingham is also now referable to this genus.

Five species are represented in the Indian subregion of which four occur in India. One species is known from Sri Lanka. The species known from India can be identified by the following key.

Key to the Species of *Sericocampsomeris*

Female

1. Vertex almost entirely subcontiguously punctate; vestiture on head and anterior of the thorax reddish-golden. Myanmar and northern India 1. *bella* (Bingham)
- Vertex with close to scattered punctures; vestiture on head and anterior of the thorax black, usually mixed with white on the occiput 2
2. Second to sixth abdominal tergites reddish-brown anteriorly, apical fringes on second to last tergites and sternites reddish-golden. Widely distributed in the Oriental Region 2. *rubromaculata* (Smith)
- Abdominal tergites black, usually with yellow spots on some of the tergites; abdominal vestiture predominantly black. Widely distributed in the Oriental Region 3. *stygia* (Illiger)

Male

1. First, second and fourth abdominal tergites with paired lateral red spots, third tergite almost entirely red, except along anterior and posterior margins, black 2. *rubromaculata* (Smith)
- Abdominal tergites without red spots or bands, first to fifth tergites usually with broad to narrow yellow apical bands 2
2. Clypeus, scapulae, scutellum, metanotum and legs maculated, more or less, with yellow; first to fourth or fifth tergites with broad to narrow yellow apical bands 3. *stygia* (Illiger)
- Clypeus, scutellum, metanotum and legs entirely black; scapulae broadly yellow dorsally; first to fifth tergites with broad yellow apical bands, the bands on first three tergites very broad, widely as well as deeply emarginated in the middle. Nepal and northern India 4. *flavomaculata* Gupta & Jonathan

1. *Sericocampsomeris bella* (Bingham), comb. nov.

1897. *Elis (Dielis) bella* Bingham, *Fauna British India, Hym.*, 1 : 93-94. Female, Myanmar : Tenasserim; India: Assam (Holotype, from Tenasserim, in Berlin Museum).
1928. *Campsomeris (Megacampsomeris) bella* (Bingham) : Betrem, *Treubia*, 9 (suppl.) : 140. Female.
1972. *Megacampsomeris (Bellimeris) bella* (Bingham) : Betrem in Bradley, *Mitt. Zool. Mus. Berlin*, 48 (1) : 6 (*Bellimeris* used as a new subgenus to accomodate *bella* Bingham).

The study of the holotype and an additional specimen from Myanmar reveals, that the mesopleural crest is very sharp, like a carina, especially on the lower portion, and upper plate of the metapleurum impunctate. Therefore, this species is placed under genus *Sericocampsomeris*.

Female : Length 18-23 mm. Integument black, first to third abdominal tergites with paired postero-lateral yellow spots. Vestiture reddish-golden on head and anteriorly on thorax, elsewhere white, second to fourth abdominal segments with a single row of white decumbent setae. Wings yellowish hyaline to brownish.

Clypeus impunctate in the middle, at sides with subcontiguous punctures; frontal area contiguously punctate; frontal spatium with mostly contiguous punctures; front and vertex with coarse, mostly subcontiguous punctures.

Scapulae contiguously punctate; mesoscutum with coarse, contiguous to subcontiguous punctures, without any impunctate area; scutellum with coarse, subcontiguous punctures, except narrowly in the middle and along posterior margin impunctate; metanotum with small, contiguous punctures; mesopleurum broadly impunctate along its anterior and posterior margins, anterior area along its sharp ridge with coarse and close punctures, posterior area impunctate except for a few scattered punctures below; metapleurum impunctate; dorso-median area of propodeum with coarse, contiguous punctures, dorso-lateral area similarly punctate except for a small impunctate area anteriorly, lateral surface with contiguous punctures above and impunctate below, posterior surface densely punctate along upper and lateral margins, elsewhere with somewhat sparse punctures.

First abdominal tergite with small scattered punctures; second tergite impunctate in the middle, anteriorly with scattered punctures, along posterior margin with a row of subapical close punctures.

Distribution : India : Assam (Loc. not known). *Elsewhere* : Myanmar.

2. *Sericocampsomeris rubromaculata* (Smith)

This polytypic species, though uncommon, is widely distributed in the Oriental

Region, where it ranges from northern India through Myanmar, Malaysia, East Indies and Kalimantan to Sulawesi and also occurs in Vietnam and Hainan.

Three subspecies have been recognised, viz., *r. rubromaculata* (Smith) ranging from northern India through Myanmar and Malaya to Sumatra, Java and Bangka Islands; *r. borneana* (Cameron) from Sarawak and Kalimantan and *r. celebensis* (Betrem) from Sulawesi and Sangir Island. These subspecies are differentiated, mainly by the extent of red maculation and vestiture on the abdominal segments. The Indian subspecies is described as below :

(a) ***Sericocampsomeris rubromaculata rubromaculata*** (Smith)

1855. *Scolia rubromaculata* Smith, *Cat Hym. British Mus.*, **3** : 99. Female, India (Holotype in British Museum).
1858. *Elis (Campsomeris) bicolor* Saussure, *Ann. Soc. ent. France*, (3) **6** : 233, pl. 5, fig. 4. Male, Java (syntypes in Leiden Museum).
1864. *Elis (Dielis) rubromaculata* (Smith) : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 196. Female, India.
1864. *Elis (Dielis) bicolor* Saussure : Saussure & Sichel, *Cat. Spec. Gen. Scolia*, : 186. Male, Java.
1897. *Scolia bicolor* (Saussure) : Dalla-Torre, *Cat. Hym.*, **8** : 148 (listed).
1897. *Scolia rubromaculata* Smith : Dalla-Torre, *Cat. Hym.*, **8** : 180.
1897. *Elis (Dielis) rubromaculata* (Smith) : Bingham, *Fauna British India, Hym.*, **1** : 93. Female, Myanmar : Tenasserim.
1904. *Scolia (Elis) rubromaculata* Smith : Tullgren, *Ark. Zool.*, **1** : 468. Female, Java : Tjilatjap.
1928. *Campsomeris (Dielis) rubromaculata rubromaculata* (Smith) : Betrem, *Treubia*, **9** (suppl.) : 119, Female; India, Sumatra, Java, Vietnam.
1928. *Campsomeris (Dielis) rubromaculata hainanensis* Betrem, *Treubia*, **9** (suppl.) : 120. Female. Hainan (holotype in Leiden Museum).
1928. *Campsomeris (Dielis) rubromaculata beharensis* Betrem, *Treubia*, **9** (suppl.) : 120. Female, India : Bihar, Banhar (holotype in F.R.I., Dehra Dun).
1928. *Campsomeris (Dielis) bicolor* (Saussure) : Betrem, *Treubia*, **9** (suppl.) : 121. Male, Sumatra, Java.
1932. *Campsomeris rubromaculata* (Smith) : Betrem, *Ent. Ber.*, **8** : 415. Female, Male; Bangka Island : Aer Mesoe (synonymised *Elis (C.) bicolor* Saussure, 1858).
1933. *Campsomeris (Dielis) rubromaculata* (Smith) : Betrem, *Stettin. ent. Ztg.*, **94** : 241. Female, Java, Soerabaja.

1941. *Campsomeris (Sericocampsomeris) rubromaculata rubromaculata* (Smith) : Betrem, *Notes Ent. Chinoise*, **8** (4) : 95. Female, Tonkin (*Sericocampsomeris*, a new subgenus).
1941. *Campsomeris (Sericocampsomeris) rubromaculata hainanensis* Betrem : Betrem, *Notes Ent. Chinoise*, **8** (4) : 96. Female, China : Hainan.
1947. *Campsomeris rubromaculata rubromaculata* (Smith) : Betrem, *Tijdschr. Ent.*, **88** : 414. India; Malakka; Java; Sumatra and southern China (synonymised *rubromaculata beharensis* Betrem, 1928 and *r. hainanensis* Betrem, 1928).
1967. *Campsomeris (Sericocampsomeris) rubromaculata rubromaculata* (Smith) : Betrem in Bradley & Betrem. *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 319 (a note on Smith's types in British Museum).
1972. *Sericocampsomeris rubromaculata rubromaculata* (Smith) : Betrem in Betrem & Bradley, *Mon. Ned. Ent. Ver.*, **6** : 12 (elevating *Sericocampsomeris* to generic status).
1974. *Sericocampsomeris rubromaculata rubromaculata* (Smith) : Betrem in Bradley, *Revue suisse Zool.*, **81** (2) : 425-426 (a note on the type of *Elis (C.) bicolor* Saussure, 1858).
1976. *Campsomeris (Sericoampsomeris) rubromaculata rubromaculata* (Smith) : Jonathan et al., *Newsl. zool. Surv. India*, **2** (3) : 113. Female, India : Arunachal Pradesh.
1989. *Sericocampsomeris rubromaculata rubromaculata* (Smith) : Gupta & Jonathan, *Ann. Entomol.*, **7** (2) : 55. Female, India : Arunachal Pradesh.

This is a uncommon subspecies in India, and only females have been reported from Arunachal Pradesh and Bihar. The male has not, so far, been reported from India.

Female : Length 30-39 mm. Integument black, except third to last abdominal tergites and sternites reddish-brown anteriorly, usually a pair of small postero-lateral reddish-yellow spots on second tergite, third and fourth tergites with similar but relatively larger spots. Erect vestiture black except scrobes and frontal spatium with white setae, and apical fringes on second to last tergites and sternites reddish-golden, the pygidium also clothed with similar setae, tomentum on the back of the head and at the lateral sides of the thorax silvery. Wings dark brown, with violet reflection.

Clypeus impunctate in the middle, longitudinally striated anteriorly in the middle, at sides contiguously punctate; frontal spatium raised and impunctate in the middle, at sides contiguously punctate; lower front subcontiguously punctate, upper front impunctate except for some close punctures laterad of anterior ocellus; frontal fissura extending up to anterior ocellus, the latter in a shallow pit; vertex sparsely punctate, posteriorly and laterad of posterior ocelli impunctate, its declivous portion sparsely punctate, but the punctures becoming closer near occipital carina; temporal groove weakly present.

Scapulae with contiguous to subcontiguous punctures; mesoscutum with punctures mostly separated by the diameter to half the diameter of a puncture, a V-shaped impunctate area posteriorly in the middle; scutellum sparsely punctate; metanotum with close punctures along anterior and posterior margins, in the middle with a transverse impunctate area; mesopleurum broadly impunctate along its anterior and posterior margins, anterior area with small, close punctures along the crest, posterior area with relatively smaller and sparser punctures; upper plate of metapleurum impunctate, lower plate with small, sparse punctures along lower margin, elsewhere impunctate; dorso-median area of propodeum sub-contiguously punctate except for a narrow longitudinal impunctate area in the middle, dorso-lateral areas with relatively smaller and subcontiguous punctures, a rectangular area anteriorly along inner margin impunctate, lateral surface with small, sparse to scattered punctures, postero-median area impunctate except along upper margin with shallow, close punctures, postero-lateral areas sparsely punctate.

Second and third abdominal tergites mat with silken reflection, broadly impunctate in the middle, anteriorly with scattered punctures, posteriorly with apical and subapical rows of close punctures.

Male : Betrem (1928) gave the following description : Length 26 mm. Black, the following reddish-yellow : paired lateral spots on first and second tergites, third tergite almost entirely except black along its anterior and posterior margins, a pair of lateral spots on fourth tergite, paired lateral spots on second to fourth sternites. Vestiture white except on fourth and the following abdominal segments, black. Wings dark brown, fore wing darker anteriorly, with golden reflection.

Distribution : India : Arunachal Pradesh (Subansiri, Tamen), Bihar (Banhar), Sikkim. Elsewhere : southern China, Indonesia, Malayasia, Myanmar and Vietnam.

3. *Sericocampsomeris stygia* (Illiger)

This polytypic species is widely distributed in the Oriental Region, where it ranges from India and Bangladesh through Myanmar, Malaya, Sumatra, Java and Kalimantan to Sulawesi. Two subspecies have been recognised, viz., *stygia stygia* (Illiger) ranging from India and Bangladesh through Myanmar, Malaya, Sumatra and Java to Kalimantan; and *stygia celebesiaca* (Dalla-Torre) from Sulawesi. Betrem in Bradley and Betrem (1967) redescribed the type of *Scolia morosa* Smith, which is now recognised as *S. stygia celebesiaca* (Dalle-Torre).

These subspecies are differentiated by the colour of abdominal tergites : in female, entirely black in *S. s. celebesiaca*, and second and third tergites usually marked with paired yellow spots in *S. s. stygia*. Only one subspecies is known from Indian subregion, which is detailed below:

***Sericocampsomeris stygia stygia* (Illiger)**

(Figure 25)

1802. *Scolia stygia* Illiger, *Mag. Ins.*, **1** : 15. Female, Tranquebar (holotype in Berlin Museum).
1928. *Campsomeris stygia* (Illiger) : Betrem, *Treubia*, **9** (suppl.) : 336. Female.
1854. *Scolia 4-guttulata* Burmeister, *Abh. Naturf. Ges. Halle*, **1** : 21. Female, Padang (holotype in Halle Museum).
1855. *Elis (Campsomeris) 4-guttulata* (Burmeister) : Saussure, *Mem. Soc. Phys. Hist. nat. Geneva*, **14** : 58. Female, Padang.
1855. *Scolia luctuosa* Smith, *Cat. British Mus. Hym.*, **3** : 101. Female, Silhet (holotype in British Museum).
1864. *Elis (Dielis) 4-guttulata* (Burmeister) : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 195, Female.
1864. *Elis (Dielis) luctuosa* (Smith) : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 194; Female, Male.
1897. *Elis (Dielis) luctuosa* (Smith) : Bingham, *Fauna British India, Hym.*, **1** : 95. Female, Male, India, Myanmar (synonymised *S. 4-guttulata* Burmeister, 1854).
1897. *Scolia luctuosa* Smith : Dalla-Torre, *Cat. Hym.*, **8** : 168 (listed).
1897. *Scolia 4-guttulata* Burmeister : Dalla-Torre, *Cat. Hym.*, **8** : 175 (listed).
1905. *Campsomeris sericeps* Cameron, *Tijdschr. Ent.*, **48** : 55. Female, Ardjoenko (Java) (type in Artis Museum).
1915. *Dielis luctuosa* (Smith) : Leefmans, *Meded. Lab. Plantenziekten*, **13** : 58. Female, tab. 1, fig. 12.
1915. *Dielis tristis* (Saussure) : Leefmans, *Meded. Lab. Plantenziekten*, **13** : 59. Female, Bendoredjo (Java). (misdet.).
1915. *Dielis javana* (Lepeletier) : Leefmans, *Meded. Lab. Plantenziekten*, **13** : 62. Female, Java. (misdet.).
1928. *Campsomeris (Dielis) peregrina* (Lepeletier) : Betrem, *Treubia*, **9** (suppl.) : 114. Female, Java, Silhet (Bangladesh) (misdet.).
1928. *Campsomeris (Dielis) peregrina* var. *4-guttulata* (Burmeister) : Betrem, *Treubia*, **9** (suppl.) : 115. Female, Java, Sumatra, Kalimantan, Malakka, Myanmar; India : Assam, Sikkim; Bangladesh : Silhet.
1928. *Campsomeris (Dielis) peregrina* var. *bendoredjoensis* Betrem, *Treubia*, **9** (suppl.) : 115. Female, Bendoredjo (Java); (holotype in Leiden Museum). **New synonymy.**
1933. *Campsomeris (Dielis) quadriguttulata* (Burmeister) : Betrem, *Stettin. ent. Ztg.*, **94** : 241. Female, Java.

1937. *Campsomeris (Dielis) quadriguttulata* (Burmeister) : Betrem, *Proc. R. Ent. Soc. London*, (B) **6** : 91-97. Male, des., Key; Malaya, Sumatra, Java (synonymised *Campsomeris malayanus* Betrem (in litt.)).
1941. *Campsomeris (Sericocampsomeris) quadriguttulata* (Burmeister) : Betrem, *Notes Ent. Chinoise*, **8** (4) : 91-92. (*Sericocampsomeris* as a new subgenus).
1966. *Campsomeris (Sericocampsomeris) quadriguttulata* (Burmeister) : Bradley & Betrem, *Beitr. Ent.*, **16** : 77 (a note on the holotype of *S. 4-guttulata* Burmeister, 1854).
1967. *Campsomeris (Sericocampsomeris) quadriguttulata quadriguttulata* (Burmeister) : Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 312 (study on the holotype of *Scolia luctuosa* Smith and its new status).
1972. *Campsomeris (Sericocampsomeris) stygia* (Illiger) : Betrem in Bradley, *Mitt. zool. Mus. Berlin*, **48** (1) : 15-16 (new combination for *Scolia stygia* Illiger, 1802).
1972. *Sericocampsomeris stygia* (Illiger) : Betrem in Betrem & Bradley, *Mon. Ned. Ent. Ver.*, **6** : 12 (*Sericocampsomeris* raised to generic status; *S. 4-guttulata* Burmeister synonymised).
1989. *Sericocampsomeris stygia stygia* (Illiger) : Gupta & Jonathan. *Ann. Entomol.*, **7** (2) : 53-57. Female, Male; fig. 3, tab. India : Tripura; Myanmar.

This subspecies is widely distributed in the Oriental Region and ranges from southern India through North-east India, Bangladesh and Myanmar to Malaysia, Java, Sumatra and Kalimantan.

Though originally described from Tranquebar (Tamil Nadu, India), there is no subsequent record of this taxon, from southern India. Bingham (1897) recorded *E. luctuosa*, a synonym of *stygia stygia* from Assam and Sikkim.

Gupta and Jonathan (1989) reported two females from Tripura in India and Myanmar; one male is now recorded from Darjeeling district, West Bengal, India which is a first record of male from India.

Female : Length 31-35 mm. Black, third and fourth tergites usually with paired yellow spots, the spots sometimes small and present only on fourth tergite, sometimes abdomen entirely black. Vestiture black, except tomentum on scrobes and declivous portion of the vertex silvery white. Wings dark brown.

Clypeus impunctate in the middle, at sides with coarse, subcontiguous punctures; frontal area and frontal spatium with coarse, contiguous punctures; upper front with similar punctures broadly along the eye margin; frontal fissura extending up to anterior ocellus; the latter in a broad, but shallow pit; vertex with mostly scattered punctures, punctures closer at some places, its declivous portion densely punctate.

Scapulae with coarse, contiguous to subcontiguous punctures; mesoscutum with coarse, contiguous punctures along its anterior and posterior margins, elsewhere the

punctures separated by the diameter of a puncture, with a V-shaped impunctate area posteriorly in the middle; scutellum with medium sized, scattered punctures; metanotum with close punctures; mesopleurum broadly impunctate along anterior and posterior margins, anterior area with coarse, contiguous to subcontiguous punctures along the crest, posterior area with small, sparse punctures below on lower plate, elsewhere impunctate; lower plate of metapleurum largely impunctate, except for a small area below with small, close punctures, upper plate impunctate; dorso-median area of propodeum with coarse, deep, mostly contiguous punctures, dorso-lateral areas with similar but subcontiguous punctures except for a small impunctate area anteriorly along inner margin, lateral surface largely impunctate, contiguously punctate along its upper margin, posterior surface with close punctures along upper and lateral margins.

First abdominal tergite with small scattered punctures, anteriorly in the middle impunctate; second tergite with small, scattered punctures and a subapical row of close punctures.

Male : Length 18-25 mm. Black, the following are yellow : clypeus largely, except narrowly along anterior margin, scapulae dorsally, broad bands on scutellum and metanotum in the middle, a stripe on the posterior half of first femur, stripes on first and second tibiae on the outer side, narrow to somewhat broad apical bands on first to fourth tergites, lateral spots on second and third sternites. Vestiture white. Wings light brown.

Clypeus largely impunctate in the middle, with coarse and close punctures along posterior and lateral margins; frontal spatium with small, contiguous punctures; anterior ocellus large and in a broad but shallow pit; frontal fissura extending up to anterior ocellus.

Distribution : India : Assam, Sikkim, Tamil Nadu (Tranquebar), Tripura (Manu), West Bengal (Darjeeling, Rangpo). *Elsewhere* : Bangladesh, Bhutan, Indonesia, Malaysia and Myanmar.

4. *Sericocampsomeris flavomaculata* Gupta & Jonathan (Figure 26, 27)

1989. *Sericocampsomeris flavomaculata* Gupta & Jonathan, *Ann. Entomol.*, **7** (2) : 53-57. Male, fig. 1-2, tab.; India : Meghalaya, Garo Hills, Dainadubi, 340 m; Nepal, Lothar near Birganj, 110 m. (holotype and four paratypes in Z.S.I., Calcutta; one paratype in Ottawa Museum).

This species can be differentiated by the nature and extent of yellow maculation on abdominal tergites and sternites as detailed below:

Male : Length 20-23 mm. Black, the following yellow : scapulae dorsally, apical bands on first to fifth tergites and second to fourth sternites, second and third

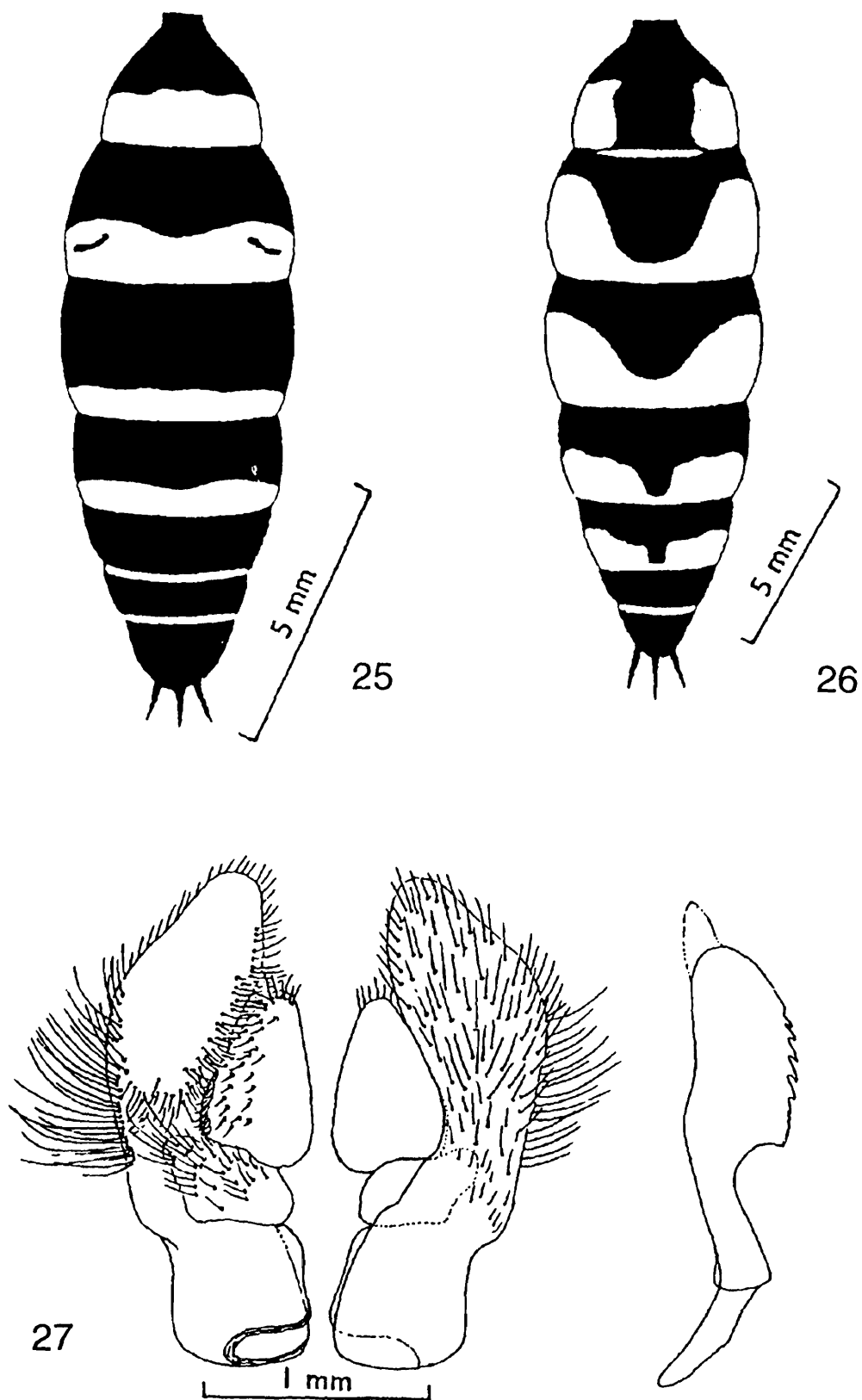


Fig. 25 : *Sericocampsomeris stygia* (Illiger), Dorsolateral aspect of male abdomen.

Figs. 26-27 : *Sericocampsomeris flavomaculata* Gupta & Jonathan : 26, Dorsal aspect of male abdomen; 27, Male genitalia : Ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right.

sternites also with paired lateral spots in the middle. The yellow bands on first three tergites very broad and cover more than half of the length of tergite, broadly interrupted in the middle on the first while deeply and broadly emarginated on second and third. The bands on the sternites narrow and interrupted in the middle, those on fourth and fifth tergites covering less than half the length of tergite and bands deeply but narrowly emarginated in the middle. Erect vestiture white, tomentum silvery. Wings hyaline, fore wing slightly infumated at apical one-fourth, with two recurrent veins.

Clypeus broadly impunctate, at sides and along posterior margin with coarse, close punctures; frontal spatium with small, contiguous punctures; anterior ocellus large, placed in a broad but shallow pit; frontal fissura extending up to anterior ocellus. Genitalia as in figure 27.

Distribution : India : Meghalaya (Dainadubi in Garo Hills). *Elsewhere* : Nepal.

6. Genus *Phalerimeris* Betrem

1967. *Campsomeris* subgenus *Phalerimeris* Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 294-295. Type-species : *Elis (Campsomeris) phalerata* Saussure, 1858.

1974. *Phalerimeris* Betrem : Bradley, *Revue suisse Zool.*, **81** (2) : 460. (*Phalerimeris* raised to generic status).

Type-species : *Elis (Campsomeris) phalerata* Saussure, 1858 (Original designation).

Female : Medium sized, about 10-20 mm in length. Black, basal abdominal tergites mat, often with narrow yellow or reddish-brown apical bands. Vestiture predominantly yellow to reddish-brown. Wings hyaline, infumated with yellowish or with a slight brownish tinge, fore wing often with a dark well defined apical mark.

Anterior rim of clypeus medially broader than at the sides of median lobe; frontal spatium and frontal area not separated, densely punctate except for a narrow impunctate stripe on frontal spatium bearing frontal fissura; front impunctate except for a group of deep punctures in front of anterior ocellus, and a wide band of punctures along eye margin; vertex largely punctate; occipital carina more or less interrupted above; temporal groove present, but usually not deep.

Scapulae without any shallow groove; transition between the dorsal area and vertical surface of mesopleurum not elevated medially, almost straight; transition between the dorsal area and vertical surface of the metapleurum not gradual, without an edge or with a distinct edge, but not like a carina; lateral carina of propodeum extended beyond the spiracle; dorsal and vertical surfaces of propodeum separated by a carina, complete or almost so, but never high on the outer side as in *Megacampsomeris* Betrem; fore wing with two recurrent veins, first submarginal cell largely setose; spurs white, longer spur of hind tibia blunt or acute, never spatulate.

Male : Small and slender than female. Integument black, usually maculated with yellow or orange-yellow. Erect vestiture predominantly pale to fulvous except black on two to four apical abdominal segments, tomentum silvery or golden. Wings hyaline, usually moderately infumated with yellow to brown.

Frontal spatium densely punctate, distinctly separated from the front by a narrow transverse impunctate band; front in the middle impunctate except for a few shallow close punctures; the posterior declivity of vertex not very sloping, temples well developed, not receding as in *Campsomeriella* Betrem.

First abdominal tergite longer than broad; anterior slope of second sternite gradual. Genitalia with parameres angular in circumference, volsellae with sparse setae.

This genus is distributed in Indo-Australian Region except Australia, and is represented by seven species. Three species, viz., *P. phalerata* (Saussure), *P. madurensis* (Betrem), and *P. lantschneri* (Dalla-Torre) occur in Indian subregion. These species can be distinguished by the following key:

Key to the Species of *Phalerimeris*

Female

1. First three abdominal tergites with narrow apical yellow or orange bands, covering less than half the length of the tergite. Widely distributed in Oriental Region 1. *phalerata* (Saussure)
- First three abdominal tergites with broad apical yellow bands, covering more than half the length of the tergite; the band on the second tergite very broad and covers almost entire surface. southern India 2. *madurensis* (Betrem)

Male

1. First four abdominal tergites with broad apical yellow bands, covering half or more than half the length of the tergite; the bands on first and second tergites cover about three-fourths the length of the tergite. southern India 2. *madurensis* (Betrem)
- First four abdominal tergites with narrow apical yellow bands, covering less than half the length of the tergite 2
2. Fore wing without any apical infumated area or mark; scutellum and metanotum with yellow maculations. Widely distributed in the Oriental Region 1. *phalerata* (Saussure)
- Fore wing with its apical one-fifth infumated; scutellum and metanotum without any yellow marks. Andaman & Nicobar Islands, India 3. *lantschneri* (Dalla-Torre)

1. *Phalerimeris phalerata* (Saussure)

This polytypic species is widely distributed in the Oriental Region, and ranges from Sri Lanka eastwards through India, Nepal, Bangladesh, Myanmar, Thailand, Malaysia and Indonesia to Sulawesi, and also occurs in China and Taiwan. It is recorded here for the first time from Andaman & Nicobar Islands, India.

Three subspecies have been recorded, viz., *p. phalerata* (Saussure) ranging from northern India, Nepal and Myanmar eastwards through Southeast Asia to Sulawesi, and also China and Taiwan; *p. bankaensis* (Betrem) from Banka Island and *p. turneri* (Betrem) from Sri Lanka and southern India. These subspecies are distinguished by the difference in colour of vestiture, particularly on apical abdominal segments, in female. The subspecies *phalerata bankaensis* (Betrem) is, however, distinguished by the yellow apical bands on first and second tergites, in female, relatively narrower and interrupted. The males of all the three subspecies are very similar and difficult to be distinguished.

The two subspecies represented in the Indian subregion can be identified by the following key :

Key to the Subspecies of *Phalerimeris phalerata*

Female

1. Antennae and legs black to reddish-brown; vestiture predominantly golden or golden with reddish tinge; one or two apical abdominal segments including pygidium with black setae. Ranging from northern India eastwards to Sulawesi(a) *P. phalerata phalerata* (Saussure)
- Antennae and legs light red; vestiture entirely reddish-golden, except sometimes pygidium with some black setae. Sri Lanka and southern India.(b) *P. phalerata turneri* (Betrem)

(a) *Phalerimeris phalerata phalerata* (Saussure)

(Figure 28, 29)

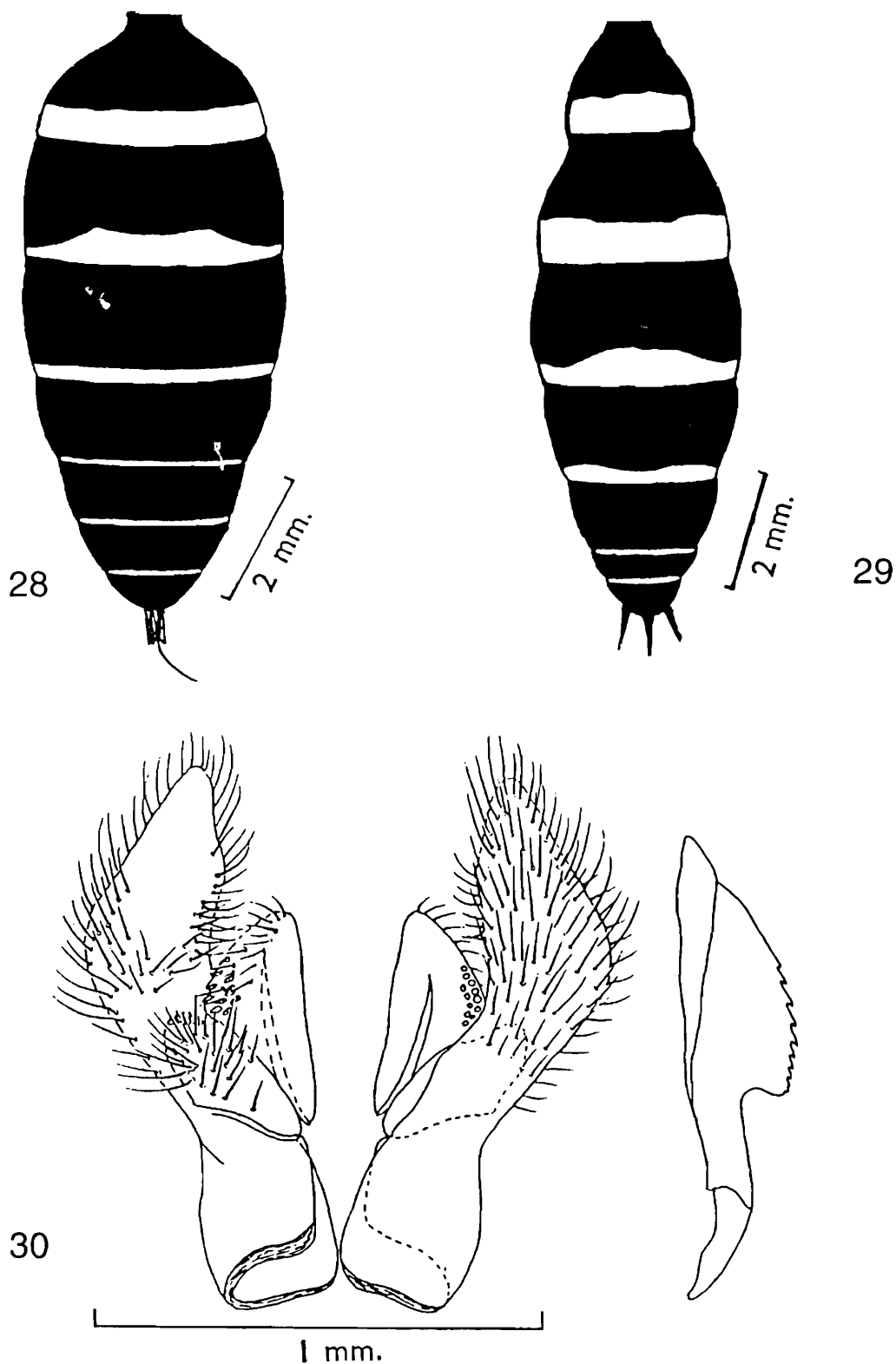
1858. *Elis (Campsomeris) phalerata* Saussure, *Ann. Soc. ent. France*, (3) **6** : 233. Female (not Male), Java (types in Copenhagen Museum).
1859. *Elis (Campsomeris) phalerata* Saussure, *Stettin. ent. Ztg.*, **20** : 268, Java.
1864. *Elis (Dielis) phalerata* Saussure : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 201; Female not Male.
1892. *Elis (Dielis) iris* Lepeletier : Magretti, *Ann. Mus. civico Stor. Nat. Genova*, **12** : 247. Female, Myanmar : Bhamo, Tenasserim.
1897. *Elis (Dielis) iris* Lepeletier : Bingham, *Fauna British India, Hym.*, **1** : 94. Female (specimens from Sikkim, Myanmar, Tenasserim and Java).

1911. *Campsomeris albopilosa* Rohwer, *Proc. U.S. Natn. Mus.*, **39** : 480. Male, Java.
1928. *Campsomeris (Dielis) phalerata phalerata* (Saussure) : Betrem, *Treubia*, **9** (suppl.) : 103-104. Female, Male; India, Malakka, Sumatra, Java, Sulawesi, Taiwan, China (synonymised *C. albopilosa* Rohwer).
1932. *Campsomeris lindenii* (Lepelletier) : Yano, *Icon. Ins. Japan* : 317. Female. fig. 616 (misdet.).
1933. *Campsomeris (Dielis) phalerata phalerata* (Saussure) : Betrem, *Stettin. Ent. Ztg.*, **94** : 238. Female, Male; Taiwan.
1934. *Campsomeris phalerata* (Saussure) : Uchida, *J. Fac. Hokkaido Imp. Univ.*, **32** : 258-259. Female, Taiwan.
1937. *Campsomeris (Dielis) phalerata phalerata* (Saussure) : Betrem, *Proc. R. Ent. Soc. London*, (B) **6** : 95. Male, Key.
1941. *Campsomeris (Dielis) phalerata phalerata* (Saussure) : Betrem, *Notes Ent. Chinoise*, **8** (4) : 101-102. Female, Male; China : Kwangtung, Hong Kong.
1967. *Campsomeris (Phalerimeris) phalerata* (Saussure) : Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 294 (*Phalerimeris* used as a new subgenus).
1972. *Campsomeris (Phalerimeris) phalerata* (Saussure) : Tsuneki, *Etizenia*, **62** : 15-16. Female, Male; Taiwan.
1974. *Phalerimeris phalerata phalerata* (Saussure) : Bradley, *Revue suisse Zool.*, **81** : 460 (*Phalerimeris* Betrem raised to generic status).

This subspecies is widely distributed in the Oriental Region, occurring from Sulawesi westward through sotheast Asia and Thailand to northern India, and also in China and Taiwan. In India *P. phalerata phalerata* is one of the widely distributed species occurring from Assam and Arunachal Pradesh westward through Nepal and western Himalaya to Kangra in North-West Himalaya. This subspecies occurs from 115 m to about 2000 m altitude in wet to very wet zones and breeds throughout the year.

The female can be easily differentiated from its allied members of the tribe Campsomerini from India by having a group of deep punctures infront of anterior ocellus, narrow yellow apical bands on the abdomen and a very dark well defined subapical mark on the fore wing. The male is usually confused with the males of *Campsomeriella collaris collaris* (Fabricius) and *C. (Annulimeris) annulata* (Fabricius). However, males of *C. collaris collaris* can be easily separated by having broader yellow bands on abdomen and dense erect setae on sixth sternite. Males of *Campsomeriella (Annulimeris) annulata* can be differentiated by the yellow abdominal bands broader at the sides than in the middle and the genae entirely black. In *P. phalerata phalerata* the yellow abdominal bands not broadened at the sides and the genae bear yellow marks.

Female : Length 12-18 mm. Black, except tibiae and tarsi light red; first three abdominal tergites with narrow orange or yellow apical bands, the band on second



Figs. 28-29 : *Phalerimeris phalerata phalerata* (Saussure) : 28. dorsal aspect of female abdomen; 29. dorsal aspect of male abdomen.

Fig. 30 : *P. p. turneri* (Betrem) : Male genitalia; ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right.

tergite narrowed at sides. Erect vestiture predominantly golden to reddish-golden, except on the last abdominal segment and pygidium, black; tomentum golden. Wings yellowish, fore wing with a dark well defined subapical mark.

Frontal spatium and lower front contiguously punctate, except for a narrow median impunctate stripe on frontal spatium bearing the frontal fissura; upper front impunctate except for wide bands of contiguous punctures along inner eye margins and a group of deep punctures in front of anterior ocellus; vertex densely punctate except for a narrow impunctate strip behind posterior ocelli.

Scapulae densely punctate; mesoscutum densely punctate, with a small area posteriorly in the middle with sparse punctures; scutellum and metanotum densely punctate; mesopleuron broadly impunctate along anterior and posterior margins, anterior area densely punctate, posterior area impunctate above and sparsely punctate along upper margin, elsewhere impunctate, lower plate with small, scattered punctures; dorsum of propodeum densely punctate, lateral surface sparsely punctate, posterior surface largely impunctate.

Abdominal tergites mat; second and third tergites with a row of subapical close punctures.

Male : Length 11-17 mm. Black, abdomen with faint blue reflections, yellow markings as follows : clypeus except for a small to large median triangular area, a line along lower inner eye orbit, scrobes, an elongated mark on genae, scapulae broadly along its posterior margin, callosities, usually tiny postero-lateral marks on mesoscutum, a narrow band anteriorly on scutellum, a small antero-median spot on metanotum, fore coxae, apical mark on fore femur beneath, narrow stripes above and below on middle femur, outer surfaces of fore and middle tibiae, apical bands on first to fourth tergites, the band on first usually cover apical half of the tergite, band on third emarginated at sides, band on fourth narrow and sometimes interrupted in the middle, rarely postero-lateral spots on the fifth tergite also, narrow apical bands on second and third sternites, sometimes on fourth sternite also, broadly interrupted in the middle, sometimes that on second not interrupted. Erect vestiture pale except black on last three abdominal segments. Wings slightly infumated.

Distribution : India : Arunachal Pradesh (Siang, Bane, Dosing, Subansiri, Tipi, Tamen, Kimin, Lamking), Assam (Kobo, Sadiya, Nowgong), Bihar (Parasnath Hills in Girdhi dist.), Himachal Pradesh (Kangra), Meghalaya (Cherrapunji, Dainadubi, Rongrang, Songsak), Sikkim (Gangtok, Tumalhang Khola, Ranjeet Valley, Melli), Tripura (Taliamura, Ambassa), Uttaranchal (Dehra Dun, Ranipur, Mohan, Dhikala, Chilla, Motichur, Khatima, Garjia, Tanakpur) and West Bengal (Teesta Bridge, Singla, Pashok, Bijanbari, Rangpo, Chapramari Forest). *Elsewhere* : China, Indonesia, Malaysia, Myanmar, Nepal, Taiwan and Thailand.

(b) *Phalerimeris phalerata turneri* (Betrem)

(Figure 30)

1889. *Campsomeris ceylonica* Kirby. *Trans. ent. Soc. London*, **3** : 452. Female. Sri Lanka (Female allotype from Sri Lanka misidentified)
1928. *Campsomeris (Dielis) phalerata turneri* Betrem, *Treubia*, **9** (suppl.) : 104. Female. Male; Sri Lanka, southern India (new name for the misidentified female allotype of *Campsomeris ceylonica* Kirby).
1941. *Campsomeris (Dielis) phalerata turneri* Betrem : Betrem, *Notes Ent. Chinoise*, **8** (4) : 100.
1965. *Campsomeris phalerata turneri* Betrem : Guiglia, *Verh. Naturf. Ges. Basel*, **76** : 316. Female, Male; Sri Lanka.
1978. *Phalerimeris phalerata turneri* (Betrem) : Krombein, *Smithsonian Contr. Zool.*, 283 : 14-16, figure 9. Female, Male; Sri Lanka.

The distribution of this subspecies is restricted to Sri Lanka, southern India and Andaman & Nicobar Islands. In southern India this subspecies attains peak population in May-June and September-October, and occurs from sea level to an altitude of 1000 m.

Female can be easily recognised by having reddish-golden vestiture, a group of deep and close punctures in front of anterior ocellus, apex of the fore wing with a large, dark well defined mark and first three abdominal tergites with narrow apical orange bands.

Female : Length 12-18 mm. Integument black, except antennae, tibiae and tarsi, reddish; first three abdominal tergites with narrow apical orange or yellow bands, the band on second broad in the middle. Erect vestiture and tomentum, yellowish-reddish-golden, except very rarely black on the last abdominal segment and pygidium. Wings yellowish, apex of the forewing with a large, dark well defined spot.

Details of punctation and body structure as in *P. phalerata phalerata*.

Male : Length 10-16 mm. Similar to *P. phalerata phalerata* in structure and body colour.

Male genitalia : As in figure 30.

Variations : A female collected for the first time from Port Blair, Andaman and Nicobar Islands, possibly, represents an undescribed subspecies, differing slightly from the female from southern India in having the orange-yellow band on second tergite not broadened in middle and the vestiture on last two abdominal tergites black. For the present this female from Port Blair has been placed under this subspecies.

Distribution : India : Andaman & Nicobar Islands (Port Blair), Karnataka (Chikmagalur, Mudigere, Agumbe, Jog falls, Bangalore), Kerala (Thekkadi, Ponmudi),

Pondicherry (Karikal), Tamil Nadu (Devala, Coimbatore, Anamalai Hills, Shevaroy Hills, Yercaud). *Eleswhere* : Sri Lanka.

2. *Phalerimeris madurensis* (Betrem), comb. nov.
(Figures 31, 32)

1928. *Campsomeris (Dielis) madurensis* Betrem, *Treubia*, 9 (suppl.) : 105 : Female. Madurai, Southern India (holotype in British Museum).

This species is distinguished from *Phalerimeris phalerata* (Saussure) by having yellow apical band on second tergite very broad.

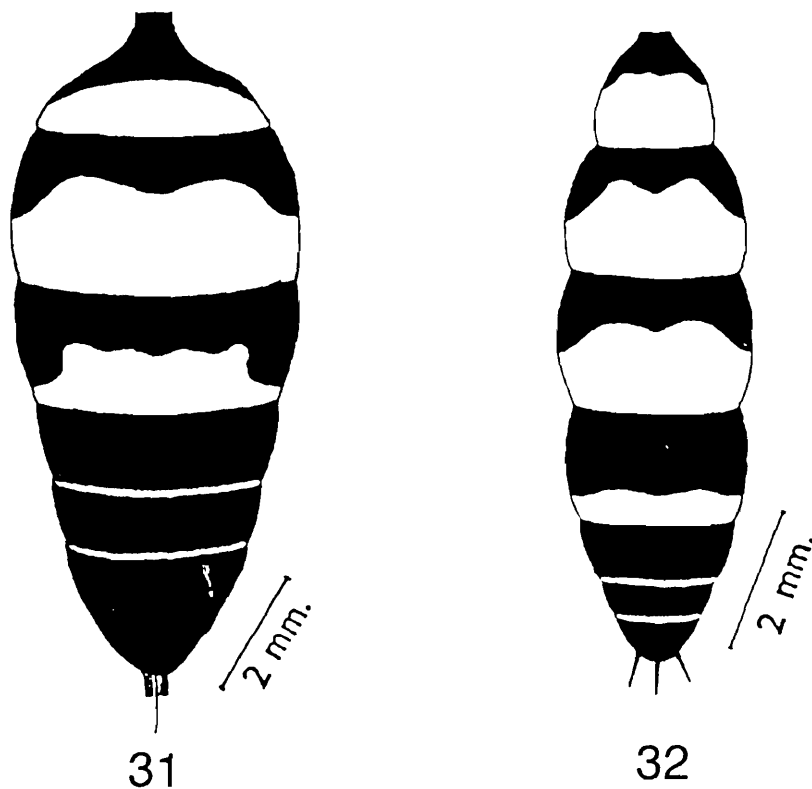
The distribution of this species is restricted to southern India. The male, previously unknown, is described here for the first time. It has broad yellow apical bands on abdominal tergites and can easily be misidentified as of *Capmsomeriella collaris collaris* (Fabricius), however, it can be easily separated by the absence of dense erect setae on the sixth sternite. The female also has very broad apical yellow bands on basal abdominal tergites, band on second tergite covering about three-fourths of the length of the tergite.

Female : Length 14-17 mm. Black, except antennae and legs reddish; first three abdominal tergites with broad apical yellow bands, band on second tergite covering three-fourths to almost the entire surface, emargenated anteriorly at sides, band on fourth tergite covering three-fourths of the surface; and postero-lateral yellow spots on second and third sternites. Erect vestiture reddish-golden on head and thorax, golden on abdomen, except sometimes the pygidium with black setae, tomentum golden. Wings yellowish hyaline, apex of fore wing with a well defined dark spot.

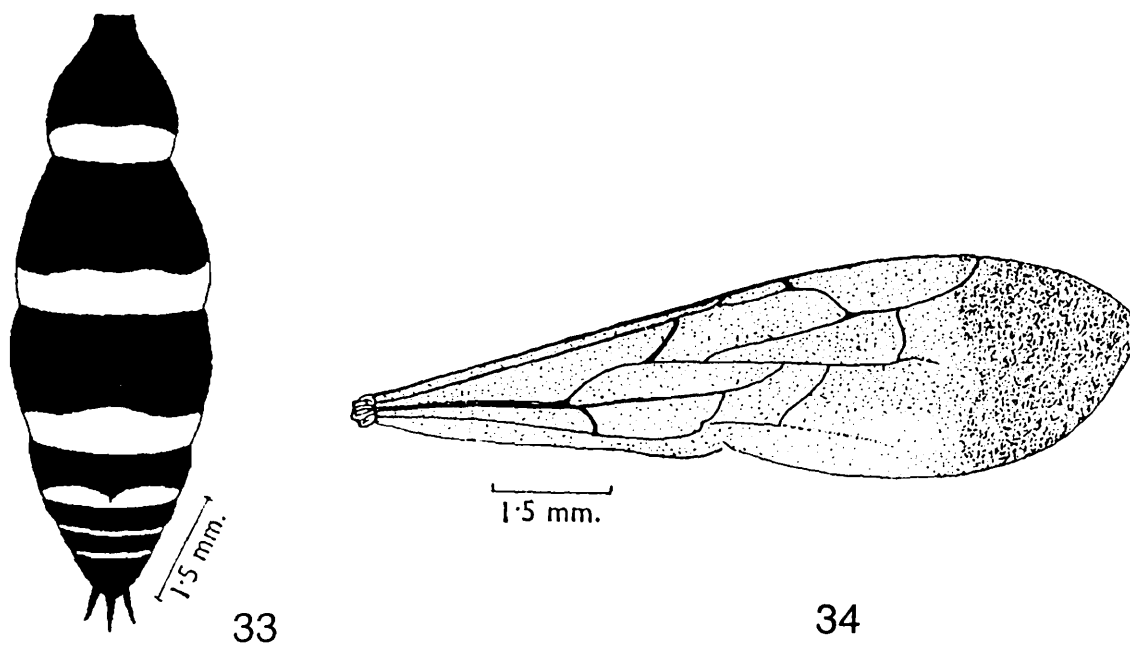
Clypeus impunctate, at side with close punctures; frontal area densely punctate; frontal spatium densely punctate, except for a narrow impunctate longitudinal stripe in the middle; lower front densely punctate in continuation with frontal spatium, upper front with broad band of close punctures along eye margins and a group of close punctures in front of anterior ocellus; vertex with sparse punctures except for a narrow impunctate area behind posterior ocelli.

Scapulae with small, close punctures; mesoscutum anteriorly and along posterior margin with coarse deep close punctures, elsewhere sparsely punctate, posteriorly in the middle with a large impunctate area; scutellum with small, close punctures, broadly impunctate along posterior margin; metanotum with small dense punctures; dorso-median area of propodeum with small close punctures, dorso-lateral area with a large impunctate area anteriorly, in the middle with small close punctures, the punctures becoming fine and widely separated posteriorly.

Male : Length 12-15 mm. Black, abdomen with faint blue reflection. The following yellow: clypeus anteriorly and at the sides, scrobes, small spots on genae, pronotum dorsally, small postero-lateral marks on mesoscutum, broad anterior bands on



Figs. 31-32 : *Phalerimeris madurensis* (Betrem) : 31, Dorsal aspect of female abdomen; 32, Dorsal aspect of male abdomen.



Figs. 33-34 : *Phalerimeris lantschneri* (Dalla-Torre) : 33, dorsal aspect of male abdomen; 34, fore wing of male

scutellum and metanotum, a broad line on apical half of fore femur beneath, a broad line on the apical three-fourths of middle and hind femora, fore and middle tarsi on outer side, broad apical yellow bands on first four abdominal tergites, those on first and second covering more than three-fourths of the surface, those on third and fourth covering half of the surface; narrow widely interrupted apical bands on second to fourth sternites. Erect vestiture yellowish-white, except black on last three abdominal segments. Wings hyaline, slightly infumated, apex of the fore wing with a dark mark.

Distribution : India : Karnataka (Kollar, Bangalore, Bannerghatta Park), Kerala (Perummur in Cochin dist.) and Tamil Nadu (Mudumalai).

3. *Phalerimeris lantschneri* (Dalla-Torre) (Figures 33, 34)

1864. *Elis (Dielis) cyanea* Saussure in Saussure and Sichel, *Cat. Spec. Gen. Scolia* : 323. Male, Nicobar Island (syntypes in Vienna Museum).
1867. *Elis (Dielis) cyanea* Saussure : Saussure, *Hym. Reise Novara*, **2** : 104, Male.
1892. *Elis (Dielis) cyanea* Saussure : Cameron, *Mem. Proc. Manch. Lit. Phil. Soc.*, (4) **5** : 112.
1897. *Elis (Dielis) cyanea* Saussure : Bingham, *Fauna British India, Hym.*, **1** : 100. Male, Nicobars.
1897. *Scolid lantschneri* Dalla-Torre, *Cat. Hym.*, **8** : 167 (new name for *Elis cyanea* Saussure, the name *cyanea* preoccupied in the genus *Scolia* by Lepeletier, 1845).
1928. *Campsomeris (Dielis) cyanea* (Saussure) : Betrem, *Treubia*, **9** (suppl.) : 102-103. Male, Nicobars.
1974. *Phalerimeris lantschneri* (Dalla-Torre) : Betrem in Bradley, *Revue suisse Zool.*, **81** : 432-433 (comb. nov.).

This species is, so far, known by males, and can be distinguished from other Indian species of *Phalerimeris* by having apical fifth of the fore wing darker than rest of the wing membrane, which is yellowish hyaline, and scutellum and metanotum entirely black.

Male : Length 11-12 mm. Black, abdomen with faint blue reflections. Pale yellow markings as follows : clypeus except for a large black area in the middle, scrobes, and elongated streak along the outer margin of lower eye lobe, a spot on gena, scapulae, a line on apical half of fore femur on inner side, an apical spot on middle femur on outer side and a line on inner side, a line on fore tibia on the outer surface, narrow apical bands on first to fourth tergites and second to fourth sternites, band on fourth tergite narrowly interrupted in the middle, band on third and fourth sternites widely interrupted in the middle. Erect vestiture yellowish-white, except black on the three apical abdominal segments. Wings yellowish hyaline, apical fifth of the fore wing slightly fuscous.

Distribution : India : Andaman & Nicobar Islands (Great Nicobar, Campbell Bay).

7. Genus *Megacampsomeris* Betrem

1928. *Campsomeris* subgenus *Megacampsomeris* Betrem. *Treubia*, **9** (suppl) : 138.

1972. *Megacampsomeris* Betrem : Betrem in Betrem and Bradley, *Mon. Ned. Ent. Ver.*, **6** : 164 (*Megacampsomeris* raised to generic status).

Type-species : *Tiphia grossa* Fabricius, 1804 (Original designation).

Female : Moderately small to large sized, about 15-37 mm in length. Integument black, sometimes basal abdominal tergites with narrow apical yellow or orange spots or bands, the bands sometimes very broad. Vestiture on head and thorax usually golden to reddish-brown; vestiture and tomentum sometimes entirely black. Wings yellowish hyaline to dark brown.

Anterior rim of clypeus broader medially than at the sides; frontal spatium densely punctate; upper front usually with a wide band of close punctures along upper eye margin, medially impunctate or with sparse to scattered punctures; frontal fissura usually deep and extending up to anterior ocellus, the latter in a deep or shallow pit; vertex impunctate to coarsely and densely punctate.

Scapulae usually densely punctate and with longitudinal impression; callosities broad and punctate, impunctate area behind them usually large; mesoscutum densely to sparsely punctate and usually with a large impunctate area posteriorly in the middle; transition between dorsal and vertical areas of mesopleurum straight or almost straight, not strongly elevated either medially or anteriorly, longitudinal crest at its lower portion usually not sharp, lower posterior area largely impunctate; upper plate of metapleurum more or less punctate above, transition between its horizontal and vertical areas partly gradual, not marked with a carina; longer spur of hind tibia black to white, straight, often pointed to blunt at the apex; fore wing with its second submarginal cell bare, sometimes setose only above.

Lateral carina of propodeum extending beyond the spiracle; transition between dorso-lateral area and vertical area of propodeum sharp, with a high carina that has a groove on its inner side, this carina further extended on upper half of postero-lateral area; dorso-median area usually twice as broad as long, with or without small tubercle posteriorly in the middle; dorso-lateral area usually with a cross-area of punctures, bearing setae. Vestiture on the thorax usually dense and long.

Basal abdominal tergites opaque, second and third tergites broadly impunctate in the middle, and with apical and subapical rows of setae bearing punctures.

Male : Smaller and slender than the female. Integument black, the following yellow : Clypeus usually at sides, sometimes scrobes; rarely spots on genae; dorsum of pronotum along posterior margin; sometimes postero-lateral small spots on mesoscutum; legs variously marked; narrow to broad apical bands on some of the basal sternites. Sometimes integument entirely black.

Head not broader than high in front view; declivity of the vertex not very sloping and temples not receding; frontal spatium densely punctate, with a small impunctate area posteriorly in the middle.

First abdominal tergite longer than broad. Genitalia with basal part of the volsellae for a greater part covered with long setae, the interspaces between their basal rings smaller than the diameter of these rings.

This genus is widely distributed in the Oriental Region and also occurs in China, Japan and Korea. It is represented by 30 species, of which 10 species occur in India.

Key to the Species of *Megacampsomeris*

Female

1. Integument and vestiture entirely black; wings dark brown. India 1. *reticulata* (Cameron)
- Integument entirely black or maculated on basal abdominal tergites with broad to narrow yellow apical bands; vestiture never entirely black; wings usually yellowish hyaline, rarely dark brown 2
2. Vestiture black on second to last abdominal segments and reddish-yellow on head, thorax and first tergite; wings yellowish hyaline. India; Taiwan 2. *binghami* (Betrem)
- Vestiture not black on second to last abdominal segments 3
3. First to third (or fourth also) abdominal tergites with well defined, narrow to broad, yellow or reddish-yellow apical bands 4
- Abdominal tergites without any well defined, yellow or reddish-yellow apical bands, sometimes postero-lateral margins yellow or with narrow bands on second and third tergites only. 6
4. Fore wing with a well defined dark apical spot; first to fourth abdominal tergites with broad yellow apical bands, those on second and third covering almost three-fourths of the surface. India. 3. *nilgirensis*, sp. nov.
- Fore wing without any well defined dark apical spot; first to third abdominal tergites with narrow yellow or reddish-yellow apical bands, covering less than half of the surface 5
5. Integument of head and thorax entirely black; vestiture predominantly golden except on the fifth and sixth abdominal segments black; front medially with coarse, scattered punctures. India, Myanmar and Nepal. 4. *shillongensis* (Betrem)

- Integument of head and thorax black except antennae and legs reddish-yellow; vestiture entirely reddish-yellow; front medially impunctate. India. 5. *dehraensis* (Betrem)
- 6. Basal three or four abdominal tergites with apical fringes of silvery white decumbent setae 7
- Abdominal tergites without apical fringes of silvery white decumbent setae 8
- 7. Vertex with scattered punctures, its declivous portion with dense punctures; transition between dorso-median and postero-median areas of propodeum straight and marked with a distinct carina. Widely distributed in Oriental Region 6. *asiatica* (Saussure)
- Vertex, including its declivous portion, impunctate; transition between dorso-median and postero-median areas of propodeum gradual, marked with a tubercle in the middle. India, China 7. *grossiformis* (Betrem)
- 8. Fore wing with a large diffused infumated area beyond marginal cell. India. ...8. *cochinensis* (Betrem)
- Fore wing without any diffused infumated area beyond marginal cell 9
- 9. Front, vertex and dorsum of propodeum with very coarse, deep and contiguous to subcontiguous punctures, bearing long setae; mesoscutum without any impunctate area. India, Thailand 9. *montanum*, sp. nov.
- Front with a few coarse scattered punctures; vertex with coarse, close to scattered punctures; mesoscutum with a large impunctate area. Oriental Region; China, Japan, Korea 10. *prismatica* (Smith)

Male

- 1. Integument and vestiture entirely black. India 1. *reticulata* (Cameron)
- Integument and vestiture never entirely black 2
- 2. Basal abdominal tergites with very broad yellow apical bands, the bands on second and third tergites covering almost entire surface. India. 5. *dehraensis* (Betrem)
- Basal abdominal tergites with narrow yellow apical bands 3
- 3. Vestiture reddish-golden; wings yellowish hyaline, fore wing with a diffuse infumated area beyond marginal cell. India 8. *cochinensis* (Betrem)
- Vestiture usually yellow or golden, sometimes mixed with white; wings yellowish hyaline or brownish, fore wing without any diffuse infumated area beyond the marginal cell 4

4. Clypeus entirely yellow except sometimes for a tiny black spot in the middle; genae with large yellow marks; mesoscutum, scutellum usually with small, postero-lateral yellow marks; all the femora almost entirely yellow on the outer surface. India, Myanmar and Nepal 4. *shillongensis* (Betrem)
- Clypeus with a small to large black area in the middle or anteriorly, never entirely yellow; genae, mesoscutum and scutellum without yellow marks; femora never marked yellow on outer surface 5
5. Clypeus and legs black; vestiture on legs entirely white; apical fringes of first to fourth abdominal tergites white. Widely distributed in the Oriental Region 6. *asiatica* (Saussure)
- Clypeus more or less marked with yellow; vestiture on the legs never white; apical fringes of abdominal tergites not white 6
6. Second and third femora without any yellow markings.....10. *prismatica* (Smith)
- All femora marked with yellow 7
7. Erect vestiture predominantly golden; frontal fissura extending up to anterior ocellus; vertex with moderately large punctures, mostly separated by half the diameter of puncture; first abdominal tergite with coarse contiguous to subcontiguous punctures, second sternite without any tubercle 9. *montanum*, sp. nov.
- Erect vestiture dirty white to white; frontal fissura not extending up to anterior ocellus; vertex largely impunctate on its declivous portion; abdominal first tergite with scattered punctures posteriorly, second sternite with a well developed basal tubercle 7. *grossiformis* (Betrem)

1. *Megacampsomeris reticulata* (Cameron)

(Figure 35)

1892. *Elis (Dielis) reticulata* Cameron, *Mem. Proc. Manch. Lit. Phil. Soc.*, (4) 5 : 109; Male, India : Pune (type in University Museum, Oxford).
1897. *Elis (Dielis) reticulata* Cameron : Bingham, *Fauna British India, Hym.*, 1 : 100; India : Pune, Bombay.
1897. *Scolia reticulata* (Cameron) : Dalla-Torre, *Cat Hym.*, 8 : 179.
1928. *Campsomeris (Megacampsomeris) reticulata* (Cameron) : Betrem, *Treubia*, 9 (suppl.) : 157; Female, Male. India : Bangalore, Malabar, Sangli, Jabalpur.
1972. *Megacampsomeris reticulata* (Cameron) : Betrem in Betrem and Bradley, *Mon. Ned. Ent. Ver.*, 6 : 164 (*Megacampsomeris* Betrem referred as genus).
1976. *Campsomeris (Magacampsomeris) reticulata* (Cameron) : Jonathan *et al.*, *Newsl. zool. Surv. India*, 2 (3) : 112-113.; Female, India : Orissa, Keonjharhgarh.

This species is very close to *M. vanoordti* (Betrem) from Sri Lanka in having entirely black integument and vestiture and more or less similar punctation in both the sexes. *M. reticulata*, however, can be differentiated by having vertex with coarse, scattered punctures in female. In *M. vanoordti* vertex, in female, impunctate. The males are more or less similar.

This species, is widely distributed in India, and ranges from South to North. It breeds throughout the year in certain areas, attaining peak population during September-October.

Female : Length 22-30 mm. Integument and vestiture, including tomentum, entirely black; abdomen with faint blue reflections. Wings dark brown, with dark blue effulgence.

Clypeal disc broadly impunctate in the middle, at sides with mostly contiguous punctures; frontal area and frontal spatium with contiguous punctures; frontal fissura extending up to anterior ocellus, distinct on upper front only; lower front with contiguous punctures, upper front impunctate medially, at sides along upper inner eye margin with a band of coarse, deep, contiguous punctures, a group of 3-7 coarse, deep punctures laterad of anterior ocellus; anterior ocellus in a shallow pit; posterior ocelli margined by a shallow groove; vertex with coarse, close to scattered punctures, its declivous portion with close punctures.

Scapulae with coarse, deep, contiguous punctures; mesoscutum with an impunctate area posteriorly in the middle, elsewhere with coarse, dimpled, contiguous to subcontiguous punctures; disc of scutellum broadly impunctate along posterior margin and in the middle, elsewhere with medium sized, sparse to close punctures; metanotum with close punctures; upper plate of mesopleurum impunctate except for a few close punctures along the crest anteriorly, lower plate broadly impunctate along anterior margin, anterior area with close punctures, posterior area with small, close to sparse punctures; upper plate of metapleurum impunctate except for some close punctures above, lower plate broadly impunctate along its upper and posterior margin, elsewhere with small to fine, sparse punctures; dorso-median area of propodeum with medium sized punctures, mostly separated by half the diameter of a puncture, sometimes with a narrow longitudinal impunctate stripe in the middle, dorso-lateral area contiguously punctate except for a large impunctate area anteriorly along inner margin, lateral surface with small, shallow, scattered punctures, the punctures becoming closer along upper margin, postero-median area impunctate, postero-lateral areas impunctate except for small, shallow punctures along upper and outer margins.

Abdominal tergites mat, first tergite with scattered punctures, the punctures close at sides, posteriorly with rows of small sparse punctures.

Male : Length 20-24 mm. Integument and vestiture entirely black, abdomen with faint blue reflections. Wings dark brown with purplish effulgence.

Clypeus broadly impunctate in the middle, at sides and along posterior margin with coarse, subcontiguous punctures; frontal area with confluent punctures; frontal spatium distinctly defined posteriorly, its surface with small, contiguous punctures, narrowly impunctate along posterior margin; front with medium sized, scattered punctures, the punctures closer laterad of anterior ocellus; anterior ocellus in a shallow pit; ocellar triangular punctate; posterior ocelli margined by a shallow groove; declivous portion of the vertex with close punctures.

Scapulae with moderately small, subcontiguous punctures; mesoscutum with moderately large punctures, mostly separated by the diameter of a puncture, punctures in the middle widely separated; scutellum with close punctures, broadly impunctate along its posterior margin; metanotum with close punctures except for a narrow longitudinal impunctate stripe in the middle, narrowly impunctate along its posterior margin; upper plate of mesopleurum with small, close to sparse punctures except for a large impunctate area posteriorly along lower margin, lower plate broadly impunctate along its anterior margin, its anterior area with small punctures mostly separated by the diameter of a puncture, posterior area with smaller and sparser punctures; upper plate of metapleurum impunctate except for a narrow to broad band of small, shallow, close to sparse punctures along its upper margin, lower plate with fine, scattered punctures, broadly impunctate along its upper margin; dorsal surface of propodeum with moderately small, contiguous to subcontiguous punctures, lateral surface with small, scattered punctures, the latter becoming closer along upper margin.

First abdominal tergite largely with coarse, close punctures; second tergite with similar punctures mostly separated by the diameter of a puncture; rest of the tergites coarsely punctate.

Male genitalia : As in figure 35.

Distribution : India : Bihar (Hazaribagh N.P.), Delhi, Haryana (Gurgaon), Himachal Pradesh (Khajjiar), Karnataka (Bangalore), Madhya Pradesh (Jabalpur), Maharashtra (Pune, Nasik, Malabar), Orissa (Keonjhar), Rajasthan (Abu) and Tamil Nadu (Valparai, Marudamalai Hills).

2. *Megacampsomeris binghami* (Betrem)

This polytypic species is distributed in Taiwan and northern India. The female is readily distinguished by having reddish-yellow vestiture on head, thorax, first abdominal tergite anteriorly, and second sternite, and black elsewhere except for a few reddish-yellow mixed setae on abdominal tergites. The male is readily distinguished by having reddish-yellow vestiture on head and dorsum of thorax, and yellow apical bands on first to fourth tergites and second to fourth sternites.

Two subspecies, viz., *M. binghami binghami* (Betrem) from Taiwan, and *M. binghami khasiensis* (Betrem) from Khasi Hills, India have been recorded. The

population from Khasi Hills can be distinguished in having wings yellowish hyaline rather than dark brown as in the nomino-typical subspecies from Taiwan.

(a) *Megacampsomeris binghami khasiensis* (Betrem)

1928. *Campsomeris* (*Megacampsomeris*) *binghami khasiensis* Betrem, *Treubia*, 9 (suppl.) : 143. Female. India : Shillong, Khasi Hills (holotype in I.A.R.I., New Delhi; paratypes in Z.S.I., Calcutta and Leiden Museum).

1972. *Megacampsomeris binghami khasiensis* (Betrem) : Betrem in Betrem & Bradley, *Mon. Ned. Ent. Ver.*, 6 : 164 (by reason of referring *Megacampsomeris* as a genus).

This subspecies is, hitherto, known only from Meghalaya in India. It is distinguished from its counterpart from Taiwan by having wings, in female, yellowish hyaline rather than dark brown. The male is not known.

Betrem (1928) differentiated *binghami khasiensis* by having second abdominal tergite with narrow yellow lateral stripes in female, instead of entirely black as in nomino typical subspecies. It is observed that yellow marks on second tergite, in female, are usually absent.

Female : Length 23-27 mm. Black, sometimes second abdominal tergite with paired yellow postero-lateral stripes. Vestiture reddish-yellow on head, thorax, first tergite anteriorly and second sternite; and black on the rest of abdomen, except for a few scattered reddish-yellow setae. Wings yellowish hyaline, fore wing dark anteriorly.

Clypeus impunctate in the middle, at sides with contiguous punctures; frontal spatium contiguously punctate; frontal fissura extending up to anterior ocellus; lower front with contiguous punctures, upper front impunctate in the middle, at sides along the eye orbit with coarse, deep, close punctures; anterior ocellus in a shallow pit; post-ocellar furrow slightly impressed; vertex behind the furrow broadly impunctate, posteriorly and at its declivous portion with subcontiguous to contiguous punctures.

Scapulae with subcontiguous to contiguous punctures; mesoscutum with medium sized punctures, mostly separated by the diameter of a puncture, with a small impunctate area posteriorly in the middle; scutellum with contiguous to subcontiguous punctures, broadly impunctate along posterior margin; metanotum with small, contiguous punctures; upper plate of mesopleurum impunctate, lower plate broadly impunctate along anterior and posterior margins, anterior area sparsely punctate, posterior area with small, scattered punctures; upper plate of metapleurum with small, sparse punctures at its upper one-fourth, lower three-fourths impunctate, lower plate with fine, scattered punctures; dorso-median area of propodeum with small, subcontiguous punctures, dorso-lateral areas similarly punctate except for a small impunctate area anteriorly, lateral surface with small, shallow, scattered punctures, the latter becoming closer along upper margin, posterior surface impunctate.

First abdominal tergite at its anterior half impunctate, posterior half with sparse punctures, the punctures becoming closer at sides and along the posterior margin; second and third tergites broadly impunctate in the middle, anteriorly with some scattered punctures, along the posterior margin with apical and subapical rows of small punctures; second sternite without any antero-median tubercle.

Distribution : India : Meghalaya (Khasi Hills : Shillong, Lalit Kor Peak, Laitting Kole).

3. *Megacampsomeris nilgirensis*, sp. nov.

(Figure 36)

This species is known by its holotype female from Nilgiri Hills in southern India. Superficially, it resembles the females of *Megacampsomeris shillongensis* (Betrem) and *M. dehraensis* (Betrem) in having yellow apical bands on basal abdominal tergites; vestiture golden to reddish-golden, and wings yellowish hyaline. It is, however, readily distinguished by a yellow band on second tergite relatively broader and apex of fore wing with a large well defined fuscous mark.

M. shillongensis (Betrem), *M. dehraensis* (Betrem) and *M. nilgirensis*, sp. nov. are the only species of *Megacampsomeris* from India having, in female, well defined yellow apical bands on first to third (or fourth also) abdominal tergites.

Female : Length 26 mm. Black, except first to fourth abdominal tergites with apical yellow bands, the band on the second tergite broad, covering almost half of the surface, emarginate along the lateral margins, band on third tergite also broad, emarginate at sides, the bands on first and fourth tergites relatively narrow and entire. Vestiture golden with reddish tinge. Wings yellowish hyaline, apex of the fore wing with a large, well defined fuscous mark.

Clypeus impunctate in the middle, at sides with mostly contiguous punctures; frontal spatium with contiguous punctures; frontal fissura extending up to anterior ocellus; front impunctate in the middle, at sides along the eye margins with contiguous punctures, around the ocelli with a few, scattered punctures. Vertex, including its declivous portion with mostly contiguous punctures.

Scapulae with contiguous punctures; mesoscutum at its anterior half with coarse punctures mostly separated by half the diameter of a puncture, posterior half with a large impunctate area in the middle, at sides with coarse punctures mostly separated by half the diameter of a puncture; scutellum impunctate in the middle, at sides with coarse, close to scattered punctures; metanotum with small, subcontiguous punctures; upper plate of mesopleurum impunctate, lower plate with coarse, close punctures at its anterior area, and small sparse punctures at its lower half of posterior area, upper half impunctate; upper plate of metapleurum impunctate except for a few small, scattered punctures along the upper margin, lower plate with small, scattered

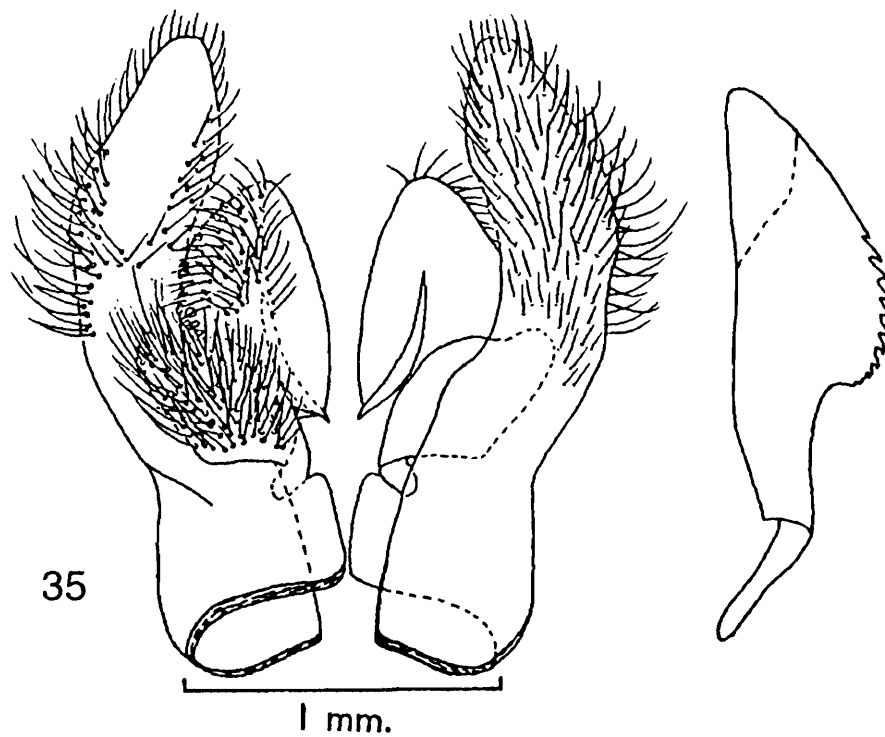


Fig. 35 : *Megacampsomeris reticulata*(Cameron) : Male genitalia, ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right.



Figs. 36 : *Megacampsomeris nilgirensis*, sp. nov. : dorsal aspect of female abdomen.

punctures, broadly impunctate along upper and posterior margins; dorso-median area of propodeum with medium-sized, shallow punctures mostly separated by half the diameter of a puncture, dorso-lateral areas broadly impunctate anteriorly and posteriorly, in the middle with a transverse stripe of medium sized, subcontiguous punctures, lateral surface with small, sparse to scattered punctures, posterior surface impunctate.

First abdominal tergite impunctate at its anterior half, posterior half with small, sparse punctures, at sides the punctures large and close; second tergite broadly impunctate in the middle, anteriorly and posteriorly with small, sparse to scattered punctures; second sternite without any tubercle anteriorly.

Holotype : Female, India : Tamil Nadu : Nilgiri Hills, Kallar, 700-800m, 9.xii.1978, Jap-Ind Co Tr. (Z.S.I., Calcutta).

Distribution : India : Tamil Nadu.

4. *Megacampsomeris shillongensis* (Betrem)

(Figures 37, 38)

1928. *Campsomeris* (*Megacampsomeris*) *shillogensis* Betrem, *Treubia*, 9 (suppl.) : 155-156; Female, Khasi Hills, Shillong (holotype in I.A.R.I., New Delhi, paratype in Leiden Museum).
1928. *Campsomeris* (*Megacampsomeris*) *lindenii* Lepelletier: Betrem, *Treubia*, 9 (suppl.) : 151-152 (Male, Pashok, Sureli, Darjeeling dist. in West Bengal and Shillong in Meghalaya; misidentified).
1972. *Megacamposeris shillongensis* (Betrem) : Betrem in Betrem and Bradley, *Mon. Ned. Ent. Ver.*, 6 : 164 (by reason of referring to *Megacampsomeris* as a genus).

Betrem (1928) described this species on the basis of two females from Shillong, Khasi Hills, India. It is recorded here, for the first time, from Myanmar and Nepal. The male, hitherto unknown, is described here from a long series of specimens from India, Myanmar and Nepal.

This species superficially resembles *M. dehraensis* (Betrem) by having, in female, yellow apical bands on first to third abdominal tergites and yellowish hyaline wings. The female of *M. shillogensis* is, however, readily separated by having black vestiture on fifth and sixth tergites rather than having vestiture on the entire abdomen reddish-yellow, and the front medially with coarse, scattered punctures rather than impunctate medially as in *M. dehraensis* (Betrem).

Betrem (1928) misidentified the males from Darjeeling dist. and Shillong as *C. lindenii* Lepelletier. The distinguishing characters of males are : clypeus entirely yellow, large yellow marks on genae and the vestiture on fifth to last abdominal segments, black.

This montane species occurs in the wet zone, in areas of heavy rainfall at an altitude of 1000 to 1500 m.

Female : Length 19-21mm. Black except tegulae reddish-yellow. The following yellow: broad apical bands on first to third abdominal tergites, each band covering about one-third of the dorsal surface of the segment; lateral paired spots posteriorly on second and third sternites. Vestiture reddish-yellow to golden except black on fifth and sixth abdominal segments. Wings yellowish hyaline.

Anterior rim of the clypeus broadly subtruncate anteriorly, disc impunctate in the middle, at sides with mostly subcontiguous punctures; frontal spatium with small, contiguous punctures except for a narrow linear impunctate stripe in the middle; frontal fissura extending up to anterior ocellus; front with coarse, contiguous punctures along eye margins, in the middle with coarse, scattered punctures; anterior ocellus in a shallow pit; vertex and its declivous portion with mostly coarse, deep, contiguous to subcontiguous punctures.

Scapulae with small, contiguous punctures; mesoscutum with coarse, deep punctures, mostly subcontiguous anteriorly and at the sides, posteriorly in the middle the punctures are widely separated; scutellum with coarse, subcontiguous punctures, narrowly impunctate along posterior margin; metanotum with small, subcontiguous punctures; upper plate of mesopleurum impunctate, lower plate impunctate except for some small, sparse punctures posteriorly on the lower part of its anterior area; upper plate of metapleurum impunctate except for a few small scattered punctures along its upper margin, lower plate impunctate; dorso-median area of propodeum with a small tubercle at its posterior end in the middle, surface with small sparse punctures, the punctures becoming closer in the middle, dorso-lateral area impunctate at its posterior half, anterior half with close punctures except for a rectangular impunctate area along anterior margin, lateral surface with small, shallow, scattered punctures, posterior surface largely impunctate.

First abdominal tergite with coarse punctures mostly separated by the diameter of a puncture, the punctures becoming closer at sides and along posterior margin; second tergite with similar but sparse punctures; second sternite without any antero-median tubercle.

Male : Length 17-24 mm. Black except antennae reddish. The following yellow: mandibles at the basal half, clypeus entirely, rarely with a black spot in the middle; scrobes; a large spot on each gena; scapulae; usually paired very small spots at posterior corners of mesoscutum; usually paired spots on scutellum at sides; fore coxae; almost entire outer surface of all femora; fore and middle tibiae on outer surface; broad apical bands on first to fourth abdominal tergites and narrow apical bands on second to fourth sternites, rarely narrow apical bands on fifth tergite and sternite also. Vestiture golden except black on fifth to last abdominal segments. Wings yellowish hyaline, fore wing somewhat darker anteriorly.

Distribution : India : Manipur (Mao), Meghalaya (Shillong, Tura, Malki Hills), Sikkim (Deorali, Phungta) and West Bengal (Darjeeling, Pedong, Lava, Sureli, Pashok, Gajoli, Lahha, Kalimpong, Algarh). *Elsewhere* : Myanmar and Nepal.

5. *Megecampsomeris dehraensis* (Betrem)
(Figures 39, 40)

1928. *Campsomeris* (*Megacampsomeris*) *dehraensis* Betrem, *Treubia*, 9 (suppl.) : 80, 156-157; Male, Dehra Dun (holotype and one paratype in F.R.I., Dehra Dun; one paratype in Leiden Museum).

1972. *Megacampsomeris dehraensis* (Betrem): Betrem in Betrem and Bradley, *Mon. Ned. Ent. Ver.* 6 : 164 (by reason of referring *Megacampsomeris* as a genus).

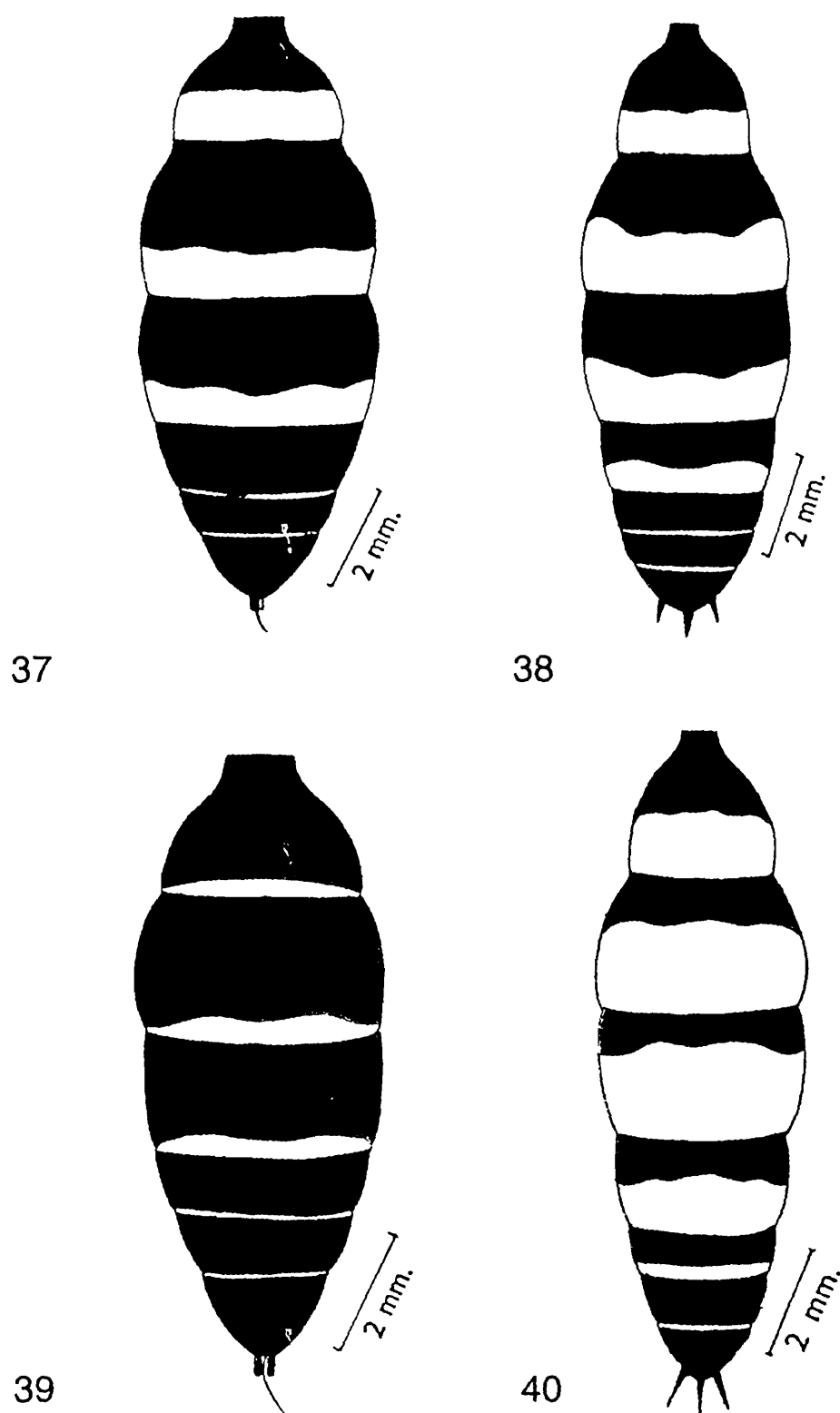
Betrem (1928) described this species on the basis of three males from Dehra Dun, Uttar Pradesh, India. A number of males and five females were also available to the authors for study at Forest Research Institute, Dehra Dun. Both the sexes resemble in having reddish-yellow erect vestiture, golden tomentum and yellowish hyaline wings.

The female of this species is readily distinguished by the reddish antenna and legs, narrow apical yellow bands on first to third abdominal tergites, entirely reddish-yellow erect vestiture, golden tomentum and yellowish hyaline wings. The male is easily distinguished from all other species of this genus, from Indian subcontinent, by having very broad yellow apical bands on abdominal tergites, that on second to fourth covering half to three-fourths of surface, and narrow apical yellow bands on second to fourth sternites, bands narrowly interrupted in the middle.

Female : Length 16-17 mm. Black except mandibles, antennae, and legs reddish, the following are yellow: tegulae, narrow apical bands on first to third tergites. Erect vestiture entirely reddish-yellow, tomentum golden. Wings yellowish hyaline.

Clypeus broadly impunctate in the middle, at sides with contiguous punctures; frontal spatium with contiguous punctures; frontal fissura extending up to anterior ocellus; front along the upper inner eye orbits with coarse, contiguous punctures, areas laterad of anterior ocellus with some coarse, deep, close punctures, in the middle impunctate; anterior ocellus in a shallow pit; post-ocellar furrow weakly impressed; vertex with coarse, close punctures, its declivous portion with small, subcontiguous punctures.

Scapulae with small, contiguous punctures; mesoscutum with coarse, mostly subcontiguous punctures, a small impunctate area posteriorly in the middle; scutellum with contiguous to subcontiguous punctures, narrowly impunctate along posterior margin; metanotum with small, contiguous punctures; upper plate of mesopleurum impunctate except for a few scattered punctures, lower plate broadly impunctate along anterior and posterior margins, elsewhere with sparse to scattered punctures; upper plate of metapleurum impunctate except for a few scattered punctures along



Figs. 37-38 : *Megacampsomeris shillongensis* (Betrem) : 37, Dorsal aspect of female abdomen; 38, Dorsal aspect of male abdomen.

Figs. 39-40 : *Megacampsomeris dehraensis* (Betrem) : 39, Dorsal aspect of female abdomen. 40, Dorsal aspect of male abdomen.

upper margin, lower plate impunctate except for some fine, sparse punctures; dorso-median area of propodeum with moderately small punctures, mostly separated by half the diameter of a puncture, dorso-lateral areas broadly impunctate anteriorly, along the posterior margin with fine, sparse punctures, in the middle with small, subcontiguous punctures, lateral surface with small, shallow, sparse to scattered punctures, posterior surface impunctate except along upper margin with sparse punctures.

First abdominal tergite with coarse, scattered punctures anteriorly, at sides and posteriorly with small, close punctures; second sternite without any antero-median tubercle.

Male : Length 16-17 mm. Black except the antennae reddish. The following yellow: clypeus except for a small area in the middle; mandibles at basal-half; scrobes; paired spots anteriorly and posteriorly on scapulae; tegulae; a small spot at the outer apex of fore femur; a long line on inner and a spot at apex of outer side of middle femur; fore and middle tibiae almost entirely on outer side; tarsal segments of fore leg on outer surface; apical bands on first to fifth abdominal tergites, bands on second and third tergites very broad, covering about three-fourths of surface, band on fifth very narrow; narrow apical bands on second to fourth sternites, narrowly or broadly interrupted in the middle and broader at sides, usually paired lateral spots on fifth sternite. Vestiture reddish-yellow, tomentum golden. Wings yellowish hyaline, slightly dark out side the cells.

Distribution : India: Uttaranchal (Dehra Dun).

6. *Megacampsomeris asiatica* (Saussure)

This polytypic species is widely distributed in the Oriental Region, where it ranges from Philippines westwards through Sulawesi and East Indies to India, Bhutan and Nepal. It is recorded now, for the first time, from Nepal and southern India.

Megacampsomeris asiatica (Saussure) and *Megacampsomeris grossiformis* (Betrem) are close to each other by having, in female, basal three to four abdominal segments with apical fringes of silvery white decumbent setae. However, the female of *M. asiatica* can be easily differentiated from that of *M. grossiformis* by having the declivous portion of the vertex with dense punctures rather than entirely impunctate. The transition between dorso-median and postero-median areas of the propodeum straight and marked with a carina. The male can be differentiated by having the integument of the head and thorax entirely black, in addition to differences given in the key to the males.

Two subspecies have been recorded, viz., *M. asiatica asiatica* (Saussure) ranging from Philippines through Sulawesi to East Indies, and *M. asiatica himalayana* (Betrem) from northern India, Bhutan and Nepal. In addition, one new subspecies,

M. asiatica deccanensis, is described here from southern India. These subspecies are differentiated mainly by the difference in the colour of wings in both the sexes. The wings are dark brown in nomono typical subspecies, but predominatly yellowish hyaline in *M. asiatica himalayana*. *M. asiatica deccanensis*, sp. nov. can be differentiated from its counter part from northern India, by having relatively darker wings in both sexes.

(a) ***Megacampsomeris asiatica himalayana* (Betrem)**

1928. *Campsomeris (Megacampsomeris) asiatica himalayana* Betrem, *Treubia*, **9** (suppl.). 141. Female, Bhutan; Almora, Kumaon Hills, India (holotype in Leideh Museum) (Male misidentified).
1972. *Megacampsomeris asiatica himalayana* (Betrem) : Betrem in Betrem & Bradley, *Mon. Ned. Ent. Ver.*, **6** : 164 (by reason of referring *Megacampsomeris* as genus).

Betrem (1928) described this subspecies on the basis of a female holotype from Bhutan, two females from Almora, Kumaon Hills, India, and four males from Kumaon Hills, India.

This subspecies differs from its counterparts, *M. asiatica asiatica* (saussure) and *M. asiatica deccanensis* subsp. nov. by having wings predominantly yellowish hyaline rather than dark brown in female.

Female : Length 20-30 mm. Integument black, rarely paired, small lateral yellow marks on second and third tergites. Vestiture yellowish-white in front of the head, reddish-golden setae on occiput and dorsum of the thorax, white on the thorax laterally and first abdominal tergite anteriorly, apical fringes on first to fourth tergites and second to fourth sternites with white decumbent setae, rest of the abdominal vestiture black. Wings yellowish hyaline to slightly brownish.

Clypeus broadly impunctate in the middle, at sides with moderate sized, contiguous punctures; frontal area and frontal spatium with moderately small contiguous punctures; frontal fissura extending up to anterior ocellus; lower front with small to moderately large, mostly contiguous punctures, upper front with moderately large, subcontiguous to scattered punctures; anterior ocellus in a shallow pit; ocellar triangle with a few small, scattered punctures; vertex mostly with small scattered punctures, its delivous portion with moderately large, dense punctures in the middle and sparse at sides.

Scapulae with small, contiguous punctures; mesoscutum with large, contiguous to subcontiguous punctures, in the middle the punctures become sparser, with a V-shaped impunctate area posteriorly; scutellum with moderately small punctures, punctures close at sides and sparse in the middle, broadly impunctate along posterior margin; metanotum with small, contiguous punctures, except for a very narrow, longitudinal impunctate stripe in the middle; upper plate of mesopleurum with

contiguous punctures; impunctate anteriorly and posteriorly, lower plate with moderate sized, mostly close punctures, broadly impunctate along anterior margin and posteriorly above; upper plate of metapleurum impunctate, except for a few close punctures along upper margin, lower plate with small, sparse punctures, broadly impunctate above; dorso-median area of propodeum with moderate sized contiguous punctures, its transition with postero-median area straight, marked with a carina in the middle, dorso-lateral area in the middle with similar but shallow punctures, anteriorly and posteriorly the punctures well separated, lateral surface with moderate sized, close to dense punctures at its upper half, lower half impunctate, postero-median area impunctate, except for a few close punctures along upper margin, postero-lateral areas with very shallow, close to sparse punctures.

First abdominal tergite impunctate anteriorly in the middle, posteriorly with small to medium sized, sparse to close punctures, laterally the punctures becoming dense; second sternite without basal tubercle.

Remarks : Betrem recorded four males from different localities of Kumaon Hills. These males have yellow maculation on the clypeus and legs, and the transition between dorso-median and postero-median propodeal areas is gradual and marked with a tiny tubercle in the middle. The study of these males and additional material of both sexes of *M. grossiformis* from Kumaon Hills reveals that the males recorded by Betrem (1928) as of *M. asiatica himalayana* belong to *M. grossiformis* (Betrem). The male of *M. asiatica himalayana* (Betrem) is, therefore, not known.

Distribution : India : Himachal Pradesh (Kangra), Meghalaya (Shillong), Sikkim and Uttar Pradesh (Kausanie). *Elsewhere* : Nepal.

(b) *Megacampsomeris asiatica deccanensis*, sp. nov.

This subspecies can be differentiated from its counterpart from northern India by having darker wings in both the sexes. Both the sexes have similar propodeal structure, particularly the transition between dorso-median and postero-median areas straight and with a well developed tubercle in the middle.

Female : Length 28-32 mm. Integument black. Vestiture dirty white on the front of the head; reddish-golden on occiput and dorsum of thorax; white on thorax laterally, legs, first abdominal tergite anteriorly and the apical fringes of first to fourth tergites and second to fourth sternites, the apical fringes on the fourth tergite interrupted in the middle. Wings dark brown with bluish reflections.

Other structure and punctation as in *M. asiatica himalayana*.

Male : Length 18-25 mm. Integument black except first to fourth abdominal tergites with narrow apical yellow bands and second to fourth sternites with paired small, postero-lateral yellow spots, the band on the fourth tergite narrowly interrupted

in the middle. Vestiture yellowish-white on head and sides of thorax; reddish-yellow on dorsum of thorax; entirely white on legs, first abdominal tergite anteriorly; apical fringes of first to fourth tergites and second to fourth sternites with white setae; rest of the abdominal vestiture black. Wings light brown with coppery reflections.

Holotype Female, India: Karnataka : 3 km. east of Ponnampet, 18.iv.1979. P.P. Girish (Z.S.I, Calcutta). *Allotype* Male, data same as Holotype. *Paratypes* 3 Females, 6 Males. India : Karnataka : 5 Males, same data as holotype; 1 Female, Mercara, Thalathmani, 1000m, 2.ii.1977, P.T. Cherian. Tamil Nadu : Nilgiri Hills, Devala, 1000m, 2 Females, x.1960, P.S. Nathan. Kerala : Calicut dist., Chembra Peak, 1000m, 1 Male, iv.1970, S.P. Singh (Z.S.I., Calcutta).

Distribution : India : Karnataka, Kerala and Tamil Nadu.

7. *Megacampsomeris grossiformis* (Betrem)

1928. *Campsomeris* (*Megacampsomeris*) *grossiformis* Betrem, *Treubia*, **9** (suppl.): 68, 139. Female; Szetschwan Province, China; Almora, Kumaon Hills, India (holotype and a paratype in Ent. Lab., Wageningen; a paratype from India in F.R.I., Dehra Dun).
1928. *Campsomeris* (*Megacampsomeris*) *asiatica himalayana* Betrem, *Treubia*, **9** (suppl.) : 141-142. Male not Female (males from India misidentified).
1941. *Campsomeris* (*Megacampsomeris*) *grossiformis* Betrem : Betrem, *Notes Ent. Chinoise*, **8** (4): 53, 67 (redescription).
1972. *Megacampsomeris grossiformis* (Betrem): Betrem in Betrem & Bradley, *Mon. Ned. Ent. Ver.*, **6** : 164 (by reason of referring *Megacampsomeris* as a genus).

Betrem (1928) described this species on the basis of two females from Kwanhsien, Szechwan, China and a female from Almora in Kumaon Hills, India.

It is recorded here, for the first time from North-eastern India, and previously unknown male is also described.

The females of *M. grossiformis* (Betrem) and *M. asiatica* (Saussure) can be easily differentiated from that of other species of *Megacampsomeris* from India, by having apical fringes of silvery white decumbent setae on first to third (or fourth also) abdominal tergites and second to third (or fourth also) sternites.

Betrem (1928 & 1941) observed that the female of *M. grossiformis* can be distinguished from *M. asiatica himalayana* (Betrem) by having black vestiture on the head anteriorly, and relatively denser punctation on the scutellum. However, the studies, based on a series of females from Shillong in Meghalaya and western Himalaya, Uttar Pradesh, India, reveal that the vestiture on the anterior of the head is not black but usually yellowish-white; vertex and its declivous portion entirely impunctate. The declivous portion of the vertex in *M. asiatica* (saussure) is densely punctate. The female of *M. grossiformis* (Betrem) is also distinguished by having a

very gradual transition between dorso-median and postero-median areas of the propodeum, which is marked by a small tubercle in the middle. However, the transition between dorso-median and postero-median areas of the propodeum is practically straight and marked with a large tubercle in the middle in *M. asiatica* (Saussure).

The males of *M. asiatica* (Saussure) always have clypeus and legs entirely black. Whereas, the males of *M. grossiformis* (Betrem) are maculated with yellow on the clypeus posteriorly, and legs, and can also be further differentiated from other species of *Megacampsomeris* from India by having a well developed basal tubercle on second sternite.

Female : Length 24-30 mm. Integument black except mandibles and antennal flagellum beneath reddish-brown, and tegulae reddish-yellow. Erect vestiture on the head, thorax and first abdominal tergite anteriorly golden, first to third or fourth abdominal tergites and second to third or fourth sternite with apical fringes of silvery white decumbent setae, apical two to three abdominal segments with black vestiture, tomentum on the head and thorax golden. Wings yellowish hyaline, fore wing slightly brownish anteriorly.

Clypeal disc largely impunctate, at sides with moderate sized, contiguous punctures; frontal area with contiguous to confluent punctures; frontal spatium with moderately small, contiguous punctures, except narrowly in the middle with large, widely separated punctures; front largely impunctate, except narrowly along frontal spatium with contiguous punctation and a few coarse, close punctures along eye orbit; frontal fissura extending half way to anterior ocellus, ending in a pit; anterior ocellus in a shallow pit; ocellar triangle impunctate; vertex impunctate, except for a few small punctures near eye orbits, declivous portion of the vertex entirely impunctate.

Scapulae with small, contiguous punctures; mesoscutum with moderately large, mostly subcontiguous punctures except in the middle with sparse punctures, and with a small impunctate area posteriorly in the middle; scutellum with moderately small, subcontiguous punctures, except broadly impunctate along posterior margin; metanotum with small, contiguous punctures, except for a small impunctate area posteriorly in the middle; mesopleurum with moderately large, subcontiguous to more separated punctures anteriorly, posteriorly with small, sparse to scattered punctures; upper plate of metapleurum with small, close to sparse punctures on its upper half, lower plate with fine, scattered punctures; dorso-median area of propodeum with moderate sized, subcontiguous to slightly sparse punctures, its transition to postero-median area very gradual and with a small tubercle in the middle, dorso-lateral areas with moderately small, subcontiguous to contiguous punctures, vertical surface with small, scattered punctures, except along upper margin closely punctate, posterior surface with small, sparse punctures at upper half, lower half with scattered punctures.

First abdominal tergite impunctate, except for a few fine, sparse to scattered punctures posteriorly, and coarse, close punctures laterally; second sternite without basal tubercle.

Male : Length 18-21 mm. Integument black, except mandibles and antennal flagellum reddish-brown and tegulae reddish-yellow, the following yellow: clypeus at its posterior half, mark usually narrowly interrupted in the middle; scrobes sometimes; elongated marks on all the femora and fore and middle tibiae; narrow apical bands on first to fifth abdominal tergites and second to fifth sternites. Erect vestiture predominantly dirty white on the head and thorax and white on abdomen. Wings yellowish hyaline, fore wing slightly brownish anteriorly.

Clypeus largely impunctate, at sides and posteriorly with moderately large, close punctures; frontal area with small mostly subcontiguous punctures; frontal spatium distinctly defined posteriorly through a narrow impunctate stripe, surface with small, mostly contiguous punctures; frontal fissura not extending up to anterior ocellus, ending in a pit; front laterad of anterior ocellus with small, close punctures, at sides impunctate, and with an impunctate area in front of anterior ocellus; anterior ocellus larger than the posterior ocelli, placed on a flat impunctate surface; ocellar triangle with a few coarse, close punctures; vertex impunctate, its declivous portion with fine, scattered punctures.

The thoracic punctation similar to that of female; transition between dorsal and posterior surfaces of propodeum very gradual, marked with a very small tubercle in the middle.

First abdominal tergite medially with coarse, mostly subcontiguous punctures at its anterior two-thirds, posterior third with slightly small, scattered punctures, laterally with dense punctures; second sternite with a well developed basal tubercle.

Distribution : India: Meghalaya (Cherrapunji, Shillong) and Uttaranchal (Patharia nr. Almora, Ranikhet, Binsar, Jaruca, Dalmoti). *Elsewhere* : China.

8. *Megacampsomeris cochinensis* (Betrem)

1928. *Campsomeris* (*Megacampsomeris*) *cochinensis* Betrem, *Treubia*, 9 (suppl.): 80, 151. Male. Parambikulam, Kerala (holotype in Z.S.I., Calcutta).

1972. *Megacampsomeris cochinensis* (Betrem) : Betrem in Betrem & Bradley. *Mon. Ned. Ent. Ver.*, 6 : 164 (by reason of referring *Megacampsomeris* as a genus).

Both the sexes of this species are distinguished from other Indian species of the genus by having an abundance of golden-reddish vestiture on the entire body, yellowish hyaline wings, and fore wing with a subapical dark mark. Superficially, both sexes resemble *M. ceylonica ceylonica* (Kirby), in having similar vestiture and wings. The female of *M. cochinensis* differs in having vertex behind ocelli with coarse, scattered

punctures, and legs black. Whereas, the vertex behind ocelli in the female of *M. ceylonica ceylonica* from Sri Lanka, is broadly impunctate, and the legs, except coxae red. The male also differs in having the legs, except coxae black rather than red.

This species is distributed in southern India and is also not uncommon in western ghats.

Female : Length 20-24 mm. Black except apical portion of the clypeus reddish and tegulae reddish-yellow. Vestiture golden-reddish, tomentum on back of head, and on sides of thorax dense, golden. Wings yellowish hyaline, fore wing with a large diffused infumate area beyond marginal cell, effulgence golden.

Clypeus broadly impunctate in the middle, at sides with close punctures; frontal spatium with contiguous punctures; frontal fissura extending up to anterior ocellus; front with contiguous punctures below, medially impunctate, at sides along the eye margin with coarse dense punctures, and a few close punctures laterad of anterior ocellus; ocular sinuses impunctate; anterior ocellus in a shallow pit; post-ocellar furrow distinctly marked, vertex behind the furrow with coarse, close to scattered punctures, along the eye margin and declivous portion with coarse, contiguous to subcontiguous punctures.

Scapulae contiguously punctate; mesoscutum anteriorly, at sides and along the posterior margin subcontiguously punctate, and with a large impunctate area in the middle. Scutellum with subcontiguous punctures at sides, scattered punctures in the middle, broadly impunctate along posterior margin; metanotum with small, contiguous punctures, except for a narrow impunctate longitudinal stripe in the middle; upper plate of mesopleurum impunctate, except for a few scattered punctures on its anterior area along the crest, lower plate broadly impunctate along its anterior and posterior margins, rest of the surface anteriorly with dense punctures and posteriorly with sparse punctures; upper plate of metapleurum impunctate, except for a stripe of close punctures along upper margin, lower plate with fine, scattered punctures; dorsum of propodeum with small, contiguous to subcontiguous punctures, except for an impunctate area anteriorly on lateral areas, lateral surface with small, scattered punctures, the punctures along upper margin close, posterior surface impunctate.

First abdominal tergite largely with dense punctures except for a sparsely punctate area anteriorly in the middle; second tergite densely punctate along its posterior margin, elsewhere with scattered punctures.

Male : Length 15-21 mm. Black, except antennal flagellum on the under side reddish and the tegulae reddish-yellow. The following yellow or orange: mandibles at basal half; clypeus except for a large area in the middle; scrobes, a small square mark on scapula anteriorly; callosities; first coxae below; an elongated streak on second femur on inner side and a small spot at the apex on outer side; first and second tibiae on outer side; narrow apical bands on first to fourth abdominal tergites

and postero-lateral spots on second to fourth sternites. Vestiture golden-reddish, tomentum on head and lateral sides of thorax golden. Wings yellowish hyaline, fore wing with a diffused infumated area beyond marginal cell.

Remarks : Betrem (1928) described this species on the basis of a holotype male. This male, in the collection of Zoological Survey of India, Calcutta, was collected by F.H. Gravely from Parambikulam in the Timber Forests of former Cochin State, now in Kerala, southern India. Betrem (1928), in his key, erroneously mentioned the locality as 'Cochin China'

Distribution : India : Karnataka (Gerssopa nr. Jog Falls, Nagody), Kerala (Ponmudi in Trivandrum dist., Thekkady, Parambikulam) and Tamil Nadu (Valparim, Madurai, Coimbatore, Cinchona in Annamalai Hills, Devala in Nilgiri Hills, Shevaroy, Yercaud).

9. *Megacampsomeris montanum*, sp. nov.

This uncommon montanic species is described on the basis of both the sexes from India, and Thailand. The female can be easily distinguished from all other species of the genus *Megacampsomeris* by having entirely black integument, almost entirely golden to reddish-golden vestiture, except on last two abdominal segments black, and with very coarse, deep, mostly contiguous to subcontiguous punctures on the front, vertex and dorsum of propodeum. The males are also with relatively denser punctation on head and thorax.

Female : Length 24 mm. Integument entirely black. Erect vestiture on the head and thorax long, dense and reddish-golden; golden on the abdomen, except on two apical segments black. Wings yellowish hyaline, fore wing slightly fuscous in its apical third.

Clypeus impunctate in the middle, at sides and along the posterior margin with mostly subcontiguous punctures; frontal area and frontal spatium contiguously punctate; frontal fissura extending up to anterior ocellus; front with coarse, deep, contiguous to subcontiguous punctures; anterior ocellus in a shallow pit; ocellar triangle with coarse, close punctures; vertex and its declivous portion with coarse deep contiguous punctures.

Scapulae with moderate sized, deep, contiguous punctures; mesoscutum largely with coarse, deep, contiguous to subcontiguous punctures, except the punctures somewhat more sparse posteriorly in the middle; scutellum with mostly contiguous punctures, narrowly impunctate along posterior margin; metanotum with small, contiguous punctures; upper plate of mesopleurum largely impunctate, except for a few coarse, dense punctures above in the middle, lower plate with moderate sized, close punctures anteriorly, posteriorly with small, scattered punctures, broadly impunctate along anterior and posterior margins; upper plate of metapleurum impunctate, except for some small, scattered punctures along upper margin, lower plate with small, scattered punctures; dorso-median area of propodeum with moderately

large to small, mostly contiguous punctures, its transition to postero-median area straight and marked by a carina, dorso-lateral areas with small, subcontiguous punctures, except for a small impunctate area anteriorly, vertical surface with small, sparse to scattered punctures, except the punctures closer along upper margin, postero-median area largely impunctate except above with some close punctures, postero-lateral areas with small, close punctures.

First abdominal tergite with moderate to small punctures, mostly separated by half of the diameter of a puncture, punctures at sides dense; second sternite without basal tubercle.

Male : Length 16 mm. Black, the following yellow: mandibles at basal half; clypeus, except for a large area anteriorly in the middle; scrobes; a large spot on scapula anteriorly; a spot on tegula; long streaks on all the femora on the under side; narrow apical bands on first to fourth tergites; postero-lateral spots on second to fourth sternites. Erect vestiture and tomentum predominantly golden, except black on fifth to last abdominal segments. Wings yellowish hyaline, fore wing anteriorly more yellowish.

Frontal spatium distinctly defined posteriorly, surface with small, contiguous punctures; frontal fissura extending up to anterior ocellus; anterior ocellus in a shallow pit; vertex with moderately large punctures, mostly separated by half the diameter of a puncture; dorsum of the thorax with close punctures, more or less, similar to female.

First abdominal tergite with coarse subcontiguous to contiguous punctures; second sternite without basal tubercle.

The male is matched with female on the basis of collection of both female and a male from the same locality and at the same time in Thailand, and also by having vestiture and pattern of thoracic punctation similar to that of female.

Holotype Female, India : Manipur : Kanchanpur, 720m, 8.x.1976, V. K. Gupta (Z.S.I., Calcutta). *Allotype* Male, India : Manipur : Erioshemba, 900 m, 11.x.1976, M. Verghese (Z.S.I., Calcutta). *Paratypes* 5 Females, 1 Male. Thailand : Chiang Mai Province, Dio Inthanon Natn. Park, Huai Sai Luang, 950-1050 m, 1 Female, 13.x.1981; Siripum, 1100-1200 m, 1 Female, 1 Male, 8.x.1981; On Road to Summit, 750-1800 m, 2 Female, 28.x.1979; Fang Horticult. Exp. Station, 7 km N-W, 1 Female, 2.xi.1979, Zool. Mus. Copenhagen Exp. (Copenhagen Museum).

Distribution : India : Manipur. *Elsewhere* : Thailand.

10. *Megacampsomeris prismatica* (Smith)

1855. *Scolia prismatica* Smith, *Cat. Hym. British Mus.*, **3** : 102. Female, Shainghai, China (holotype in British Museum).

1864. *Elis (Dielis) prismatica* (Smith) : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 199 Female, China.
1892. *Elis (Dielis) lindenii* (Lepeletier) : Magretti, *Ann. Mus. civico Stor. Nat. Genova*, **12** : 247. Female not Male, Myanmar.
1897. *Scolia prismatica* Smith : Dalla-Torre, 1897. *Cat. Hym.*, **8** : 174.
1897. *Elis (Dielis) prismatica* (Smith) : Bingham, *Fauna British India.*, *Hym.*, **1** : 98. Female, Male, China, Myanmar, Tenasserim, Sikkim.
1907. *Elis prismatica* (Smith) : Paiva, *Rec. Indian. Mus.*, **1** : 14. Female, Darjeeling, India.
1908. *Elis prismatica* (Smith) : Bingham, *Rec. Indian Mus.*, **2** : 352. India : Shimla; Phagu; Matiana, 2300 m; Mussoorie, 2000 m; and Darjeeling, 2000 m.
1911. *Campsomeris prismatica* (Smith) : Turner, *Ann. Mag. nat. Hist.*, **6** (8) : 623.
1928. *Campsomeris (Megacampsomeris) prismatica* (Smith) : Betrem, *Treubia*, **9** (suppl.) : 152-153. Female, Male; Sulawesi, Kalimantan, Sarawak, Java, Sumatra, Malakka, Taiwan, China, Japan, India: Sikkim, Darjeeling dist., Shillong, Kumaon Hills, Shimla Hills.
1928. *Campsomeris (Meacampsomeris) prismatica* var. *quinquefasciata* Betrem, *Treubia*, **9** (suppl.): 153. Female, Mussoorie, India (holotype in Z.S.I., Calcutta). **New synonymy.**
1928. *Campsomeris (Megacampsomeris) prismatica* var. *fulvoanalis* Betrem, *Treubia*, **9** (suppl.) : 153. Female. Taiwan (type in Berlin Museum). **New synonymy.**
1932. *Campsomeris prismatica* (Smith) : Yono, *Icon. Ins. Japan* : 318. Female.
1933. *Campsomeris prismatica* (Smith) : Uchida, *J. Fac. Agric. Hokkaido Imp. Univ.*, **32** : 259. Female, Male, Taiwan.
1934. *Campsomeris prismatica* var. *shibatai* Uchida. *J. Fac. Agric. Hokkaido Imp. Univ.*, **32** : 259. Female, Honshu, Taiwan. **New synonymy.**
1941. *Campsomeris (Megacampsomeris) uchidai* Betrem, *Notes Ent. Chinoise*, **8** (4) : 81-82 (Male specimens from different localities of India).
1941. *Campsomeris (Megacampsomeris) prismatica* (Smith) : Betrem, *Notes Ent. Chinoise*, **8** (4) : 78-79 (Female, Male, China).
1967. *Campsomeris (Megacampsomeris) prismatica* (Smith) : Bradley & Betrem, *Bull British Mus. (Nat. Hist.) Ent.*, **20** (7) : 310 (notes on holotype of *Scolia prismatica* Smith).
1970. *Campsomeris (Megacampsomeris) prismatica* (Smith) : Peterson, *Ent. Meded.*, **38** : 46. Female, Male, Philippines.
1972. *Campsomeris (Megacampsomeris) prismatica* (Smith) : Tsuneki. *Etizenia*, **62** : 5. Female, Male, Japan : Honsu; Korea; Taiwan.
1972. *Megacampsomeris prismatica* (Smith) : Betrem in Betrem & Bradley, *Mon. Ned. Ent. Ver.*, **6** : 164 (by reason of elevating *Megacampsomeris* to generic rank).
1976. *Campsomeris (Megacampsomeris) prismatica* (Smith) : Jonathan et al., *Newsl. zool. Surv. India*, **2**(3) : 112. Female, Male, India (in part) (material from Shimla and Manipur only).

This species is widely distributed in the Oriental Region and also occurs in China, Japan and Korea. It is also recorded here for the first time from Nepal.

In the Oriental Region, this species ranges from northern India, Nepal and Myanmar through Malaya, Java, Sumatra and Kalimantan to Sulawesi, Philippines and Taiwan.

This is one of the common scoliids found in Himalayan ranges of India, where it ranges from Arunachal Pradesh in the east to Kashmir in the west. It occurs from foot hills to an elevation of 2743 m.

Betrem (1941) noted that the males identified from India (Betrem, 1928) as *Campsomeris (M.) prismatica* (Smith) belonged to *C. (M.) uchidai* Betrem. However, the authors could not confirm the occurrence of *M. (M.) uchidai* in India.

Female : Length 10-22 mm. Black, rarely with narrow yellow apical bands on second and third abdominal tergites, the band on third tergite widely interrupted in the middle. Vestiture yellowish-golden, rarely reddish-brown, except on fifth or sixth and following abdominal segments, black. Wings yellowish hyaline, fore wing with a light brown mark at the apex.

Clypeus impunctate in the middle, at sides with coarse dense punctures; frontal spatium contiguously punctate; punctation extending above along the eye orbits : frontal furrow indistinct; anterior ocellus in a shallow pit; front and ocellar area with a few coarse scattered punctures, its declivous portion closely punctate.

Scapulae subcontiguously punctate; mesoscutum with moderate sized close to sparse punctures, a large impunctate area posteriorly in the middle, scutellum with similar but mostly closer punctures, impunctate along posterior margin; metanotum subcontiguously punctate; mesopleurum impunctate long anterior and posterior margins, anterior area with moderate sized, close to sparse punctures, posterior area with small, scattered punctures; upper plate of metapleurum with small scattered punctures along upper margin, elsewhere impunctate, lower plate with small, very scattered punctures; dorso-median area of propodeum with moderate sized punctures, mostly separated by half the diameter of a puncture, dorso-lateral area with similar punctures, except punctures sparser posteriorly, lateral surface with small, shallow, sparse to scattered punctures.

First abdominal tergite, anteriorly with coarse, scattered punctures, posteriorly and at the sides with close punctures; second sternite with a weak to well developed antero-median tubercle.

Male : Length 16-20 mm. Black, the following yellow : mandibles at basal half, clypeus usually at the sides, sometimes largely, except for a large to small black area antero-medially, scrobes, a long streak on first femur below, second tibia almost wholly above, usually a basal small streak on second tibia, narrow apical bands on

first to fourth tergites, sometimes a similar band on fifth tergite also, narrow apical bands on second to fourth sternites, sometimes paired postero-lateral spots on fifth also, the bands on third and fourth widely interrupted in the middle. Vestiture white, except on fifth or sixth and following abdominal segments, black. Wings hyaline, fore wing slightly infuscated.

Frontal spatium densely punctate, weakly marked posteriorly; frontal furrow extending up to anterior ocellus, the latter in a shallow pit, post-ocellar furrow indistinct.

Pronotum closely punctate; mesoscutum and mesopleurum sparsely punctate; scutellum anteriorly with close punctures, posteriorly impunctate; dorsum of propodeum with punctures separated by half to a diameter of a puncture. Second abdominal sternite with a weak to well developed tubercle.

Distribution : India : Arunachal Pradesh (Bomdilla, Choba Road, Dirang, Rupa in Bomdilla dist., Ziro in Subansiri dist), Himachal Pradesh (Shimla, Kufri, Tuttikandi, Chail, Phagu, Kasauli, Dalhousi, Chamba, Kangra), Jammu and Kashmir (Batote), Manipur (Ukhrul-Hundung), Meghalaya (Shillong), Orissa (Keonjhar), Sikkim (Gangtok), Uttaranchal (Ranikhet, Kausani, Dalmoti, Dwali, Dunagiri, Bapote, Nainital, Kathgodam, Gargia, Mussoorie, Dehra Dun, Chakrata) and West Bengal (Darjeeling, Pashok, Ghoom, Kurseong, Lava, Mirik, Kalimpong). *Elsewhere* : China, Indonesia, Japan, Korea, Malaysia, Myanmar, Nepal, Philippines, Taiwan.

II. Tribe **Scoliini** Latreille

1910. **Scoliinae** Latreille : Schrottky, *Deutly. Ent. Ztschr.* : 201 (Part).

1972. **Scoliinae** Latreille : Betrem & Bradley, *Mon. Ned. Ent. Ver.*, 6 : 24-25.

1981. **Scoliini** Latreille : Day *et al.*, *J. nat. Hist.*, 15 : 672.

The sexual dimorphism in this tribe is not as developed as in the tribe Campsomerini; the abdominal tergites usually without yellow apical bands; sides of thorax, in male, never with silvery pile. Upper plate of mesopleurum with a distinct dorsal surface, thorax widest at the level of mesopleurum.

Fore wing usually with a single recurrent vein, second recurrent vein absent, or when present, the second recurrent vein joining with first recurrent vein.

First abdominal tergite usually with a small to large antero-median tubercle; second and third tergites never with subapical row of setae bearing punctures.

Male genitalia : Volsellae consisting of one piece only.

Betrem and Bradley (1972) treated this tribe as a subfamily. Day *et al.*, (1981) noted that with the establishment of subfamily Proscoliinae, the traditional subfamilies Campsomerinae and Scoliinae were reduced to tribes under the subfamily Scoliinae.

This tribe is distributed throughout the World and is represented by about 240 species under 11 genera. 54 species belonging to six genera are represented in India. Of these, four species and one subspecies are described here as new to science. The genera from Indian subregion can be distinguished by the following key :

Key to the genera of the Tribe Scoliini

1. Fore wing with two recurrent veins (the second recurrent coalescent with first before reaching cubital vein), and three discoidal cells 8. Genus *Liacos* Guerin
- Fore wing with only one recurrent vein (the second recurrent absent) and two discoidal cells 2
2. Front with a transverse ridge (or carina) present between frontal spatium and anterior ocellus, carina very strong in the male but rather weak in the female; male genitalia with basal portion of volsella very long, at least as long as apical portion, and with long, dense hair. 9. Genus *Carinoscolia* Betrem
- Front without such a transverse carina between frontal spatium and anterior ocellus 3
3. Mesopleurum with extremely deep, large and contiguous punctures, many interspaces between the punctures lamelliform; apical margin of clypeus, in female, deeply and narrowly emarginate adjacent to median lobe; male genitalia with parameres conspicuously narrowed at the base, aedeagus truncated at the apex 10. Genus *Microscolia* Betrem
- Mesopleurum without such deep, large and contiguous punctures, apical margin of clypeus, in female, not so deeply and narrowly emarginate adjacent to the median lobe; male genitalia with aedeagus not truncated at the apex 4
4. Front with an arched ridge, running from one ocular sinus to another and passing behind anterior ocellus, ridge prominent in male, but rather weak in female; frontal laminae, in female, not raised anteriorly; first abdominal tergite with a transverse tubercle anteriorly in the middle, tubercle rarely absent; male genitalia with basal portions of volsella having small, sparse hair, and aedeagus with four large teeth 11. Genus *Austroscolia* Betrem
- Front without such an arched ridge; first abdominal tergite with pointed or globular tubercle anteriorly in the middle; male genitalia with aedeagus having more than four teeth 5
5. Large sized species, about 19-50 mm in length; distance from eyes to hind margin of head, in female, equal to about twice the diameter of the upper lobe of an eye; fore wing with three submarginal cells, except two in *M. fulvifrons* Saussure; first abdominal tergite with a very strong tubercle anteriorly in the middle, which is usually pointed in male. 12. Genus *Megascolia* Betrem

- Small to moderate sized species about 5-25 mm in length; distance from eyes to hind margin of head, in female, slightly more than the diameter of the upper lobe of an eye; fore wing always with two submarginal cells; first abdominal tergite with a small to moderate sized tubercle anteriorly in the middle, this tubercle often absent 13. Genus *Scolia* Fabricius

8. Genus *Liacos* Guerin

1838. *Scolia* subgenus *Liacos* Guerin, *Voy. d. Coq. Zool.*, **2** : 246. Type-species : *Scolia (Liacos) dimidiata* Guerin, 1838.
1864. *Liacos* subgenus *Triliacos* Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 33.
1897. *Liacos* Guerin : Bingham, *Fauna British India, Hym.*, **1** :101.
1903. *Liacos* Guerin : Ashmead, *Can. Ent.*, **35** : 7.
1910. *Liacos* Guerin : Schrottky, *Deut. ent. Ztschr.*, : 196.
1927. *Scolia* subgenus *Liacos* Guerin : Betrem, *Tijdschr. Ent.*, **70** (verslag) : xcvi.
1927. *Liacos* Guerin : Micha, *Mitt. zool. Mus. Berlin*, **13** : 55-72.
1928. *Scolia* subgenus *Liacos* Guerin : Betrem, *Treubia*, **9** (suppl) : 163-176.
1959. *Scolia* subgenus *Liacos* Guerin : Bradley, *Ann. Trans. Mus.*, **23** (4) : 342 (African species).
1964. *Liacos* Guerin : Bradley & Betrem, *Spolia zool. Mus. Hun.*, **21** : 8, 9,18.
1966. *Liacos* Guerin : Bradley & Betrem, *Beitr. Ent.*, **16** : 73-74 (*Liacos* reinstated as genus).
1967. *Liacos* Guerin : Bradley & Betrem. *Bull British Mus. (Nat. Hist) Ent.*, **20** (7) : 293.

Type-species : *Scolia (Liacos) dimidiata* Guerin, 1838 [= *Liacos analis analis* (Fabricius, 1804)] (Original designation).

This genus contains moderately small to large sized species, about 15-30 mm in length. Integument black, usually replaced by yellow or red on apical or most of the abdominal segments. Vestiture black, yellow or red on coloured parts of the abdomen. Wings medium to dark brown, with violaceous, bluish or coppery reflections.

Head narrower than the thorax; mandibles with two teeth along inner margin in female, three in male; apical margin of median lobe of clypeus broadly rounded; frontal area, in female, twice as wide as high; frontal laminae poorly developed; frontal spatium raised above the level of frontal area; front with a transverse carina in front of anterior ocellus, extending from one ocular sinus to another, very prominent in male, but weak in female; occipital carina strong and extending down to a point opposite to the ocular sinus; frontal laminae not developed; vertex very large and raised above the level of front; distance from the eyes to the hind margin of the head more than the diameter, but less than twice the diameter of the upper lobe of an eye;

hind tibial spurs tapering gradually to the pointed apex, the longer spur extending about half way to the apex of hind basi-tarsus; fore wing with two recurrent veins (the first joined above with the second so that second submarginal cell receives only one vein), three discoidal (two discoidal and one brachial of some authors) cells and three submarginal cells. *L. fulgidipennis* (Smith), however, with two submarginal cells.

First tergite without any tubercle anteriorly except only in *L. fulgidipennis*, which has a distinct tubercle; apical fringes of abdominal segments consisting of a single row; pygidium of female raised in the middle but not dentate, hypopygidium with strong, acute subbasal teeth on lateral margins.

Male genitalia : Parameres normal, volsellae more than twice as long as broad and basal half with dense long hair.

This genus is widely distributed in the tropical areas of the Old World, with species occurring in Indo-Australian Region, China, Korea and Africa. Five species are known from Indo-Australian Region, China and Korea, of these, only one polytypic species, viz., *L. erythrosoma* (Burmeister) is represented in Indian subregion.

1. *Liacos erythrosoma* (Burmeister)

This polytypic species is widely distributed in the Oriental Region, where it ranges from Kalimantan, Sumatra and Java through Malaya, Thailand and Myanmar to India and Sri Lanka, and also in Taiwan, southern China and Korea. It is also now recorded from Nepal.

Seven subspecies have been recorded, viz., *e. erythrosoma* (Burmeister) from Kalimantan, Sumatra, Malaya, Thailand, Myanmar, Nepal and India; *e. formosana* Micha from Taiwan; *e. pyrrhopyga* Micha from Java; *e. chosensis* Uchida from southern China and Korea; *e. fulvopicta* (Cameron) from Andaman Islands, India; *e. aurantiaca* Micha from Nicobar Islands, India and *e. cruszi* Krombein from Sri Lanka. These subspecies are distinguished mainly by the extent of red or yellow maculations and/or vestiture on abdomen, and by the difference in colour and reflection of wings. The subspecies known from Indian subregion can be identified by the following key.

Key to the subspecies of *Liacos erythrosoma*

1. First abdominal tergite usually with a pair of small to large red spots, second tergite almost entirely and third to last entirely red in both sexes; vestiture red to bright red on red areas of abdomen. Wings dark brown with golden reflections. Kalimantan, Sumatra, Malaya Thailand, Myanmar, Nepal and India
.....(a) *e. erythrosoma* (Burmeister)
- First and second abdominal tergites entirely black except, sometimes, second tergite in female with a pair of elongate ferruginous spots, third to last tergites

- with red or yellow integument and vestiture in both sexes. Wings dark brown with violaceous reflections 2
2. First and second abdominal tergites black except second abdominal with a pair of elongate ferruginous spots in female, third to last tergites with red integument and vestiture in both sexes. Sri Lanka
.....*e. cruszi* Krombein (not discussed in the test)
- First and second abdominal tergites entirely black, integument and vestiture on third to last tergites yellow in female, and in male either yellow or red 3
3. Third to last tergites, in both sexes, with lemon yellow integument and vestiture. Andaman Islands, India(b) *e. fulvopicta* (Cameron)
- Third to last tergites with lemon yellow integument and vestiture in female and red in male. Nicobar Islands, India.(c) *e. aurantiaca* Micha

(a) *Liacos erythrosoma erythrosoma* (Burmeister)

1854. *Scolia erythrosoma* Burmeister, *Abh. Naturf. Ges. Halle*, 1 : 15. Male, Padang, Sumatra (holotype in Halle Museum).
1855. *Scolia (Scolia) penangensis* Saussure, *Mem. Soc. Phy. Hist. nat. Geneva*, 14 : 39. Penang (Type in Geneva Museum).
1861. *Scalia dimidiata* Guerin : Smith, *J. Linn. Soc. Zool.*, 6 : 53.
1864. *Liacos (Triliacos) analia* var. *penangensis* Saussure : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 34. Female.
1864. *Liacos (Triliacos) erythrosoma* (Burmeister) : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 35. Female, male.
1892. *Liacos dimidiata* var. *f.* Magretti, *Ann. Mus. civico Stor. nat. Hist. Genova*, 12 : 235. Female, Male, Myanmar.
1897. *Liacos analis* (Fabricius) : Bingham, *Fauna British India, Hym.*, 1 : 101. Female, Male, material from Myanmar, Malaya and India only (misdet.).
1897. *Scolia erythrosoma* Burmeister : Dall-Torre, *Cat. Hym.*, 8 : 157.
1927. *Liacos erythrosoma erythrosoma* (Burmeister) : Micha, *Mitt. zool. Mus. Berlin*, 13 : 55-58. Male, Female, Sumatra (synonymised *Scolia penangensis* Saussure).
1927. *Liacos erythrosoma* forma *rufocoronata* Micha, *Mitt. zool. Mus. Berlin*, 13 : 58. Female, Pulo Penang (holotype in Berlin Museum).
1927. *Liacos erythrosoma* forma *vulpes* Micha, *Mitt. zool. Mus. Berlin*, 13 : 59. Male; west Sumatra, Kambang (holotype in Berlin Museum).
1927. *Liacos erythrosoma sikkimensis* Micha, *Mitt. zool. Mus. Berlin*, 13 : 59. Female, Male. Myanmar, Sikkim and Assam (types in Berlin Museum).

1927. *Liacos erythrosoma borneensis* Micha, *Mitt. zool. Mus. Berlin*, **13** : 59. Female, Male; Kalimantan (types in Berlin Museum).
1927. *Liacos erythrosoma hainana* Micha. *Mitt. zool Mus. Berlin*, **13** : 60. Female, Hainan (holotype in Berlin Museum).
1928. *Scolia (Liacos) erythrosoma erythrosoma* Burmeister : Betrem, *Treubia*, **9** (suppl.) : 168. Female, Male. Kalimantan, Sumatra.
1928. *Scolia (Liacos) erythrosoma sikkimensis* (Micha) : Betrem, *Treubia*, **9** (suppl.) : 168-169. Male. Myanmar, Sikkim, Darjeeling and Assam.
1928. *Scolia (Liacos) erythrosoma sikkimensis* var. *hainana* (Micha) : Betrem, *Treubia*, **9** (suppl.) : 169. Male; Kuala Lumpur (type in Singapore Museum).
1941. *Scolia (Liacos) erythrosoma* Burmeister : Betrem, *Notes Ent. Chinoise*, **8** (4) : 120. Kalimantan, Sumatra and Malacca.
1941. *Scolia (Liacos) erythrosoma sikkimensis* var. *michai* Betrem, *Notes Ent. Chinoise*, **8** (4) : 121. Female, Male. Malacca, Thailand and Myanmar (holotype male in Singapore Museum).
1966. *Liacos erythrosoma erythrosoma* (Burmeister) : Betrem in Bradley & Betrem, *Beitr. Ent.*, **16** : 75 (type study and new combination for *S. erythrosoma*).
1972. *Liacos erythrosoma erythrosoma* (Burmeister) : Bradley, *Mitt. zool Mus. Berlin*, **48** (1) : 6, 10, 14, 15, 18 (type study note on the following : *L. e. borneensis* Micha : 6, female lectotype; *L. e. hainana* Micha : 10, female holotype ; *L. e. forma rufocoronata* Micha : 14, female holotype; *L. e. sikkimensis* Micha : 15, females, Males; *L. e. vulpes* Micha : 18, male holotype).

This typical subspecies is widely distributed in the Oriental Region and ranges from Kalimantan westwards through Sumatra, Malaya Thailand and Myanmar to Nepal and India. It is recorded for the first time from Nepal.

This subspecies is usually found to occur at low altitudes, sometimes this is also available at an altitude of 1500 m and breeds in the areas of heavy rain fall.

Female : Length 21-33 mm. Black, the following red : usually a pair of large rounded spots on first tergite, sometimes the tergite almost entirely, second tergite except for a pair of black lateral spots, sometimes entirely, third to sixth tergites entirely, usually second sternite at sides, sometimes entirely and third to sixth sternites also entirely. Vestiture black except red to bright red on red integumental areas of abdomen. Wings dark brown with golden reflections.

Clypeus broadly impunctate in the middle, at sides with scattered punctures; frontal laminae narrow, slightly raised; frontal spatium impunctate in the middle, at sides along the frontal laminae densely punctate; frontal fissura weak, extending up to anterior ocellus; front with a few scattered punctures; vertex impunctate, its declivous portion with small, sparse punctures.

Scapulae with moderate sized punctures, mostly separated by the diameter of a puncture; mesoscutum with a large impunctate area posteriorly in the middle, elsewhere with moderate sized scattered punctures, the latter becoming closer along anterior and posterior margins; scutellum with moderate sized dimpled punctures, mostly separated by the diameter of a puncture; mentanotum similarly punctate; mesopleurum with moderate sized punctures, the latter mostly separated by half the diameter of a puncture, except for a small impunctate area on the elevated portion of its upper plate; upper plate of metapleurum punctate narrowly along its upper margin, lower plate with small, scattered punctures. Dorso-median area of propodeum with small, sparse punctures anteriorly, coarser and closer posteriorly, dorso-lateral areas with a quadrate impunctate area anteriorly along inner margin, elsewhere with small, shallow and sparse punctures, punctures closer along lateral margins; lateral surface with small and scattered punctures; posterior surface closely punctate.

First abdominal tergite with a longitudinal keel on anterior half of the dorsal surface, the surface with coarse to small punctures; second tergite with small and scattered punctures, third to fifth tergites with small, dense punctures on apical half or two thirds; second sternite with a strong median tubercle anteriorly.

Male : Length: 17-22 mm. Black, rest of the integument and vestiture as in female, rarely all the abdominal tergites with red integument and vestiture. Wings as in female.

Clypeus with scattered punctures; frontal spatium with moderate sized, contiguous punctures; frontal fissura extending up to anterior ocellus, weakly impressed on front; front with sparse punctures; ocellar area sparsely punctate; post-ocellar groove indistinct; vertex with small, scattered punctures, its declivous portion with fine close punctures.

Scapulae with small, sparse punctures; mesoscutum sparsely punctate at its anterior half, posterior half with scattered punctures; scutellum with moderate sized close punctures; metanotum with small, sparse punctures; mesopleurum with moderate sized punctures, mostly separated by the diameter of a puncture; metapleurum impunctate except along its upper margin and lower plate with small, scattered punctures; dorso-median area of propodeum with moderate sized punctures, mostly separated by the diameter of a puncture, dorso-lateral areas with an impunctate area anteriorly along inner margin, rest of the surface with sparse to scattered punctures, lateral surface with small, scattered punctures, posterior surface somewhat closely punctate.

First abdominal tergite with a weak median longitudinal keel on anterior one-third, surface with close punctures anteriorly, posteriorly the punctures becoming smaller and sparser; second sternite with a strong antero-median tubercle.

Distribution : India : Arunachal Pradesh (Siang dist.: Basar, Peyring, Kameng dist. : Tipi, Denling, Subansiri : Kimin, Ziro), Assam, Kerala (Silent Valley, Kummathaneudu dam site), Manipur (Erioshemba), Sikkim (Manjitar in Ranjeet Valley) and West Bengal (Darjeeling, Bijanbari, Sanchal Lake). *Elsewhere* : Indonesia: Sumatra, Kalimantan; Malayasia, Myanmar; Thailand, Nepal and S. China : Hainan Island.

(b) *Liacos erythrosoma fulvopicta* Cameron

1892. *Liacos fulvopicta* Cameron, *Mem. Proc. Manch. Lit. Phil. Soc.*, **5** (4) : 98. Female, Barrackpore (holotype in Oxford Museum).
 1927. *Liacos erythrosoma fulvopicta* Cameron : Micha, *Mitt. zool. Mus. Berlin*, **13** : 63. Female, Male, Andaman Island.
 1928. *Scolia (Liacos) erythrosoma fulvopicta* (Cameron) : Betrem, *Treubia*, **9** (suppl.) : 171-172.

This subspecies was described, on a collection made by James Rothney, from Barrackpore near Calcutta. There is no subsequent record of this subspecies from the type locality. Micha described the male and redescribed the female on a series of specimens from the collections made by Bingham from Andamans.

This subspecies is not uncommon in Andamans. It can be easily distinguished from other subspecies by having integument and vestiture lemon yellow on third to last abdominal segments in both sexes.

Female : Length 19-28 mm. Black. The following yellow: third to sixth abdominal tergites, except for a small black area anteriorly in the middle on the third tergite; third to sixth sternites, usually third sternite black, except for a pair of postero-lateral spots. Vestiture black, lemon yellow on third to sixth abdominal segments, usually lemon yellow and brownish setae mixed with black on black integumental parts of abdomen. Wings dark brown with violaceous reflections.

Male : Length 13-20 mm. Integument, vestiture and wings as in female.

Distribution : India : Andaman & Nicobar Islands : South Andaman (Wrafters Creek, Wright Myo, Caddle Gunj, Chiria Tapu) and West Bengal (Barrackpore).

(c) *Liacos erythrosoma aurantiaca* Micha

1927. *Liacos erythrosoma aurantiaca* Micha, *Mitt. zool. Mus. Berlin*, **13** : 62. Male, Female, Nicobar (types in Berlin Museum).
 1928. *Scolia (Liacos) erythrosoma aurantiaca* (Micha) : Betrem, *Treubia*, **9** (suppl.) : 171.
 1972. *Liacos erythrosoma aurantiaca* Micha : Bradley, *Mitt. zool. Mus. Berlin*, **48** (1) : 5 (type study).

Micha (1927) described this subspecies on the basis of three female and six males from Nicobars, belonging to Bingham's collections. The present study based on

additional specimens from Great Nicobar and Car Nicobar Islands reveals that it is very close to *L. erythrosoma fulvopicta* known from South Andaman. However, it can be differentiated by having vestiture on apical abdominal segments, in males, yellowish-red instead of lemon yellow.

Female : Length: 22-25 mm. Integument, vestiture and details of punctation as in *L. erythrosoma fulvopicta* Cameron.

Male : Length: 15-22 mm. Integument and vestiture black, except yellowish-red on third to last abdominal segments. Punctation as in *L. erythrosoma fulvopicta* Cameron.

Distribution : India : Andamn & Nicobar Islands : Great Nicobar (Campbell Bay, Galathia) and Car Nicobar (Magarnallah).

9. Genus *Carinoscolia* Betrem

1927. *Scolia* subgenus *Carinoscolia* Betrem, *Tijdschr. Ent.*, **70** (verslag) : xcvi. Type-species : *Scolia opalina* Smith, 1588.

1928. *Scolia* subgenus *Carinoscolia* Betrem, *Treubia*, **9** (suppl.) : 176. (Indo-Australian species).

1967. *Carinoscolia* Betrem : Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 293 (*Carinoscolia* raised to generic status).

Type-Species : *Scolia opalina* Smith, 1858 (Original designation).

Small to large sized species, about 15-35 mm in length; body entirely black, or marked with red or yellow on head and some of the abdominal tergites, sometime marked on pronotum also.

Head globular and narrower than thorax in female, inner margin of mandibles unidentate in female and tridentate in male.

In female, anterior rim of the clypeus broad, its median lobe usually a little projecting, not emarginate at the sides; frontal spatium raised above the level of frontal area; frontal laminae usually indistinct, sometimes distinct but small and triangular.

Front with a transverse ridge between frontal spatium and anterior ocellus, the carina weak in female and strong in male, rarely rudimentary; the area between the carina and frontal spatium more or less depressed and bears sparse to dense punctures; fore wing with a single recurrent vein and two to three submarginal cells.

First abdominal tergite without any antero-median tubercle; second sternum with a more or less prominent tubercle.

The male genitalia is characterised by having volsella with dense hair; basal portion of volsella very long, at least as long as the apical portion and the aedeagus giving an appearance of a lyre.

This moderate sized genus is widely distributed in the Oriental Region, New Guinea, the Bismarks and Solomons, and also occurs in Korea, southern China and Mangolia.

This genus is represented by ten species, of which two species, viz., *C. opalina* (Smith) and *C. bhamoensis* (Magretti) occur in India. These can be identified by the following key.

Key to the species of *Carinoscolia*

1. Integument and vestiture entirely black. Ranging from Philippines through East Indies to Myanmar and India. 1. *opalina* (Smith)
- Integument on head and pronotum reddish-brown, elsewhere black. Myanmar and India. 2. *bhamoensis* (Magretti)

1. *Carinoscolia opalina* (Smith)

This polytypic species can be easily differentiated from its congeners by having, in both sexes, entirely black integument and dorso-median area of propodeum with small and sparse punctures. Three subspecies are recorded, viz., *o. opalina*, (Smith) ranging from Sarawak and Kalimantan, through Sumatra, Malaya and Myanmar to Sikkim in India; *o. brevicornis* (Saussure) from Java and *C. o. propodealis* (Rohwer) from Philippines. These subspecies are differentiated mainly by the difference in the colour and reflection of wings. However, *o. propodealis*, can easily be distinguished by having two submarginal cells in the fore wing instead of three. The only subspecies known from India is detailed as below :

(a) *Carinoscolia opalina opalina* (Smith)

1858. *Scolia opalina* Smith, *J. Proc. Linn. Soc. London (Zool)*, **2** : 89, Female, Male; Sarawak (Lectotype male, in Saunder's colln.).
1964. *Scolia (Triscolia) opalina* Smith: Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 42. Female, Male.
1889. *Scolia unimaculata* Kirby, *Trans ent. Soc. London* : 446. Female, India (type in British Museum).
1897. *Scolia (Triscolia) opalina* Smith : Bingham, *Fauna British India, Hym.*, **1** : 75. Female, Sikkim, Tenasserim (synonymised *Scolia unimaculata* Kirby).
1897. *Scolia opalina* Smith : Dalla-Torre, *Cat. Hym.*, **8** : 172.
1901. *Scolia (Triscolia) lathona* Cameron, *Proc. zool. Soc. London*, **2** : 18, Male, Malaya.
1902. *Scolia (Triscolia) opalina* : Cameron, *J. Str. British Asiat. Soc.*, **37** : 81.
1911. *Scolia (Triscolia) opalina* Smith : Turner, *Ann. Mag. nat. Hist.*, (8) **8** : 619.

1927. *Triscolia opalina opalina* (Smith) : Micha, *Mitt zool. Mus. Berlin*, **13** : 79-81. Male, Kalimantan.
1927. *Triscolia opalina lathona* (Cameron) : Micha, *Mitt. zool. Mus. Berlin*, **13** : 83. Male, Myanmar.
1927. *Triscolia opalina violaceipennis* Micha, *Mitt. zool. Mus. Berlin*, **13** : 83, Female, Sumatra (Holotype in Berlin Museum)
1928. *Scolia* (*Carinoscolia*) *opalina opalina* (Smith) : Betrem, *Treubia*, **9** (suppl.) : 178-179. Female, Male, Sumatra, Kalimantan, Malaya, Myanmar and India (synonymised *Scolia lathona* Cameron and *Triscolia opalina violaceipennis* Micha).
1967. *Carinoscolia opalina opalina* (Smith) : Betrem & Bradley, *Bull. British Mus. (Nat. Hist.) Ent.*, **20**(7) : 317. (Lectotype female of *Scolia opalina* Smith designated).

This widely distributed subspecies ranges from Brunei and Sarawak through Kalimantan, Sumatra and Malaya to Myanmar and Sikkim in India. It can be differentiated from *C. o. brevicornis* (Magretti) by having the reflection of wings purplish golden instead of violaceous.

Female : Length 23-29 mm. Black, propodeum and abdomen with dark blue reflections. Vestiture black. Wings dark brown, fore wing anteriorly more darker, reflection purplish-golden.

Apical margin of the clypeus broad and broadly rounded anteriorly, median lobe slightly projecting, median tumid area impunctate, at sides with sparse to scattered punctures; frontal area raised in the middle like a keel, narrowly impunctate in the middle, at sides with deep and contiguous punctures; frontal spatium raised above the level of frontal area, weakly marked posteriorly, impunctate in the middle, at sides along the un-differentiated frontal laminae with coarse, deep and subcontiguous to contiguous punctures; frontal fissura extending up to anterior ocellus, very weak at front; front with a weak transverse carina, the space between this carina and frontal spatium with a few deep and scattered punctures; anterior ocellus in a shallow pit; upper front medially impunctate, at sides along the eye margins with a few coarse punctures; ocellar triangle impunctate; posterior ocelli marked behind with a weak groove; vertex with small, sparse to scattered punctures.

Scapulae with moderate sized dimpled-shaped punctures, mostly separated by more than the diameter of a puncture; mesoscutum with a large impunctate area posteriorly in the middle, elsewhere with moderate sized sparse to scattered punctures, the latter becoming closer along anterior and posterior margins; scutellum with moderate sized punctures, mostly separated by twice the diameter of a puncture, impunctate along the posterior margin; metanotum similarly punctate; mesopleurum with moderate sized, sparse punctures, broadly impunctate along the posterior margin; upper plate of metapleurum broadly impunctate along its anterior and lower margins, elsewhere with small and close punctures, lower plate impunctate except for a patch of small close to sparse punctures anteriorly along the lower margin.

Dorso-median area of propodeum with moderately small and sparse punctures, the latter separated by two to three times the diameter of a puncture, dorso-lateral areas with an impunctate area anteriorly along inner margin, elsewhere with small, sparse punctures, the latter becoming closer along lateral margin; lateral surface with small, shallow and scattered punctures.

First abdominal tergite without any antero-median tubercle, surface in the middle with a few large to small scattered punctures, at sides with small and relatively close punctures; second tergite largely with small, scattered punctures; first sternite with coarse, dense punctures at sides, second sternite with a antero-median tubercle, surface coarsely punctate.

Male : Length 19-21 mm. Integument and vestiture black. Wings dark brown, fore wing anteriorly dark with purplish-golden reflections.

Clypeus broadly impunctate in the middle, at sides with moderately large, close punctures; frontal area raised in the middle like a keel, at sides with coarse, close punctures; frontal spatium weakly marked posteriorly, surface with coarse, contiguous punctures; frontal fissura distinct but weak, extending up to anterior ocellus, the latter in a shallow pit; front with coarse, close punctures and with a transverse carina, the latter with a row of shallow, dimpled punctures on its anterior face; vertex with moderate sized, sparse punctures.

Scapulae with moderately small, shallow and sparse punctures, mostly separated by one and a half times the diameter of a puncture; mesoscutum and scutellum with similar punctures, separated by two to four times the diameter of a puncture; metanotum with small, sparse punctures; mesopleurum with moderately small punctures, mostly separated by two to three times the diameter of a puncture; upper plate of metapleurum impunctate, except a for patch of close punctures along its upper margin, lower plate with a patch of small, sparse to close punctures anteriorly along the lower margin, elsewhere impunctate.

Dorso-median area of propodeum with moderate sized and sparse punctures, separated by one to two times the diameter of a puncture, dorso-lateral areas with an impunctate area anteriorly along inner margin, elsewhere with moderate sized, sparse punctures, the latter becoming closer along lateral margin, lateral surface with only a few small, scattered punctures, posterior surface with small, sparse punctures. Fore wing with three submarginal cells.

First abdominal tergite at its anterior two-thirds with coarse punctures, mostly separated by half the diameter of a puncture, posterior one-third with small and more separated punctures; second sternite with a strong antero-median tubercle, surface with coarse, close punctures.

Distribution : India : Sikkim. *Elsewhere* : Myanmar; Malaysia : Malaya; Indonesia: Sumatra, Sarawak, Kalimantan and Brunei.

2. *Carinoscolia bhamoensis* (Magretti)

(Figure 41)

1892. *Scolia (discolia) bhamoensis* Magretti, *Ann. Mus. civico. Storia Nat. Genova*, **32** : 239-241. Male, Bhamo, Myanmar (Holotype in Genova Museum).
1897. *Scolia (Discolia) bhamoensis* Magretti : Bingham, *Fauna British India, Hym.*, **1** : 80. Female, Bhamo, Myanmar.
1928. *Scolia (Carinoscolia) bhamoensis* Magretti : Betrem, *Treubia*, **9** (suppl.) : 184-185. Female, Male, India : Sikkim; Meghalaya : Garo Hills, Tura.
1967. *Carinoscolia bhamoensis* (Magretti) : Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20**(7) : 293 (by reason of elevating *Carinoscolia* to generic status).

This uncommon species ranges from Bhamo in Myanmar to Sikkim and Garo Hills in India. It can be easily distinguished from its congener by having, in both sexes, the head and scapulae largely reddish-yellow instead of black.

Female : Length 21-23 mm. Black, the following reddish-yellow : head and scapulae, except anterior margin of clypeus, antennae, frontal laminae partly, ocellar triangle. Vestiture black, except reddish-yellow on coloured parts. Wings brownish with coppery reflection, fore wing darker anteriorly.

Anterior rim of the clypeus broad, its median lobe not emarginate at sides, large tumid area of the disc impunctate, at sides with a few moderate sized, close punctures; frontal spatium with coarse, close punctures; frontal fissura extending up to anterior ocellus, the latter in a shallow pit; front with a weak transverse carina; the area between frontal spatium and transverse carina with coarse, contiguous punctures, rest of the surface with coarse, close punctures, the latter becoming more closer along the eye margins and around the anterior ocellus; posterior ocelli marked behind with a shallow groove; ocellar triangle with deep, close punctures; vertex with relatively small and sparse punctures.

Scapulae with large, dimpled-shaped and close punctures; mesoscutum with moderate sized, close punctures, posteriorly with a V-shaped impunctate area; scutellum with moderate sized, deep, close punctures; metanotum with similar but sparse punctures; mesopleurum broadly impunctate along its anterior and posterior margins, its upper plate with coarse and contiguous punctures, lower plate at its upper half with similar punctation, lower half with smaller and subcontiguous punctures; upper plate of metapleurum impunctate, except along its upper margin with small and contiguous punctures, lower plate with very small, scattered punctures.

Dorsal surface of propodeum with coarse, deep, contiguous punctures, dorso-lateral areas with a small impunctate area anteriorly along inner margin, lateral surface with small, shallow and scattered punctures; posterior surface with relatively small and sparse punctures. Fore wing with two submarginal cells.

First abdominal tergite at its anterior half with coarse, close to sparse punctures, posterior half with small, sparse to scattered punctures; second sternite with a poorly developed antero-median tubercle, its surface with close to sparse punctures.

Male : Length 18 mm. Integument black, the following reddish-yellow : head, except mandibles, anterior rim of clypeus, frontal laminae partly, ocellar triangle; and pronotum. Vestiture black except reddish-brown on coloured areas. Wings medium brown with coppery reflections.

Clypeus with coarse, dimpled-shaped, mostly close punctures except for a small impunctate area medially above the anterior margin; frontal area raised in the middle, surface with coarse, deep, close punctures; frontal spatium not distinctly marked posteriorly, surface with coarse, dense punctures; front with a moderately strong transverse carina, space between this carina and frontal spatium with coarse, contiguous punctures; areas between anterior ocellus and eye margins with coarse, close punctures; area in front of anterior ocellus with coarse, contiguous punctures; posterior ocelli marked with a weak groove; vertex with moderately large but sparse punctures.

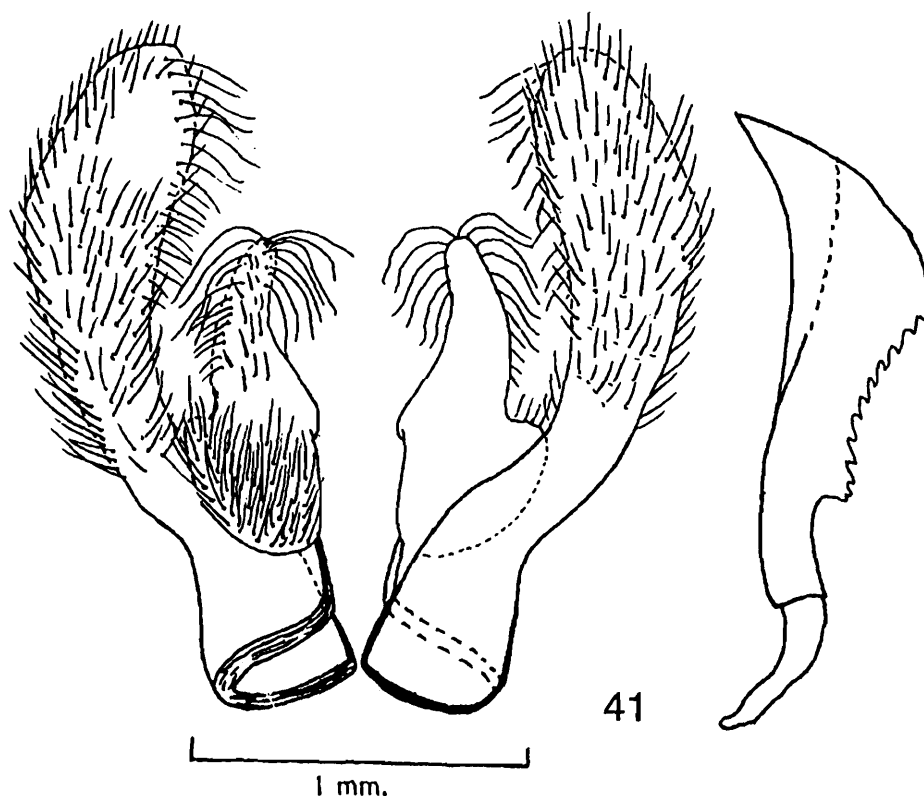


Fig. 41 : *Carinoscolia bhamoensis* (Magretli) : Male genitalia, ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right.

Scapulae with moderately large, dimpled-shaped close punctures; mesoscutum with moderate size close punctures, the latter sparse posteriorly in the middle; scutellum with moderately large, close punctures; metanotum with relatively small, sparse punctures; mesopleurum with moderate sized punctures, mostly separated by half the diameter of a puncture; upper plate of metapleurum with small, close punctures along the upper margin, elsewhere impunctate, lower plate with very small, scattered punctures.

First abdominal tergite with large and close punctures at its anterior half, posterior half with relatively small, sparse punctures; second sternite with a antero-median tubercle, its surface with moderately large and close punctures. Male genitalia as in figure 41.

Distribution : India : Meghalaya (Tura in Garo Hills) and Sikkim. *Elsewhere* : Myanmar.

10. Genus *Microscolia* Betrem

1927. *Scolia* subgenus *Microscolia* Betrem, *Tijdschr. Ent.*, **70** (verslag) : xcvi-xcvii. Type-species : *Scolia cephalotes* Burmeister, 1855.

1928. *Scolia* subgenus *Microscolia* Betrem : Betrem, *Treubia*, **9** (suppl.) : 197-208 (Indo-Australian species).

1967. *Microscolia* Betrem : Betrem in Bradley & Betrem, *Bull. British Mus. (Nat Hist.) Ent.*, **20** (7) : 293 (*Microscolia* elevated to generic status).

Type-species : *Scolia cephalotes* Burmeister, 1855 (Original designation).

Small to moderate sized species, about 10-25 mm in body length. Integument entirely black. Vestiture black, often mixed with white; rarely with reddish-yellow on apical abdominal segments. Wings medium to dark brown with violaceous, purplish, coppery or golden reflections.

Frontal area and frontal spatium continuous with one another; front without any carina or depression; frontal spatium and front with coarse, close to sparse punctures; vertex usually with small, sparse to scattered punctures.

Thorax coarsely punctate; mesopleurum, particularly in Indo-Australian species, with very coarse, deep and close punctures, interspaces between the punctures lamelliform. Fore wing with a single recurrent vein and two to three submarginal cells.

First abdominal tergite usually with a small tubercle anteriorly in the middle, sometimes the tubercle pronounced but obtuse; second sternite without any basal tubercle.

Female : Head large and quadrate, broader than or as broad as the thorax; mandibles with two blunt teeth along inner margin; clypeus small, transverse, apical

margin narrowly but deeply emarginate at the sides of the median lobe, clypeal disc raised in the middle; temples well developed and bulging behind the eyes.

Lateral propodeal carina extending more than half the length of lateral surface of propodeum.

Male : Mandibles with three blunt teeth along inner margin.

Male Genitalia : Volsellae with small hair, basal part much shorter than the apical; parameres clavate towards the apex and narrowed at the base; aedeagus truncate apically.

Remarks : The large and quadrate head with large and bulging temples, in female, is obvious adaptation for parasitizing larvae in the wood. *Microscolia parastasiae* (Betrem) from East Indies has been reared from the larvae of a scarabaeid beetle in a fallen palm tree. Krombein (1978) mentioned about the collection of males of *M. hydrocephala* (Micha) flying around the trunk of a fallen tree in Sri Lanka. The other species of the genus are also presumed to parasitize larvae of Scarabaeidae in similar habitats.

This genus is widely distributed in the Old World tropics, ranging from northern Australia, Solomon Islands and New Guinea through the Philippines, East Indies and Indian subcontinent to eastern, western and southern Africa.

Ten species are distributed in the Indo-Australian Region. Three species, viz., *M. khasiana* (Betrem), *M. tyranthina* (Kirby), and *M. hydrocephala* (Micha) occur in India. In addition, one new species, viz., *M. nicobarensis* is described here from Nicobar Islands, India. The species from India can be differentiated by the following key :

Key to the species of *Microscolia*

Female

1. Vertex with small, shallow, scattered punctures without any impunctate area behind post-ocellar furrow; postocellar furrow punctate. Sri Lanka and India.
.....1. *hydrocephala* (Micha)
- Vertex with a large impunctate area behind post-ocellar furrow, elsewhere with small, scattered punctures; post-ocellar furrow impunctate. India
.....2. *tyranthina* (Kirby)

Male

1. Vestiture almost entirely white on the head, ventral and lateral surface of thorax and second to fourth abdominal sternites. Wings with mostly golden reflections. India 3. *khasiana* (Betrem)
- Vestiture predominantly to entirely black. Wings with purplish and coppery reflections 2

2. Mesoscutum and scutellum with coarse, deep, mostly contiguous punctures, mesoscutum without any impunctate area in the middle. India 4. *nicobarensis*, sp. nov.
- Mesoscutum with coarse, deep and close punctures, with a small V-shaped impunctate area in the middle; scutellum with sparser punctures than mesoscutum 3
3. Male genitalia with parameres rounded apically. Sri Lanka and India 1. *hydrocephala* (Micha)
- Male genitalia with parameres truncate apically. India 2. *tyranthina* (Kirby)

1. *Microscolia hydrocephala* (Micha)

(Figure 42)

1927. *Triscolia hydrocephala* Micha, *Mitt. zool. Mus. Berlin*, **13** : 86-87. Female, Sri Lanka (holotype in Berlin Museum).
1928. *Scolia (Microscolia) hydrocephala* (Micha) : Betrem, *Treubia*, **9** (suppl.): 203. Female, Male; Sri Lanka, southern India.
1958. *Scolia (Microscolia) hydrocephala* (Micha) : Bradley, *Pan-Pacific Ent.*, **34** : 103. (listed).
1967. *Microscolia hydrocephala* (Micha) : Betrem in Bradley & Betrem, *Bull British Mus. (Nat. Hist.) Ent.*, **20** (7) : 293 (*Microscolia* raised to generic status).
1972. *Microscolia hydrocephala* (Micha) : Bradley, *Mitt. zool. Mus. Berlin*, **48** (1) : 10 (a note on holotype female of *Triscolia hydrocephala* Micha).
1978. *Microscolia hydrocephala* (Micha) : Krombein, *Smithsonian Contr. Zool.*, **283** : 25-27, fig. 20. Female, Male; Sri Lanka.

This species occurs in Sri Lanka and southern India. It is close to *M. tyranthina* (Kirby) from Andaman & Nicobar Islands, India, in having similar integument and vestiture in both the sexes. The female differs in, details of body punctation as mentioned in the key. The males in both the species are having more or less similar punctation on the body and can be differentiated by the differences in male genitalia as mentioned in the key.

Krombein (1978) redescribed this species on a series of specimens from Sri Lanka. The record from India is based on a single male from Trichur (Kerala).

Female : Length 14-16 mm. Black, abdomen with dark blue reflections. Vestiture black, except front and vertex with scattered, short brown setae. Wings dark brown, anterior area of fore wing darker than rest of the membrane, effulgence purplish-blue.

Median area of clypeal disc with a few scattered punctures above, and a submarginal row of close ones above the apical margin; frontal spatium with large, deep, contiguous

to subcontiguous punctures; frontal laminae narrow, raised, separated from frontal spatium by a row of contiguous punctures; fissura weak, linear and extending half way to anterior ocellus; front and area laterad of ocelli with punctation as on frontal spatium; anterior ocellus in a weak pit; post-ocellar furrow punctate, vertex with small, shallow, scattered punctures, occiput with small, close punctures.

Scapulae with deep, moderately large, subcontiguous punctures; mesoscutum with large, deep, close punctures and a V-shaped impunctate area in the middle; scutellum with close punctures along margins, more scattered punctures elsewhere; metanotum with denser punctation than scutellum; mesopleurum with very coarse, extremely deep, close punctures, the interspaces lamelliform; upper plate of metapleurum with coarse, contiguous punctures on upper half, lower half impunctate, lower plate with similar punctation on lower half, upper half impunctate; dorso-median area of propodeum with coarse, deep, mostly contiguous punctures, dorso-lateral area smooth along inner margin, elsewhere subcontiguously punctate, lateral propodeal surface with small scattered punctures, postero-median area practically devoid of large punctures, postero-lateral areas subcontiguously punctate. Fore wing with three submarginal cells and one recurrent vein.

First abdominal tergite with antero-median tubercle lacking or very faintly indicated, surface with large, shallow, dimpled punctures anteriorly in the middle, posteriorly with small, scattered punctures, laterally with larger, subcontiguous punctures; second to fifth tergites with very small, scattered punctures and an apical row of fine, close punctures; second sternite without any tubercle near the base.

Male : Length 12-14 mm. Black, abdomen with purplish blue reflections. Vestiture black, except brownish and cinereous on head. Wings dark brown, anterior area of fore wing darker, with purplish reflection beyond cells and coppery in cellular areas.

Clypeus with a few scattered punctures in the middle, at sides with subcontiguous punctures; frontal area with small, subcontiguous punctures; frontal spatium with coarse, contiguous punctures; frontal fissura narrow, extending half way to anterior ocellus; front and area laterad of ocelli with coarse, contiguous to subcontiguous punctures; vertex with fine punctures, mostly separated by half the diameter of a puncture.

Scapula with moderate-sized, mostly contiguous punctures; mesoscutum with coarse, deep, contiguous to sparse punctures, with a V-shaped impunctate area in the middle; scutellum with coarse, deep, close punctures; metanotum with small and sparse punctures; mesopleurum with very large, deep, contiguous punctures; upper plate of metapleurum with contiguous to subcontiguous punctures on upper third, lower two-thirds impunctate, lower plate with coarse, contiguous punctures on lower two-thirds and scattered punctures on upper third; dorso-median area of propodeum with coarse, deep, mostly contiguous punctures, dorso-lateral areas impunctate along inner margin, elsewhere with coarse, subcontiguous punctures, lateral propodeal surface with small, scattered punctures.

First abdominal tergite with a small antero-median tubercle, surface with large, confluent punctures at its basal area, posteriorly with scattered punctures, laterally with subcontiguous punctures.

Male genitalia as in figure 42.

Distribution : India : Kerala (Trichur). *Elsewhere* : Sri Lanka.

2. *Microscolia tyranthina* (Kirby)

(Figure 43)

1889. *Scolia tyranthina* Kirby, *Trans. ent. Soc. London* : 446. Female, Andaman Islands (holotype in British Museum).
1897. *Scolia tyranthina* Kirby : Dalla-Torre, 1897. *Cat. Hym.*, **8** : 185. (listed).
1897. *Scolia (Triscolia) tyranthina* Kirby : Bingham, *Fauna British India, Hym.*, **1** : 75 (female from Andaman Islands only).
1927. *Triscolia tyranthina* (Kirby): Micha, *Mitt. zool. Mus Berlin*, **13** : 84. Female, Male, Andaman Islands.
1928. *Scolia (Microscolia) tyranthina* (Kirby) : Betrem, *Treubia*, **9** (suppl.) : 201. Female, Port Blair, Andamans.
1958. *Scolia (Microscolia) tyranthina* (Kirby) : Bradley, *Pan-Pacific Ent.*, **34** : 103. (listed).
1967. *Microscolia tyranthina* (Kirby): Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 293 (*Microscolia* to generic status).

This species previously known from Andaman Islands, is recorded here from Nicobar Islands also. Bingham (1897) recorded a female from Tenasserim, Myanmar, which requires further investigations.

It resembles *M. hydrocephala* (Micha), known from Sri Lanka and southern India. The female differs in details of body punctation as mentioned in the key. The males of both the species are morphologically similar, but can be differentiated with the help of shape of male genitalia.

Female : Length 14-23 mm. Integument and vestiture entirely black. Wings dark brown with violaceous effulgence.

Median raised area of clypeal disc with small, scattered punctures, posteriorly with a submarginal row of small, close punctures; frontal area with small, close to sparse punctures; frontal laminae slightly raised and separated from the frontal spatium by a row of contiguous punctures; frontal spatium with coarse, deep punctures, mostly separated by half the diameter of a puncture; front with close to scattered punctures, with large interspaces between the rows of close punctures; frontal fissura extending half way to anterior ocellus; anterior ocellus in a shallow pit; post-ocellar

groove impunctate, vertex broadly impunctate behind the groove, elsewhere with scattered, small punctures, occiput with similar but close punctures.

Scapulae with moderate-sized, deep, mostly subcontiguous punctures, except areas in front of tegulae, with sparse punctures; mesoscutum with coarse, close to sparse punctures, with a V-shaped impunctate area posteriorly in the middle; scutellum with similar, mostly sparse punctures; metanotum with sparse to close punctures; mesopleurum with very coarse, extremely deep, contiguous punctures; upper plate of metapleurum with coarse, deep, contiguous punctures at its upper third, lower two-thirds impunctate, lower plate with similar close to contiguous punctures, broadly impunctate along posterior and upper margins; dorso-median area of propodeum with large, deep, subcontiguous to contiguous punctures, dorso-lateral areas impunctate along inner margin, elsewhere with subcontiguous to contiguous punctures, lateral surface with shallow, scattered punctures, postero-median area impunctate, postero-lateral areas with subcontiguous to contiguous punctures.

First abdominal tergite with a obtuse tubercle antero-medially, anterior discal surface with large, shallow, dimple-shaped, contiguous punctures medially, posteriorly with small, scattered punctures, laterally with small, close punctures; second and third tergites with scattered but small punctures and an apical row of fine, close punctures; second sternite without any tubercle near the base.

Male : Length 10-14 mm. Integument and vestiture entirely black. Wings dark brown with violaceous reflections.

Clypeus broadly impunctate in the middle, at sides with coarse, shallow, subcontiguous punctures; frontal area with small, subcontiguous punctures; frontal spatium with coarse, contiguous punctures; frontal fissura narrow, extending half way to anterior ocellus; front with coarse, contiguous to subcontiguous punctures; vertex with small, close punctures.

Scapulae contiguously punctate; mesoscutum with coarse, deep, subcontiguous to contiguous punctures, with a V-shaped impunctate area posteriorly in the middle; scutellum with coarse, close punctures; metanotum with smaller punctures with same density as on scutellum; mesopleurum with large, deep, contiguous punctures; upper plate of metapleurum impunctate, except along the upper margin with contiguous punctures, lower plate almost entirely with coarse, contiguous to subcontiguous punctures, except for a small impunctate area along upper margin; propodeal surface bear punctation as in the female except for some scattered punctures on postero-median area at its upper half.

Male genitalia as in figure 43.

Distribution : India : Andaman & Nicobar Islands (Port Blair, Wrafters Creek, Nicobar).

3. *Microscolia khasiana* (Betrem)

1928. *Scolia* (*Microscolia*) *khasiana* Betrem, *Treubia*, **9** (suppl.) : 204-205, fig. 29, No. 7, Female, Khasi Hills, India (Holotype in colln. Schulthess).
1958. *Scolia* (*Microscolia*) *khasiana* Betrem : Bradley, *Pan-Pacific Ent.*, **34** : 103.
1967. *Microscolia khasiana* (Betrem) : Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 293 (*Microscolia* raised to generic status).

Betrem (1928) described this species based on a male from Khasi Hills, Meghalaya, India. It resembles *M. kollari* (Saussure) in having similar integument and vestiture. However, *M. khasiana* is differentiated by having the wings with weak golden effulgence, and male genitalia with parameres comparatively wide. The wings in *M. kollari* have strong golden effulgence and parameres are comparatively narrow.

Male : Length 16 mm. Integument black. Vestiture black, except white on the head, ventral side of the thorax and second to fourth sternites. Wings dark brown with light golden effulgence. The other body details similar to *M. kollari* (Saussure).

Remarks : No material of this species was available for study. The above account is based on a brief description given by Betrem (1928), mentioning similarities and differences between *M. kollari* and *M. khasiana*.

Distribution : India : Meghalaya (Khasi Hills).

4. *Microscolia nicobarensis*, sp. nov.

(Figure 44)

This species is described here on a male from Car Nicobar, Nicobar Islands, India. It resembles *M. tyranthina* (Kirby) and *M. hydrocephala* (Micha), in having entirely black integument and vestiture, but differs in having dense punctation on dorsum of the thorax, particularly on mesoscutum. The mesoscutum in this species is coarsely, and mostly contiguously punctate, without any V-shaped impunctate area in the middle.

Male : Length 14 mm. Integument and vestiture entirely black. Wings dark brown with purplish reflections.

Clypeus broadly impunctate in the middle, at sides with coarse, contiguous to subcontiguous punctures; frontal area with small, contiguous punctures; frontal spatium with coarse, contiguous punctures; frontal fissura not distinct, extending half way to anterior ocellus; front with coarse mostly subcontiguous punctures; anterior ocellus in a shallow pit; vertex with small, subcontiguous punctures, and a shallow groove behind posterior ocelli.

Scapulae with subcontiguous to contiguous punctures; mesoscutum with coarse, deep, mostly contiguous punctures, without any V-shaped impunctate area in the

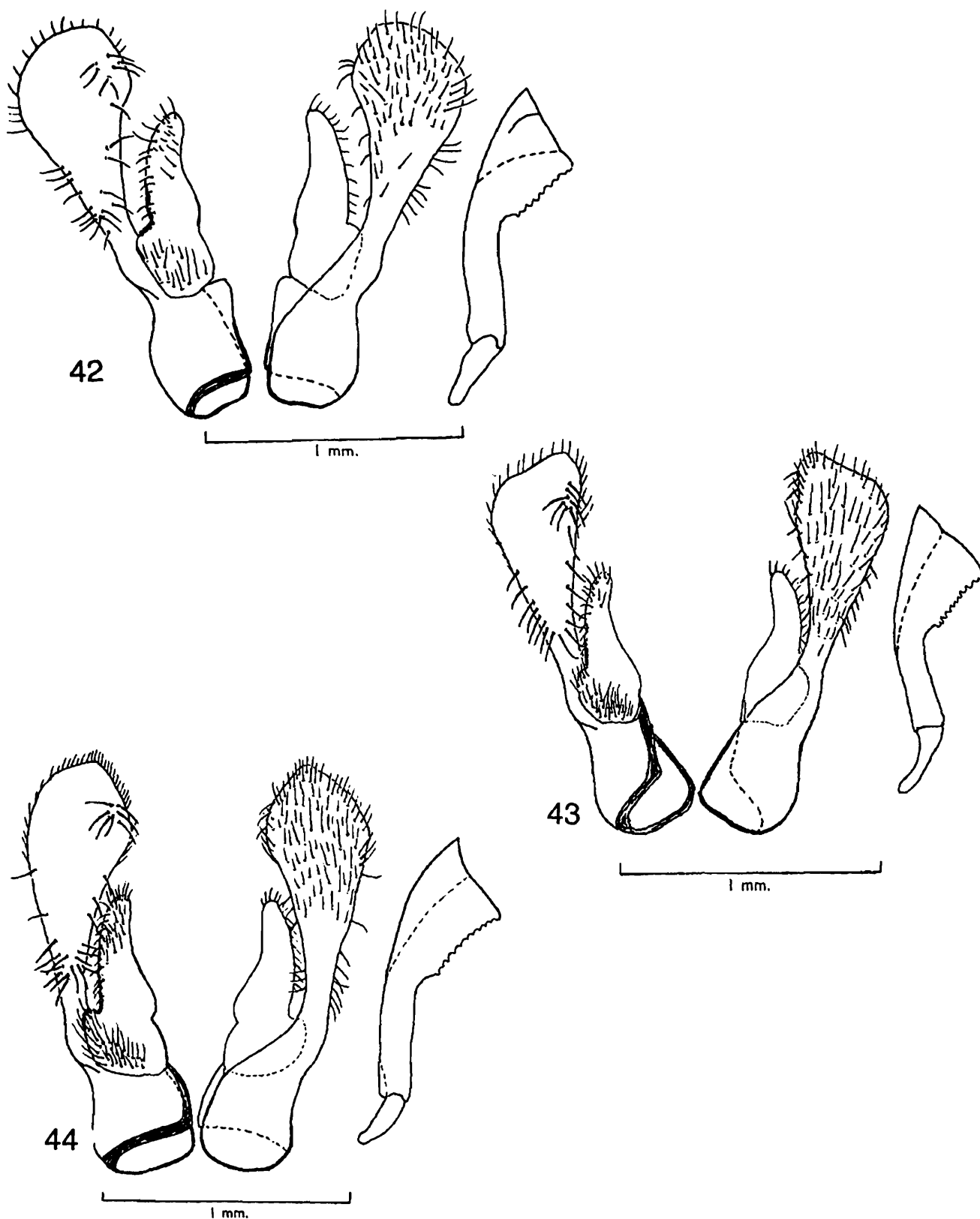


Fig. 42-44 : Male genitalia : Ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right : 42, *Microscolia hydrocephala* (Micha); 43, *Microscolia tyranthina* (Kirby); 44, *Microscolia nicobarensis*, sp. nov.

middle; scutellum with similar punctation; metanotum with small subcontiguous punctures; mesopleurum with large deep contiguous punctures; upper plate of metapleurum with contiguous punctures along its upper margin, elsewhere impunctate, lower plate almost entirely with subcontiguous punctures, broadly impunctate along posterior margin; dorsal surface of propodeum with coarse deep, mostly subcontiguous punctures, lateral surface with small shallow and sparse punctures, posterior surface, except median area below with subcontiguous punctures; fore wing with three submarginal cells and single recurrent vein.

First abdominal tergite with an obtuse antero-median tubercle, surface antero-medially with large, dimple-shaped contiguous punctures, posterior half with small round close to sparse punctures, laterally with small rounded subcontiguous punctures; second sternite not tuberculate near the base; first to sixth tergites with apical rows of close, setae bearing punctures.

Male genitalia as in figure 44.

Holotype Male, India : Andaman & Nicobar Islands : Car Nicobar. Magarnallah, 14.i.1975, S.K. Bhattachaya (in Z.S.I., Calcutta; Reg. No. 8879/H3).

Distribution : India : Andaman & Nicobar Islands (Magarnallah).

11. Genus *Austroscolia* Betrem

1927. *Scolia* subgenus *Austroscolia* Betrem, *Tijdschr. Ent.*, **70** (verslang) : xcvi. Type-species : *Scolia ruficeps* Smith, 1855.

1928. *Scolia* subgenus *Austroscolia* Betrem : Betrem, *Treubia*, **9** (suppl.) : 208 (Indo-Australian species). Type-species : *Scolia nitida* Smith, 1859 (subsequent designation).

1967. *Austroscolia* Betrem : Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 293 (*Austroscolia* raised to generic status).

Type-species : *Scolia nitida* Smith, 1859 (subsequent designation).

Small to moderately large-sized species, about 10-34 mm in body length. Integument black, except in *Austroscolia ruficeps* (Smith), where the head and antennae are red; vestiture usually black. Wings medium to dark brown, sometimes yellowish hyaline.

Front with an arched ridge or carina, running from one ocular sinus to another and passing behind the anterior ocellus, very strong in the male but rather weak in female.

Fore wing with single recurrent vein and two to three submarginal cells.

Female : Head narrower than the thorax; mandibles with two blunt teeth along inner margin near the tip, frontal laminae not raised above the level of frontal spatium, usually differentiated by a row of close punctures; depressed basins laterad of posterior ocelli punctate.

Thorax moderately punctate; lateral carina of propodeum not extending beyond half of the length of the propodeum.

First abdominal tergite usually with a transverse ridge or carina anteriorly in the middle, sometimes the carina weak or indistinct.

Male : Mandibles with three blunt teeth along inner margin near the tip; anterior ocellus placed on a raised platform-like structure.

Thorax moderately punctate. First abdominal tergite with a transverse ridge or tubercle anteriorly in the middle, the tubercle sometimes weak to indistinct.

Male genitalia : Parameres normal, volsellae comparatively long, aedeagus with 4-5 blunt teeth.

This genus is characterised by having a typical carina on the front, which passes in a flaring from above the anterior ocellus to ocular sinuses. The carina is very strong in the male but weak in the female. The first abdominal tergite often with a transverse ridge or tubercle anteriorly in the middle, in both sexes.

This genus is widely distributed in the Old World tropics, with species occurring in Indo-Australian Region and Africa. Out of a total of twelve species distributed in the Indo-Australian Region, only two species, *viz.*, *A. ruficeps* (Smith) and *A. nudata* (Smith) are represented in India. These can be differentiated by the following key.

Key to the Species of *Austroscolia*

1. Head and antennae orange to red, rest of the integument entirely black. Widely distributed in the Oriental Region 1. *ruficeps* (Smith)
- Integument entirely black. India, Myanmar, Nepal 2. *nudata* (Smith)

1. *Austroscolia ruficeps* (Smith)

This polytypic species is widely distributed in the Oriental Region, where it ranges from Sri Lanka through India, Myanmar and southeast Asia to Flores Island in Philippines and China.

This species can be easily recognised and separated from its all other congeners, by having head and antennae orange or red. Eight subspecies have been recorded. These are : *ruficeps ruficeps* (Smith) from Sumatra, Java, Malaya, Myanmar and India; *ruficeps pagiensis* (Betrem) from Siberut Island; *ruficeps roepkei* (Betrem) from East Sumba; *ruficeps lombokenesis* (Betrem) from Lombok; *ruficeps costalis* (Micha) from Sulawesi; *ruficeps cupreoviolacea* (Micha) from Andaman & Nicobar Islands, India; *ruficeps henryi* Krombein from Sri Lanka; and an undescribed subspecies from Philippines. These subspecies are differentiated mainly by the differences in the colour and reflections of the wings, particularly that of female. Two subspecies are represented in India. These can be differentiated by the following key :

Key to the Indian Subspecies of *ruficeps*

1. Wings, in female, yellowish-brown with coppery or golden effulgence. India; Indonesia, Malaysia and Myanmar.(a) *ruficeps ruficeps* (Smith)
- Wings, in female, dark brown with predominantly purplish effulgence. India....
.....(b) *ruficeps cupreoviolacea* (Micha)

(a) *Austroscolia ruficeps ruficeps* (Smith)

1838. *Scolia capitata* Guerin, *Voy. Coq.* : 238. Male, Senegal or Indes Orientali (holotype in Paris Museum).
1855. *Scolia ruficeps* Smith, *Cat. Hym. British Mus.*, **3** : 111. Female, Male, Philippines (type in British Museum).
1864. *Scolia (Triscolia) capitata* Guerin : Suassure & Sichel, *Cat. Spec. Gen. Scolia* : 47. Female, Male.
1873. *Scolia (Triscolia) capitata* Guerin : Smith, *J. Linn. Soc. Zool.*, **11** : 343 (synonymised *Scolia ruficeps* Smith, 1855).
1892. *Scolia (Triscolia) capitata* Guerin : Magretti, *Ann. Mus. civico Stor. Nat. Genova*, **12** : 237. Male, Bhamo, Myanmar.
1897. *Scolia capitata* Guerin : Dalla Torre, *Cat. Hym.*, **8** : 150.
1897. *Scolia (Triscolia) capitata* Guerin : Bingham, *Fauna British India, Hym.*, **1** : 76. Female, Male. India : Sikkim, Calcutta, Kumaon; Myanmar.
1906. *Scolia (Triscolia) capitata* Guerin : Bingham, *Fasc. Malayesis*, **2** (app.) : IV. Biserat, Malakka.
1927. *Triscolia ruficeps ruficeps* (Smith) : Micha, *Mitt. zool. Mus. Berlin*, **13** : 96 (*Scolia ruficeps* Smith, 1855 resurrected by reason of *capitata* Guerin preoccupied as *Triscolia capitata* Fabricius, 1804).
1927. *Triscolia nigropilosa* Micha, *Mitt. zool. Mus. Berlin*, **13** : 100. Male, Sikkim (type in Berlin Museum).
1927. *Triscolia tenggerana* Micha, *Mitt. zool. Mus. Berlin*, **13** : 100. Male, Tenggerab, Ost Java (type in Berlin Museum).
1927. *Triscolia viridiaenea* Micha, *Mitt. zool. Mus. Berlin*, **13** : 100. Male, Batu Island, West Sumatra (holotype in Berlin Museum).
1927. *Triscolia ruficeps impressifrons* Micha, *Mitt. zool. Mus. Berlin*, **13** : 100. Male; Tenasserim, Thunghu (holotype in Berlin Museum).
1928. *Scolia (Austroscolia) ruficeps ruficeps* Smith : Betrem, *Treubia*, **9** (suppl.) : 217-218. Female, Male (material from Java, Sumatra, Malakka, Myanmar and India).
1941. *Scolia (Austroscolia) ruficeps ruficeps* Smith : Betrem, *Notes Ent. Chinoise*, **8** (4) : 125. Male; Yunnan, China.

1967. *Austroscolia ruficeps ruficeps* Smith : Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 319-320 (specimen of *Scolia rufipes* Smith, 1855 from Molumein in Myanmar, designated as lectotype, and also noted that the syntypes from Philippines belonged to different subspecies).
1972. *Scolia ruficeps ruficeps* (Smith) : Bradley, *Mitt. zool. Mus. Berlin*, **48** (1) : 11, 13, 16, 17, 18 (type study notes on *Triscolia ruficeps impressifrons* Micha, p. 11, Male holotype; *T. r. nigropilosa* Micha, p. 13, Male syntype; *T. r. tenggerana* Micha, p. 16, 17, Male type; *T. r. viridiaenea* Micha, p. 18, Male type).

This subspecies is widely distributed in Indo-Malayan subregion, where it ranges from Sumatra westwards through Malaya and Myanmar to India, and also occurs in Java. It is recorded here, for the first time, from southern India.

This subspecies can be differentiated from its allied subspecies from Sri Lanka and Andaman & Nicobar Islands, by having wings, in female, yellowish-brown with coppery to golden effulgence.

Female : length 17-20 mm. Black, except head and antennae entirely orange or red. Vestiture black, except reddish to brownish on the head, sometimes brownish on pronotum also. Wings yellowish-brown, fore wing anteriorly darker, with coppery effulgence.

Apical margin of the clypeus bisinuate, median raised area of the disc impunctate, at sides with close punctures; frontal spatium subcontiguously punctate; frontal fissura weak, extending half-way to anterior ocellus; front with moderate-sized close to sparse punctures medially, at sides impunctate; anterior ocellus in a shallow pit; vertex impunctate, except laterad of posterior ocelli with some close punctures.

Scapula subcontiguously punctate anteriorly, posteriorly with sparse punctures; mesoscutum with moderately large, mostly sparse punctures, with a large to small impunctate area posteriorly in the middle; scutellum and metanotum with moderate-sized subcontiguous punctures; mesopleurum with coarse, contiguous to subcontiguous punctures; upper plate of metapleurum with moderate-sized, subcontiguous punctures at its upper half, lower half impunctate, lower plate with subcontiguous punctures; propodeum with large, mostly subcontiguous punctures, except for a small impunctate area anteriorly on dorso-lateral areas; fore wing with a single recurrent vein and three submarginal cells.

First abdominal tergite with a small antero-median tubercle, surface medially with scattered punctures, at sides with subcontiguous punctures.

Male : Length 15-18 mm. Black, except head and antennae reddish. Vestiture black, except on head reddish-brown. Wings dark brown, fore wing dark anteriorly, with golden and a few coppery reflections.

Clypeus with small, sparse punctures in the middle, laterally with close punctures; frontal area with small, sparse to close punctures; frontal spatium with close to subcontiguous punctures; frontal fissura very weak, not extending to anterior ocellus; front with small, scattered punctures; anterior ocellus in a shallow pit, slightly depressed anteriorly; posterior ocelli slightly depressed laterally, not margined behind by any groove; vertex with moderately close punctures.

Scapulae with shallow, close punctures; mesoscutum with close punctures, except for a small impunctate area in the middle; scutellum with close punctures; metanotum with similar punctation, except narrowly impunctate longitudinally in the middle; mesopleurum with coarse, mostly subcontiguous punctures; upper plate of metapleurum with coarse to fine, close to subcontiguous punctures; lower plate with coarse, subcontiguous punctures; propodeum with coarse, subcontiguous punctures; fore wing with a single recurrent vein and three submarginal cells.

First abdominal tergite without any antero-median tubercle, surface with large, close punctures. Genitalia as in figure.

Distribuion : India : Karnataka (Ponnampet in Kodagu dist.), Manipur (Kanchipur), Sikkim and West Bengal (Siliguri). *Elsewhere* : Indonesia, Java, Sumatra, Malaysia and Myanmar.

(b) *Austroscolia ruficeps cupreoviolacea* (Micha)
(Figure 45)

1927. *Triscolia ruficeps cupreoviolacea* Micha, *Mitt. zool. Mus. Berlin*, **13**. 97. Female, Male; Andamans (types in Berlin Museum).
1928. *Scolia (Austroscolia) ruficeps cupreoviolacea* (Micha) : Betrem, *Treubia*, **9** (suppl.) : 218-219 (notes and key based on Micha, 1927).
1972. *Austroscolia ruficeps cupreoviolacea* (Micha) : Betrem in Bradley, *Mitt. zool. Mus. Berlin*, **48** (1) : 7 (new comb.; notes on types by Bradley).

This subspecies previously known from Andamans only, is recorded here, for the first time from Nicobar Islands.

It differs from its allied subspecies from northern and sothern India, in having dark brown wings with purplish and coppery reflections.

Female : Length 17-22 mm. Black, except head and antennae entirely red. Vestiture black, except for some reddish hair on head. Wings dark brown with predominantly purplish effulgence.

Body punctation as in *A. ruficeps ruficeps* (Smith).

Male : Length 15-20 mm. Black, except head and antennae entirely red. Vestiture black, except on the head, inter-mixed with some reddish hair. Wings dark brown with mostly violaceous reflections.

Body punctation as in *A. ruficeps ruficeps* (Smith).

Male genitalia as in figure 45.

Distribution : India : Andaman & Nicobar Islands : Middle Andaman (Bakutala, Yereta, Rangot) and Nicobar.

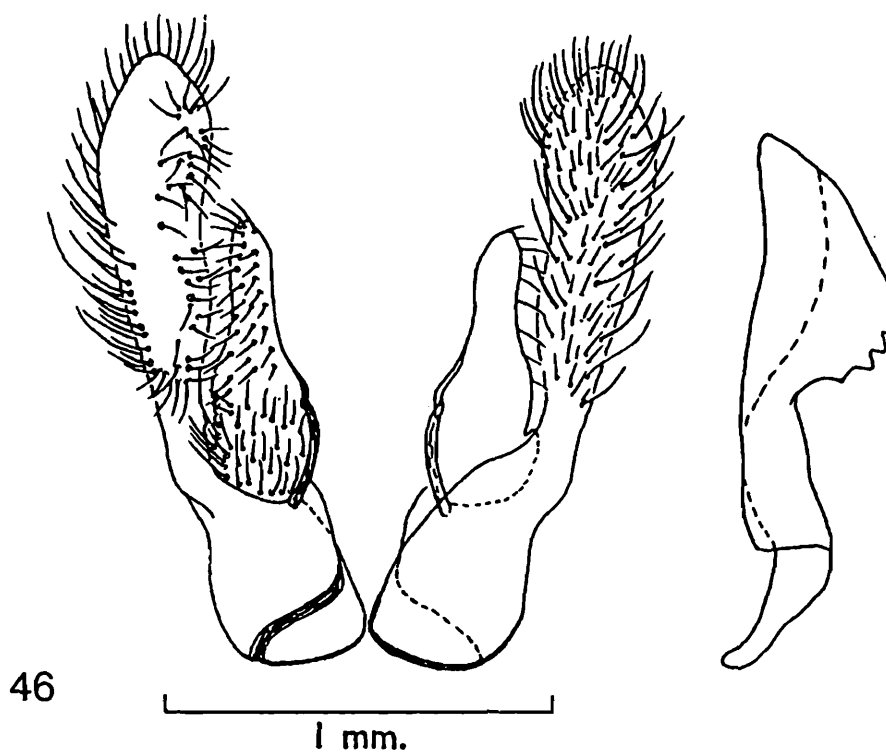
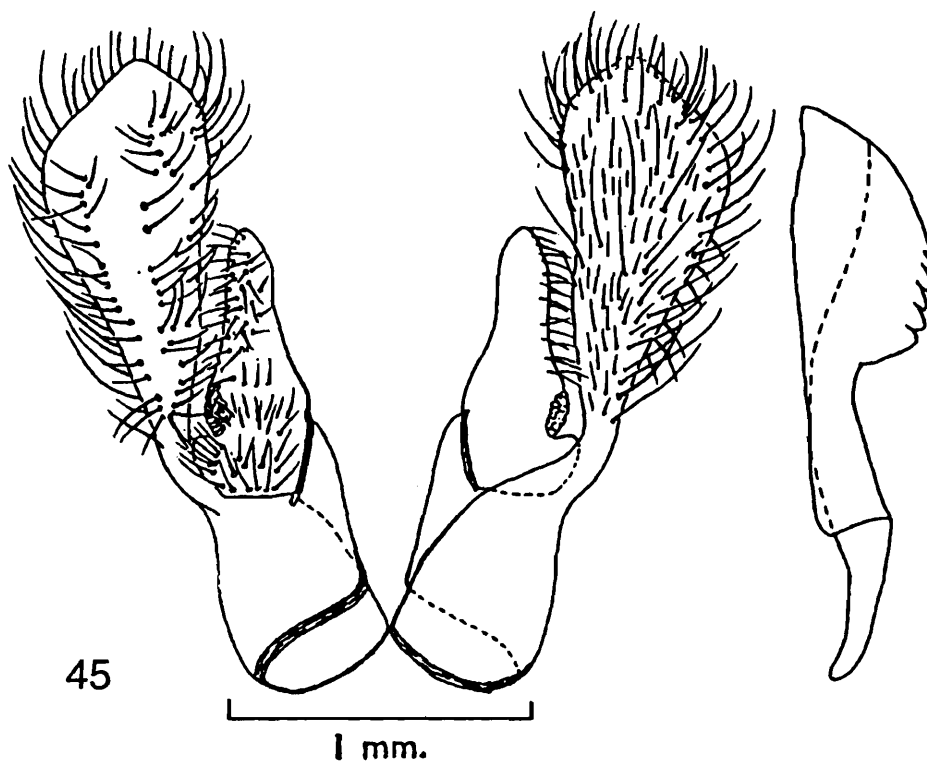
2. *Austroscolia nudata* (Smith) (Figure 46)

1855. *Scolia nudata* Smith, *Cat. Hym. British Mus.*, **3** : 110. Female, North Bengal (holotype in British Museum).
1864. *Scolia (Triscolia) nudata* Smith : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 38. Male, Female.
1892. *Scolia (Triscolia) nudata* Smith : Magretti, *Ann. Mus. civico Stor. Nat. Genova*, **12** : 237. Female.
1897. *Scolia (Triscolia) nudata* Smith : Bingham, *Fauna British India, Hym.*, **1** : 74. Female, Male, India : Assam; Myanmar : Tenasserim.
1897. *Scolia nudata* Smith : Dalia-Torre, *Cat. Hym.*, **8** : 172.
1927. *Triscolia semibrunescens* Micha, *Mitt. zool. Mus. Berlin*, **13** : 101. Male, Kumaon Hills (holotype in Berlin Museum).
1928. *Scolia (Austroscolia) nudata* Smith : Betrem, *Treubia*, **9** (suppl.) : 219-220. Female, Male, India : Madras, Abu; Bangladesh : Silhet (synonymised *Triscolia semibrunescens* Micha).
1967. *Austroscolia nudata* Smith : Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 317 (note on holotype; new combination).
1972. *Triscolia semibrunescens* Micha : Bradley, *Mitt. zool. Mus. Berlin*, **48** (1) : 14 [notes on holotype; suggested new combination as *Austroscolia semibrunescens* (Micha)].

This species is widely distributed in India and also found in Myanmar. It is recorded here for the first time from Nepal.

It is very close to *Austroscolia ignota* (Betrem) from Sri Lanka, in having entirely black integument and vestiture, dark brown wings and more or less similar punctation of the body in both the sexes. However, it can be differentiated by having, in female, vertex behind post-ocellar furrow with coarse scattered punctures, and mesoscutum entirely punctate, except for a V-shaped impunctate area in the middle. Whereas, in *A. ignota* vertex behind the furrow broadly impunctate and mesoscutum with a large impunctate area in the middle.

Bradley (1972) noted that *Austroscolia semibrunescens* (Micha) should be treated as a distinct species or at least subspecies. *A. semibrunescens* (Micha) differs in



Figs. 45-46 : Male genitalia : Ventral aspect at left, dorsal aspect in middle and aedeagus in profile on right. 45, *Austroscolia ruficeps cupreoviolacea* (Micha); 46, *Austroscolia nudata* (Smith).

having posterior half of the fore wing hyaline rather than the fore wing entirely dark brown. Since, the type locality of this species is within the distributional range of *A. nudata*, it can not be considered even a different subspecies. The collection and study of more material, particularly the females, can only help in solving this problem. Therefore, it is treated here under *A. nudata* (Smith).

Female : Length 14-19 mm. Integument and vestiture entirely black, abdomen with faint blue reflections. Wings dark brown with mostly purplish reflections.

Apical margin of the clypeus weakly bisinuate, lateral lobes not well developed, raised median area of the disc impunctate, at sides with moderate-sized subcontiguous punctures; frontal fissura weak, extending half-way to anterior ocellus; frontal spatium with contiguous to subcontiguous punctures; front with some subcontiguous to more separated punctures medially in front of anterior ocellus, elsewhere impunctate; ocelli in a shallow pits; vertex with coarse, scattered punctures in the middle, at sides with small, close punctures.

Scapulae with small, subcontiguous punctures; mesoscutum with moderate-sized punctures, mostly separated by the diameter of a puncture anteriorly, posteriorly the punctures widely separated, with a V-shaped impunctate area in the middle; scutellum and metanotum with small punctures, mostly separated by the diameter of a puncture; mesopleurum with moderate-sized, mostly subcontiguous punctures, broadly impunctate anteriorly and posteriorly; upper plate of metapleurum with small, subcontiguous punctures on upper fourth to half, elsewhere impunctate, lower plate with subcontiguous punctures, impunctate along upper and posterior margins; dorsal propodeal surface with moderately large subcontiguous punctures, except for a small impunctate area anteriorly on lateral sections, vertical surface punctate, except punctures contiguous along upper margin, posterior surface with more separated punctures.

First abdominal tergite with a short transverse tubercle anteriorly in the middle, surface medially with scattered punctures, laterally with small, dense punctures.

Male : Length 13-17 mm. Integument and vestiture black, abdomen with faint blue reflections. Wings dark brown, often basally hyaline, sometimes posterior half hyaline, effulgence purplish.

Clypeus with small punctures, sparse in the middle and close at sides; frontal area with small, close punctures; frontal fissura weak; front with subcontiguous to somewhat sparse punctures; frontal fissura weak; front with small, close to scattered punctures in the middle, at sides impunctate, ocular sinuses with small, close and sparse punctures; vertex with moderately close punctures, its declivous portion with small, sparse punctures.

Scapulae with shallow, close punctures; mesopleurum with mostly sparse punctures, with a V-shaped impunctate area posteriorly in the middle; scutellum and metanotum with close punctures, except metanotum narrowly impunctate in the midline;

mesopleurum with moderately large, subcontiguous punctures; upper plate of metapleurum with small subcontiguous to sparse punctures on upper third, lower two-third impunctate, lower plate with moderately large subcontiguous punctures; propodeum with coarse, mostly subcontiguous punctures, except for a small impunctate area anteriorly on lateral horizontal surface.

First abdominal tergite with short, transverse tubercle anteriorly in the middle, surface with sparse punctures in the middle, laterally with close punctures. Male genitalia as in figure.

Male genitalia as in figure 46.

Distribution : India : Assam, Himachal Pradesh (Kangra), Karnataka (Bangalore), Orissa (Angul, Sambalpur), Rajasthan (Abu), Tamil Nadu (Coimbatore, Chennai), Uttaranchal (Almora, Kausanie, Dehra Dun) and West Bengal (North Bengal). *Elsewhere* : Bangladesh, Myanmar and Nepal.

12. Genus *Megascolia* Betrem

1927. *Scolia* subgenus *Triscolia* Saussure and Sichel : Betrem, *Tijdschr. Ent.*, **70** (verslag) : xcvii. Type-species : *Scolia flavifrons* Fabricius, 1775.
1928. *Scolia* subgenus *Triscolia* Saussure and Sichel : Betrem, *Treubia*, **9** (suppl.) : 224.
1928. *Scolia* subgenus *Triscolia* section *Triscolia* Saussure and Sichel : Betrem, *Treubia*, **9** (suppl.) : 228. Type-species : *Scolia flavifrons* Fabricius, 1775.
1928. *Scolia* subgenus *Triscolia* section *Megascolia* Betrem, *Treubia*, **9** (suppl.) : 239. Type-species : *Scolia procer* Illiger, 1802.
1933. *Scolia* subgenus *Triscolia* Saussure and Sichel : Betrem, *Stettin. ent. Ztg.*, **94** : 254.
1941. *Scolia* subgenus *Triscolia* Saussure and Sichel : Betrem, *Notes Ent. Chinoise*, **8** (4) : 117.
1964. *Megascolia* Betrem : Betrem and Bradley, *Zool. Meded.*, **39** : 437 (*Megascolia* Betrem raised to generic status).

Type-species : *Scolia procer* Illiger, 1802 (Original designation).

Medium to large-sized species, about 19-50 mm in length. Black, usually extensively marked with yellow or red on head and abdomen, sometimes thorax also maculated with similar marks. Vestiture dense and long, predominantly black or ferruginous, usually black with yellow or red on coloured parts. Wings usually dark brown, sometimes yellowish hyaline, with blue, violaceous or golden reflections.

Female : Mandibles with one blunt tooth at their inner margin; frontal laminae strongly raised and divergent; frontal spatium finely punctate, often impunctate in middle; frontal furrow extending half-way to anterior ocellus and ending into a pit; temporal groove barely indicated; posterior ocelli near to each other than to the eyes;

distance from the eyes to the hind margin of head equal to about twice the diameter of upper lobe of an eye; post-ocellar furrow shallow; vertex without any depressed basin on either side of the posterior ocelli; scapulae with or without tubercle; thorax moderately punctate, propodeum finely punctate, at least at its dorso-median area. Fore wing with three submarginal cells, except *M. fulvifrons* (Saussure) with two submarginal cells.

Abdominal tergites widely glabrous anteriorly, first tergite with a strong glabrous antero-median tubercle, apical fringes of tergites invisible in dense setae.

Male : Mandibles with two blunt teeth at their inner margin; frontal spatium usually densely punctate; front without any carina; ocelli not enclosed by any carina; scapulae with or without tubercle. Fore wing with three submarginal cells, except *M. fulvifrons* (Saussure) with two submarginal cells.

Abdominal tergites densely punctate, first tergite with a strong, pointed antero-median tubercle.

Male genitalia : Basal volsella separated by a deep notch; cuspis volsellaris with or without blade-like appendage along its inner edge; apical setae of the cuspis long, coarse and conspicuous; aedeagus roundedly subtruncate apically, with needle-like or small teeth.

This genus is widely distributed in the Oriental Region, and also occurs in the Mediterranean subregion. Of the thirteen species known from these regions, eleven species are represented in the Oriental Region. In addition, one new species is described here from India.

Betrem (1928) divided *Triscolia* into two sections, viz., *Triscolia* s. str and *Megascolia* Betrem. The former contained several Oriental species, two Mediterranean species, and two North American species. Section *Megascolia*, however, contained only several Oriental species. Betrem & Bradley (1964) observed that the two North American species, included in *Triscolia* s. str. by Betrem (1928), belonged to a taxon different from that of Mediterranean and Oriental species. The name *Triscolia* Saussure, with *Scolia badia* Saussure known to be its type-species, was applied to the American taxa, and *Megascolia* Betrem, contained the Old World species.

Betrem in Betrem & Bradley (1964) also observed that De Saussure published the taxon *Triscolia* in the year 1863, and included only *Scolia badia* Saussure, which is therefore the type-species by monotypy. The genus *Megascolia* was further divided into two subgenera, viz., *Megascolia* Betrem, identical with the section called *Megascolia* by Betrem (1928), and *Regiscolia* Betrem & Bradley (1964), for the section that Betrem (1928) called *Triscolia*.

The subgenera *Megascolia* Betrem and *Regiscolia* Betrem & Bradley can be differentiated by the following key :

Key to the Subgenera of *Megascolia*

Female

1. Clypeus very broad, its anterior rim narrow and not broadly truncate or subtruncate at its median portion; disc of the clypeus strongly raised in the middle, punctate; scapulae usually with a strong tubercle in front of each tegula, this tubercle may be small and weak. Oriental Region 1. subgenus *Megascolia* Betrem
- Clypeus relatively small and narrow, its anterior rim broad and broadly truncate or subtruncate at its median portion; clypeal disc not raised in the middle, flat, usually rugulose; scapulae without any tubercle in front of tegulae. Oriental Region, Mediterranean subregion 2. subgenus *Regiscolia* Betrem & Bradley

Male

1. Apical portion of the volsellae without a blade-like appendage along inner edge; apex of the cuspis volsellaris with long, coarse, conspicuous setae; plates of the aedeagus with needle-like teeth subgenus *Megascolia* Betrem
- Apical portion of the volsellae with a blade-like appendage along inner edge; apex of the cuspis volsellaris often with small setae; apical third of the plates of aedeagus often with very fine, small teeth subgenus *Regiscolia* Betrem & Bradley

1. Subgenus *Megascolia* Betrem

1928. *Scolia* subgenus *Triscolia* section *Megascolia* Betrem, *Treubia*, 9 (suppl.): 239. Type-species : *Scolia procer* Illiger, 1802.

1964. *Megascolia* subgenus *Megascolia* Betrem : Betrem & Bradley, *Zool. Meded.*, 39 : 438 (*Megascolia* Betrem raised to subgeneric status).

Type-species : *Scolia procer* Illiger, 1802 (Original designation).

Large-sized species, about 30-50 mm in length. Black, usually with yellow or reddish marks on head and some of the abdominal tergites, sometimes similar marks on scapulae, scutellum and metanotum also. Vestiture predominantly black, sometimes black mixed with yellow, usually yellow on coloured integumental parts. Wings dark brown with blue or brown reflections.

Female : Clypeus very broad, its anterior rim narrow and not widely truncate or subtruncate at its median portion; disc of the clypeus strongly raised in the middle, punctate.

Scapulae with a strong tubercle in front of each tegula, sometimes this tubercle is small and indistinct.

Male genitalia : Apical portion of volsellae without a blade-like appendage along inner edge; apex of the cuspis volsellaris with long, coarse and conspicuous setae; plates of the aedeagus with about 11 needle-like teeth, the teeth in the middle longer.

This subgenus is distributed in the Oriental Region, where it ranges from northern India eastwards through Myanmar, Thailand and southeast Asia to north Sulawesi and Moluccas. It is recorded here for the first time from India.

This subgenus is represented in Oriental Region by four species, viz., *M. (M.) procer* (Illiger, 1802), *M. (M.) scutellaris* (Gribodo, 1893), *M. (M.) velutina* (Saussure, 1859) and *M. (M.) speciosa* (Smith, 1857). These species are the largest-sized members of the family Scoliidae.

Only one species, viz., *M. (M.) procer* (Illiger) occurs in India. It is detailed as below.

1. *Megascolia (Megascolia) procer* (Illiger)

This polytypic species is widely distributed and ranges from Arunachal Pradesh in northern India eastwards through Myanmar, Thailand, Malaysia, Sumatra, Java and Kalimantan to Palawan in Philippines, and also occurs in Nias Island.

It can be distinguished from other species of this subgenus by having metanotum, in female, broadly impunctate and the vertex entirely to largely maculated with yellow. Betrem & Bradley (1964) recorded four subspecies, viz., *procer procer* (Illiger) from Myanmar, Thailand, Malaya, Singapore, Sumatra, Sarawak and Kalimantan; *procer javanensis* Betrem, from Java; *procer nigriventris* (Mantero) from Nias Island; and *procer bimaculata* (Gribodo) from Palawan in Philippines.

M. (M.) procer procer (Illiger, 1802) is the only subspecies now recorded from India, which is described below.

(a) *Megascolia (Megascolia) procer procer* (Illiger)

(Figure 47)

- 1802. *Scolia procer* Illiger, *Mag. Ins.*, 1 : 196. Female, Male; Sumatra (type in Berlin Museum).
- 1804. *Scolia procer* Illiger : Fabricius, *Syst. piez.*, : 238-239. Female, Male; Sumatra.
- 1858. *Scolia procer* Illiger : Smith, *J. Linn. Soc. London (Zool)*, 2 : 89. Female.
- 1864. *Scolia (Triscolia) procer* Illiger : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 43. Female, Male.
- 1871. *Scolia (Triscolia) procer* Illiger : Smith, *J. Linn. Soc. London (Zool)*, 11 : 343. Female, Male.
- 1892. *Scolia (Triscolia) procer* Illiger : Magretti, *Ann. Mus. civico Stor. Nat. Genova*, 12 : 236. Female; Bhamo, Myanmar.
- 1893. *Triscolia procer* (Illiger) : Gribodo, *Bull. Soc. Ent. Ital.*, 25 : 152. Female, Male; Sumatra.
- 1893. *Triscolia procer* var. *scapulata* Gribodo, *Bull. Soc. Ent. Ital.*, 25 : 163. (Female lectotype from Sumatra only).

1893. *Triscolia procer* var. *sumatrensis* Gribodo, *Bull. Soc. Ent. Ital.*, **25** : 164. Male; Sumatra.
1897. *Scolia* (*Triscolia*) *procer* Illiger : Bingham, *Fauna British India, Hym.*, **1** : 75-76, fig., Female, Male (specimens from Kalimantan, Sumatra and Myanmar only).
1897. *Scolia procer* Illiger : Dalla-Torre, *Cat. Hym.*, **8** : 174.
1897. *Scolia procer* var. *scapulata* Gribodo : Dalla-Torre, *Cat. Hym.*, **8** : 174.
1897. *Scolia procer* var. *sumatrensis* Gribodo : Dalla-Torre, *Cat. Hym.*, **8** : 174.
1905. *Scolia* (*Triscolia*) *procer* Illiger : Cameron, *Tijdschr. Ent.*, **48** : 52; Malakka.
1927. *Triscolia procer* forma *luteifrons* Micha, *Mitt. zool. Mus. Berlin*, **13** : 108-109 (Female, Male from Sumatra and Kalimantan).
1927. *Triscolia procer* forma *capitata* Fabricius : Micha, *Mitt. zool. Mus. Berlin*, **13** : 109, Male; Sumatra and Kalimantan (misdet. *capitata* Fabricius, 1804).
1928. *Scolia* (*Triscolia*) *procer* Illiger : Betrem, *Treubia*, **9** (suppl.) : 240-241. Female, Male (specimens from Kalimantan, Malaysia, Singapore, Sumatra, Thailand and Myanmar only).
1928. *Scolia* (*Triscolia*) *procer* var. *sarawakensis* Betrem, *Treubia*, **9** (suppl.) : 241-242. Males; Bajong, Kalimantan (holotype in Leiden Museum).
1928. *Scolia* (*Triscolia*) *procer* var. *capitata* Fabricius : Betrem, *Treubia*, **9** (suppl.) : 241-242. Male; Kalimantan (misdet. *capitata* Fabricius, 1804).
1933. *Scolia* (*Triscolia*) *procer* var. *luteifrons* Micha : Betrem, *Stettin. ent. Ztg.*, **94** : 256, Male; Kalimantan.
1964. *Megascolia* (*Megascolia*) *procer procer* Illiger : Betrem & Bradley, *Zool. Meded.*, **39** : 438-439, 441 (*Megascolia* raised to generic status; synonymised *scapulata* Gribodo, 1893, *luteifrons* Micha, 1927, *sumatrensis* Gribodo, 1893 and *sarawakensis* Betrem, 1928; types of *Scolia procer* Illiger studied and lectotype female designated).
1972. *Megascolia* (*Megascolia*) *procer procer* Illiger : Betrem in Bradley, *Mitt. zool. Mus. Berlin*, **48** (1): 12,14 (notes on the types of *Triscolia procer* form *luteifrons* Micha, p.12 and *Scolia procer* Illiger, p.14).

This species, of the family Scoliidae from the Oriental Region, is largest in body size. It is widely distributed from Sarawak and Kalimantan westwards through Singapore, Sumatra, Malaya and Thailand to Myanmar, and is also recorded here from India. The large-sized female, measuring 50 mm in length has been recently recorded from Tirap district of Arunachal Pradesh, India.

Female : Length 45-50 mm. Black, the following yellow : front and vertex entirely, except ocellar triangle, dorsal surface of scapulae, scutellum in the middle, a small spot on metanotum (rarely absent), a large spot anteriorly in the middle on first abdominal tergite (rarely absent), paired antero-lateral spot on third tergite. Vestiture predominantly black. Wings dark brown with blue reflections.

Clypeus with coarse, sparse to close punctures at median raised area, at sides with subcontiguous to contiguous punctures, along anterior margin with small, contiguous punctures; frontal spatium broadly impunctate in the middle, at sides along the frontal laminae with moderate sized punctures, mostly separated by the diameter of a puncture; frontal fissura extending half-way to anterior ocellus and ending into a pit; anterior ocellus in a shallow pit; front and vertex impunctate, except for a few scattered punctures.

Scapulae with a large tubercle in front of tegula, dorsal surface largely impunctate posteriorly, anteriorly with small punctures, mostly separated by the diameter of a puncture, vertical surface with somewhat large punctures separated by the diameter or half the diameter of a puncture; mesoscutum with a very large impunctate area posteriorly in the middle of its two-thirds, anterior one-third with punctures mostly separated by the diameter of a puncture, at sides with small, sparse to scattered punctures; scutellum broadly impunctate in the middle, along the anterior margin and at sides with sparse to scattered punctures; metanotum with a few scattered punctures in the middle, at sides with a few small sparse punctures; mesopleurum with moderate-sized punctures, mostly separated by the diameter of a puncture; upper plate of metapleurum with moderate-sized, sparse punctures at its posterior half, anterior half with small, scattered punctures, lower plate with mostly small, sparse to scattered punctures, broadly impunctate along its upper and posterior margins.

Dorso-median area of propodeum with small punctures, mostly separated by the diameter of a puncture, dorso-lateral areas with moderate-sized to coarse punctures, mostly separated by the diameter of a puncture, the punctures becoming closer along lateral margins, with a large impunctate area anteriorly, lateral surface with small, scattered punctures, punctures closer along upper margin, posterior surface sparsely punctate.

First abdominal tergite with a large antero-median tubercle, surface with a large impunctate area behind the tubercle, posteriorly and at the sides with small, dense punctures; second tergite with scattered punctures, except along the posterior margin and paired large patches antero-laterally with small, dense punctures, second sternite with a large antero-median tubercle.

Male : Length 37 mm. Black, the following yellow : clypeus, scrobes, frontal area, frontal spatium along the posterior margin, front, ocular sinuses, vertex, except ocellar triangle, a narrow line along upper posterior eye margin, dorsal surface of scapulae, scutellum and metanotum in the middle, a large antero-median spot on first abdominal tergite, paired antero-lateral spots on third tergite. Vestiture black. Wings dark brown, with blue reflections.

Clypeus with small, scattered punctures in the middle and along anterior margin, at sides with large and close punctures; frontal spatium distinctly marked posteriorly,

contiguously punctate; frontal fissura extending up to anterior ocellus; the latter in a shallow pit; front impunctate, except for some small shallow punctures in ocular sinuses; ocellar triangle with moderate-sized deep sparse to close punctures; vertex with small, sparse to scattered punctures, without any furrow behind ocelli.

Scapulae sparsely punctate; mesoscutum with moderately small punctures, mostly separated by the diameter of a puncture, posterior two-thirds with an impunctate area; scutellum and metanotum with sparse to scattered punctures; upper plate of mesopleurum with punctures mostly separated by the diameter of a puncture, lower plate with relatively smaller and sparser punctures; upper plate of metapleurum with punctures mostly separated by half the diameter of a puncture except for a small impunctate area anteriorly below, lower plate with punctures mostly separated by more than the diameter of a puncture.

Dorsal surface of propodeum with moderately small punctures mostly separated by the diameter of a puncture, lateral surface with small, scattered punctures, posterior surface closely punctate above but sparsely punctate below.

First abdominal tergite with a large, pointed antero-median tubercle, surface behind the tubercle broadly impunctate, posteriorly and at sides with small, dense punctures; second tergite with small, sparse punctures, punctures closer at sides and denser posteriorly; second sternum with a tubercle.

Male genitalia as in figure 47.

Distribution : India : Arunachal Pradesh (Miao in Tirap dist.). *Elsewhere* : Indonesia : Sarawak, Kalimantan, Sumatra. Malaysia, Myanmar, Singapore, Thailand.

2. Subgenus *Regiscolia* Betrem & Bradley

1928. *Scolia* subgenus *Triscolia* section *Triscolia* Saussure : Betrem, *Treubia*, **9** (suppl.): 228. Type-species : *Scolia flavifrons* Fabricius, 1775.

1964. *Megascolia* subgenus *Regiscolia* Betrem & Bradley, *Zool. Meded*, **39** : 441 (*Regiscolia* erected as a new subgenus under genus *Megascolia*). Type-species : *Scolia flavifrons* Fabricius, 1775.

Type-species : *Scolia flavifrons* Fabricius, 1775 (Original designation).

Medium to large-sized species, about 17-35 mm in length. Integument black, marked with yellow or red on head and some of the abdominal tergites. Vestiture usually black, sometimes ferruginous, mostly black with yellow or reddish on coloured integument. Wings dark brown, sometimes yellowish hyaline or brownish, with blue or golden reflections.

Female : Clypeus relatively narrow, anterior rim broad and broadly truncate or subtruncate in the middle, disc not raised in the middle, rather flat, usually longitudinally rugulose.

Scapulae without any tubercle in front of tegulae. Fore wing with three submarginal cells, except *M. (R.) fulvifrons* (Saussure), which has two submarginal cells.

Male genitalia : A large hook separated by a deep notch at the base of each volsella; sensory cones numerous; terminal part of volsella with a blade-like along inner edge; lateral plates of aedeagus roundly subtruncate, with serrate teeth.

This subgenus is widely distributed in the Oriental Region, and also occurs in the Mediterranean subregion.

Betrem & Bradley (1964) recorded nine species from Oriental Region, of these three species occurs in India. In addition one new species is described here from India. These can be differentiated by the following key :

Key to the species of *Megascolia* (*Regiscolia*)

Female

1. Fore wing with two submarginal cells. India, Bangladesh 1. *fulvifrons* (Saussure)
- Fore wing with three submarginal cells.....2
2. Second and third abdominal tergites with large paired yellow spots, Vestiture predominantly ferruginous. Wings yellowish hyaline, with golden reflections. Turkestan, Bukhara, Pakistan and India. 2. *rubida* (Gribodo)
- Second abdominal tergite never with yellow spots; third to sixth or fourth to sixth tergites with yellow or reddish spots. Vestiture predominantly black except reddish on apical abdominal segments. Wings dark brown, with blue reflections. Widely distributed in the Oriental Region. 3. *azurea* (Christ)

Male

1. Fore wing with two submarginal cells. India, Bangladesh. 1. *fulvifrons* (Saussure)
- Fore wing with three submarginal cells. 2
2. Second and third abdominal tergites with large paired yellow spots. Vestiture predominantly ferruginous. Wings yellowish hyaline, with golden reflections. Turkestan, Bukhara, Pakistan and India 2. *rubida* (Gribodo)
- Second abdominal tergite never with yellow spots. Vestiture either entirely black or black with reddish on apical abdominal segments. Wings dark brown, with blue reflection. 3
3. Vestiture on three or four apical abdominal segments reddish; median section of posterior surface of propodeum closely punctate adjacent to dorsal surface,

elsewhere with sparse to scattered punctures; first abdominal tergite with small subcontiguous punctures except impunctate behind tubercle. Widely distributed in the Oriental Region. 3. *azurea* (Christ)

- Vestiture on abdomen entirely black; median section of posterior surface of propodeum contiguously punctate; first abdominal tergite with moderately large deep subcontiguous punctures at its anterior half, posterior half with small, contiguous punctures, without impunctate area behind tubercle. India.
.....4. *almoraensis*, sp. nov.

1. *Megascolia (Regiscolia) fulvifrons* (Saussure)

(Figure 48)

1855. *Scolia (Lacosi) fulvifrons* Saussure, *Mem. Soc. Phys. Hist. nat. Geneva*, **14** : 43, fig. 11; Female, "Indes Orientales" (holotype in Geneva Museum).
1855. *Scolia personata* Smith, *Cat. British Mus. Hym.*, **3** : 91; Female; Sylhet (now in Bangladesh) (holotype in British Museum).
1864. *Scolia (Discolia) fulvifrons* Saussure: Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 116; Male, Female, India Orientali (synonymised *S. personata* Smith under *S. fulvifrons* Saussure).
1897. *Scolia (Discolia) fulvifrons* Saussure : Bingham, *Fauna British India, Hym.*, **1** : 81; Male, Female; Sylhet, Bangladesh; Assam, India; Tenasserim, Myanmar; Singapore.
1897. *Scolia fulvifrons* Saussure : Dalla-Torre, *Cat. Hym.*, **8** : 161.
1928. *Scolia (Triscolia) fulvifrons* Saussure : Betrem, *Treubia*, **9** (suppl.) : 238-239; Male, Female; Sylhet in Bangladesh; Darjeeling, Assam, India.
1964. *Megascolia (Regiscolia) fulvifrons* (Saussure) : Betrem & Bradley, *Zool. Meded.*, **39** : 444.
1967. *Megascolia (Regiscolia) fulvifrons* (Saussure) : Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** : 317-318 (a note on the holotype of *S. personata* Smith).
1974. *Megascolia (Regiscolia) fulvifrons* (Saussure) : Bradley, *Revue suisse Zool.*, **81** : 441 (a note on the holotype of *S. (L.) fulvifrons* Saussure).

This is an anomalous member of the genus *Megascolia*, in that the fore wing, in both sexes, has two submarginal cells rather than three. It is distributed from eastern Himalayan ranges of India and Bangladesh through Myanmar to Singapore.

Female : Length 35 mm. Black, the following reddish-yellow: front; vertex, except ocellar triangle; a pair of large rounded spots on third tergite. Vestiture black. Wings dark brown, with purplish blue reflections.

Apical margin of the clypeus broadly rounded anteriorly, in the middle widely truncate, disc flat, a subapical stripe of small, dense punctures, lateral areas with close, large punctures, center of disc longitudinally striated and impunctate; frontal

spatium impunctate in the middle, at sides along the strongly raised frontal laminae with medium sized, sparse punctures; frontal fissura extending up to anterior ocellus, distinct on the frontal spatium but weakly impressed on front; anterior ocellus in a pit; front with scattered punctures; postocellar furrow shallow, vertex with small, scattered punctures.

Scapulae with small, contiguous punctures; mesoscutum largely impunctate except anteriorly and at sides with coarse, close to sparse punctures; scutellum punctate, punctures mostly separated by the diameter of a puncture, more separated in the middle; metanotum with close punctures, in the middle with a narrow longitudinal impunctate area; mesopleurum with close punctures, the latter becoming sparser along anterior and posterior margins; upper plate of metapleurum with medium-sized, close punctures at its upper half, lower half impunctate; lower plate with small, sparse punctures; fore wing with two submarginal cells; propodeal dorsum with small contiguous to subcontiguous punctures, lateral surface with sparse to scattered punctures, posterior surface with close punctures.

First abdominal tergite with a well developed antero-median tubercle, surface with small, dense punctures except for a small impunctate area behind the tubercle; second tergite with sparse punctures, the latter becoming smaller and denser posteriorly, with a transverse shining impunctate area in the middle; third tergite largely impunctate and shining except for a apical band of fine, dense punctures.

Male : Length 30-36 mm. Black, the following reddish-yellow : a long line on scrobe extending up to ocular sinus; paired large spots, almost joining in the middle, on third tergite. Vestiture black, except reddish-yellow on the coloured integument of third tergite. Wings dark brown, with purplish reflections.

Clypeus with coarse, deep, contiguous punctures; frontal spatium distinctly defined posteriorly, surface with small, contiguous punctures; frontal fissura extending up to anterior ocellus, but not distinct on frontal spatium; anterior ocellus in a deep pit; front with medium-sized, close punctures; ocellar area with close punctures; postocellar groove shallow; vertex with shallow, close to sparse punctures.

Scapulae with small, contiguous punctures; mesoscutum largely with close punctures, the latter sparser posteriorly in the middle; scutellum with small punctures mostly separated by the diameter of a puncture; metanotum with small, close punctures, except for an impunctate longitudinal stripe in the middle; upper plate of mesopleurum closely punctate, lower plate with somewhat sparser punctures; upper plate of metapleurum with close punctures at its posterior half, anterior half impunctate, except for a few scattered punctures above, lower plate with small, sparse punctures. Fore wing with two submarginal cells.

Propodeal dorsum with small punctures, mostly separated by the diameter of a puncture, lateral surface with shallow, scattered punctures, the latter closer along upper and posterior margins, posterior surface with close punctures.

First abdominal tergite with a very strong, pointed antero-median tubercle, surface with medium-sized, close punctures, except for an impunctate area behind the tubercle; second tergite closely punctate anteriorly and posteriorly, in the middle with small and sparse punctures.

Male genitalia as in figure 48.

Distribution : India : Assam; Sikkim and West Bengal (Darjeeling). *Elsewhere* : Bangladesh, Myanmar and Singapore.

2. *Megascolia (Regiscolia) rubida* (Gribodo)

(Figure 49)

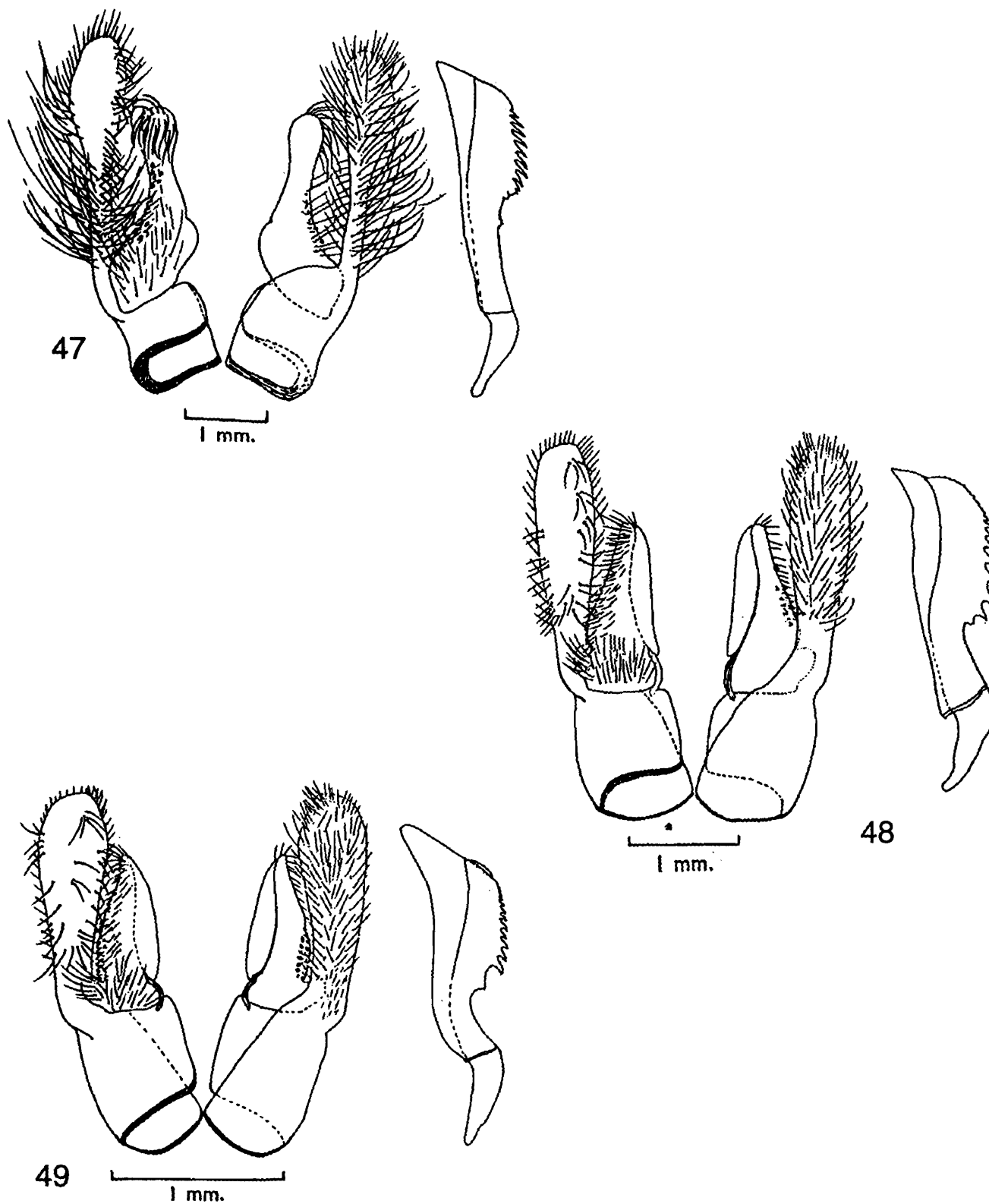
1880. *Triscolia haemorrhoidalis* (Fabricius) : Saussure, *Fedtschenko: Turkestan Scoliid* : 18; Female, Male; Turkestan (misdet.)
1893. *Triscolia haemorrhoidalis* var. *rubida* Gribodo, *Bull. Soc. Ent. Italia*, **25** : 151, Female, Turkestan.
1897. *Scolia flavifrons* var. *rubida* (Gribodo): Dalla-Torre, *Cat. Hym.*, **8** : 160.
1897. *Scolia (Triscolia) haemorrhoidalis* Fabricius : Bingham, *Fauna British India, Hym.* **1** : 77; Female, Male (material from Karachi, Pakistan and Kashmir, India only).
1927. *Triscolia rubida* Gribodo : Micha, *Mitt. zool. Mus. Berlin*, **13** : 133-134; Female, Male, Turkestan.
1928. *Scolia (Triscolia) haemorrhoidalis* Fabricius : Betrem, *Treubia*, (suppl.): 229-230 Female, Male; Kashmir; Turkestan; Bukhara and Pakistan (synonymised *rubida* Gribodo, 1893 under *Scolia haemorrhoidalis* Fabricius, 1787).
1941. *Scolia (Triscolia) rubida* (Gribodo) : Betrem, *Notes Ent. Chinoise*, **8** (4) : 118. Turkestan; Pakistan, Baluchistan, Kashmir, Punjab.
1964. *Megascolia (Regiscolia) rubida* (Gribodo) : Betrem & Bradley, *Zool. Meded.*, **39** : 443.

Gribodo (1893) observed that the female from Turkestan, identified as *Triscolia haemorrhoidalis* (Fabricius), by Saussure (1880), was different from *S. haemorrhoidalis* Fabricius and placed it under a new variety *rubida*. Betrem (1928) synonymised *rubida* Gribodo under *S. haemorrhoidalis* Fabricius. Micha (1927) and subsequently Betrem (1941) treated *rubida* as a distinct species.

This species is recorded here for the first time from Chamba in Himachal Pradesh, India.

Female : Length 30-37 mm. Black, most of the integument with reddish-brown tinge, and the following yellow : front; vertex, except ocellar triangle; paired large spots on second and third tergites. Vestiture ferruginous. Wings yellowish hyaline with golden reflections.

Clypeus behind the anterior rim with a band of small, dense punctures, at sides with coarse, close punctures, disc in the middle impunctate and rough; frontal spatium



Figs. 47-49 : Male genitalia : Ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right. 47. *Megascolia (Megascolia) procer procer* (Illiger); 48. *Megascolia (Regiscolia) fulvifrons* (Saussure) ; 49. *Megascolia (Regiscolia) rubida* (Gribodo).

in the middle impunctate, at sides with close punctures; frontal fissura extending mid-way to anterior ocellus and ending into a pit; anterior ocellus in a shallow pit; front and vertex with small to fine, scattered punctures.

Scapulae with medium-sized to small, contiguous punctures, except for a large impunctate area in front of tegulae ; mesoscutum with a large impunctate area posteriorly in the middle, anteriorly and narrowly along the posterior margin with small, close punctures, at sides with sparse punctures; scutellum with medium-sized punctures, sparse at its anterior half and scattered at its posterior half; metanotum with small, contiguous punctures; upper plate of mesopleurum contiguously punctate, lower plate with contiguous to subcontiguous punctures; upper plate of metapleurum impunctate, except for shallow close punctures along upper margin, lower plate with small shallow close punctures, broadly impunctate along upper and posterior margins; dorsal surface of propodeum contiguously punctate, lateral surface with contiguous punctures at its upper half, lower half with sparse punctures, posterior surface with close punctures.

First abdominal tergite with a large antero-median tubercle, a deep pit behind the tubercle, surface largely with close punctures, except for a sparsely punctate area behind tubercle; second tergite with small, scattered punctures, the latter become dense along posterior margin; third tergite largely impunctate, except for a stripe of small, dense punctures along posterior margin; second sternite without any tubercle anteriorly.

Male : Length 24-27 mm. Black, except antennal flagellum red, integument with reddish tinge, and the following yellow : second and third tergites almost entirely except along anterior and posterior margins dark brown. Vestiture black, on the following ferruginous : head, pronotum, the abdominal tergites except first, and sternites except first two. Wings brownish hyaline.

Clypeus with close punctures; frontal spatium with small contiguous punctures; frontal fissura extending up to anterior ocellus, the latter in a shallow pit; front and vertex with close punctures.

Scapulae contiguously punctate; mesoscutum with small, contiguous punctures at its anterior half, posterior half with somewhat large, subcontiguous punctures; scutellum with contiguous to subcontiguous punctures; metanotum contiguously punctate; mesopleurum with contiguous to subcontiguous punctures; upper plate of metapleurum with close punctures, narrowly impunctate along its lower margin, lower plate with small, contiguous punctures; dorsal propodeal surface with mostly contiguous punctures, lateral surface with somewhat well separated punctures, posterior surface with subcontiguous punctures.

First abdominal tergite with a large pointed tubercle anteriorly in the middle, surface contiguously punctate except for a small area behind tubercle, where punctures

are more separated; second tergite sparsely punctate, along the posterior margin with dense punctures; second sternite without any antero-median tubercle.

Male genitalia as in figure 49.

Distribution : India : Himachal Pradesh (Chamba) and Jammu & Kashmir (Udhampur, Srinagar, Jhelum Valley). *Elsewhere* : Pakistan and Turkistan.

3. *Megascolia (Regiscolia) azurea* (Christ)

This polytypic species is widely distributed in the Oriental Region, where it ranges from Kalimantan westwards through Java, Sumatra, Malakka, Thailand, Myanmar to Bangladesh, India, Nepal and Sri Lanka, and also occurs in southern China and Vietnam. It is recorded here for the first time from Nepal.

Betrem and Bradley (1964) recorded five subspecies, viz., *azurea azurea* (Christ) from Kalimantan, Sumatra, Java, Malakka and southern China; *azurea christiana* (Betrem & Guiglia) from Myanmar, Bangladesh and northern India; *azurea siamensis* (Betrem) from Thailand; *azurea cochinchensis* (Betrem) from Vietnam; and *azurea hindostana* (Micha) from southern India and *azuria michae* (Betrem) from Sri Lanka.

Three subspecies occur in Indian subcontinent. These subspecies are differentiated by the absence or presence of yellow or reddish maculation on certain parts of the body, or by the extent of reddish vestiture on abdominal segments. *M. (R.) azurea michae* (Betrem) from Sri Lanka can be easily distinguished by having clypeus, in both sexes, entirely or largely reddish-yellow instead of black. The other two subspecies from India differ very slightly in female, having pygidial setae in *azurea hindostana* (Micha) black, and yellowish-red in *azurea christiana* (Betrem & Guiglia).

(a) *Megascolia (Regiscolia) azurea christiana* (Betrem & Guiglia)

- 1892. *Scolia (Triscolia) rubiginosa* Fabricius : Magretti, *Ann. Mus. civico. Stor. nat. Geneva*, **32** : 236; Female, Male. Myanmar.
- 1897. *Scolia (Triscolia) rubiginosa* Fabricius : Bingham, *Fauna British India, Hym.*, **1** : 76-77; Female, Male (material from Myanmar and northern India only).
- 1927. *Triscolia azurea azurea* (Christ) : Micha, *Mitt. zool. Mus. Berlin*, **13** : 117; Female, Male. Myanmar, India.
- 1928. *Scolia (Triscolia) azurea rubiginosa* Fabricius : Betrem, *Treubia*, **9** (suppl.) : 231-232; Female, Male (specimens from Myanmar, Bangladesh and northern India only).
- 1958. *Scolia (Triscolia) azurea christiana* Betrem & Guiglia, *Ann. Mus. civico Stor. nat. Genova*, **70** : 96 (a new name for the population from Myanmar and northern India).
- 1964. *Megascolia (Regiscolia) azurea christiana* (Betrem & Guiglia) : Betrem & Bradley, *Zool. Meded.*, **39** : 444.

This is one of the large-sized and common scollids of India. It is widely distributed in northern India and ranges from eastern Himalaya through Nepal to western Himalaya, and also occurs in Myanmar and Bangladesh. It breeds throughout the year and attains peak population during March-May. It is recorded here for the first time from Nepal.

This subspecies can be easily differentiated from typical subspecies by having, in both the sexes, paired yellowish-red or red spots on third tergite in addition to reddish vestiture on third to last abdominal segments. In typical subspecies the third tergite, in both the sexes, is entirely black and fourth to last abdominal segments bear reddish vestiture.

Female : Length 30-42 mm. Black, the following are red or yellowish-red : frontal spatium along its upper margin; front; vertex entirely including ocular sinuses; paired large oval spots on third tergite, fourth to last tergites usually with reddish tinge. Vestiture black except yellowish-red or red on third to last abdominal segments including pygidium. Wings dark brown with violaceous effulgence.

Anterior rim of the clypeus subtruncate in the middle, disc of clypeus flat, a subapical stripe of small, dense punctures, at sides with close punctures, centre of the disc smooth or rugulose; frontal spatium impunctate in the middle, at sides along the strongly raised frontal laminae with dense punctures; frontal fissura extending half way to anterior ocellus; front with small, scattered punctures, ocular sinuses impunctate, anterior ocellus in a shallow pit; vertex impunctate except for a few small scattered punctures, its declivous portion impunctate.

Scapulae with small, dense punctures except an area adjacent to tegula with a few scattered punctures; mesoscutum broadly impunctate in the middle, anteriorly and along parapsidal furrows with coarse, subcontiguous punctures, at sides with small, sparse punctures; scutellum with medium sized punctures, close anteriorly and sparse posteriorly, broadly impunctate along posterior margin; metanotum with small, subcontiguous punctures except for a longitudinal impunctate stripe in the middle; mesopleurum with small, subcontiguous punctures, the latter scattered along posterior margin; upper plate of metapleurum with small, subcontiguous punctures at its upper three-fourths, elsewhere impunctate, lower plate with small, subcontiguous to sparse punctures; dorsal surface of propodeum with medium sized, mostly subcontiguous punctures, lateral surface with small, scattered punctures except along upper and posterior margins with close punctures, posterior surface with small, scattered punctures, the latter closer along lateral margins.

First abdominal tergite with a well developed antero-median tubercle, the surface with small, dense punctures, except behind the tubercle with scattered punctures; second tergite with small, subcontiguous punctures at its posterior one-fourth, middle half with large and scattered punctures, anterior one-fourth with small punctures

separated by one or two times the diameter of a puncture; third tergite impunctate in the middle, along anterior margin with scattered punctures, posterior one-third, at sides, with subcontiguous punctures, posteriorly in the middle punctate area very narrow; fourth and fifth tergites largely with subcontiguous punctures.

Male : Length 23-30 mm. Black, the following reddish-yellow: ocular sinuses entirely or partly, paired large oval spots on third tergite, fourth to last tergites almost entirely. Vestiture black except reddish-yellow on third to last abdominal tergites and sternites. Wings dark brown with violaceous effulgence.

Clypeus with subcontiguous punctures on upper half, a subapical stripe of small, dense puncture, elsewhere with scattered punctures; frontal spatium with small contiguous punctures; frontal fissura indistinct; front with punctures mostly separated by the diameter of a puncture; anterior ocellus in a shallow pit; vertex with small punctures mostly separated by the diameter of a puncture, post-ocellar groove shallow.

Scapulae with small, subcontiguous punctures; mesoscutum with small punctures mostly separated by one or two times the diameter of a puncture, posteriorly in the middle with a V-shaped impunctate area; scutellum and metanotum with small, sparse punctures; mesopleurum with small, subcontiguous punctures; metapleurum with small, subcontiguous punctures, broadly impunctate in the middle; dorsal surface of propodeum with small, contiguous to subcontiguous punctures, lateral surface with small, scattered punctures, the latter becoming denser along upper and posterior margins, posterior surface with sparse punctures, the punctures dense along lateral margins. Fore wing with three submarginal cells.

First abdominal tergite with a strong antero-median tubercle, surface with small, subcontiguous punctures, except impunctate behind the tubercle; second tergite with small, dense punctures anteriorly and posteriorly, in the middle with somewhat sparse punctures; third and fourth tergites sparsely punctate on anterior two-thirds, contiguously punctate elsewhere.

Distribution : India : Arunachal Pradesh (Denling and Pinjuli in Kameng dist., Tamen and Pamir in Subansiri dist., Nansai and Namdhapa in Lohit dist.), Assam (North Cachar Hills, Dibrugarh), Himachal Pradesh (Kangra), Manipur (Shugne), Meghalaya (Shillong), Tripura (Garjee), Uttaranchal (Dehra Dun, Tehri) and West Bengal (Rangpo, Darjeeling, Reang, Sonada, Mahanadi, Sukhāna). *Elsewhere* : Bangladesh, Myanmar and Nepal.

(b) *Megascolia (Regiscolia) azurea hindostana* (Micha)
(Figure 50)

1927. *Triscolia azurea hindostana* Micha, *Mitt. zool. Mus. Berlin*, **13** : 121-122; Female, Male; South India, Madurai, Shen-Bagamur (types in Berlin Museum).
1928. *Scolia (Triscolia) azurea hindostana* (Micha) : Betrem, *Treubia*, **9** (Suppl.) : 232; Female, South India.

1964. *Megascolia (Regiscolia) azurea hindostana* (Micha) : Betrem & Bradley, *Zool. Meded.*, **39** : 444.
1972. *Megacolia (Regiscolia) azurea hindostana* (Micha) : Bradley, *Mitt. zool. Mus. Berlin*, **48** (1) : 10 (notes on syntypes, 2 females and 1 male in Berlin Museum; 1 female from Shen-Bagamur designated as lectotype).

Micha (1927) described this subspecies with one female and one male from Shen-Bagamur, Madurai, southern India, and one female from an unknown locality. Betrem (1928) observed that the male is similar to the male of *azurea azurea* (Christ) and restricted *azurea hindostana* (Micha) to female types only.

This subspecies is widely distributed in southern India and is more abundant in areas of heavy rainfall.

Both female and male normally have reddish vestiture on third to last abdominal tergites except pygideal setae in the female black, however, the lectotype female shows variation in having third tergite entirely black.

Female : Length 28-40 mm. Black, the following are reddish-yellow : frontal spatium above; front and vertex entirely; paired large oval spots on third tergite; fourth and fifth tergites almost entirely. Vestiture black except reddish-brown on third to last abdominal segments, pygideal setae black. Wings dark brown with violaceous effulgence.

Punctuation and other details as in *M. (R.) azurea christiana* (Betrem & Guiglia).

Male : Length 25-36 mm. Black, the following reddish-yellow; usually a spot in ocular sinus; sometimes a spot on vertex adjacent to upper inner eye margin; a line along the upper posterior margin of eye; paired large spots on third abdominal tergite; fourth to seventh tergites almost entirely. Vestiture black except reddish brown on third to last abdominal segments. Wings dark brown with violaceous effulgence.

Rest similar to *M. (R.) azurea christiana*.

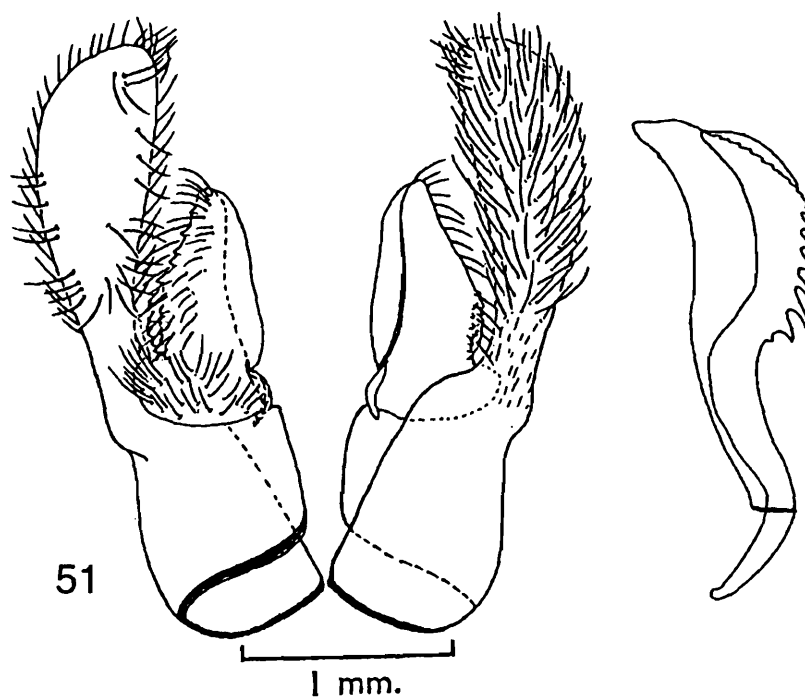
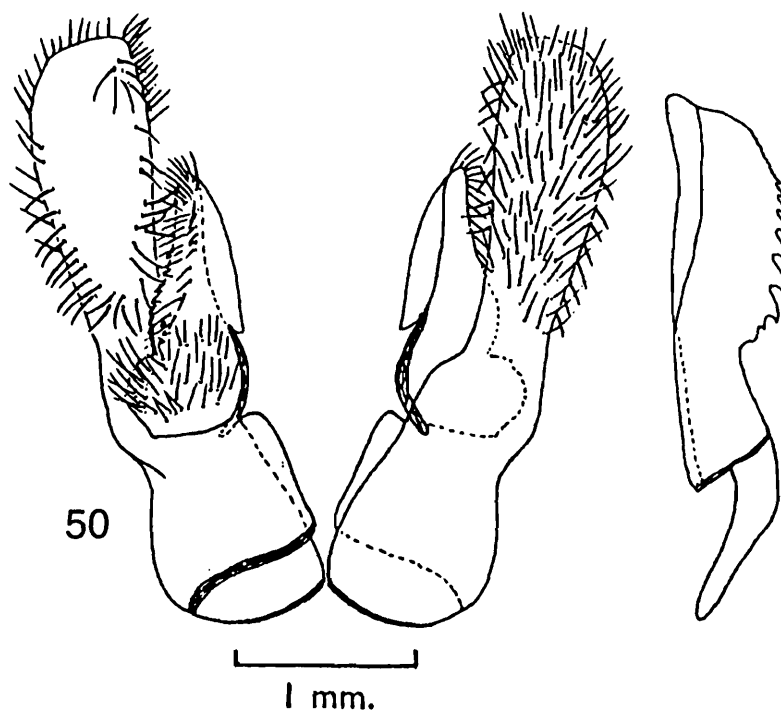
Male genitalia as in figure 50.

Distribution : India: Karnataka (Chikmagalur, Ponnampet, Agumbeghat, Coorg, Sidapur, Vijapur, Poloibetta, Mercara), Kerala (Kollayam dist., Edopalayam, Silent Valley, Mukhali, Valiapparathadu, Palghat, Nilambur, Calicut) and Tamil Nadu (Palni Hills, Kodaikanal, Madurai, Anamalai Hills, Topslip, Cinchona, Kalyanapandal, Varagalier, Ambaliparai, Shivaroy Hills, Yercaud).

4. *Megascolia (Regiscolia) almoraensis* sp. nov.

(Figure 51)

This species is distinguished by having integument and vestiture black, except for yellowish-red marks on temples, ocular sinus and paired large spots on third tergite. One of the males, however, also has paired obliterated yellowish-red marks anteriorly on fourth tergite. Superficially, it resembles the male of *M. fulvifrons* (Saussure) in



Figs. 50-51 : Male genitalia : Ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right. 50, *Megascolia (Regiscolia) azurea hindostana* (Micha); 51, *Megascolia (R.) almoraensis*, sp. nov.

having more or less similar integument and vestiture. However, it differs in having three submarginal cells in the fore wing.

It is distinguished from the male of *M. (R.) azurea* in having black vestiture on abdominal segments; the punctures on posterior surface of propodeum contiguous and surface of first tergite entirely with subcontiguous to contiguous punctures.

The female not known.

Male : Length 24 mm. Black, the following yellowish-red : ocular sinus, a broad line along upper outer eye margin, paired large spots on third tergite. Vestiture black. Wings dark brown with blue reflections.

Clypeus largely with close punctures; frontal spatium distinctly defined posteriorly, in the middle with a longitudinal ridge, surface with small, contiguous punctures; frontal fissura very weak on front; anterior ocellus in a shallow pit; front narrowly impunctate in the middle, areas laterad of anterior ocellus with medium-sized, close punctures; vertex with close punctures, postocellar furrow moderately deep and densely punctate.

Scapulae with contiguous punctures; mesoscutum at anterior half with small contiguous punctures, posterior half with somewhat larger and subcontiguous punctures and with a small impunctate area in the middle; scutellum with medium-sized, sparse punctures, broadly impunctate along posterior margin; metanotum with contiguous punctures, a narrow longitudinal stripe in the middle impunctate; mesopleurum subcontiguously punctate; upper plate of metapleurum with medium sized, sparse to close punctures at its upper two-thirds, elsewhere impunctate, lower plate contiguously punctate; dorsal surface of propodeum with small, contiguous punctures, lateral surface with somewhat larger, subcontiguous punctures, the punctation along upper and posterior margins similar to that of dorsal surface, posterior surface contiguously punctate.

First abdominal tergite with a very strong, pointed antero-median tubercle, surface at its posterior half with small, contiguous punctures, anterior half with somewhat larger and subcontiguous punctures, without any impunctate area behind the tubercle; second tergite with sparse punctures in the middle, punctures denser along posterior margin and close along anterior margin; second sternite without any antero-median tubercle; male genitalia as in figure...

Variation : One paratype with additional pair of yellowish-red marks on fourth tergite.

Male genitalia as in figure 51.

Holotype Male, India : Uttaranchal, Almora district : Tilwara, 900 m, 21.ix.1958, B.S.Lamba (Z.S.I., Calcutta; Reg. No. 8877/H 3). *Paratype* 1 Male, same data as holotype (Z.S.I., Calcutta).

Distribution : India : Uttaranchal.

13. Genus *Scolia* Fabricius

1775. *Scolia* Fabricius, *Syst. Ent.* : 355.
1839. *Scolia* subgenus *Lacosi* Guerin, *Voy. Cq. Zool.*, **2** : 243.
1858. *Lisoca* Costa, *Fauna Nap. Scolüd* : 8.
1864. *Scolia* subgenus *Discolia* Saussure : Saussure and Sichel, *Cat. Spec. Gen. Scolia* : 55.
1927. *Scolia* subgenus *Scolia* Fabricius : Betrem, *Tijdschr. Ent.*, **70** (versl.) : xcvi (Type-species : *Scolia quadripunctata* Fabricius, 1775).
1928. *Scolia* subgenus *Lacosi* Guerin : Betrem, *Treubia*, **9** (Suppl.) : 56 (designated *Scolia quadripustulata* Fabricius as type-species).
1964. *Lisoca* Costa : Betrem and Bradley, *Zool. Meded.*, **39** : 434 (*Scolia quadripustulata* Fabricius, 1775, designated as type-species).
1964. *Scolia* Fabricius : Betrem and Bradley, *Zool. Meded.*, **40** : 89.

Type-species : *Scolia quadripustulata* Fabricius, 1775 (subsequent designation).

This genus comprises small to moderately large species, about 5-25 mm in length. Integument entirely black or black marked variously with yellow or red on head, thorax and abdomen, sometimes extensively marked with yellow or red on the whole body. Vestiture entirely black to white mixed with black or entirely white, often reddish or yellowish. Fore wing with a single recurrent vein and two submarginal cells. Front without any transverse carina or arched ridge; vertex not prolonged behind eye margins; head and thorax usually with small, moderate sized, close to sparse punctures, sometimes punctures large and deep on certain parts of the body. First tergite with or without a antero-median tubercle; the tubercle, small to moderate sized; tergites usually with sparse to close punctures, sometimes with dense punctures along posterior margins.

The genus *Scolia* was erected by Fabricius (1775) and a number of species were described under this genus by Fabricius and others.

The genus *Scolia* is distributed in all the Zoogeographical Regions of the World and is represented by about 175 species. In India, it is known by 40 species and nine subspecies.

The genus is divided into two subgenera (Betrem & Bradley : 1964), viz., *Scolia* Fabricius s. str. and *Discolia* Saussure. These subgenera can be distinguished by the following key :

Key to subgenera of *Scolia*

1. Base of volsella in male covered with a dense brush of silky setae subgenus *Scolia* s. str.
- Base of volsella in male without such a dense brush of silky setae subgenus *Discolia* Saussure

Subgenus *Scolia* Fabricius

1775. *Scolia* Fabricius, *Syst. Ent.* : 335.

1941. *Scolia* subgenus *Scolia* section *Scolia* Fabricius : Betrem, *Notes Ent. Chinoise*, **8** (4) : 126. (Type-species : *Scolia quadripunctata* Fabricius, 1775).

1964. *Scolia* subgenus *Scolia* Fabricius : Betrem and Bradley, *Zool. Meded*, **40** (11) : 89.

Type-species : *Scolia quadripunctata* Fabricius, 1775 (subsequent designation).

The subgenus *Scolia* s. str. is characterized by having a dense brush of silky setae covering the base of volsella.

This subgenus is distributed in the Palaearctic and Ethiopian Regions, and has not been recorded from Indian subregion.

Subgenus *Discolia* Saussure

1863. *Scolia* subgenus *Discolia* Saussure, *Ann. Soc. ent. France*, (4) **3** : 18.

1934. *Scolioides* Guiglia & Capra, *Bull. Soc. Ent. Ital.*, **66** : 128. (Type-species : *Scolia hirta* Schrank, 1781).

1941. *Scolia* subgenus *Scolia* section *Scolioides* Guiglia & Capra : Betrem, *Notes Ent. Chinoise*, **8** (4) : 128.

1964. *Scolia* subgenus *Discolia* Saussure : Betrem and Bradley, *Zool. Meded*, **40** : 91 (new subgeneric status; *Scolia nobilitata* Fabricius, 1804 designated as Type-species).

Type-species : *Scolia nobilitata* Fabricius, 1804 (subsequent designation).

This subgenus is readily distinguished by the absence of a dense brush of silky setae at the base of volsella. Integument, in most cases, marked with whitish-yellow or red spots or bands; sometimes the spots very extensive or the body integument entirely black.

This subgenus is distributed in all the Zoogeographical regions of the world and is represented by about 150 species/subspecies, of which 40 species, including two new species are known from India.

Key to species and sub-species of *Scolia* (*Discolia*)

1. Body Integument entirely black, rarely ocular sinuses reddish-brown.....2
- Body integument various; more or less, maculated with yellow or red 17
2. Vestiture black, except reddish-brown on apical abdominal segments.....
- 9. *sinensis* Saussure
- Vestiture entirely black, or black mixed with white 3
3. Female 4

- Male 8
- 4. Integument and vestiture entirely black; second abdominal tergite posteriorly in the middle finely and densely punctate 5
- Integument entirely black or sometimes black with ocular sinuses reddish-brown. Vestiture black, mixed with white; second abdominal tergite posteriorly in the middle not finely and densely punctate 6
- 5. Clypeal disc in the middle impunctate and without longitudinal striations; upper plate of metapleurum punctate on its upper 0.66; dorso-median area of propodeum about $1.5 \times$ as broad as long in the middle. India, Sri Lanka 1. *cyanipennis* Fabricius
- Clypeal disc in the middle longitudinally striated; upper plate of metapleurum impunctate except for some close punctures along upper margin; dorso-median area of propodeum about $2.0 \times$ as broad long in the middle (entirely black form). India 20. *kangraensis* Betrem
- 6. Ocular sinuses reddish-brown, the rest of the integument black. Front with sparse to scattered punctures. India. 3. *rubrosinuata* Betrem
- Integument entirely black 7
- 7. Vestiture on the head, laterally on the thorax and ventral side of abdomen usually white, and mostly black on dorsum of the thorax and abdomen. Front impunctate except for a few scattered punctures; anterior ocellus in a deep pit; postero-median area of propodeum punctate. India, Hong-kong, Myanmar, Thailand 2. *laeviceps* Smith
- Vestiture entirely black except for some white setae on occiput; lower front with close punctures medially; postero-median area of propodeum impunctate. India 5. *coimbatorensis*, sp. nov.
- 8. Integument black except ocular sinuses reddish-brown 9
- Integument entirely black 10
- 9. Clypeus almost as broad as high; metanotum and dorso-median area of propodeum with a longitudinal impunctate stripe in the middle; first abdominal tergite anteriorly in the middle without any tubercle. India. 6. *gilgitensis* Betrem
- Clypeus much broader than high; metanotum and dorso-median area of propodeum without any longitudinal impunctate stripe; first abdominal tergite anteriorly in the middle with a small tubercle. India 3. *rubrosinuata* Betrem
- 10. Antennal flagellum long, not clavate towards apex, segments towards apex distinctly longer than broad 11
- Antennal flagellum short, distinctly clavate towards apex, segments towards apex almost as broad as long 14

11. Metapleurum almost entirely, with coarse, close and deep punctures; first abdominal tergite anteriorly in the middle with a strong tubercle. India, Sri Lanka 26. *quadripustulata* Fabricius
- Metapleurum broadly impunctate in the middle, lower plate always with small to fine, sparse to scattered punctures 12
12. First abdominal tergite without any tubercle anteriorly in the middle. Volsella large, densely hairy and not divided into basal and apical portions by a constriction. India, Sri Lanka. 25. *fasciatopunctata* Guerin
- First abdominal tergite with a small tubercle anteriorly in the middle. Volsella normal, sparsely hairy and divided into basal and apical portions by a constriction 13
13. Frontal fissura strong and extending up to anterior ocellus; upper plate of metapleurum on upper half with moderate sized, mostly subcontiguous punctures, lower half impunctate. India 23. *cruenta* Klug
- Frontal fissura weak and not extending up to anterior ocellus, distinct only at frontal spatium; upper plate of metapleurum with small, sparse punctures at its upper 0.33, lower 0.66 impunctate. India 27. *fichteli* Betrem
14. Vestiture entirely black; upper plate of metapleurum mostly with contiguous to subcontiguous punctures, except impunctate narrowly along the lower margin. India, Sri Lanka 1. *cyanipennis* Fabricius
- Vestiture black, mixed with white; upper plate of metapleurum punctate on its upper 0.25 to 0.5, lower 0.25 to 0.5 impunctate 15
15. Front impunctate except for a few scattered punctures; anterior ocellus in a very deep pit. India, Hong-kong. 2. *laeviceps* Smith
- Front with sparse to close punctures; anterior ocellus in a moderately deep pit. 16
16. Wings entirely dark brown, fore wing membrane beyond cells broadly clothed with microtrichae. India 29. *wagneri* Betrem
- Fore wing dark brown at the base and in anterior half, the rest lighter in shade; fore wing membrane beyond cells with microtrichae confined to a small area adjacent to the margin. India, Sri Lanka. 28(a) *binotata binotata* Fabricius
17. Abdominal integument entirely black 18
- Abdominal integument variably maculated with whitish-yellow to red spots or bands 35
18. Thorax entirely black; antennae and head, or any one, more or less, maculated with yellow to red, but head not entirely yellow or red 19

- Thorax not entirely black, scapulae reddish, the rest of the thoracic integument black; antennae and head almost entirely reddish..... 34
- 19. Female 20
- Male 28
- 20. Propodeal dorsum, at its median area, with minute to small, shallow, sparse to scattered punctures. 21
- Propodeal dorsum, at its median area, with small to large, close to subcontiguous punctures 22
- 21. Antennal flagellum entirely reddish-yellow, the rest of the body integument black; metanotum impunctate and propodeal dorsum with minute, scattered punctures. Indian subregion 8. *affinis* Guerin
- Antennae and head mostly reddish-yellow except the clypeus, black; metanotum with small sparse punctures; propodeal dorsum at its median area with small shallow and sparse punctures. India, China, Nepal, Taiwan, Vietnam. 7. *superciliaris* Saussure
- 22. Antennal flagellum yellow to orange-red except its first segment, black; head entirely black. (Propodeal dorsum with small, mostly subcontiguous punctures. Length 15 mm). India 21. *bilunata* Saussure
- Antennal flagellum partly to entirely yellow, reddish or almost entirely black; head more or less reddish 23
- 23. Antennae almost entirely black, occiput mostly with white setae 24
- Antennae almost entirely reddish; occiput with reddish-brown or black setae 25
- 24. Wings entirely dark brown with bluish effulgence. India 4. *suratensis* Betrem
- Wings dark brown, except lighter apically with purple effulgence. India 3. *rubrosinuata* Betrem
- 25. Clypeus entirely black, the rest of the head and antennae entirely red; (occiput with mostly black setae; mesoscutum entirely punctate except for a V-shaped impunctate area posteriorly in the middle). India, Myanmar 11. *rugifrons* Betrem
- Clypeus not entirely black, more or less reddish 26
- 26. Head entirely black except clypeus partly or entirely red; antennae entirely red; (mesoscutum with a large quadrate impunctata area in the middle). India, Myanmar, Sri Lanka and Thailand 15. *chumponi* Betrem

- Head largely maculated with yellow to red 27
- 27. Clypeus reddish at its posterior half; vestiture predominately yellowish-white; frontal fissura deep and extending up to anterior ocellus; upper half of the upper plate of metapleurum with mostly subcontiguous punctures. India
.....12. *carmichaeli* Betrem
- Clypeus almost entirely reddish-yellow except narrowly along the anterior margin black; frontal fissura weak, distinct only at frontal spatium; upper plate of metapleurum impunctate, except along upper margin with some close punctures. India, Myanmar 10. *felderi* Betrem
- 28. Antennal flagellum orange-red or red, varying from entirely to only at its apical segments, the rest of the body integument entirely black 29
- Antennae as well as head, more or less, reddish-yellow or red 30
- 29. Propodeal dorsum with shallow, sparse punctures, the punctures on dorso-median area mostly separated by the diameter of puncture; volsella with a tuft of capitate bristles apically. Indian subregion 8. *affinis* Guerin
- Propodeal dorsum with moderately deep, mostly subcontiguous punctures; volsella with satiform bristles. India, Nepal and Sri Lanka 21. *bilunata* Saussure
- 30. Front and vertex black; antennae, clypeus and fronal area almost entirely reddish, the rest of the body integument black. India, Myanmar, Sri Lanka and Thailand.
.....15. *chumponi* Betrem
- Front, vertex and antennae, more or less, maculated with yellow or red; clypeus black or marked with yellow or red. 31
- 31. Clypeus entirely black, antennal flagellum almost entirely reddish-yellow, a transverse reddish-yellow band on the front, dorso-median area of propodeum with shallow punctures, mostly separated by the diameter of a puncture
.....7. *superciliaris* Saussure
- Clypeus not entirely black, dorso-median area of propodeum not punctate as above.....32
- 32. Antennae and head almost entirely reddish-yellow except anterior margin of the clypeus, black; vestiture black except on the head predominantly yellowish; upper plate of metapleurum impunctate, except for a few medium-sized, deep and sparse punctures narrowly along upper margin. India, Myanmar
.....10. *felderi* Betrem
- Antennae entirely or partly reddish-yellow; head not entirely reddish-yellow or red; vestiture largely yellowish-white; upper plate of metapleurum punctate at its upper 0.5 33

33. Antennal flagellum entirely reddish-yellow; head reddish-yellow except the vertex black; vertical surface of propodeum with deep subcontiguous to contiguous punctures. India, Myanmar 13. *elizabethae* Bingham
- Antennal flagellum reddish-yellow except 5-6 apical segment black; clypeus black except at sides and at base reddish-yellow; vertex entirely reddish-yellow; vertical surface of propodeum with shallow, sparse to scattered punctures. India 12. *carmichaeli* Betrem
34. Vestiture black, except on the head, occiput and dorsum of scapulae, reddish; first tergite closely punctate, without tubercle or keel anteriorly in the middle. India, southeast Asia 14(a). *vollenhoveni vollenhoveni* Saussure
- Vestiture on the head, scapulae, anterior of mesoscutum and mesopleurum predominantly reddish-yellow, elsewhere black; first tergite densely punctate, with a keel-like structure anteriorly in the middle. India and Nepal 16(a). *clypeata rufohirta* Betrem
35. Head and thorax entirely black except, sometimes antennal flagellum partly or wholly reddish or yellow 36
- Head and /or thorax more or less maculated with yellow to red 58
36. Female 37
- Male 49
37. Vestiture on third to last abdominal segments reddish-yellow; integument of third and fourth abdominal tergites maculated with reddish-yellow. India 17. *kamengensis*, sp. nov
- Vestiture on apical abdominal segments usually black or black mixed with white 38
38. Front with large and deep punctures; frontal fissura wide and deep. 39
- Frontal punctation and frontal fissura not as above 40
39. Second abdominal tergite with a broad yellow band; third tergite not entirely yellow; scutellum narrowly impunctate posteriorly in the middle. Length 14-15 mm. India, Myanmar, Thailand.....18(a). *formosicola malaisei*, subsp. nov.
- Second abdominal tergite black, without any yellow band; third tergite entirely yellow; scutellum broadly impunctate posteriorly. Length 12 mm. India, Malaysia 19. *lebongensis* Betrem
40. Clypeal disc longitudinally striated in the middle; frontal spatium swollen; dorso-median area of propodeum about 2 × as broad as long in the middle; (paired lateral lemon yellow spots on second and/or third abdominal tergites). India ...20. *kangraensis* Betrem

- Clypeal disc not longitudinally striated in the middle; frontal spatium not swollen; dorso-median area of propodeum about $1.5 \times$ as broad as long in the middle ... 41
- 41. Antennal flagellum $0.5 \times$ to entirely orange to red 42
- Antennal flagellum entirely black, sometimes brownish beneath 43
- 42. Antennal flagellum orange to red, except basal segment black; third abdominal tergite with paired antero-lateral yellow spots, sometimes fourth tergite also with similar but smaller spots. India, Nepal and Sri Lanka 21. *bilunata* Saussure
- Antennal flagellum orange-red in varying extents from all, except basal segment to only the apical half, in which case basal half is chestnut; third and fourth abdominal tergites with paired orange-red spots, spot on third tergite large and narrowly separated in the middle. India and Sri Lanka 22. *trivandrumensis* Betrem
- 43. Scapulae and mesoscutum medially at its posterior half and scutellum with a few scattered punctures; (inner half of the dorso-lateral area of propodeum impunctate; occiput with entirely white setae; third and fourth abdominal tergites with paired lateral rounded reddish spots). Indian subregion 28(a). *binotata binotata* Fabricius
- Scapulae and mesoscutum with close to subcontiguous punctures; scutellum with a small impunctate area posteriorly in the middle 44
- 44. Erect vestiture predominantly white except on the dorsum of the thorax and abdomen mostly black; (third tergite with a pair of oval lateral spots). Length 12-15 mm. India 29. *wagneri* Betrem
- Erect vestiture predominantly black, except on occiput usually brownish or black mixed with white. Length not less than 16 mm 45
- 45. Front largely impunctate, except for a few small scattered punctures around ocellar area; (third abdominal tergite with a broad red band, second tergite and third sternite sometimes with a pair of red spots). India, Sri Lanka 25. *fasciatopunctata* Guerin
- Front with scattered to subcontiguous punctures at its lower half 46
- 46. Upper plate of metapleurum with mostly subcontiguous punctures at its upper 0.6 ; (second and third abdominal tergites with paired large rounded red spots, sometimes entirely reddish; second and third sternites usually reddish, sometimes fourth and fifth sternites also reddish). India and Sri Lanka 26. *quadripustulata* Fabricius

- Upper plate of metapleurum punctate on its upper 0.2-0.5; abdominal sternites black 47
- 47. Upper plate of metapleurum largely impunctate except for a few small, close punctures along upper margin; anterior margin of clypeus subtruncate at its median lobe; occiput with mostly white setae; third and fourth abdominal tergites with large, paired, lateral reddish spots, spots on third usually united in the middle, second and/or fifth tergite also sometimes with small reddish spots. India 27. *fichteli* Betrem
- Upper plate of metapleurum punctate at its upper half, lower half impunctate; anterior margin of the clypeus truncate at its median lobe; occiput with mostly black setae; third to fifth abdominal tergites almost entirely reddish-yellow, second tergite with paired lateral large reddish-yellow spots 48
- 48. First tergite medially with punctures separated by the diameter of a puncture, at sides and anteriorly with mostly subcontiguous punctures. India 23. *cruenta* Klug
- First tergite uniformly closely punctate. India 24. *stizus* Saussure
- 49. Abdominal tergites with yellowish-white spots or bands 50
- Abdominal tergites with orange to red spots or bands 52
- 50. Antennal flagellum reddish-yellow, fourth abdominal tergite with paired large lateral yellowish-white spots, third tergite also, usually with paired small yellowish-white spots; vestiture entirely black; front with small, sparse punctures. Length about 17 mm. India, Nepal and Sri Lanka 21. *bilunata* Saussure
- Antennal flagellum black; fourth abdominal tergite with narrow to broad yellowish band; vestiture almost entirely yellowish-white; front with coarse, deep contiguous to subcontiguous punctures. Length 11-13 mm. 51
- 51. Second and third tergites with broad yellow bands, fourth tergite entirely black; scutellum posteriorly in the middle narrowly impunctate. Length 13 mm. India, and Thailand. 18 (a). *formosicola malaisei*, sp. nov.
- Second tergite black, third and fourth tergites with yellow bands; scutellum posteriorly broadly impunctate. Length 11 mm. India and Malaysia 19. *lebongensis* Betrem
- 52. Antennal flagellum short, clavate towards apex, segments towards tip as broad as long; erect vestiture predominantly white on the head and thorax 53
- Antennal flagellum long, not clavate towards apex, segments towards tip clearly longer than broad; erect vestiture predominantly black 54
- 53. Third and fourth abdominal tergites with paired red spots, spots larger on third,

- sometimes absent on fourth; fore wing membrane beyond cells devoid of microtrichiae except adjacent to marginal cell; base of volsella with short and sparse setae. Indian subregion 28(a). *binotata binotata* Fabricius
- Third abdominal tergite with paired, small, reddish-yellow spots; fourth tergite without spots; fore wing membrane beyond cells with microtrichiae; base of volsella with long dense setae. India 29. *wagneri* Betrem
54. Metapleurum almost entirely with coarse, subcontiguous to contiguous punctures; usually paired orange-red or red spots on third and fourth abdominal tergites, sometimes second and fifth tergites also with paired red spots. India and Sri Lanka. 26. *quadripustulata* Fabricius
- Metapleurum broadly impunctate in the middle, its upper plate punctate only at its upper 0.6 or less, lower plate with small, sparse punctures 55
55. Antennal flagellum with apical one to three segments red, at least beneath; (fourth and sometimes third abdominal tergites with paired transverse reddish-yellow spots). India and Sri Lanka 22. *trivandrumensis* Betrem
- Antennal flagellum entirely black 56
56. Upper plate of metapleurum with small, sparse punctures at its upper 0.3, lower plate with small to fine sparse to scattered punctures; vestiture on occiput, pronotum, mesoscutum and mesopleurum black, mixed with white. India 27. *fichteli* Betrem
- Upper plate of metapleurum with subcontiguous to sparse punctures at its upper 0.5 to 0.66; vestiture black except yellowish on the maculated areas of abdominal tergites 57
57. Front with moderately large, mostly subcontiguous punctures; upper plate of metapleurum with mostly subcontiguous punctures at its upper half; first tergite with a distinct antero-median tubercle. usually with paired small to large reddish-yellow spots on third to fifth abdominal tergites. India 23. *cruenta* Klug
- Front with moderately small, shallow, sparse to scattered punctures, impunctate at sides; upper plate of metapleurum at its upper 0.6 with small punctures, mostly separated by the diameter of a puncture; first tergite without antero-median tubercle; third abdominal tergite usually with a red broad band or paired large spots, fourth tergite also, sometimes with small red spots, sometimes fifth tergite also with minute spots. India 25. *fasciatopunctata* Guerin
58. Thorax entirely black, (except in some males scapulae maculated with yellow or reddish-yellow).....59
- Thorax more or less maculated in both the sexes.....69

59. Females 60
 — Males 66
60. Scutellum and metanotum largely impunctate; propodeal dorsum with small, shallow, scattered punctures; (front and vertex almost entirely yellow, paired large yellow spots on third and fourth abdominal tergites). India, China and Taiwan 30. *nobilis* Saussure
 — Scutellum and metanotum not largely impunctate; propodeal dorsum with moderate to large, close to sparse punctures 61
61. Front and vertex almost entirely yellow to reddish-brown or red 62
 — Front with a small to large yellow to brown spot, vertex entirely black 65
62. Fifth tergite with reddish-brown spots; erect vestiture entirely reddish-brown. India 35. *pseudosinensis* Betrem
 — Fifth tergite without any maculations; erect vestiture on the last abdominal tergite always black 63
63. Erect vestiture predominantly black, except coloured on maculated areas; wings dark brown with purplish reflections; (third abdominal tergite with yellow to reddish-brown broad band, sometimes fourth tergite also with similar but narrow and obliterated band; legs and tegulae black). India and Myanmar 13. *elizabethae* Bingham
 — Erect vestiture on head and thorax predominantly reddish-brown to reddish-yellow; wings predominantly yellow 64
64. Third and fourth abdominal tergites with large paired yellow spots; legs and tegulae reddish-brown. India, Bhutan and Nepal 32. *sikkimensis* Bingham
 — Third abdominal tergite almost entirely yellow; fourth tergite, legs and tegulae, black. India 33(a). *watanabei kempi* Betrem
65. Fourth abdominal tergite with a yellow band or spots, frontal spatium contiguously punctate. India, Nepal and Myanmar 34. *venusta* Smith
 — Fourth abdominal tergite black, without yellow band or spot; frontal spatium with mostly subcontiguous punctures. India 31. *dehraensis* Betrem
66. Antennal flagellum orange to red; third abdominal tergite with paired small elongated yellow spots; vestiture almost entirely white. India and Myanmar ...
13. *elizabethae* Bingham
 — Antennal flagellum black, two or more abdominal tergites with large yellow or reddish-yellow spots or bands; vestiture not predominantly white 67

67. First abdominal tergite black; second to fourth tergites entirely yellow and fifth tergite with paired lateral spots. India, Myanmar and Nepal.....34. *venusta* Smith
- First tergite with paired spots, second with a broad apical band and third tergite almost entirely, yellow 68
68. First tergite without anterior-median tubercle. India 31. *dehraensis* Betrem
- First tergite with an antero-median tubercle. India and Nepal 32. *sikkimensis* Bingham
69. Female 70
- Male 76
70. Thoracic integument black, except scapulae reddish. India and Myanmar 28(a). *binotata binotata* Fabricius
- Thoracic integument extensively maculated with yellow or reddish 71
71. Propodeal integument basically black, marked variously with yellow 72
- Propodeal integument basically ferruginous (reddish-brown), variously marked with yellow 73
72. Vestiture reddish-brown, except on fourth to sixth tergites, black; legs and tegulae reddish-brown; scutellum and metanotum black. India and Nepal.....32. *sikkimensis* Bingham
- Vestiture white except predominantly black on posterior margin of first to last tergites; legs and tegulae black, not reddish-brown; scutellum and metanotum marked with yellow. India, Indo-china, Myanmar and Taiwan 36. *desidiosa* Bingham
73. Upper plate of metapleurum coarsely and deeply punctate on upper 0.66; second discoidal cell of fore wing with an elliptical dark mark. India and Sri Lanka ..37. *picteti* Saussure
- Upper plate of metapleurum finely punctate on upper 0.5 or less; second discoidal cell of fore wing without any mark 74
74. Fore wing yellowish hyaline, having apical 0.33 darker; third tergite with paired yellow spots. India 39. *pila* Nurse
- Fore wing yellowish-hyaline with a distinct dark subapical mark; third tergite with broad apical yellow band 75
75. Dorso-median area of propodeum with mostly subcontiguous punctures, dorso-lateral area not broadly impunctate anteriorly. India 38. *mixta* (Fabricius)

- Dorso-median area of propodeum with contiguous punctures, with two impunctate stripes between the punctures; dorso-lateral area broadly impunctate anteriorly. India 40. *vivida* Smith
- 76. Thoracic integument entirely black except scapulae with reddish maculation. India and Myanmar 28(a). *binotata binotata* Fabricius
- Thoracic integument extensively maculated, with yellow and/or with reddish spots 77
- 77. Head black, except clypeus almost entirely and sometimes paired spots on frontal spatium, yellow 78
- Head extensively marked with yellow on clypeus, frontal area, scrobes, front and posterior eye margins 79
- 78. Clypeus much broader than high; wings without any dark spot in the second discoidal cell; dorso-median area of propodeum $1.65 \times$ as wide as high. India, Indo-China, Myanmar and Taiwan. 36. *desidiosa* Bingham
- Clypeus as broad as high; fore wing with a weak mark in the second discoidal cell; dorso-median area of propodeum $1.33 \times$ as wide as high. India and Sri Lanka 37. *picteti* Saussure
- 79. Wings yellowish hyaline, fore wing at its apical third darker. India and Pakistan 39. *pila* Nurse
- Wings hyaline, apical third of fore wing not darker 80
- 80. Second and third femora yellow; scutellum with paired yellow spots; lateral area of propodeum yellow; abdominal vestiture on 6th and 7th segments black, elsewhere white. India and Nepal 32. *sikkimensis* Bingham
- Second and third femora reddish-brown; scutellum without spots; lateral area of propodeum largely reddish-brown; abdominal vestiture entirely white. India.... 40. *vivida* Smith

1. *Scolia (Discolia) cyanipennis* Fabricius

(Figure 52)

- 1804. *Scolia cyanipennis* Fabricius, *Syst. Piez.* : 244. Female, Tranquebar (type in Copenhagen Museum).
- 1845. *Scolia caerulans* Lepeletier, *Hist. nat. Ins., Hym.*, 3 : 526. Male, Indes (type in Spinola coll., Turin).
- 1858. *Scolia cyanipennis* Fabricius : Saussure, *Ann. Soc. ent. France*, (3) 6 : 209. Female.
- 1864. *Scolia (Discolia) cyanipennis* Fabricius : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 103. Female.

1873. *Scolia (Discolia) cyanipennis* Fabricius : Smith, *J. Linn. Soc. Zool.*, **11** : 345.
1897. *Scolia (Discolia) cyanipennis* Fabricius : Bingham, *Fauna British India, Hym.*, **1** : 82-83. Female (from Sri Lanka only).
1928. *Scolia (Scolia) cyanipennis* Fabricius : Betrem, *Treubia*, **9** (suppl.) : 263-264. Female, Male; Sri Lanka; India : Sikkim, Calcutta and Kashmir.
1964. *Scolia (Discolia) cyanipennis* Fabricius : Bradley, *Ann. Mus. civico Stor. Nat. Genova*, **75** : 188 (note on holotype of *S. caerulans* Lepeletier, 1845).
1964. *Scolia (Discolia) cyanipennis* Fabricius : Betrem & Bradley, *Zool. Meded.*, **40** : 92. (subgeneric assignment).
1964. *Scolia (Discolia) cyanipennis* Fabricius : Bradley, *Spolia zool. Mus. Haun.*, **21** : 12 (lectotype designated).
1978. *Scolia (Discolia) cyanipennis* Fabricius : Krombein, *Smithsonian Contr. Zool.*, No. 283 : 29-31, fig. 21. Female, Male, Sri Lanka.

This species is distributed in the Indian subregion, where it ranges northwards from Sri Lanka to Sikkim in the east and Kashmir in the west.

The female can be easily distinguished by having entirely black integument and vestiture except for the entirely black form of *S. kangraensis* Betrem. The latter species is, however, distinguished by having clypeus striated medially. The clypeus is raised and impunctate medially in *S. cyanipennis*. The male can be distinguished by having the antennal flagellum shorter and clavate towards apex in addition to entirely black integument and vestiture.

Female : Length 16-22 mm. Integument and vestiture entirely black, abdomen with faint blue reflections. Wings uniformly dark brown with strong blue reflections.

Apical margin of the clypeus broad, but slightly rounded, median area strongly raised and smooth, at sides with subcontiguous punctures; frontal area with confluent punctures; frontal spatium with medium sized punctures mostly separated by the diameter of a puncture except the punctures confluent along the moderately broad and slightly raised frontal laminae; frontal fissura extending halfway to anterior ocellus; front with medium sized, sparse punctures; anterior ocellus in a shallow pit; posterior ocelli margined behind by a row of punctures; vertex with a few scattered punctures, its declivous portion with small, subcontiguous punctures.

Scapulae subcontiguously punctate except in front of tegula with sparse punctures; mesoscutum subcontiguously punctate along anterior margin, elsewhere sparsely punctate, with a large impunctate area posteriorly in the middle; scutellum with subcontiguous punctures along the anterior margin, elsewhere with close to scattered punctures; metanotum with sparse punctures; mesopleurum contiguously punctate except impunctate narrowly along anterior margin and broadly along posterior margin; upper plate of metapleurum with coarse contiguous punctures, except for a small

impunctate area anteriorly along lower margin, lower plate with small and sparse punctures, impunctate narrowly along posterior and upper margins; dorso-median area of propodeum with moderately coarse, subcontiguous to contiguous punctures, dorso-lateral area with small subcontiguous punctures, with a rectangular impunctate area anteriorly along inner margin, lateral surface with sparse to scattered punctures, posterior surface subcontiguously punctate.

First abdominal tergite with a weak antero-median tubercle; surface with fine, sparse punctures and interspersed large punctures; second tergite very sparsely punctate except along posterior margin, particularly at sides with fine dense punctures and interspersed larger punctures; second sternite with coarse and scattered punctures, except postero-laterally the punctures separated by less than the diameter of a puncture.

Male : Length 11-18 mm. Integument and vestiture black, abdomen with blue reflections. Wings dark brown.

Clypeus broadly impunctate in the middle, at sides with subcontiguous punctures and a few scattered punctures above; frontal spatium distinctly marked posteriorly, surface with contiguous punctures; frontal fissura distinct and extending up to anterior ocellus; front with medium sized punctures mostly separated by the diameter of a puncture; anterior ocellus in a deep pit; vertex with slightly larger punctures, mostly separated by the diameter of a puncture; antennal flagellum clavate towards apex, apical segments as broad as long and straight in profile beneath.

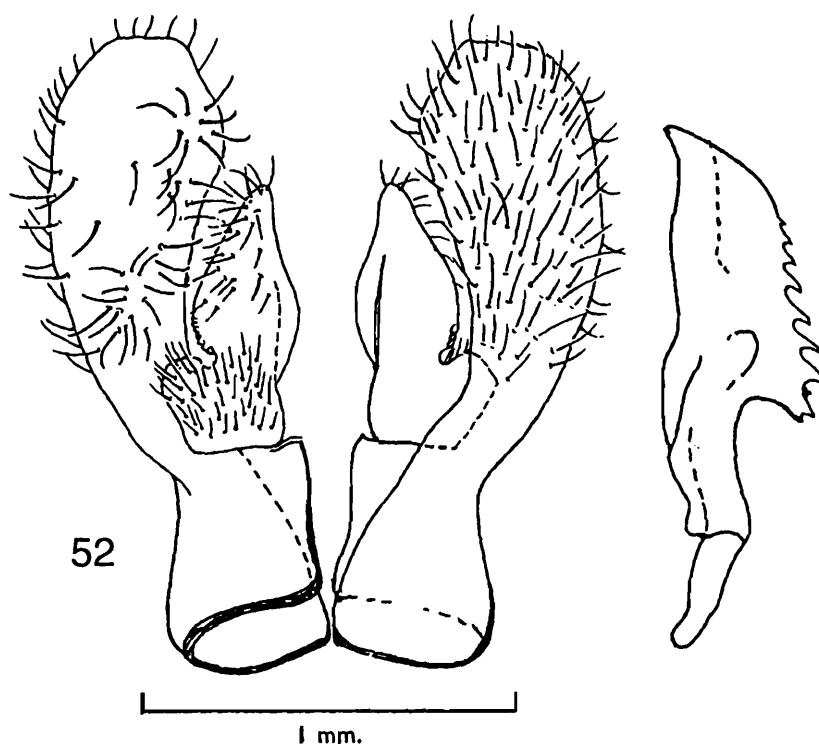


Fig. 52 : *Scolia* (*Discolia*) *Cyanipennis* Fabricius : Male genitalia : Ventral aspect at left, dorsal in middle and aedeagus in profile at right.

Scapula with small punctures, mostly separated by the diameter of a puncture; mesoscutum with similar punctures, mostly separated by the diameter of a puncture along anterior and posterior margins, widely separated elsewhere; scutellum with slightly coarse, subcontiguous punctures except for a small impunctate area posteriorly in the middle; metanotum with similar punctation; mesopleurum with mostly subcontiguous punctures; upper plate of metapleurum with contiguous to subcontiguous punctures except impunctate narrowly along lower margin, lower plate with small and sparse punctures, the punctures tending to be denser below, broadly impunctate along posterior and upper margins; dorsal surface of the propodeum with moderately coarse, mostly subcontiguous punctures except for an impunctate area anteriorly on lateral section, lateral surface with somewhat smaller, scattered punctures, posterior surface mostly subcontiguously punctate except for the punctures on median section contiguous to sparse.

First abdominal tergite with a small antero-median tubercle, surface with small and close punctures, the latter becoming smaller and denser posteriorly at sides; second and third tergites with fine and sparse punctures on anterior half, posterior half with close punctures, the latter increasing in density at sides and along the posterior margin; second sternite with a antero-median tubercle, surface with coarse and sparse punctures, punctures dense postero-laterally.

Male genitalia as in figure 52.

Distribution : India : Himachal Pradesh (Kulu), Jammu & Kashmir (Jhelum Valley), Sikkim, Tamil Nadu (Tranquebar) and West Bengal (Calcutta, Canning, Midnapore).
Elsewhere : Sri Lanka.

2. *Scolia (Discolia) laeviceps* Smith

1855. *Scolia laeviceps* Smith, *Cat. Hym. British Mus.*, **3** : 91. Female, Male; Hong Kong (Types in British Museum).
1864. *Scolia (Discolia) laeviceps* Smith : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 118. Female, Male.
1897. *Scolia (Discolia) laeviceps* Smith : Bingham, *Fauna British India, Hym.*, **1** : 82. Female, Male; Hong Kong; Myanmar; India : Sikkim.
1897. *Scolia laeviceps* Smith : Dalla Torre, *Cat. Hym.*, **8** : 167 (listed).
1928. *Scolia (Scolia) laeviceps* Smith : Betrem, *Treubia*, **9** (suppl.) : 265-266. Female, Male; Hong-Kong; Myanmar; India : Sikkim.
1964. *Scolia (Discolia) laeviceps* Smith : Betrem & Bradley, *Zool. Meded.*, **40** : 93 (new subgeneric assignment).
1967. *Scolia (Discolia) laeviceps* Smith : Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 311 (notes on types).
1972. *Scolia (Discolia) laeviceps* Smith : Tsuneki, *Etizenia*, **63** : 6-7. Male; Thailand : Bangkok, Saraburi.

This small sized and uncommon species ranges from Hong Kong westwards through Thailand and Myanmar to Sikkim in India. Both sexes have entirely black integument, predominantly white vestiture and anterior ocellus placed into a deep pit. The front and vertex largely impunctate in female, whereas in male the front is sparsely punctate.

Female : Length 12 mm. Integument black except anterior tarsus brownish. Vestiture black except on head, pronotum, lateral and ventral sides of thorax and abdomen white; fringes of the abdominal tergites black. Wings dark brown with purplish rosaceous-blue reflections.

Clypeal disc strongly raised in the middle, raised portion impunctate, at sides with fine, dense punctures; frontal area punctate; frontal spatium with dense punctures along short and broad frontal laminae, in the middle with large and sparse punctures, but impunctate posteriorly; frontal fissura extending up to anterior ocellus, deep at frontal spatium; front impunctate except for a few punctures around the ocellae; anterior ocellus in a deep pit; vertex impunctate and with a pit between posterior ocelli.

Scapulae with deep, not very dense punctures; mesoscutum with coarse, sparse punctures, posteriorly in the middle impunctate; scutellum with coarse, sparse punctures, posteriorly impunctate; upper plate of mesopleurum strongly produced above, its surface with deep but not dense punctures, impunctate along anterior and posterior margins; metanotum with considerably coarse, irregularly distributed punctures; upper plate of metapleurum impunctate except for some deep punctures along upper margin, lower plate with indistinct punctation below, elsewhere impunctate; dorso-median area of propodeum with coarse punctures, dorsolateral areas with similar but somewhat shallow punctures except impunctate anteriorly, lateral surface with sparse punctures.

First abdominal tergite with a small tubercle anteriorly in the middle, surface with deep, dense punctures; following tergites with somewhat sparse punctures, second tergite with small impunctate areas at sides; sternites impunctate in the middle, elsewhere with coarse punctures.

Male : Length 12 mm. Black, abdomen slightly shining. Vestiture black except head, pronotum, mesoscutum anteriorly, mesopleurum and underside of the thorax clothed with white erect hair. Wings dark brown with purplish rosaceous blue reflections.

Clypeus impunctate except being punctate at sides and narrowly along posterior margin; frontal area punctate; frontal spatium distinctly defined posteriorly, its surface densely punctate; frontal fissura distinct and extending up to anterior ocellus; front impunctate except for a few scattered punctures and some close punctures around ocelli; anterior ocellus in a deep pit; vertex almost impunctate, the groove between the posterior ocelli extending up to upper part of ocular sinuses.

Scapula with deep, not very dense punctures; mesoscutum with deep, not dense punctures; scutellum with deep punctures, narrowly impunctate along posterior margin; metanotum with deep and considerably sparse punctures; upper plate of mesopleurum narrowly elevated above forming a tubercle, surface with deep, sparse punctures; upper plate of metapleurum impunctate except for a narrow dense punctation along upper margin, lower plate impunctate except for a few punctures; dorso-median area of propodeum with sparse punctures except impunctate antero-medially, dorso-lateral areas punctate on posterior half along outer margin, anterior half and area along inner margin on posterior half impunctate, lateral surface sparsely punctate.

Abdominal tergites evenly and coarsely punctate, the punctures in the middle sparse; sternites with almost similar punctation except impunctate in the middle.

Distribution : India : Sikkim. *Elsewhere* : China, Myanmar and Thailand.

3. *Scolia (Discolia) rubrosinuata* Betrem

1928. *Scolia (Scolia) rubrosinuata* Betrem, *Treubia*, **9** (suppl.) : 248, 249, 266-267. Female, Male; India : Calcutta, Julalpore, Surat (Z.S.I., Calcutta).

1964. *Scolia (Discolia) rubrosinuata* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 92 (new subgeneric assignment).

This uncommon species is widely distributed in India, where it ranges from Calcutta to Surat in Gujarat and Bangalore in Karnataka.

It can be differentiated from its allied Indian species by having entirely black integument and vestiture, except for some white hair on occiput; ocular sinuses dark red or reddish-brown, in both sexes. The male can be distinguished by the characters given in the key.

Female : Length 12-15 mm. Integument black except head with reddish-brown or dark red maculation on ocular sinuses and frontal spatium; front and vertex almost entirely black. Vestiture black except white on occiput and some interspersed white hair on pronotum and abdominal sternites. Wings dark brown with bluish effulgence.

Anterior margin of the clypeus broadly round anteriorly, median area of the disc strongly raised and impunctate, at sides with coarse, subcontiguous punctures; frontal area not distinctly marked posteriorly, surface with moderate sized, deep, contiguous punctures at sides, impunctate in the middle; frontal laminae small, raised and divergent posteriorly; frontal spatium with moderately large, sparse punctures, the punctures denser along frontal laminae; frontal fissura extending halfway to anterior ocellus; front medially with moderately small, deep, mostly scattered punctures, at sides impunctate, ocular sinuses impunctate; anterior ocellus in a moderately deep pit; vertex with coarse, close to scattered punctures, posterior ocelli margined behind by a very faint groove, ocellar area with a few scattered punctures, occiput with moderately large, deep punctures, close in the middle and sparse at sides.

Scapulae with coarse, deep, contiguous to subcontiguous punctures; mesoscutum with large, deep contiguous punctures anteriorly, elsewhere with sparse to scattered punctures, with V-shaped impunctate area in the middle; scutellum with coarse, deep, scattered punctures on posterior half, anterior half with subcontiguous punctures; metanotum with smaller, mostly subcontiguous punctures; mesopleurum with moderately large punctures, mostly separated by half to a diameter of a puncture, broadly impunctate posteriorly; upper plate of metapleurum with moderate-sized deep, mostly subcontiguous punctures at its upper half, lower half impunctate, lower plate with small, deep punctures mostly separated by the diameter of a puncture, broadly impunctate along posterior and upper margins; dorso-median area of propodeum with large, deep subcontiguous to somewhat more separated punctures, dorso-lateral areas with large, sparse punctures on inner half, outer half with smaller, denser punctures, with a large impunctate area anteriorly, lateral surface with moderately small, deep mostly sparse to scattered punctures except along the upper margin with close punctures, posterior surface with moderately large, close to sparse punctures.

First abdominal tergite with a very small antero-median tubercle, surface medially with large sparse to scattered punctures anteriorly, posteriorly the punctures becoming smaller and closer, laterally with dense punctures; second tergite largely with moderate-sized sparse to scattered punctures except posteriorly at sides, with large close punctures; second sternite without basal tubercle.

Male : Length 14 mm. Integument black except ocular sinuses reddish-brown. Vestiture black mixed with white. Wings dark brown with coppery effulgence.

Clypeus impunctate antero-medially, at sides with coarse, deep and close punctures; frontal area in the middle impunctate, at side with small, close punctures; frontal spatium with coarse punctures mostly separated by half the diameter of a puncture, not distinctly marked behind; frontal fissura extending half way to anterior ocellus, the latter in a shallow pit; lower front with close and upper front with sparse punctures; vertex with close punctures; antennal flagellum clavate towards apex.

Scapulae subcontiguously punctate; mesoscutum largely sparsely punctate; metanotum with coarse, close punctures; mesopleurum with punctures mostly separated by the diameter of a puncture; upper plate of metapleurum with sparse punctures at its upper half, lower plate with small, sparse punctures, broadly impunctate posteriorly; dorso-median area of propodeum with coarse, close punctures anteriorly, posteriorly the punctures becoming sparser, dorso-lateral area with an impunctate area anteriorly, elsewhere closely punctate, lateral surface sparsely punctate, posterior surface with sparse punctures.

First abdominal tergite with a small antero-median tubercle, surface sparsely punctate.

Remarks : One female specimen from Calcutta bears reddish-brown coloration on the vertex, front and frontal spatium, and is very close to the type of *Scolia suratensis* Betrem. The details of punctation and vestiture are, more or less similar in both the species. It may be possible that the *Scolia suratensis* Betrem may be a highly coloured form of *Scolia rubrosinuata* Betrem.

Distribution : India : Gujarat (Surat), Karnataka (Bangalore) and West Bengal (Calcutta).

4. *Scolia (Discolia) suratensis* Betrem

1928. *Scolia (Scolia) suratensis* Betrem, *Treubia*, **9** (suppl.) : 253, 267-268. Female, Julalpore, Surat, India (holotype in Z.S.I., Calcutta).

1964. *Scolia (Discolia) suratensis* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 92 (new subgeneric assignment).

This species is known by a female holotype from Surat in Gujarat, a relatively low rainfall area in the western part of India.

The small sized female, 12 mm in body length, can be distinguished from its allied Indian species, by having dense white setae on the occiput; weak and short frontal fissura, front and vertex mostly reddish-yellow.

Female : Length 12 mm. Black, antennal flagellum reddish-brown beneath, abdomen with faint reflections. The following reddish-yellow : vertex except for a black transverse stripe between posterior ocelli, temples above and front. Erect vestiture black except for some yellowish scattered setae on front and dense white setae on the occiput. Wings dark brown, somewhat paler apically, with purplish reflections.

Anterior margin of the clypeus broadly rounded, raised median area of the disc impunctate, at sides with subcontiguous punctures; frontal area not distinctly defined posteriorly, surface with sparse punctures; frontal spatium with moderate-sized, sparse punctures, not distinctly defined posteriorly; front with moderate sized, sparse to scattered punctures, broadly impunctate at sides below; frontal fissura weak, short and present on frontal spatium only; vertex with sparse punctures.

Scapulae with moderate-sized, mostly subcontiguous punctures; mesoscutum with large, close punctures anteriorly and narrowly along posterior margin, elsewhere with large, deep, sparse to scattered punctures, with a large impunctate area in the middle; scutellum with similar, sparse to close punctures except being narrowly impunctate in the middle; metanotum with smaller, close punctures; mesopleurum with moderately large, deep, close punctures, broadly impunctate posteriorly; upper plate of metapleurum with mostly close punctures on upper half, lower plate with smaller, sparse to scattered punctures on lower half; dorso-median area of propodeum with moderately large, deep, mostly subcontiguous punctures except for a narrow, longitudinal impunctate area in the middle, dorso-lateral areas with smaller

subcontiguous punctures, the punctures shallow along posterior margin, broadly impunctate anteriorly, vertical surface with small, sparse punctures, upper half of the postero-median area with coarse, deep, close punctures, lower half impunctate except for a few scattered punctures, postero-lateral areas with smaller, denser punctures.

First abdominal tergite without a tubercle anteriorly on the horizontal surface, surface medially with coarse, scattered punctures anteriorly, posteriorly with smaller, closer punctures, laterally with denser punctures; second and third tergites very sparsely punctate except posteriorly with small, sparse punctures, the punctures being closer at sides.

Distribution : India : Gujarat (Surat).

5. *Scolia (Discolia) coimbatorensis* sp. nov.

This uncommon and small sized species is described here from southern India.

The small sized and almost entirely black female can be easily distinguished from allied Indian species by having the median section of posterior surface of the propodeum entirely impunctate. It is very close to *Scolia (Discolia) javanica* Betrem from Java in having similar integument and vestiture, and body punctation, particularly entirely impunctate median section on the posterior surface of the propodeum. *Scolia (Discolia) javanica* Betrem, however, differs in having mesoscutum with an impunctate area rather than entirely punctate except for a V-shaped impunctate area in the middle.

Female : Length 11 mm. Integument black except antennal flagellum beneath and mandibles being dark brown, abdomen with faint blue reflections. Vestiture black except white intermixed with brownish on the occiput, and predominantly brownish on the head and mesoscutum anteriorly. Wings dark brown, more dark on the basal half, fore wing darker anteriorly, with purplish reflections.

Anterior margin of the clypeus broadly round, median area of the disc strongly raised and impunctate, at sides with coarse contiguous punctures; frontal area with moderately large, close punctures; frontal spatium with moderately large, deep, mostly subcontiguous to somewhat more separated punctures except the punctures contiguous along the small, raised frontal laminae; frontal fissura weak, extending halfway to anterior ocellus; front with coarse, deep, mostly subcontiguous punctures in the middle, elsewhere with punctures mostly separated by the diameter of a puncture, a large area around the anterior ocellus being impunctate; anterior ocellus in a moderately deep pit; ocular sinuses practically impunctate; ocellar area with a few close punctures; posterior ocelli margined behind by a very shallow but punctate groove, vertex impunctate except for a few coarse, scattered punctures, its declivous portion of the vertex with moderately large, deep, mostly subcontiguous punctures.

Scapula with moderately large, mostly subcontiguous to somewhat more separated punctures; mesoscutum with coarse, deep punctures mostly separated by half to a diameter of a puncture, with V-shaped impunctate area posteriorly in the middle; scutellum and metanotum with similar punctures, punctures mostly separated by half the diameter of a puncture; mesopleurum with moderately large, deep, mostly subcontiguous punctures, very broadly impunctate along posterior margin; upper plate of metapleurum at its upper three-fourths with large, deep, mostly subcontiguous to somewhat more separated punctures, lower fourth impunctate, lower plate with small, sparse punctures except the punctures being closer anteriorly, broadly impunctate along upper margin; dorso-median area of propodeum, with coarse, deep, mostly contiguous punctures at its posterior half, anterior half with punctures being more separated, dorso-lateral areas with similar to somewhat smaller mostly subcontiguous to somewhat more separated punctures, the punctures being denser along lateral margins, broadly impunctate anteriorly and narrowly along inner margin, lateral surface with moderate-sized, shallow, scattered punctures, the punctures becoming closer along upper margin, postero-median area of propodeum entirely impunctate and slate like, postero-lateral areas impunctate along inner margin, elsewhere with moderately large, sparse to close punctures.

First abdominal tergite with a very small tubercle anteriorly in the middle, small area behind the tubercle impunctate except for a few coarse, scattered punctures, surface medially with moderate-sized, sparse punctures, the punctures becoming smaller and closer posteriorly, laterally with similar but dense punctures; second tergite with sparse to scattered punctures except anteriorly and posteriorly at sides with close punctures; second sternite without any basal tubercle.

The male is unknown.

Holotype Female, India : Tamil Nadu, Coimbatore, 400m, x.1964, P.S. Nathan (Z.S.I., Calcutta, Regd. No. 8880/H₃). *Paratypes* : 2 Females. India : Tamil Nadu, Coimbatore, Madumalai Hills, 510 m, 1 Female, x.1972, S.P. Singh (Z.S.I., Calcutta, Regd. No. 8881/H₃). Karnataka, Hoskote, 1 Female, 7.ix.1981, V.V. Belavadi (Ghorpade Colln., Bangalore).

Distribution : India : Karnataka and Tamil Nadu.

6. *Scolia (Discolia) gilgitensis* Betrem

1928. *Scolia (Scolia) gilgitensis* Betrem, *Treubia*, **9** (suppl.) : 269-270. Male, Gilgit, India (Holotype and Paratype in Z.S.I. Calcutta).
1964. *Scolia (Discolia) gilgitensis* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 92 (new subgeneric assignment).

This species superficially resembles *S. rubrosinuata* Betrem in having integument entirely black, except ocular sinuses reddish-brown. It can be easily differentiated by

having the clypeus almost as broad as high, a small tubercle in the middle of frontal spatium, and longitudinally impunctate stripes in the middle of metanotum and dorso-median area of propodeum.

Male : Length 15 mm. Black except ocular sinuses reddish-brown. Vestiture black. Wings dark brown with purplish blue reflections.

Clypeus almost as high as broad, surface impunctate anteriorly in the middle, at sides with coarse, close punctures; frontal area with coarse, deep punctures; frontal spatium faintly defined posteriorly, surface with small, subcontiguous to contiguous punctures, and with a small longitudinal carina in the middle; frontal fissura extending up to anterior ocellus; front with moderately large, deep punctures mostly separated by half to a diameter of a puncture except for an impunctate flat area in front of anterior ocellus, ocular sinuses with close punctures; anterior ocellus on a flat area; ocellar triangle with, coarse, deep, contiguous punctures; vertex with small area laterad of posterior ocelli being impunctate, declivous portion with moderate sized, close punctures.

Scapulae with coarse, dimpled, subcontiguous punctures; mesoscutum with coarse punctures mostly separated by half to a diameter of a puncture; scutellum with coarse punctures, close anteriorly and scattered elsewhere; metanotum with coarse, mostly subcontiguous punctures except for a narrow median longitudinal area being slightly raised and impunctate; mesopleurum with coarse, deep, mostly subcontiguous punctures; upper plate of metapleurum with shallow, close punctures at upper one-third, lower two-thirds impunctate, lower plate impunctate except for some close punctures along lower margin anteriorly; dorso-median area of propodeum with coarse, deep subcontiguous punctures except for a narrow and slightly raised longitudinal area in the middle being impunctate, dorso-lateral areas with similar punctation except for a rectangular impunctate area anteriorly and the punctures being contiguous along lateral margin, lateral surface with coarse, deep, scattered punctures except the area along upper margin being broadly contiguously punctate; lateral areas and upper half of the median area of posterior surface of propodeum with coarse, deep, subcontiguous punctures, lower half of median area with more separated punctures.

First abdominal tergite without antero-median tubercle, surface anteriorly with coarse, close punctures, posteriorly the punctures becoming smaller and more separated.

Distribution : Kashmir.

7. *Scolia (Discolia) superciliaris* Saussure

This polytypic species is widely distributed and ranges westward from China through Taiwan and Vietnam to northern India and Nepal. It is recorded here, for the first time, from India and Nepal.

Betrem (1941 : 135-137) recorded three subspecies, *viz.*, *superciliaris superciliaris* Saussure from China; *superciliaris sauteri* Betrem from Taiwan; and *superciliaris staudingeri* Betrem from Vietnam and eastern Himalaya, India. These subspecies are distinguished mainly by the extent of reddish and black colour of antennae, particularly in the male. The antennae are almost entirely black except usually the apex reddish, in the male, of *superciliaris superciliaris*. The males of *superciliaris sauteri* and *S. superciliaris staudingeri* have almost entirely reddish antennae except scapus and one or two basal flageller segments.

(a) *Scolia (Discolia) superciliaris staudingeri* Betrem
(Figure 53)

1928. *Scolia (Scolia) sauteri staudingeri* Betrem, *Treubia*, **9** (suppl.) : 278. Male; India : Assam, Khasi Hills; Vietnam : Annam (Holotype in Leiden Museum).
1941. *Scolia (Scolia) superciliaris staudingeri* Betrem : Betrem, *Notes Ent. Chinoise*, **8**(4) : 135 (new combination).
1964. *Scolia (Discolia) superciliaris staudingeri* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 92 (new subgeneric assignment).

This subspecies is recorded here, for the first time, from Myanmar, Nepal and western Himalaya, India. Previously unknown female is also described here.

Female : Length 18-20 mm. Black, the following reddish yellow : antennae entirely; frontal spatium above; front; vertex except ocellar triangle. Vestiture black. Wings dark brown, forewing darker along anterior margin, reflection purplish.

Anterior rim of the clypeus broadly rounded, median lobe rounded, separated from lateral lobes by shallow emargination, median raised area of the disc impunctate, at sides with subcontiguous punctures; frontal area with coarse, confluent punctures, not marked posteriorly; frontal laminae moderately broad; frontal spatium with coarse punctures mostly separated by half the diameter of a puncture, not marked posteriorly; frontal fissura weakly impressed, distinct on front only; front with moderately large, close to scattered punctures, in front of anterior ocellus narrowly impunctate; anterior ocellus in a shallow pit; vertex with a few close punctures laterad of posterior ocelli, elsewhere impunctate, post-ocellar furrow shallow.

Scapulae with coarse, contiguous punctures; mesoscutum with coarse, deep punctures, contiguous anteriorly and somewhat more separated posteriorly, with a small impunctate area posteriorly in the middle; scutellum with similar punctures, contiguous anteriorly and somewhat more separated posteriorly; metanotum with moderately small, sparse punctures, with a narrow longitudinal impunctate area in the middle; mesopleurum with coarse, contiguous to subcontiguous punctures; upper plate of metapleurum impunctate except at its upper fourth with small, subcontiguous punctures, lower plate with fine, sparse punctures, broadly impunctate along posterior

margin; dorso-median area of propodeum with small, shallow, sparse punctures, dorso-lateral similarly punctate except for an impunctate area anteriorly, lateral surface with small, shallow, scattered punctures, posterior surface with similar sparse punctures.

First abdominal tergite with a moderately small antero-median tubercle, surface with coarse, close to sparse punctures anteriorly, posteriorly with small, scattered punctures, the punctures becoming close to subcontiguous at sides; second sternite without any tubercle.

Male : Length 14-18 mm. Black, the following reddish-yellow : antennae except scapus and basal one flageller segment, a transverse band on front in front of anterior ocellus, ocular sinuses partly. Vestiture black except being mixed with yellowish white on the front and vertex. Wings medium brown with coppery reflections.

Clypeus with a large impunctate area anteriorly in the middle, elsewhere with coarse, subcontiguous to close punctures; frontal area raised and forming a longitudinal keel in the middle, surface subcontiguously punctate; frontal spatium with small, contiguous punctures; frontal fissura extending up to anterior ocellus; front with moderately large punctures, mostly separated by the diameter of a puncture; ocular sinus with fine, sparse punctures; anterior ocellus in a deep pit; posterior ocelli margined by a shallow groove; ocellar triangle with a few close punctures; vertex with fine, sparse punctures; antennal flagellum elongate, not clavate towards the apex, most of the segments 1.5 times as long as broad.

Scapulae with small punctures mostly separated by the diameter of a puncture; mesoscutum with moderately large punctures mostly separated by the diameter of a puncture; scutellum with similar mostly subcontiguous punctures; metanotum with relatively smaller, more separated punctures; mesopleurum with coarse, subcontiguous punctures, broadly impunctate along posterior margin; upper plate of metapleurum with small, subcontiguous to somewhat more separated punctures at its upper half, lower half impunctate, lower plate with fine, scattered punctures, broadly impunctate along upper margin; dorso-median area of propodeum with moderately small, shallow punctures mostly separated by the diameter of a puncture, dorso-lateral area with similar but somewhat closer punctures, with a large impunctate area anteriorly, lateral surface with similar scattered punctures, the punctures becoming closer along upper margin, posterior surface with scattered punctures.

First abdominal tergite without any antero-median tubercle, anterior half with moderately large punctures mostly separated by half the diameter of a puncture, posterior half with punctures mostly separated by one to two times the diameter of a puncture.

Male genitalia as in figure 53.

Distribution : India : Assam, Meghalaya (Khasi Hills), Uttaranchal (Koti in Dehra Dun dist.). *Elsewhere* : China, Myanmar, Nepal, Taiwan and Vietnam.

8. *Scolia (Discolia) affinis* Guerin

(Figure 54, 55)

1838. *Scolia affinis* Guerin, *Voy, Coq.* : 254. Female, Male, Senegal (types in Paris Museum).
1855. *Scolia (Lacosi) jurinei* Saussure, *Mem. Soc. Phys. Hist. nat. Geneva*, **14** : 45. Female, Male; Indes Orientales (types in Geneva Museum).
1855. *Scolia instabilis* Smith, *Cat. Hym. British Mus.*, **3** : 88. Female, Male; India (types in British Museum).
1864. *Scolia (Discolia) aureipennis* Lepeletier : Saussure and Sichel, *Cat. Spec. Gen. Scolia* : 109 (misidentifications. *S. aureipennis* Lepeletier and *S. jurinei* Saussure synonymised).
1871. *Scolia instabilis* Smith, *J. Linn. Soc. London, Zool.*, **11** : 345.
1892. *Scolia (Discolia) aureipennis* Lepeletier : Magretti, *Ann. Mus. civico, Stor. Nat. Geneva*, **12** : 239. Male, Myanmar.
1892. *Scolia (Discolia) ruficornis* Fabricius : Magretti, *Ann. Mus. civico Stor. Nat. Geneva*, **12** : 237-238. Female, Male, Myanmar (misidentified).
1897. *Scolia affinis* Guerin : Dalla-Torre, *Cat. Hym.*, **8** : 144.
1897. *Scolia aureipennis* Lepeletier : Dalla-Torre, *Cat. Hym.*, **8** : 147.
1897. *Scolia (Discolia) aureipennis* Lepeletier : Bingham, *Fauna British India, Hym.*, **1** : 79-80. Female, Male (material from Malabar, Sikkim and Tenasserim only).
1907. *Scolia aureipennis* Lepeletier : Paiva, *Rec. Indian Mus.*, **1** : 14. Female, Male, Bhimtal, Kumaon Hills.
1928. *Scolia (Scolia) aureipennis* Lepeletier : Betrem, *Treubia*, **9** (suppl.) : 280-282. Female, Male, India : Sikkim, Calcutta, Bangalore, Orissa, Dehra Dun, Kerala : Parambikulam; Andamans; Sri Lanka; Myanmar.
1941. *Scolia (Scolia) jurinei* Saussure : Betrem, *Notes Ent. Chinoise*, **8**(4) : 136 (*S. jurinei* Saussure not a synonymy of *S. aureipennis* Lepeletier; *S. jurinei* Saussure, 1855 widely distributed in Indian subcontinent).
1964. *Scolia (Discolia) jurinei* Saussure : Betrem & Bradley, *Zool. Meded.*, **40** : 90 (new subgeneric assignment).
1965. *Scolia (Discolia) jurinei* Saussure : Guiglia, *Verh. Naturf. Ges. Basel*, **76** : 320. Female, Male. Sri Lanka.
1967. *Scolia instabilis* Smith : Betrem in Bradley & Betrem, *Bull. British. Mus. (Nat. Hist.) Ent.*, **20**(7) : 309 (lectotype Female designated; *instabilis* Smith synonymised under *jurinei* Saussure).
1973. *Scolia (Discolia) affinis* Guerin : Bradley, *Bull. Mus. natn. Hist. Nat., Zool.*, **86** : 218 (lectotype Female designated; Betrem noted that *S. affinis* Guerin is a senior synonym of *S. jurinei* Saussure and *S. aureipennis* Lepeletier is the black variety of *S. castanea* Perch).

1974. *Scolia (Lacosi) jurinei* Saussure : Bradley, *Revue suisse Zool.*, 81(2) : 446 (lectotype Female designated; *S. jurinei* synonymised under *S. (D.) affinis* Guerin).
1978. *Scolia (Discolia) affinis* Guerin : Krombein, *Smithsonian Contr. Zool.*, 283 : 31-33. Female, Male, Sri Lanka.

This is one of the most common Indian scoliids distributed throughout Indian subcontinent, ranging from Sri Lanka northwards through India to Nepal, penetrating eastwards to Myanmar and west-wards to Pakistan. Betrem's (1928) citing of Southeast Asia in range of distribution on the basis of material labelled as having come from Cochin State was an error. This material was collected by F.H. Gravely from Parambikulam, a locality in former State of Cochin in India (now in Kerala).

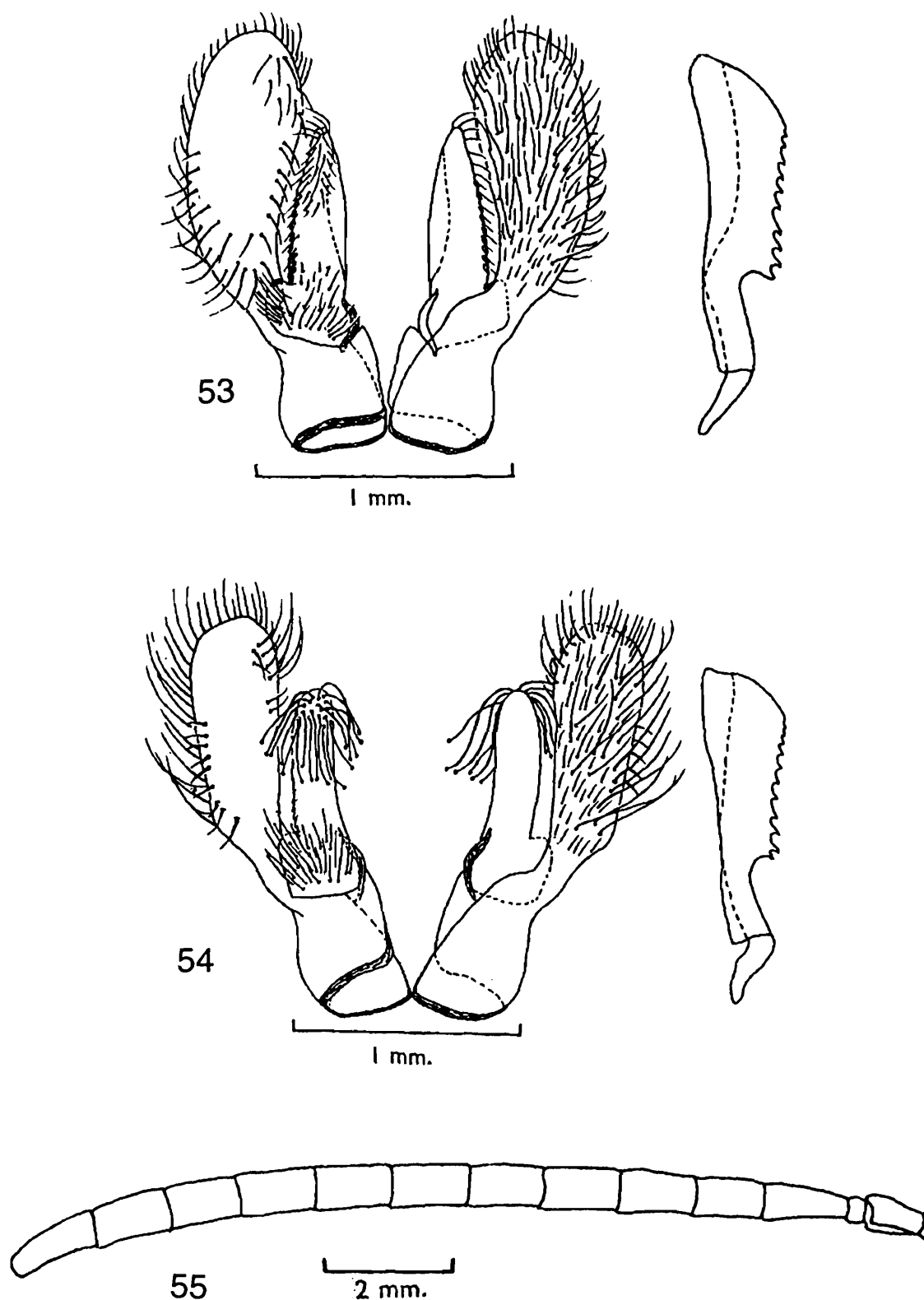
The female can be easily distinguished from its congeners by having orange-red antennal flagellum, rest of the integument entirely black and almost entirely smooth metanotum and propodeal dorsum. The male has black integument except antennal flagellum, orange-red apically or entirely, and the propodeal dorsum with sparse and shallow punctures. This is the only Indian scoliid with capitate bristles on the apex of the volsellae in male.

This species breeds in India in areas of low to very heavy rainfall, occurring from sea level to about 1400m elevation.

Female : Length 17-25 mm. Integument black except antennal flagellum orange-red. Vestiture entirely black. Wings dark brown, forewing darker anteriorly, effulgence dark blue.

Apical margin of median lobe of the clypeus rounded, trapezoidal area impunctate, at sides with mostly contiguous punctures; frontal area with coarse, confluent punctures; frontal spatium with confluent punctures along the narrow and raised frontal laminae, elsewhere with relatively sparse punctures; frontal fissura moderately deep, extending two-thirds of the distance to anterior ocellus; front medially impunctate, at sides with coarse, scattered punctures; anterior ocellus in a shallow pit; posterior ocelli margined behind by a shallow groove, vertex impunctate except for a few small, sparse punctures adjacent to eye margin, its declivous portion with fine, scattered punctures.

Scapulae with coarse, dimpled, mostly confluent punctures; mesoscutum with coarse, contiguous to confluent punctures along anterior margin, small and sparse punctures posteriorly; scutellum with small, scattered punctures; metanotum impunctate; mesopleurum with coarse, subcontiguous punctures, broadly impunctate along anterior and posterior margins; upper plate of metapleurum with medium sized, subcontiguous punctures on upper half to three-fourths, lower half to third impunctate, lower plate with fine scattered punctures on lower two-thirds, upper third impunctate; dorsum of propodeum with very tiny scattered punctures, lateral surface with small scattered punctures; posterior surface with tiny, scattered punctures.



Figs. 53-55 : Male genitalia : Ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right. 53, *Scolia (Discolia) superciliaris staudingeri* Betrem; 54, 55, *Scolia (D.) affinis* Guerin : Genitalia and antenna of male.

First abdominal tergite with a well developed antero-median tubercle, surface largely with small, scattered punctures except postero-laterally, with subcontiguous; second abdominal sternite without a basal tubercle.

Male : Length 12-21 mm. Integument black except antennal flagellum being orange red entirely or only apically. Wings dark to light brown with purplish reflections, sometimes with coppery lights.

Clypeus with contiguous to subcontiguous punctures except for a small median area above the margin impunctate; frontal spatium with small, contiguous punctures; frontal fissura extending up to anterior ocellus; front with punctures mostly separated by less than the diameter of a puncture; anterior ocellus in a shallow pit; posterior ocelli margined behind by a weak groove, vertex with small, sparse punctures. Antennal flagellum elongate, not clavate towards apex, most segments one and a half times as long as broad (Fig. 55).

Scapulae with medium sized punctures, mostly separated by half the diameter of a puncture; mesoscutum with moderately large punctures mostly separated by half to diameter of a puncture; scutellum with similar punctures, mostly separated by the diameter of a puncture; mesopleurum with subcontiguous punctures, impunctate along anterior and posterior margins; upper plate of metapleurum with dense punctures at upper two-thirds, lower third impunctate, lower plate largely with very fine, scattered punctures; metanotum and dorso-median area of propodeum with shallow punctures, mostly separated by the diameter of a puncture, lateral area with shallow, somewhat close punctures, broadly impunctate anteriorly, lateral surface with small, sparse punctures except punctures being closer adjacent to upper margin, posterior surface largely sparsely punctate.

First abdominal tergite with a small antero-median tubercle, surface with small punctures, mostly separated by the diameter of a puncture; second sternite without any antero-median tubercle.

Male genitalia as in figure 54.

Distribution : India : Arunachal Pradesh (Subansiri dist.); Assam (Silchar, Rangapara); Bihar (Pusa, Hazaribagh N.P.; Islampur); Delhi (Delhi Univ. Campus, Wazirpur); Himachal Pradesh (Solan dist., Bilaspur dist., Sirmour dist.); Jammu & Kashmir (Shalimar); Karnataka (Sandur, Coorg, Bangalore); Kerala (Calicut, Parambikulam, Trivandrum dist.); Madhya Pradesh (Shivpuri, Raipur); Maharashtra (Pune); Meghalaya (Garo Hills, Jaintia Hills); Nagaland (Naga Hills); Orissa (Angul dist., Ganjam dist., Sundargarh, Satpara); Pondicherry (Karaikal) Sikkim (Melli); Tamil Nadu (Annamalai Hills, Nilgiri Hills, Coimbatore); Tripura (Garjee, Dharpur); Uttaranchal (Bhimtal, Ranikhet, Uttarkashi, Tehri, Chilla, Dehra Dun, Mohand, Mussoorie, Rishikesh, Motichur); Uttar Pradesh (Allahabad, Aligarh); West Bengal (Darjeeling Dist. Nadia dist., Calcutta, Sagar Island). *Elsewhere* : Bangladesh, Myanmar, Nepal and Pakistan.

9. *Scolia (Discolia) sinensis* Saussure
(Figure 56)

1864. *Scolia (Discolia) sinensis* Saussure in Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 322. Male; Sina, Shanghai (holotype in Vienna Museum).
1867. *Scolia (Discolia) sinensis* Saussure : Saussure, *Reise Novara Zool.*, 2 (Hym.) : 103. Male.
1894. *Scolia (Discolia) sinensis* Saussure : Sickmann, *Zool. Jahrb. Abt. Syst.*, 8(2) : 225. Female, North China.
1897. *Scolia sinensis* Saussure : Dalla-Torre, *Cat. Hym.*, 8 : 183 (listed).
1925. *Scolia indica* Saussure : Uchida, *Ins. World*, 29 : 333. Korea (misidentified).
1928. *Scolia (Scolia) sinensis* Saussure : Betrem, *Treubia*, 9 (suppl.) : 295-296. Female, Male; China; Gilgit and Kashmir.
1933. *Scolia (Scolia) sinensis* Saussure : Uchida, *J. Fac. Agric. Hokkaido Imp. Univ.*, 32(6) : 246. Female, Male, Korea.
1936. *Scolia sinensis* Saussure : Uchida, *Fauna Nipp.*, 10 : 24.
1941. *Scolia (Scolia) sinensis* Saussure : Betrem, *Notes Ent. Chinoise*, 8(4) : 160-161. Female, Male, China.
1962. *Scolia (Scolia) sinensis* Saussure : Tsuneki, *Life Study*, 6(1) : 1. Ryukyus, Japan.
1962. *Scolia (Scolia) sinensis* Saussure : Shteinberg, *Fauna Soviet Russia*, 13 : 128, fig. 60 (Genitalia).
1964. *Scolia (Discolia) sinensis* Saussure : Betrem & Bradely, *Zool. Meded.*, 40 : 92 (subgeneric assignment).
1972. *Scolia (Discolia) sinensis* Saussure : Tsuneki, *Etizenia*, 62 : 37, Female, Male, Taiwan, China, Korea.
1974. *Scolia (Discolia) sinensis* Saussure : Bradley, *Revue suisse Zool.*, 81(2) : 468 (note on holotype).
1979. *Scolia sinensis* Saussure : Abdurakhmanov, *Zoologicheskii Zh.*, 58(11) : 1748-1750 (Biology).

This widely distributed species ranges from Korea westwards through eastern China and Tibet to Kashmir in India, and also occurs in Pakistan and Tadzikistan.

Both the sexes are differentiated easily by having reddish-yellow vestiture on second to last abdominal segments and the rest of the vestiture and integument entirely black.

Female : Length 20-23 mm. Integument entirely black. Vestiture black except reddish-yellow on second to last tergites and sternites. Wings medium brown with violaceous reflections.

Anterior rim of the clypeus truncate at the median lobe, disc strongly raised in the middle, raised area impunctate, at sides with coarse, subcontiguous punctures; frontal area contiguously punctate; frontal spatium with contiguous to subcontiguous punctures; frontal laminae moderately broad; frontal fissura very weak, extending halfway to anterior ocellus; front in the middle with medium sized, subcontiguous to somewhat more separated punctures, elsewhere with scattered punctures; anterior ocellus in a shallow pit; post-ocellar furrow shallow and punctate; vertex impunctate except for some close punctures laterad of posterior ocelli and small, contiguous punctures along posterior margin in the middle.

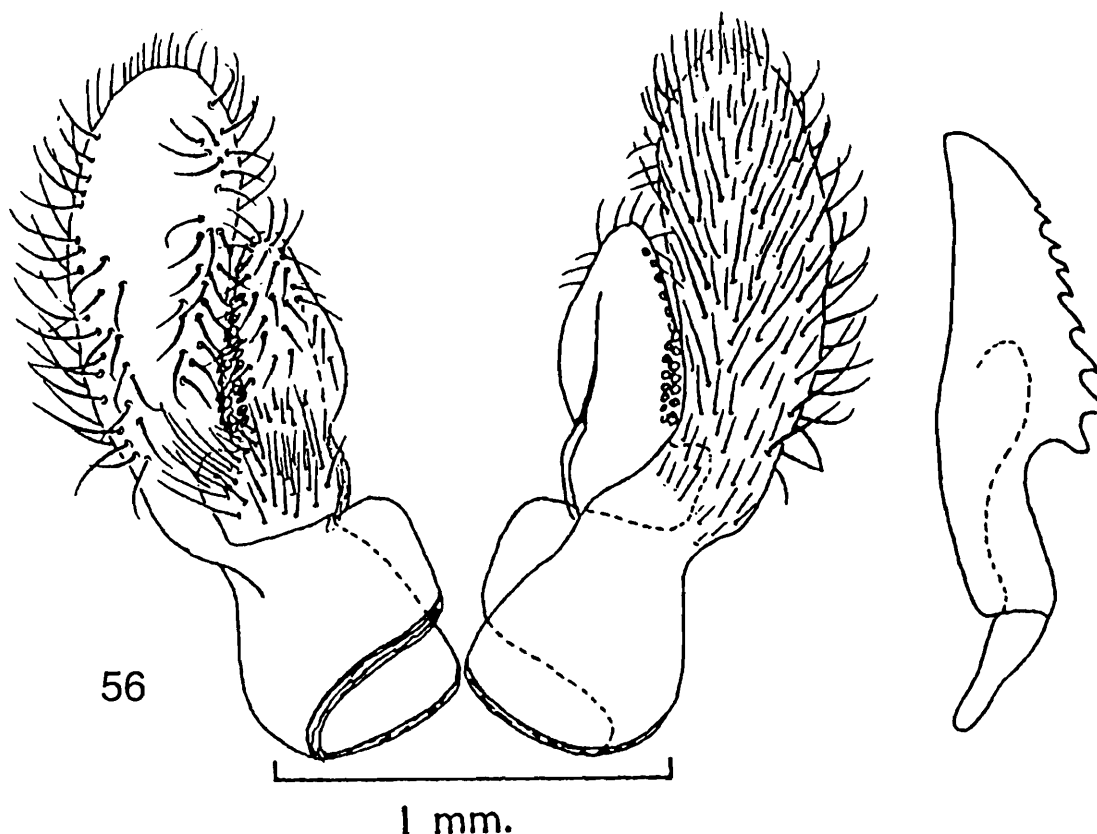
Scapulae with moderate sized punctures mostly separated by half to a diameter of a puncture; mesoscutum with similar punctures, subcontiguous anteriorly, elsewhere more separated, with a V-shaped impunctate area posteriorly in the middle; scutellum with medium sized mostly subcontiguous punctures; metanotum with small, subcontiguous punctures; mesopleurum with mostly subcontiguous punctures; upper plate of metapleurum with coarse, contiguous punctures at upper three-fourths, lower fourth impunctate, lower plate sparsely punctate, posterior half impunctate; dorso-median area of propodeum anteriorly with small punctures mostly separated by the diameter of a puncture, posteriorly with coarse, contiguous punctures, dorso-lateral area with small to large, contiguous punctures except for a small impunctate area anteriorly, lateral surface with sparse to scattered punctures except contiguous to subcontiguous punctures along upper and posterior margins, postero-median area with small, scattered punctures except along upper margin the punctures close, postero-lateral areas contiguously punctate.

First abdominal tergite with a small antero-median tubercle, surface behind the tubercle with large to small, subcontiguous punctures, elsewhere with small, close punctures; second tergite anteriorly at sides with small, close punctures, in the middle with small and large, scattered punctures, posteriorly with fine, dense punctures; second sternite without any antero-median tubercle.

Male : Length 12-16 mm. Integument entirely black. vestiture black except reddish yellow on apical portion of second abdominal segment and entirely on third to last segments. Wings medium brown with violaceous reflections.

Clypeus in the middle with scattered punctures, at sides with subcontiguous punctures; frontal area with fine, close punctures; frontal spatium contiguously punctate; frontal fissura distinct on frontal spatium, not extending up to anterior ocellus; front with subcontiguous to somewhat more separated punctures; anterior ocellus in a shallow pit.

Scapulae with small punctures mostly separated by the diameter of a puncture; mesoscutum with medium sized, mostly subcontiguous punctures at anterior half, posterior half with punctures mostly separated by the diameter of a puncture; scutellum



Figs. 56 : *Scolia (Discolia) sinensis* Saussure : Male genitalia : Ventral aspect at left, dorsal aspect in middle and aedeagus in profile at right.

and metanotum subcontiguously punctate; mesopleurum with moderately large, mostly subcontiguous punctures; upper plate of metapleurum with coarse, deep, contiguous punctures except impunctate narrowly along lower margin, lower plate with small, sparse to scattered punctures; dorso-median area of propodeum with mostly small punctures mostly separated by half the diameter of a puncture at anterior half, posterior half with somewhat large and contiguous punctures, dorso-lateral areas with moderate sized contiguous punctures except for a large impunctate area anteriorly, lateral surface with moderate-sized contiguous to subcontiguous punctures, posterior surface with contiguous punctures.

First abdominal tergite with a small antero-median tubercle, surface behind the tubercle with large, subcontiguous punctures, at sides with medium sized, close punctures, posteriorly with small to fine close punctures.

Male genitalia as in figure 56.

Distribution : India : Jammu & Kashmir (Srinagar). *Elsewhere* : China, Korea, Pakistan, Tibet and Tadzikistan.

10. *Scolia (Discolia) felderi* Betrem

1897. *Scolia (Discolia) erratica* Smith : Bingham, *Fauna British India, Hym.*, 1 : 77-78 (misidentification of specimens from Myanmar and Sikkim).
1928. *Scolia (Scolia) felderi* Betrem, *Treubia*, 9 (suppl.) : 274-275. Female, Male; India : Sikkim, Ranjit Valley; Naga Hills; Myanmar : Tenasserim (holotype Female from Ranjit Valley, Sikkim in British Museum; allotype Male from unknown locality in Vienna Museum; paratypes in Z.S.I., Calcutta).
1964. *Scolia (Discolia) felderi* Betrem : Betrem & Bradley, *Zool. Meded.*, 40 : 93 (new subgeneric assignment).

This uncommon species previously known, from Myanmar, and Nagaland and Sikkim in India, has been recorded here for the first time from southern India.

The females of *S. felderi* Betrem and *S. rugifrons* Betrem are very much allied to each other. The female of *S. felderi* can be differentiated by having the clypeus almost entirely red, and the vertical surface of propodeum with medium-sized, deep, sparse punctures. The male can be differentiated by having the head entirely reddish-yellow except the apical margin of the clypeus black.

Female : Length 12-18 mm. Black, antennae and head entirely red except the clypeus anteriorly being black. Vestiture black except the setae on the head being mostly reddish yellow. Wings dark brown, effulgence purplish.

Anterior rim of the clypeus broadly subtruncate at its median lobe, disc medially raised and impunctate, at sides with coarse, subcontiguous punctures, a band of small, dense punctures behind anterior rim; frontal area not marked posteriorly, surface with close punctures; frontal spatium not distinctly defined posteriorly, surface with coarse, sparse punctures except along small, raised frontal laminae, where the punctures becoming closer; frontal fissura weak, distinctly marked at frontal spatium only; front impunctate except for a few sparse, deep punctures in front and laterad of anterior ocellus; anterior ocellus in a moderately deep pit; post-ocellar furrow shallow; vertex impunctate.

Scapulae with moderately large, mostly sparse to subcontiguous punctures; mesoscutum with coarse, deep punctures, the punctures very close along anterior and posterior margins, posteriorly in the middle with a V-shaped impunctate area; scutellum usually with large, deep, scattered punctures; metanotum with coarse, deep, mostly close punctures; upper plate of mesopleurum with coarse, deep, subcontiguous punctures, lower plate with sparse punctures, broadly impunctate along anterior and posterior margins; upper plate of metapleurum with medium-sized close to sparse punctures along upper margin, elsewhere impunctate, lower plate with small, close to sparse punctures on anterior half, posterior half impunctate; dorso-median area of propodeum with coarse, deep punctures, mostly separated by less than the diameter of a puncture, dorso-lateral areas with smaller and sparser

punctures, with a large impunctate area anteriorly, lateral surface with medium-sized, deep, sparse punctures.

First abdominal tergite with a small antero-median tubercle, surface with moderately large, sparse punctures anteriorly, posteriorly with small to fine, sparse punctures; second tergite with sparse to scattered punctures; second sternite without any antero-median tubercle.

Male : Length 14-16 mm. Black, head and antennae reddish-yellow except apical margin of the clypeus being black. Vestiture black except on head being largely yellowish white. Wings dark brown with purplish to coppery effulgence.

Clypeus with coarse sparse punctures in the middle, at sides with close punctures and small and dense punctures along anterior margin; frontal area with close punctures; frontal spatium with small, subcontiguous punctures, not distinctly defined posteriorly; frontal fissura weak, distinct on frontal spatium only; front with medium-sized, close to sparse punctures; anterior ocellus in a moderately deep pit; posterior ocelli margined behind by a shallow furrow; ocellar area with close punctures, distance between posterior ocelli more than the distance between anterior ocellus and one of the posterior ocelli; vertex with shallow pits behind posterior ocellus, surface largely impunctate.

Scapulae with medium-sized, deep punctures mostly separated by the diameter of a puncture; mesoscutum with coarse, deep, close to sparse punctures; scutellum with large, deep, mostly close punctures; metanotum with most of the punctures separated by half the diameter of a puncture; upper plate of the mesopleurum with coarse, deep, subcontiguous to sparse punctures, lower plate with small punctures, mostly separated by the diameter of a puncture, broadly impunctate along anterior and posterior margins; upper plate of metapleurum impunctate except for a few medium-sized, deep, sparse punctures, lower plate with smaller, close to sparse punctures; propodeal surface punctate as in the female.

First abdominal tergite without any antero-median tubercle, surface with coarse, close, deep punctures anteriorly elsewhere with small, sparse punctures; second tergite with medium-sized, deep, sparse punctures.

Distribution : India : Assam (North Cachar Hills), Karnataka (Kodagu), Kerala (Calicut), Meghalaya (Garo Hills), Nagaland and Sikkim (Melli, Ranjeet Valley). *Elsewhere* : Myanmar.

11. *Scolia (Discolia) rugifrons* Betrem

1928. *Scolia (Scolia) rugifrons* Betrem, *Treubia*, **9** (Suppl.) : 273. Female; Khasi Hills, Ranjit Valley, India; Pegu Hills, Myanmar (types in British Museum).

1964. *Scolia (Discolia) rugifrons* Betrem : Betrem & Bradlev, *Zool. Meded.*, **40** : 93 (new subgeneric assignment).

The females of *S. rugifrons* Betrem, *S. rohweri* Betrem and *S. felderi* Betrem resemble in having most of the head red and the rest of the integument entirely black, vestiture black except yellowish on the head and a weak to indistinct frontal fissura. *S. rugifrons* can be distinguished by having mesoscutum entirely punctate except for a V-shaped impunctate area posteriorly and clypeus black.

Female : Length 26 mm. Black, the following red : antennal flagellum entirely; frontal spatium; front; vertex except ocellar triangle being black. Vestiture black except only the fringes on the mandibles being reddish brown. Wings dark brown with purplish golden reflections.

Clypeus impunctate in the middle, at sides punctate; frontal area with dense punctures; frontal spatium weakly defined posteriorly, surface with coarse, sparse punctures; front and vertex impunctate except for a few deep punctures.

Scapulae with deep, dense punctures; mesoscutum similarly punctate anteriorly, posteriorly with larger punctures and a V-shaped impunctate area in the middle; scutellum with coarse, deep punctures except being narrowly impunctate posteriorly in the middle; metanotum with deep, sparse punctures, impunctate in the middle; mesopleurum punctate, impunctate along anterior and posterior margins; metapleurum almost impunctate, upper plate with deep punctures above, lower plate with some effaced punctures; dorso-median area of propodeum with deep, sparse punctures, dorso-lateral areas with smaller and denser punctures, impunctate anteriorly, lateral surface with fine, sparse punctures.

Abdominal tergites with deep, sparse punctures except punctures being denser at sides, impunctate along posterior margin; sternites almost impunctate, at sides with considerably large punctures.

Distribution : India : Meghalaya (Khasi Hills), Sikkim (Ranjeet Valley). *Elsewhere* : Myanmar.

12. *Scolia (Discolia) carmichaeli* Betrem (Figure 57)

1928. *Scolia (Scolia) carmichaeli* Betrem, *Treubia*, **9** (suppl.) : 286-287. Female, Male; India : West Bengal, Darjeeling dist., Singla, Pashok; Sikkim (Z.S.I., Calcutta).

1964. *Scolia (Discolia) carmichaeli* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 93 (new subgeneric assignment).

Both the sexes are maculated with red on most of the head and have largely yellowish-white vestiture. The female can be distinguished, from that of allied species, by having a prominent and deep frontal fissura, which is extending up to anterior ocellus. The male can be distinguished by having scapus and five to six apical antennal segments black, a longitudinal carina in the middle on frontal spatium, and a large anterior ocellus, which is larger than the distance between posterior ocelli.

Female : Length 18-20 mm Black, the following red : antennae; clypeus at its posterior half; frontal spatium partly; scrobes; front entirely; vertex entirely including its declivous portion except temples. Vestiture predominantly yellowish-white except being black on dorsum of the thorax, most of the mesopleurum, legs and almost all the abdominal tergites and apical sternites. Wings medium brown, fore wing darker anteriorly and basally, with coppery reflections.

Anterior rim of the clypeus broadly rounded anteriorly, median and lateral lobes not differentiated, median raised area of the disc impunctate, at sides with coarse, contiguous punctures; frontal area narrowly raised in the middle like a keel and impunctate, at sides with confluent punctures; frontal spatium with one to two rows of coarse, contiguous punctures along the moderately small and raised frontal laminae, in the middle impunctate; frontal fissura prominent and deep, extending up to anterior ocellus; front impunctate except for a few coarse, scattered punctures and some close punctures along margin of eye lobe; anterior ocellus in a deep pit; post-ocellar furrow not distinct; vertex impunctate except for a group of a few close punctures behind posterior ocelli, declivous portion with coarse, mostly subcontiguous punctures.

Scapulae with coarse, deep, mostly subcontiguous punctures; mesoscutum on anterior half with coarse, deep, close punctures along the anterior margin, elsewhere the punctures mostly separated by the diameter of a puncture, posterior half with an impunctate area in the middle, elsewhere with punctures mostly separated by the diameter of a puncture except close punctures along posterior margin; scutellum with coarse, deep, close punctures except being impunctate in the middle; metanotum with relatively smaller punctures, punctures mostly separated by half the diameter of a puncture, impunctate narrowly in the middle and along posterior margin; upper plate of mesopleurum with coarse, subcontiguous to contiguous punctures, lower plate with similar, mostly subcontiguous punctures except being broadly impunctate along posterior margin; upper plate of metapleurum with moderately large, deep, mostly subcontiguous punctures on upper half, lower half impunctate, lower plate impunctate except for a few small, shallow, scattered punctures; dorso-median area of propodeum with medium-sized, deep punctures mostly separated by one to half the diameter of a puncture, dorso-lateral area with similar punctures except for an impunctate area anteriorly, lateral surface with some small, shallow, scattered punctures except for a few larger punctures along upper margin.

First abdominal tergite with a small antero-median tubercle, surface anteriorly with coarse, close punctures, posteriorly with small, sparse punctures except at sides, where the punctures are larger and closer; second and third tergites with small, scattered punctures; second sternite without any antero-median tubercle.

Male : 15-17 mm. Black, the following reddish-yellow : antennae except scapus and five to six apical segments; clypeus at sides and posteriorly; front except ocular sinuses; vertex entirely including upper half of the occiput. Vestiture yellowish-white

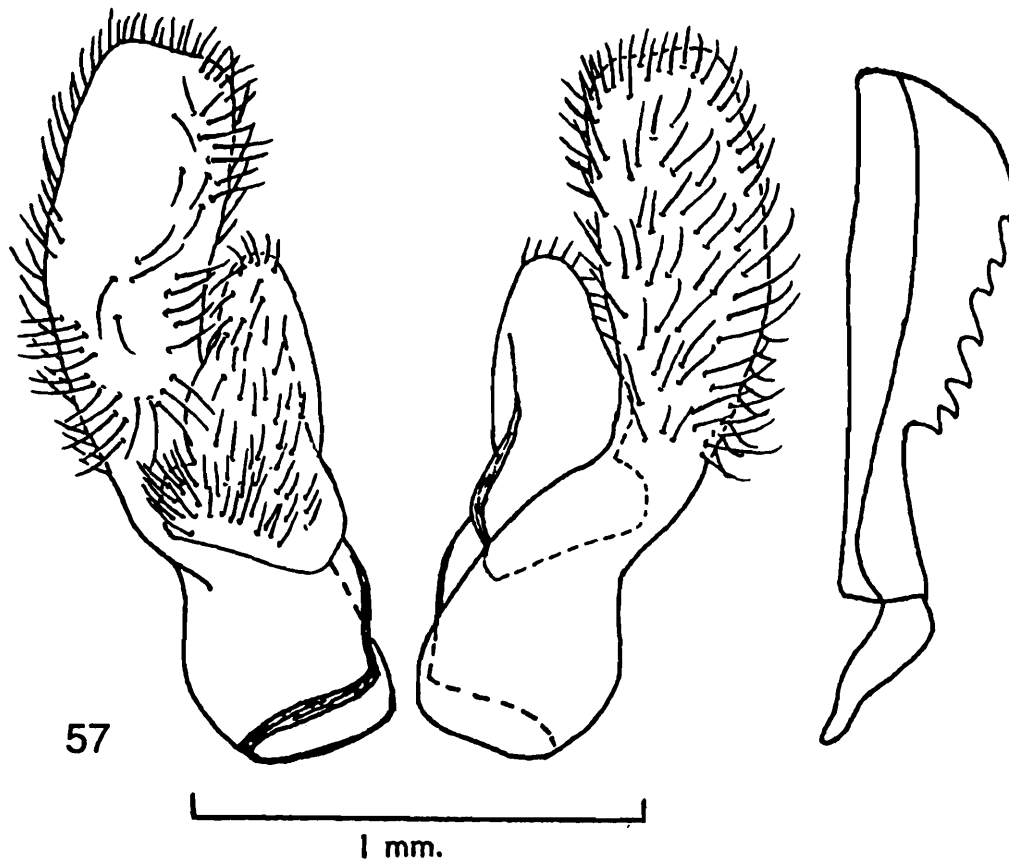


Fig. 57 : *Scolia (Discolia) carmichaeli* Betrem : Male genitalia : Ventral aspect at left, dorsal at the middle and aedeagus in profile at right.

except black on dorsum of the thorax, abdominal tergites and apical sternites. Wings medium brown with coppery reflections.

Clypeus broadly impunctate in the middle, at sides and posteriorly with coarse, close punctures; frontal area with some coarse, close punctures; frontal spatium with a longitudinal carina in the middle, surface with moderately large, subcontiguous punctures; frontal laminae sharply raised; front medially with subcontiguous to more separated punctures, at sides impunctate, frontal fissura extending up to anterior ocellus, distinct on front only; anterior ocellus large, larger than the distance between posterior ocelli; anterior ocellus in a large pit; post-ocellar furrow not present; vertex with moderately large, shallow, scattered punctures.

Scapula with medium-sized, dimpled punctures, mostly separated one to half the diameter of a puncture; mesoscutum with coarse punctures, mostly separated by 0.5 to 1 × the diameter of a puncture; scutellum and metanotum with coarse, close punctures; mesopleurum with coarse, mostly subcontiguous punctures except being broadly impunctate along posterior margin; upper plate of metapleurum with coarse,

subcontiguous to more separated punctures on upper half, lower half impunctate, lower plate impunctate except for a few small shallow scattered punctures; dorsum of propodeum with moderately coarse punctures, mostly separated by half the diameter of a puncture except for a small impunctate area anteriorly on lateral areas, lateral surface with small, shallow, sparse to scattered punctures.

First abdominal tergite without any antero-median tubercle, surface with coarse, close punctures anteriorly, posteriorly with smaller, sparser punctures; second sternite without any antero-median tubercle, surface coarsely punctate.

Male genitalia as in figure 57.

Distribution : India : Arunachal Pradesh (Tipi in Kameng dist.), Sikkim and West Bengal (Singla and Pashok in Dajeeling dist.).

13. *Scolia (Discolia) elizabethae* Bingham

(Figure 58)

1897. *Scolia (Discolia) elizabethae* Bingham, *Fauna British India, Hym.*, **1** : 78, figure 15. Female, Male; Myanmar : Tenasserim, Karenee; India : Sikkim (types in British Museum).
1928. *Scolia (Scolia) elizabethae* Bingham : Betrem, *Treubia*, **9** (suppl.) : 302-303. Female, Male; Myanmar: Tenasserim; India : Sikkim, Darjeeling.
1928. *Scolia (Scolia) elizabethae* var. *maculicollis* Betrem, *Treubia*, **9** (suppl.) : 304. Male; India : Sikkim (holotype in Z.S.I., Calcutta). **New Synonymy.**
1964. *Scolia (Discolia) elizabethae* Bingham : Betrem & Bradley, *Zool. Meded.*, **40** : 93 (new subgeneric assignment).

This uncommon species is known from Sikkim, Meghalaya, and Darjeeling Hills of West Bengal in India, and also occurs in Myanmar. The female can be distinguished by having red or yellow markings on head and one or two abdominal tergites, frontal spatium with a few scattered punctures and the mesoscutum with a large impunctate area in the middle. The males having abdomen with paired yellow lateral spots on third tergite or entirely black; red or orange antennal flagellum; clypeus, frontal area, scrobes, frontal spatium posteriorly, and front entirely yellow. The variety *maculicollis* Betrem is considered as a synonym.

Female : Length 21-25 mm. Black, abdomen with faint blue reflections, the following red to light red or rarely yellow : antennal flagellum; posterior half of frontal spatium; front and vertex entirely; rarely a small spot above on upper plate of mesopleurum; a broad band anteriorly on third abdominal tergite and sometimes a narrow band on fourth tergite also. Vestiture predominantly black, sometimes with some white hair on occiput, lateral thorax, legs and abdominal sternites. Wings dark brown with purplish reflections.

Anterior rim of the clypeus broadly rounded anteriorly, median lobe truncate, raised median area of the disc impunctate, at sides with coarse, subcontiguous

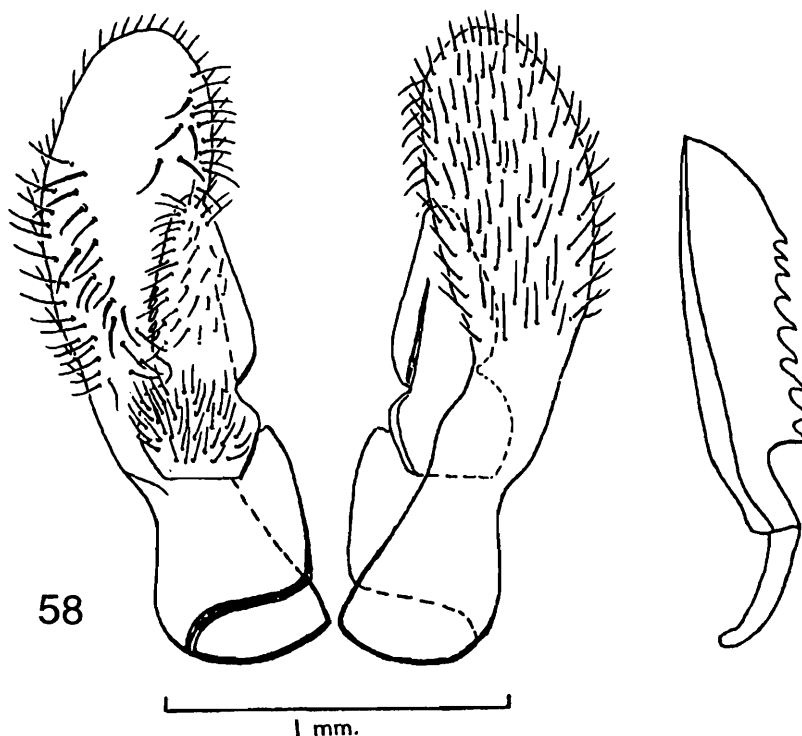


Fig. 58 : *Scolia (Discolia) elizabethae* Bingham : Male genitalia : Ventral aspect at left, dorsal at the middle and aedeagus in profile at right.

punctures; frontal area contiguously punctate; frontal spatium with a few coarse scattered punctures, narrowly impunctate in the middle, along the moderately broad and raised frontal laminae with a row of coarse, contiguous punctures; frontal fissura extending halfway to anterior ocellus; front and vertex practically impunctate; anterior ocellus in a shallow pit.

Scapulae with coarse, deep, mostly contiguous punctures; mesopleurum with coarse, subcontiguous punctures anteriorly, elsewhere with similar but sparse to scattered punctures and with a large impunctate area in the middle; scutellum with coarse, scattered punctures; metanotum with coarse, close punctures, narrowly impunctate in the middle; mesopleurum with coarse, contiguous to subcontiguous punctures except being broadly impunctate along posterior margin; upper plate of metapleurum with coarse, deep, mostly subcontiguous punctures on upper three-fourths, lower fourth impunctate, lower plate with small, close to sparse punctures; propodeum with coarse, deep, contiguous to subcontiguous punctures.

First abdominal tergite with a strong antero-median tubercle, surface with large, scattered punctures behind the tubercle, elsewhere with small, contiguous to subcontiguous punctures; second and third tergites with mostly scattered punctures.

Male : Length 20-22 mm. Black except antennal flagellum orange to red, abdomen with blue reflections, the following yellow : clypeus; scrobes; frontal area; posterior

half of frontal spatium; front entirely; usually paired elongated spots on third abdominal tergite. Vestiture almost entirely white. Wings light brown, fore wing darker anteriorly with coppery reflections.

Clypeus with coarse, close to sparse punctures; frontal area with small, close punctures except being impunctate narrowly in the middle; frontal spatium contiguously punctate; front with subcontiguous punctures in the middle, at sides impunctate; frontal fissura extending up to anterior ocellus; anterior ocellus in a deep pit; post-ocellar furrow deep and with coarse, dense punctures.

Scapula with small, mostly subcontiguous punctures; mesoscutum, scutellum and metanotum with moderately large, mostly subcontiguous punctures; mesopleurum with coarse, deep, contiguous to subcontiguous punctures; upper plate of metapleurum with medium-sized, close to sparse punctures, impunctate along lower margin, lower plate with small, mostly sparse punctures; propodeum with coarse, deep, subcontiguous to contiguous punctures.

First abdominal tergite without any tubercle anteriorly, anterior half of the surface with coarse, subcontiguous punctures, posterior half with smaller and sparser punctures.

Male genitalia as in figure 58.

Distribution : India : Meghalaya (Garo Hills), Sikkim and West Bengal (Singla, Pashok in Darjeeling dist.) *Elsewhere* : Myanmar.

14. *Scolia (Discolia) vollenhoveni* Saussure

This widely distributed species ranges from the Philippines westwards through Kalimantan, East Indies and Malaya to northern India.

Betrem (1941) recorded three subspecies, viz., *S. vollenhoveni vollenhoveni* Saussure (1859) from Borneo, Java, Sumatra and Malakka; *S. vollenhoveni chumponi* Betrem (1928) from Thailand and Myanmar and an undescribed subspecies from Philippines. Krombein (1978) described one new subspecies, *S. vollenhoveni wickwari* from Sri Lanka.

Scolia chumponi Betrem is treated separately as a distinct species, and *wickwari* Krombein as *S. chumponi wickwari* Krombein.

(a) *Scolia (Discolia) vollenhoveni vollenhoveni* Saussure

1859. *Scolia (Lacosi) vollenhoveni* Saussure, *Stettin. ent. Ztg.*, **20** : 188. Female, Male, Sumatra (types in Leiden Museum).

1864. *Scolia (Discolia) vollenhoveni* Saussure : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 112. Female, Male, Sumatra.

1905. *Scolia (Discolia) vollenhoveni* Saussure : Cameron, *Tijdschr. Ent.*, **48** : 52.

1928. *Scolia (Scolia) vollenhoveni vollenhoveni* Saussure : Betrem, *Treubia*, **9** (suppl.) : 289-290. Female, Male; Sumatra, Java, Banka, Malakka, India : Darjeeling, Pashok.
1941. *Scolia (Scolia) vollenhoveni vollenhoveni* Saussure : Betrem, *Notes Ent. Chinoise*, **8**(4) : 143; Kalimantan, Java, Sumatra, Malakka.
1964. *Scolia (Discolia) vollenhoveni vollenhoveni* Saussure : Betrem & Bradley, *Zool. Meded.*, **40** : 93 (subgeneric assignment).
1974. *Scolia (Discolia) vollenhoveni vollenhoveni* Saussure : Bradley, *Revue suisse Zool.*, **81**(2) : 479 (note on the type of *Scolia vollenhoveni* Saussure, and a female designated as lectotype).

This subspecies ranges from Kalimantan westwards through Java, Sumatra and Malaya to northern India. It can be differentiated from other subspecies by having relatively extensive reddish-yellow maculation on the head, scapulae and pronotum. The head and antennae are almost entirely reddish-yellow except anterior margin of the clypeus, frontal laminae and scapus.

Female: Length 20 mm. Black, the following reddish-yellow : antennae except scapus, head almost entirely except anterior margin of the clypeus and frontal laminae, scapulae at their horizontal surface. Vestiture black except yellowish or reddish on the head anteriorly, occiput and horizontal surface of the scapulae. Wings dark brown, forewing darker anteriorly, with golden reflections.

Anterior margin of the clypeus broadly rounded anteriorly, raised median area impunctate, at sides with contiguous punctures, a row of close punctures set in a groove behind anterior rim; frontal area not defined posteriorly, surface with a few coarse, close punctures; frontal spatium contiguously punctate narrowly along the frontal laminae, elsewhere with moderate sized punctures, mostly separated by half the diameter of a puncture; frontal laminae broadened below, and bearing long setae along inner margin; frontal fissura weak, extended halfway to anterior ocellus; lower front impunctate except for some close punctures medially, upper front with subcontiguous to scattered punctures; anterior ocellus in a shallow pit; posterior ocelli margined by a shallow, punctate groove; vertex impunctate except for a patch of small, contiguous punctures behind each posterior ocellus, and a few scattered punctures, occiput with subcontiguous punctures.

Scapulae subcontiguously punctate; mesoscutum with moderately small, mostly subcontiguous punctures anteriorly, elsewhere with most of the punctures separated by more than the diameter of a puncture, with a V-shaped impunctate area in the middle; scutellum with large, mostly sparse punctures; metanotum with smaller, subcontiguous punctures; upper plate of mesopleurum with large, mostly contiguous punctures, lower plate with similar subcontiguous punctures, broadly impunctate posteriorly; upper plate of metapleurum entirely with coarse, subcontiguous punctures except for a small, impunctate area anteriorly below, lower plate with fine, close to

sparse punctures, broadly impunctate along posterior margin; propodeal dorsum with coarse, contiguous to subcontiguous punctures except for a small impunctate area anteriorly on lateral sections, vertical surface with smaller, shallow, sparse punctures except along upper margin, where the punctures becoming larger and denser.

First abdominal tergite without tubercle anteriorly in the middle, surface anteriorly with scattered punctures medially, at sides with close punctures, posteriorly with smaller punctures, sparse in the middle and close at sides; second and third tergites with coarse to small, mostly scattered punctures except anteriorly at sides with close punctures, and posteriorly along margin with small, dense punctures at sides and sparse in the middle; second sternite without any basal tubercle.

Distribution : India : West Bengal (Pashok in Darjeeling dist.). *Elsewhere* : Indonesia, Malaysia and Malakka.

15. *Scolia (Discolia) chumponi* Betrem

This species was described from Thailand and Myanmar (Betrem, 1928) and subsequently Betrem (1941) considered it as one of the subspecies of *Scolia vollenhoveni* Saussure.

Krombein (1978) described *Scolia (Discolia) vollenhoveni wickwari* from Sri Lanka. This subspecies is very close to *S. v. chumponi* Betrem in colour and body structure and is distinguished by the female having black rather than red hair on the occiput, the wings having blue rather than purplish golden reflections, and the frontal spatium having scattered punctures rather than being smooth above.

The study of the female lectotype of *S. vollenhoveni* Saussure reveals that it differs from *S. v. chumponi* Betrem and *S. v. wickwari* Krombein, in addition to coloration, by having entirely punctate mesoscutum except for a V-shaped impunctate area in the middle instead of mesoscutum with a large quadrate smooth area in the middle.

Scolia (Discolia) chumponi Betrem is a distinct polytypic species, represented by two subspecies, viz., *S. (Discolia) chumponi chumponi* Betrem from Thailand and Myanmar, and *S. (Discolia) chumponi wickwari* Krombein, from Sri Lanka. *S. (Discolia) chumponi wickwari* is recorded here, for the first time from southern India and North Andaman, India. These subspecies can be distinguished by the following key :

Key to the subspecies of *chumponi*

Female

1. Occiput with black hair; wings with blue reflections; frontal spatium with scattered punctures above. Sri Lanka; India : Karnataka, North Andaman
.....(a) *chumponi wickwari* Krombein, comb. nov.

- Occiput with red hair; wings with purplish golden reflections; frontal spatium smooth above. Thailand; Myanmar(b) *chumponi chumponi* Betrem

(a) *Scolia (Discolia) chumponi wickwari* Krombein, **comb. nov.**

(Figure 59)

1978. *Scolia (Discolia) vollenhoveni wickwari* Krombein, *Smithsonian Contr. Zool.*, 283 : 33-34, figures 24, 35. Male, Female; Sri Lanka (holotype Male and allotype Female in USNM; paratype Male in Colombo Museum)

Female : Length 20-27 mm. Black except clypeus entirely or only at median raised portion, and entire antenna being light red. Erect vestiture black except light red on clypeus and front. Wings dark brown with purplish blue reflections, forewing anteriorly darker.

Apical margin of the clypeus broadly rounded anteriorly, median portion not differentiated and apparently subtruncate, disc strongly raised medially, raised area impunctate, at sides with contiguous punctures; frontal area narrowly impunctate in the middle, at sides with confluent punctures; frontal laminae broadened below; frontal spatium with a few moderately large, sparse to scattered punctures, along the frontal laminae with a row of dense punctures bearing long setae; frontal fissura short and weak, distinct on frontal spatium only; front impunctate except for a few, moderately large, close punctures in front of anterior ocellus; a stripe of subcontiguous punctures laterad of ocelli; ocular sinus with a few fine, sparse punctures; anterior ocellus in shallow pit; posterior ocelli margined behind by a shallow punctate groove; vertex medially with a few large, deep, scattered punctures, at sides impunctate, occiput with small, mostly subcontiguous punctures.

Scapulae with moderately large, subcontiguous punctures anteriorly, posteriorly punctures become sparse to scattered; mesoscutum anteriorly with close punctures, a large quadrate impunctate area in the middle, elsewhere with sparse to scattered punctures except for close punctures along posterior margin; scutellum with sparse to scattered punctures; metanotum with small punctures, close at sides and more separated in the middle; upper plate of mesopleurum with large, subcontiguous punctures, horizontal area strongly produced posteriorly, lower plate anteriorly with similar but somewhat more separated punctures, posterior area impunctate except along the ridge with small, close punctures; upper plate of metapleurum with coarse, subcontiguous punctures except for a small impunctate area below anteriorly, lower plate with fine, close to sparse punctures on anterior half, posterior half impunctate; dorso-median area of propodeum anteriorly with moderately large, subcontiguous to somewhat more separated punctures, posteriorly with coarse, deep, mostly subcontiguous punctures, dorso-lateral areas with similar punctures except for an impunctate area anteriorly, lateral surface with smaller, sparse punctures except with close punctures along upper margin, postero-lateral areas subcontiguously punctate, postero-median area with more separated punctures.

First abdominal tergite without any anterior tubercle, surface with long, recumbent setae, anteriorly with coarse and numerous small punctures, posteriorly with fine, dense punctures except punctures sparse in the middle; anterior three-fourths of second tergite with large and small scattered punctures, except punctures close at sides, posterior fourth with fine, close punctures at sides, sparse in the middle.

Male : Length 17-20 mm. Black, the following light red : clypeus except narrowly along apical margin; frontal area; antennae entirely. The abdomen with faint blue reflections. Vestiture black except being mostly reddish on the head. Wings dark brown with purplish reflections, forewing somewhat darker anteriorly.

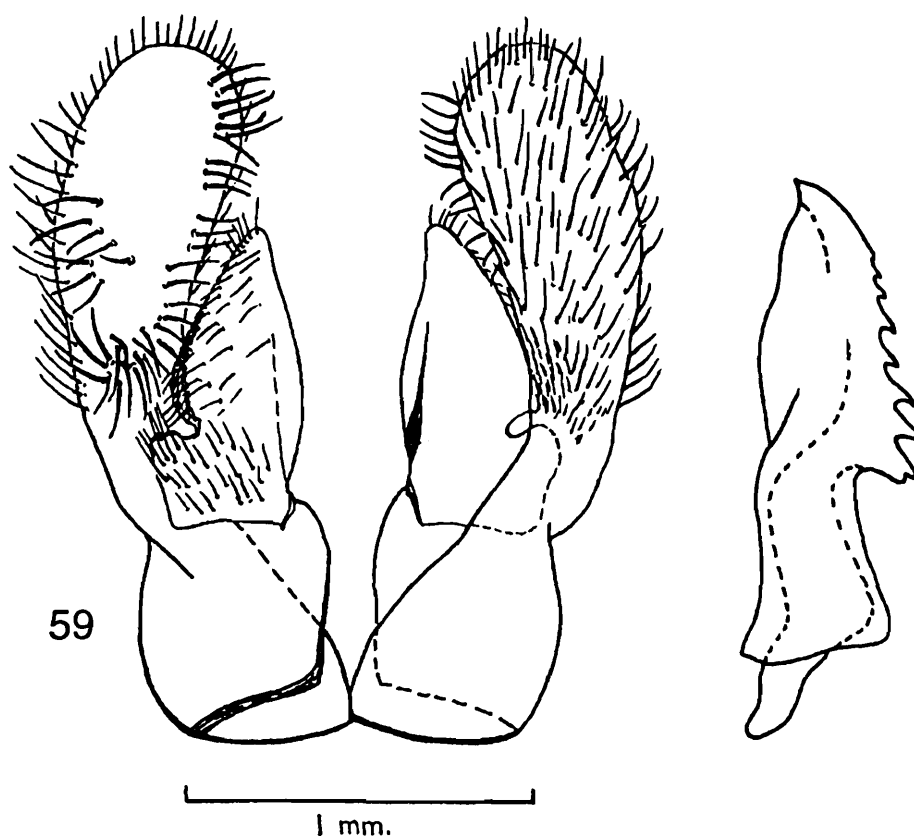


Fig. 59 : *Scolia (Discolia) chumponi wickwari* Krombein : Male genitalia : Ventral aspect at left, dorsal at the middle and aedeagus in profile at right.

Clypeus at sides with subcontiguous punctures, elsewhere with scattered punctures; frontal area with small, scattered punctures; frontal spatium with small, contiguous to subcontiguous punctures; frontal fissura distinct, but not extending up to anterior ocellus; anterior ocellus in a deep pit; front with more separated punctures than on frontal spatium; ocular sinus with very small, close punctures; post-ocular groove absent, vertex with small, mostly sparse punctures, occiput with fine, close punctures; antennal flagellum somewhat thickened towards apex, apical flagellar segments as broad as long.

Scapulae with shallow punctures, mostly separated by the diameter of a puncture; mesoscutum with sparse punctures, punctures in the middle more separated; scutellum with subcontiguous to more separated punctures, posteriorly in the middle impunctate; metanotum with small, mostly subcontiguous punctures except for a narrow longitudinal impunctate stripe in the middle; upper plate of mesopleurum with coarse, shallow, mostly subcontiguous punctures, lower plate with small, sparse punctures and broadly impunctate posteriorly; upper plate of metapleurum with subcontiguous to contiguous punctures on upper half, lower half impunctate, lower plate with small, sparse punctures, broadly impunctate posteriorly; dorsum of propodeum with medium-sized to coarse, deep contiguous to subcontiguous punctures, lateral surface with smaller, sparse to scattered punctures, posterior surface with punctation almost similar to dorsum.

First abdominal tergite without any antero-median tubercle, surface with moderately large, mostly subcontiguous punctures anteriorly in the middle, elsewhere with smaller, subcontiguous punctures; second tergite with medium-sized, sparse punctures except along posterior margin the punctures small and dense.

Male genitalia as in figure 59.

Krombein (1978) described this subspecies from Sri Lanka. This is the first record of this subspecies from Karnataka and North Andaman in India. A pair of female and male from Karnataka resemble in colouration and punctation with the types from Sri Lanka, but this single female from North Andaman differs slightly in having only the median raised portion of the clypeus red rather than the clypeus entirely red. The female from North Andaman probably represents another subspecies.

Distribution : India : Andaman & Nicobar Islands (North Andaman, Milagaon), Karnataka (Kodagu, Ponnampet). *Elsewhere* : Sri Lanka.

16. *Scolia (Discolia) clypeata* Sickmann

This widely distributed polytypic species ranges from northern China southwards to Taiwan and westwards in India and Nepal. It is recorded here, for the first time, from Nepal and North-East India.

It is very close to *Scolia (Discolia) vollenhoveni* Saussure by having, in female, more or less, similar body structure and colouration, but can be differentiated by having long vestiture on mesopleurum and denser punctation on the first tergite.

Betrem (1941) recorded four subspecies, viz., *S. clypeata clypeata* Sickmann from northern China; *S. clypeata rufohirta* Betrem from southern China and western Himalaya, India, *S. clypeata pseudovollenhoveni* Betrem from Taiwan and southern China; and a doubtful subspecies *S. clypeata grahami* Betrem from China. These subspecies are differentiated mainly on the basis of differences in reddish-yellow

markings on abdominal tergites and in the colour of vestiture. *Scolia clypeata rufohirta* Betrem, the only subspecies occurring in India and Nepal can be easily differentiated by having integument of abdomen entirely black.

(a) *Scolia (Discolia) clypeata rufohirta* Betrem

1928. *Scolia (Scolia) vollenhoveni rufohirta* Betrem, *Treubia* **9** (suppl.) : 290. Female, India : Kumaon, Kousanie (holotype in Z.S.I., Calcutta).
1933. *Scolia (Scolia) clypeata rufohirta* Betrem : Betrem, *Stettin. ent. Ztg.*, **94** : 259 (new combination).
1941. *Scolia (Scolia) vollenhoveni rufohirta* Betrem : Betrem, *Notes Ent. Chinoise*, **8(4)** : 144-145. Female. India : Kumaon Hills.
1964. *Scolia (Discolia) clypeata rufohirta* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 92 (new subgeneric assignment).

This subspecies differs from other subspecies in having abdominal integument entirely black.

Female : Length 20-23 mm. Black, the following reddish-yellow : median raised area of the clypeal disc; frontal area; antenna except scapus; frontal spatium except frontal laminae; front and vertex including declivous portion of the vertex; temples above; and scapulae almost entirely on the dorsal surface. Vestiture black except on the head, scapulae, mesoscutum anteriorly, forelegs and ventral side of the thorax with reddish yellow or golden hair; mesopleurum with long black hair intermixed with yellowish. Wings dark brown, fore-wing darker anteriorly, with coppery reflections.

Anterior rim of the clypeus broadly rounded anteriorly, median lobe subtruncate, median area of the disc strongly raised and impunctate, at sides with coarse, contiguous to subcontiguous punctures, a narrow band of small, close punctures behind the anterior rim; frontal area with a few coarse contiguous punctures; frontal laminae moderately broad; frontal spatium with moderate sized, close to sparse punctures, at sides along the frontal laminae punctures becoming contiguous; frontal fissura weak and distinct only on frontal spatium; front with small to moderately large, mostly sparse punctures except laterad of anterior ocellus, at sides impunctate; anterior ocellus in a shallow pit; vertex impunctate except for some moderate sized, close punctures laterad of posterior ocelli, posterior ocelli margined behind by a shallow groove, declivous portion with subcontiguous punctures.

Scapulae with mostly subcontiguous punctures; mesoscutum with moderate sized, contiguous punctures anteriorly, elsewhere the punctures mostly subcontiguous except being more separated in the middle; scutellum with similar punctures, mostly separated by half the diameter of a puncture, punctures more separated in the middle; metanotum with mostly contiguous punctures; upper plate of mesopleurum with coarse, contiguous punctures, lower plate with similar mostly subcontiguous punctures anteriorly,

posteriorly with smaller, sparser punctures, broadly impunctate along posterior margin; upper plate of metapleurum with coarse, deep, mostly contiguous punctures except for a small impunctate area along lower margin, lower plate with small mostly sparse punctures, broadly impunctate along posterior margin; dorso-median area of propodeum with moderately large, deep contiguous to confluent punctures, dorso-lateral areas with small, dense punctures at anterior half, posterior half with moderately large subcontiguous punctures, lateral surface with large, deep contiguous to subcontiguous punctures except anteriorly below the lateral carina with some sparse punctures, posterior surface with mostly contiguous punctures.

First abdominal tergite without any antero-median tubercle, but with a longitudinal ridge-like structure on anterior half in the middle, anterior half of the surface with large, subcontiguous to somewhat more separated punctures in the middle, at sides with smaller, denser punctures, posterior half with small, dense punctures bearing long setae; second tergite with small to large, sparse to scattered punctures in the middle, anteriorly at sides and along posterior margin with small dense punctures; second sternite without basal tubercle.

Male : Not known.

This subspecies was known from Kumaon Hills, India. It is now also recorded from North-East India and Nepal.

Distribution : India : Manipur (Imphal) and Uttarakhand (Kumaon Hills). *Elsewhere* : Nepal.

17. *Scolia (Discolia) kamengensis*, sp. nov.

This species is closely allied to *Scolia (Discolia) minowai* Uchida of Taiwan, resembling in having more or less similar integument and vestiture, and similar punctation on lateral surface of thorax and abdominal tergites. *S. minowai* is, however, a more coarsely and closely punctate species, the punctures on the dorsum of the thorax coarse and close, and very close or dense on the dorsum of propodeum, the surface becoming puncto-reticulate. In *S. kamengensis*, sp. nov., the punctures on the pronotum small and subcontiguous, and coarse, deep, contiguous to subcontiguous on the dorsum of propodeum.

Female : Length 25 mm. Black, the following reddish-yellow : paired large oval spots, more or less united in the middle, on third tergite and a broad band anteriorly on fourth tergite. Vestiture black except reddish-yellow on third to last abdominal segments. Wings medium brown with coppery reflections.

Anterior rim of the clypeus subtruncate at its median lobe, median area of the disc strongly raised, raised portion impunctate, at sides with contiguous punctures; frontal area with coarse, confluent punctures; frontal laminae moderately broad, raised;

frontal spatium with contiguous to subcontiguous punctures; frontal fissura weak, extending halfway to anterior ocellus; front with small, scattered punctures; anterior ocellus in a shallow pit; vertex impunctate, its declivous portion with close to sparse punctures.

Scapula with small, subcontiguous punctures; mesoscutum anteriorly and at sides with medium sized, contiguous punctures, posteriorly in the middle with more separated punctures; scutellum and metanotum with contiguous to subcontiguous punctures; mesopleurum with medium sized mostly contiguous punctures, broadly impunctate along posterior margin; upper plate of metapleurum with coarse, deep, contiguous punctures except for a small impunctate area along lower margin, lower plate with small, contiguous to subcontiguous punctures except impunctate broadly along posterior and upper margins; dorsum of propodeum with coarse, deep, contiguous to subcontiguous punctures, lateral surface with moderately large, sparse punctures except along upper and posterior margin, where the punctures becoming close to subcontiguous, posterior surface with close punctures.

First abdominal tergite without any antero-median tubercle, surface with moderate sized, subcontiguous punctures anteriorly and in the middle, at sides and posteriorly with small, contiguous punctures; second tergite largely with sparse to scattered punctures except at sides and posteriorly, where the punctures close.

Male : Not known.

Holotype : Female, India : Arunachal Pradesh : Kameng district, Dirang Dzong, Road side camp, 1830 m., 18.vii.1961, S. Biswas (Z.S.I., Calcutta).

Distribution : India : Arunachal Pradesh.

18. *Scolia (Discolia) formosicola* Betrem

This widely distributed polytypic species ranges from Taiwan, westwards through eastern China, Thailand and Myanmar to northern India.

The population from Taiwan belongs to typical subspecies and differs from continental races by having predominantly black vestiture on the head and the thorax, and the third abdominal tergite yellow. The population from Thailand, Myanmar and northern India belongs to an undescribed subspecies which is described here as *Scolia formosicola malaisei*, sp. nov. This subspecies differs from typical subspecies in having predominantly yellowish-white vestiture on the head and thorax and yellow bands on the second and third tergites.

18a. *Scolia (Discolia) formosicola malaisei*, subsp. nov. (Figures 60, 61)

1941. *Scolia formosicola* Betrem : Betrem, *Notes Ent. Chinoise*, 8(4) : 134-135 (Part). (Male, Chiangmai Thailand; Tura, Garo Hills, Meghalaya).

This is a widely distributed subspecies, ranges from Thailand westwards through Myanmar and Khasi Hills, Meghalaya to western Himalaya, U.P., India. Betrem (1941) recorded one male from Thailand and one male from Garo Hills in Meghalaya, India.

The description of this new subspecies is based on two females and two males from Myanmar and one male from Western Himalaya, U.P. India. The male from Thailand and Garo Hills in India are also considered to belong to this subspecies.

This subspecies differs from its counterparts from eastern China and Taiwan by having predominantly yellowish-white vestiture on the head and thorax, and the integument of second and third tergites predominantly yellow.

Female : Length 14 mm. Black, the second tergite with a broad apical yellow band and the third tergite almost entirely yellow. Vestiture yellowish-white except on fourth to last abdominal tergites black. Wings light brown, fore wing darker anteriorly.

Anterior margin of the clypeus broadly rounded, not differentiated into lateral and median lobes, median raised area of the disc impunctate, at sides with mostly contiguous punctures; frontal area not defined posteriorly, surface with deep, contiguous punctures; frontal spatium, front and vertex with very large, extremely deep, mostly contiguous punctures, the punctures on front much larger; frontal fissura on front very deep and wide, extending up to anterior ocellus; anterior ocellus in a deep pit; posterior ocelli not margined by any groove; declivous portion of vertex contiguously punctate.

Scapulae contiguously punctate; mesoscutum with coarse, subcontiguous punctures except along the anterior margin the punctures becoming contiguous, and with a small impunctate V-shaped area posteriorly in the middle; scutellum with coarse, subcontiguous to contiguous punctures, narrowly impunctate along posterior margin in the middle; metanotum with smaller, subcontiguous punctures; upper plate of mesopleurum with mostly contiguous punctures, lower plate with subcontiguous punctures, broadly impunctate along anterior and posterior margins; metapleurum practically impunctate; dorso-median area of propodeum with moderate to small punctures, mostly separated by slightly more than the diameter of a puncture, dorso-lateral areas with similar punctation except for a small impunctate area anteriorly, vertical surface impunctate except for a few small, scattered punctures along upper margin, posterior surface sparsely punctate.

First abdominal tergite with a well developed tubercle anteriorly in the middle, anterior half of the surface with coarse, mostly subcontiguous punctures, posterior half with smaller, more separated punctures; second sternite without any basal tubercle.

Male : Length 13 mm. Black, the second tergite with a broad apical yellow band and third almost entirely yellow. Vestiture yellowish white except fourth to last abdominal tergites being with black. Wings light brown.

Clypeus broadly impunctate in the middle, at sides with coarse, mostly subcontiguous punctures; frontal spatium with contiguous punctures; frontal fissura distinct on upper front, extending up to anterior ocellus; front with coarse, deep, contiguous to subcontiguous punctures; anterior ocellus in a deep pit.

Scapulae with moderately small punctures, mostly separated by half the diameter of a puncture; mesoscutum with coarse, subcontiguous to somewhat more separated punctures; scutellum with coarse, mostly subcontiguous punctures except being impunctate posteriorly in the middle; mesopleurum with mostly subcontiguous punctures, broadly impunctate along anterior and posterior margins; metapleurum impunctate; dorsal propodeal surface with moderate sized, mostly subcontiguous punctures, vertical surface with small, shallow, very scattered punctures.

First abdominal tergite with a strong tubercle anteriorly on the horizontal surface, surface with coarse, contiguous punctures except along posterior margin, where the punctures becoming smaller and sparser.

Male genitalia as in figure 61.

Holotype : Female Myanmar : Shan States, Taunggyi, 1400 m, 1.viii.-22.ix.1934, R. Malaise (Stockholm Museum). Allotype Male, Same data as of holotype. *Paratypes* 2 Female, 2 Male. 1 Female, 1 Male, same data as holotype. India : Meghalaya : Garo Hills, 1 Female ; 1 Male, Uttar Pradesh : Dhanolti (Z.S.I., Calcutta).

Distribution : India : Meghalaya and Uttaranchal. *Elsewhere* : Myanmar and Thailand.

This subspecies is named after R. Malaise who collected these males and females and many more scoliids in Myanmar.

19. *Scolia (Discolia) lebongensis* Betrem (Figure 62)

1928. *Scolia (Scolia) lebongensis* Betrem, *Treubia*, **9** (suppl.) : 258 (key), 305 (des). Female, Malakka, Lebong (holotype in Museum Singapore).

1941. *Scolia (Scolia) formosicola lebongensis* Betrem, *Notes Ent. Chinoise*, **8**(4) : 135 (*S. lebongensis* Betrem considered a subspecies of *S. formosicola* Betrem).

This species is recorded for the first time, from India. It can be differentiated from *S. formosicola* Betrem by having scutellum broadly impunctate posteriorly rather than having a small impunctate area, and first tergite, in female, anteriorly with subcontiguous to somewhat sparse punctures rather than having contiguous punctures. In addition, it is relatively smaller in size, having body length 12 mm in female and 11 mm in male.

The male previously unknown, is described here from Darjeeling district, India.

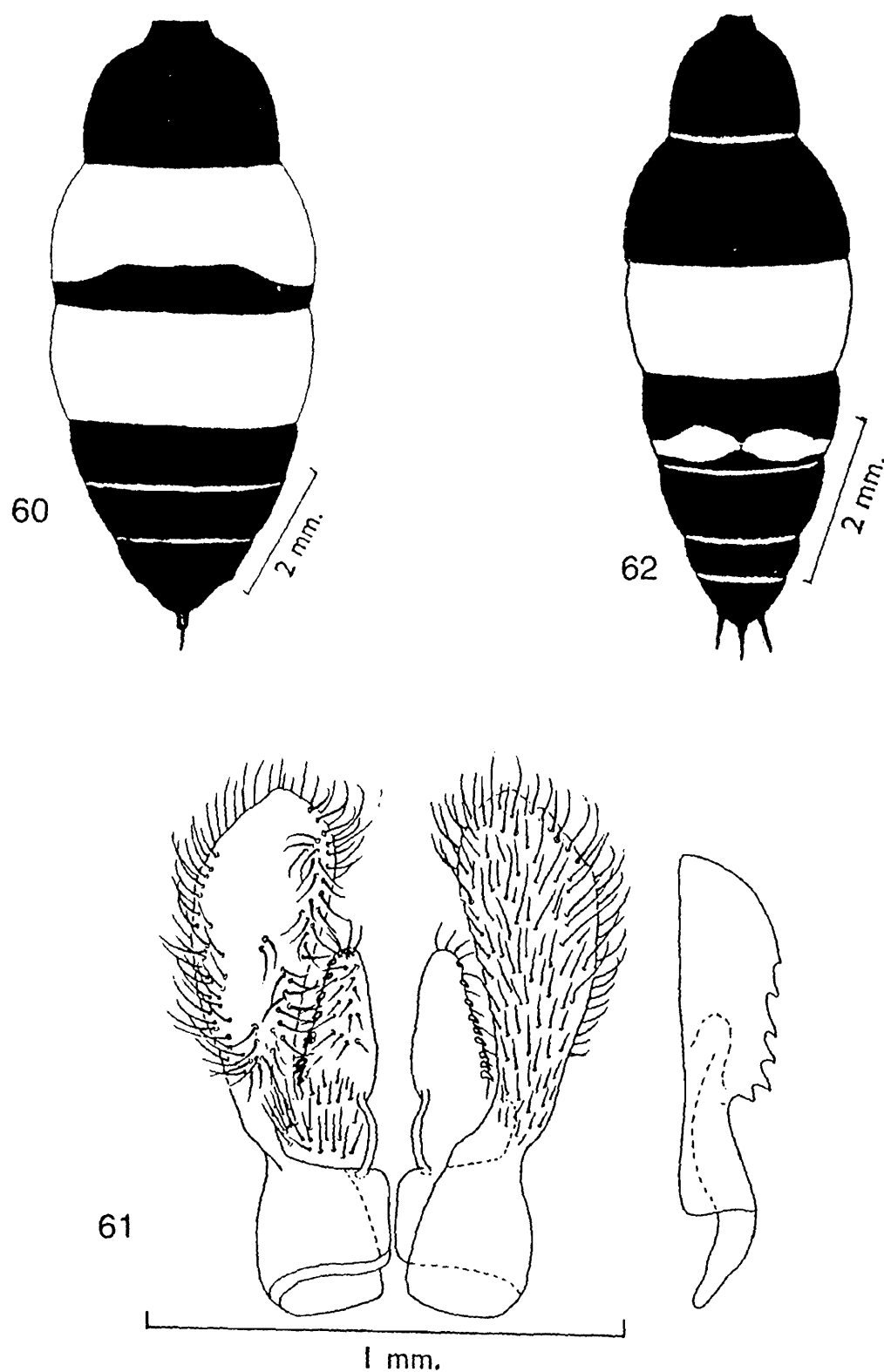


Fig. 60-62 : *Scolia (Discolia) formosicola malaise* subsp. nov. 60, dorsal aspect of female abdomen, showing colour pattern; 61, Male genitalia, dorsal & ventral aspect and aedeagus in profile view; 62, *Scolia (Discolia) lebonensis* Bertem, dorsal aspect of male abdomen, showing colour pattern.

Female : Length 12 mm. Black, the third tergite entirely yellow, and fourth tergite with paired postero-lateral obliterated yellow spots. Vestiture yellowish white except on fourth to last abdominal tergites being black. Wings light brown, fore wing darker anteriorly.

Anterior rim of the clypeus broadly rounded anteriorly, median raised area of the disc impunctate, at sides with contiguous punctures; frontal area not defined posteriorly, surface with deep, contiguous punctures; frontal laminae small, raised; frontal spatium with coarse, deep, mostly contiguous punctures; front with very large, extremely deep, contiguous punctures; frontal fissura very deep and wide, extending up to anterior ocellus; anterior ocellus in a deep pit; posterior ocelli not margined by groove, vertex with coarse, mostly contiguous punctures, its declivous portion contiguously punctate.

Scapulae with contiguous punctures; mesoscutum anteriorly with coarse, contiguous punctures, elsewhere with mostly subcontiguous punctures, with V-shaped impunctate area posteriorly in the middle; scutellum with coarse, contiguous to subcontiguous punctures, broadly impunctate posteriorly; metanotum with relatively small, subcontiguous punctures; mesopleurum with contiguous to subcontiguous punctures, broadly impunctate along anterior and posterior margins; metapleurum practically impunctate; dorsal propodeal surface with moderate to small punctures, mostly separated by slightly more than the diameter of a puncture except for a small impunctate area anteriorly on lateral areas, vertical surface impunctate except for a few small, scattered punctures along upper margin, posterior surface sparsely punctate.

First abdominal tergite with a well developed antero-median tubercle, surface at its anterior half with coarse punctures, mostly separated by the diameter of a puncture, posterior half with smaller, sparser punctures; second sternite without any basal tubercle.

Male : Length 11 mm. Black, the third tergite entirely yellow, fourth tergite with a narrow apical yellow band (Fig. 62). Vestiture almost entirely yellowish white except being black on fourth to last abdominal tergites. Wings light brown, fore wing darker anteriorly.

Clypeus broadly impunctate in the middle, at sides with coarse, contiguous punctures; frontal spatium with relatively shallow, mostly contiguous punctures; frontal fissura present on upper front, extending upto anterior ocellus; front with coarse, deep, contiguous to subcontiguous punctures; anterior ocellus in a deep pit.

Scapulae with relatively shallow punctures, mostly separated by half the diameter of a puncture; mesoscutum with coarse, subcontiguous to somewhat more separated punctures; scutellum with coarse, mostly subcontiguous punctures, broadly impunctate posteriorly; mesopleurum with mostly subcontiguous punctures, broadly impunctate along anterior and posterior margins; metapleurum impunctate; dorsal propodeal surface with moderate sized, mostly subcontiguous punctures, vertical surface with small, shallow, very scattered punctures.

First abdominal tergite with a well developed antero-median tubercle, surface anteriorly with coarse punctures, mostly separated by half the diameter of a puncture, posteriorly with smaller, sparser punctures.

Distribution : India : West Bengal (Pedong, Mirik in Darjeeling dist.). *Elsewhere* : Malakka.

20. *Scolia (Discolia) kangraensis* Betrem

1928. *Scolia (Scolia) kangraensis* Betrem, *Treubia*, **9** (suppl.) : 258, 307. Female, Kangra Valley, India (holotype in Z.S.I., Calcutta).

1964. *Scolia (Discolia) kangraensis* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 93 (new subgeneric assignment).

This species originally described from Himachal Pradesh, India is now considered to be widely distributed. It has now been recorded from Kumaon Hills in Uttar Pradesh and Western Ghats in Karnataka, India.

The female is variable in having integument entirely black, or with lemon-yellow spots on scapulae, and second and third tergites. This species can be differentiated by having clypeus with longitudinal striations in the middle and dorso-median area of propodeum above, twice as broad as long in the middle.

This species is very close to *Scolia desidiosa* Bingham, but *desidiosa* is highly maculated with yellow on head, thorax and abdomen, and clothed with white vestiture.

Female : Length 20-25 mm. Integument black except antennal flagellum beneath and tegulae reddish-brown; elsewhere entirely black or with the following lemon-yellow; very rarely a small spot on scapulae posteriorly; usually paired lateral spots on second or second and third tergites. Vestiture dark brown and black. Wings dark brown, fore wing darker anteriorly, with purplish blue reflections.

Anterior margin of the clypeus broadly round anteriorly, a narrow band of small dense punctures behind anterior rim; disc raised medially and longitudinally striated, at sides with coarse, mostly contiguous punctures, frontal area with deep contiguous to confluent punctures; frontal space with dense punctures along frontal laminae, in the middle with moderately large, deep and contiguous to subcontiguous punctures; frontal laminae broader at base, strongly raised and divergent posteriorly; frontal fissura distinct and extending up to anterior ocellus; anterior ocellus in a deep pit; front with small, scattered punctures; post-ocellar furrow very shallow and punctate; ocellar triangle with a few small punctures; vertex with close to scattered punctures, its declivous portion with punctures mostly separated by the diameter of a puncture.

Scapulae with subcontiguous punctures anteriorly, the punctures sparse in front of tegulae; mesoscutum with moderate sized, subcontiguous punctures anteriorly and posteriorly, elsewhere with punctures mostly separated by the diameter of a puncture

or more and with a V-shaped impunctate area in the middle; scutellum with similar but sparse punctures, sometimes with only a few scattered punctures; metanotum with small to sparse punctures; mesopleurum subcontiguously punctate, broadly impunctate along posterior margin, upper plate of metapleurum impunctate except for a few close punctures along upper margin, lower plate with small, shallow close to sparse punctures, broadly impunctate posteriorly; dorso-median area of propodeum about twice as broad as long in the middle, surface with coarse, subcontiguous to contiguous punctures, dorso-lateral areas with moderate-sized, subcontiguous to contiguous punctures and a rectangular impunctate area anteriorly along inner margin, lateral surface with small sparse punctures, the punctures being denser along upper and posterior margins, posterior surface at its median area sparsely punctate below and with close punctures above, lateral areas closely punctate, the punctures becoming denser along lateral margins.

First abdominal tergite with a well-developed median tubercle anteriorly on the horizontal surface, area behind the tubercle impunctate except for a few coarse scattered punctures, at sides and posteriorly with small, dense punctures; second and third tergites sparsely punctate except with fine and dense punctures along posterior margins, second sternite without any basal tubercle anteriorly.

Distribution : India : Himachal Pradesh (Kangra), Karnataka (Mudigere) and Uttaranchal (Banbasa and Khatima in Nainital dist.).

21. *Scolia (Discolia) bilunata* Saussure

1858. *Scolia (Lacosi) bilunata* Saussure, *Ann. Soc. ent. France*, (3) 6 : 212. Male, Nepal (types in Berlin Museum).
1864. *Scola (Discolia) bilunata* Saussure : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 115. Male, Nepal.
1892. *Scolia bengalensis* Cameron, *Mem. Proc. Lit. Phil. Soc.*, (4) 5 : 104. Female, Male, Poona (types in Oxford Museum).
1897. *Scolia bengalensis* Cameron : Dalla-Torre, *Cat. Hym.*, 8 : 148.
1897. *Scolia bilunata* Saussure : Dalla-Torre, *Cat. Hym.*, 8 : 149.
1897. *Scolia (Discolia) bilunata* Saussure : Bingham, *Fauna British India, Hym.*, 1 : 79 Female, Male; Nepal; India : Poona, Bangalore (synonymised *S. bengalensis* Cameron).
1928. *Scolia (Scolia) bilunulata* Saussure : Betrem, *Treubia*, 9 (suppl.) : 300-301. Female. Male; India : Bangalore, Poona, Allahabad (*bilunata* misspelled as *bilunulata*).
1928. *Scolia (Scolia) aureipenniformis* Betrem, *Treubia*, 9 (suppl.) : 301-302. Female, Male; Sri Lanka; India : Pondicherry, Bangalore, Travancore (holotype Male from Pondicherry in Leiden Museum, allotype Female from unknown locality in Zoolgy Museum, Amsterdam). **New synonymy.**

1964. *Scolia (Discolia) aureipenniformis* Betrem : Betrem & Bradley, *Zool. Meded*, **40** : 93 (new subgeneric assignment).
1964. *Scolia (Discolia) bilunata* Saussure : Betrem & Bradley, *Zool. Meded*, **40** : 93 (new subgeneric assignment).
1965. *Scolia (Discolia) aureipenniformis* Betrem : Guiglia, *Verh. Naturf. Ges. Basel*, **76** : 321. Male, Sri Lanka.
1974. *Scolia (Discolia) bilunata* Saussure : Bradley, *Revue suisse Zool.*, **81**(2) : 426 (note on types of *S. (Lacosi) bilunata* Saussure).
1978. *Scolia (Discolia) aureipenniformis* Betrem : Krombein, *Smithsonian Contr. Zool.*, 283 : 35-37. Male, Sri Lanka (redes. of allotype female).

This species is widely distributed in India, ranging from Manipur in North-East India to Tamil Nadu in southern India, occurring in Wet as well as Semi-Arid zones, and also occurs in Nepal and Sri Lanka. The males are more common than the females, and can be observed in large numbers during September-October.

The female can be differentiated in having entirely black integument and vestiture except for the antennal flagellum being orange or red, and third or third and fourth tergites with paired oval yellow lateral spots. The males are usually entirely black except the antennal flagellum entirely reddish or only at apical one or two segments, and rarely with paired yellow transverse lateral marks on third or fourth, or both the tergites.

Superficially, the males of *Scolia bilunata* Saussure and *Scolia affinis* Guerin resemble in having black integument and vestiture, and elongate antennal flagellum which is orange-red entirely or in part. The males of *Scolia bilunata*, however, can be easily distinguished by having comparatively denser and coarser propodeal punctation.

The male holotype of *Scolia auripenniformis* Betrem is the male of *Scolia bilunata* Saussure with entirely black abdomen. The allotype is an abnormally small female, resembling females of *S. bilunata* except for the abdomen being entirely black.

Female : Length 15-23 mm. Black, flagellum orange to red, except basal segment, usually paired large to small, oval antero-lateral yellow spots on third tergite, sometimes similar but minute yellow spots on fourth tergite also, rarely abdomen entirely black. Vestiture entirely black. Wings medium to dark brown with purplish reflections.

Apical margin of the clypeus broadly rounded anteriorly, not differentiated into median and lateral lobes, median area of the disc gently raised and impunctate, at sides with coarse, subcontiguous punctures; frontal area contiguously punctate; frontal laminae moderately narrow and raised; frontal spatium with coarse, mostly contiguous punctures; frontal fissura extending up to anterior ocellus; the latter in a deep pit;

lower front with punctation as on the frontal spatium, upper front with coarse, scattered punctures except for a few close punctures laterad of ocelli; post-ocellar groove shallow and punctate; vertex impunctate except for a few scattered punctures.

Scapulae contiguously punctate; mesoscutum with coarse, deep contiguous to subcontiguous punctures, without any impunctate area; scutellum with large, subcontiguous to scattered punctures; metanotum entirely with coarse, contiguous punctures; mesopleurum with subcontiguous to more separated punctures, broadly impunctate along posterior margin; upper plate of metapleurum with small, contiguous to subcontiguous punctures at its upper three-fourths, lower fourth impunctate, lower plate with small, sparse punctures, broadly impunctate along posterior margin; dorso-median area of propodeum with coarse, deep, mostly subcontiguous punctures, dorso-lateral areas similarly punctate except for a small impunctate area anteriorly, lateral surface with smaller, sparse to scattered punctures.

First abdominal tergite with a weak antero-median tubercle, surface with moderately large, scattered punctures except at sides and along posterior margin, the punctures becoming smaller and somewhat closer; second sternite without any basal tubercle.

Male : Length 14-20 mm. Black, flagellum orange red variously, from entirely to only last segment at its apical half, rarely with a paired yellow transverse marks on third or fourth or third and fourth abdominal tergites. Abdomen with faint blue reflection. Vestiture black. Wings dark brown, anterior area of forewing darker, with dark blue to golden reflections.

Clypeus with coarse, scattered punctures in the middle, at side subcontiguously punctate; frontal area and frontal spatium with small, contiguous punctures; frontal fissura extending up to anterior ocellus; anterior ocellus in a shallow pit; front with moderate-sized punctures, mostly separated by the diameter of a puncture; ocellar triangle punctate; flagellum elongate, not clavate towards apex.

Scapula with small punctures, mostly separated by half the diameter of a puncture; mesoscutum with large punctures, mostly separated by half the diameter of a puncture; scutellum with similar but contiguous to subcontiguous punctures, narrowly impunctate along posterior margin; mesopleurum with small to large subcontiguous punctures; upper plate of metapleurum with moderate-sized, contiguous punctures except being impunctate narrowly along lower margin, lower plate with smaller, subcontiguous to more separated punctures; dorso-median area of propodeum with coarse, subcontiguous to contiguous punctures, dorso-lateral area with similar punctures except for an impunctate area anteriorly, lateral propodeal surface with similar punctures, separated by one to two times the diameter of a puncture, the punctures subcontiguous along upper margin.

First abdominal tergite with a very weak to indistinct antero-median tubercle, surface with small punctures, mostly separated by half the diameter of a punctures;

succeeding tergites with smaller and more separated punctures; second sternite without any basal tubercle.

Distribution : India : Bihar (Hazaribagh N. P.), Delhi (Univ. Campus), Karnataka (Bangalore, Sandur), Maharashtra (Bombay, Pune), Manipur (Moirang), Orissa (Dhenkanal), Punjab (Hoshiarpur), Uttar Pradesh (Jhansi, Allahabad), Uttaranchal (Dehra Dun), Tamil Nadu (Coimbatore). *Elsewhere* : Nepal and Sri Lanka.

22. *Scolia (Discolia) trivandrumensis* Betrem

1928. *Scolia (Scolia) trivandrumensis* Betrem, *Treubia*, **9** (suppl.) : 257, 301. Female, Travancore, Trivandrum, India (holotype in Z.S.I., Calcutta).
1964. *Scolia (Discolia) trivandrumensis* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 93 (new subgeneric assignment).
1965. *Scolia (Discolia) trivandrumensis* Betrem : Guiglia, *Verh. Naturf. Ges. Basel*, **76** : 320-321. Sri Lanka.
1978. *Scolia (Discolia) trivandrumensis* Betrem : Krombein, *Smithsonian Contr. Zool.*, **283** : 34-35. Female, Male; Sri Lanka.

Betrem (1928) described this species on the basis of female holotype from Travancore, India and three female paratypes from Sri Lanka. Krombein (1978) redescribed female and also described, previously unknown, male from Sri Lanka.

The female of this species is close to *Scolia (Discolia) fichteli* Betrem in having lower front with subcontiguous punctures and more or less similar orange red markings on the abdominal tergites. However, it can be differentiated by having a prominent frontal fissura, which is extending up to anterior ocellus. The frontal fissura in *Scolia (D.) fichteli* Betrem is very weak and not extended up to anterior ocellus. The males can be distinguished by the characters given in the key.

Female : Length 16-21 mm. Integument black except as follows : flagellum orange red varying from all (except basal segment) to only the apical half in which case basal half chestnut, third abdominal tergite with a pair of large orange-red spots that may be narrowly separated in the middle; fourth tergite with smaller rounded orange red spots, sometimes spots united to form a band. Vestiture black. Wings dark brown, anterior half of fore wing darker, with blue reflections.

Apical margin of the clypeus broadly rounded, central area not strongly raised, impunctate in the middle, at sides contiguously punctate; frontal area and frontal spatium contiguously punctate; frontal fissura extending to anterior ocellus, lower front with subcontiguous punctures, upper front largely impunctate; anterior ocellus in a shallow pit; posterior ocelli margined by a row of punctures in a shallow groove; vertex with a few larger, scattered punctures, occiput with smaller, subcontiguous punctures.

Scapulae contiguously punctate; mesoscutum with large, contiguous punctures except the punctures being more separated towards middle, usually with a V-shaped impunctate area in the middle; scutellum with contiguous to subcontiguous punctures except for a small impunctate area posteriorly in the middle; metanotum with smaller, mostly contiguous punctures except for a small impunctate area at the apex; anterior area of mesopleurum with contiguous to subcontiguous punctures except being impunctate narrowly along anterior margin, posterior area with smaller, scattered punctures, and broadly impunctate along posterior margin; upper plate of metapleurum with small, contiguous punctures on its upper two-thirds, lower plate with small punctures mostly separated by the diameter of a puncture on its lower two-thirds; dorsum of propodeum with moderately, large, mostly subcontiguous punctures except for a small impunctate area anteriorly on lateral areas, lateral surface with punctures separated by the diameter of a puncture or more except the punctures becoming closer along upper margin, posterior surface subcontiguously punctate except lower half of the median section being sparsely punctate.

First abdominal tergite with a weak antero-median tubercle, anterior half of the surface with large, scattered punctures, posterior half with smaller and closer punctures; second sternite without basal tubercle.

Male : Length 13-17 mm. Vestiture and integument black except as follows : apical one to three flagellar segments orange red at least beneath, fourth or third and fourth abdominal tergites with paired transverse orange red spots, abdomen with faint blue reflections. Wings medium brown, anterior half of fore wing darker, with dark blue to purple reflections.

Clypeus with scattered punctures in the middle, laterally and above subcontiguously punctate; frontal area subcontiguously punctate; frontal spatium contiguously punctate; frontal fissura weak but extending to anterior ocellus, anterior ocellus in a shallow pit; posterior ocelli margined by a shallow groove; antennal flagellum elongate, not clavate towards apex.

Scapulae with shallow, subcontiguous punctures; mesoscutum with somewhat larger, subcontiguous punctures; scutellum with larger contiguous punctures, and with a narrow smooth area posteriorly; upper two-thirds of upper plate of metapleurum with small, contiguous punctures, lower two-thirds of lower plate with very small, scattered punctures; dorsal surface of propodeum with moderate sized, contiguous to subcontiguous punctures except for a small impunctate strip on lateral areas anteriorly; lateral surface with punctures separated by about their diameter except contiguous above.

First abdominal tergite without any antero-median tubercle, surface with small, scattered punctures anteriorly in the middle, and with subcontiguous punctures at sides and posteriorly; second tergite with fine, sparse punctures; second sternite without any basal tubercle.

Distribution : India : Kerala (Travencore). *Elsewhere* : Sri Lanka.

23. *Scolia (Discolia) cruenta* Klug
(Figures 63, 64)

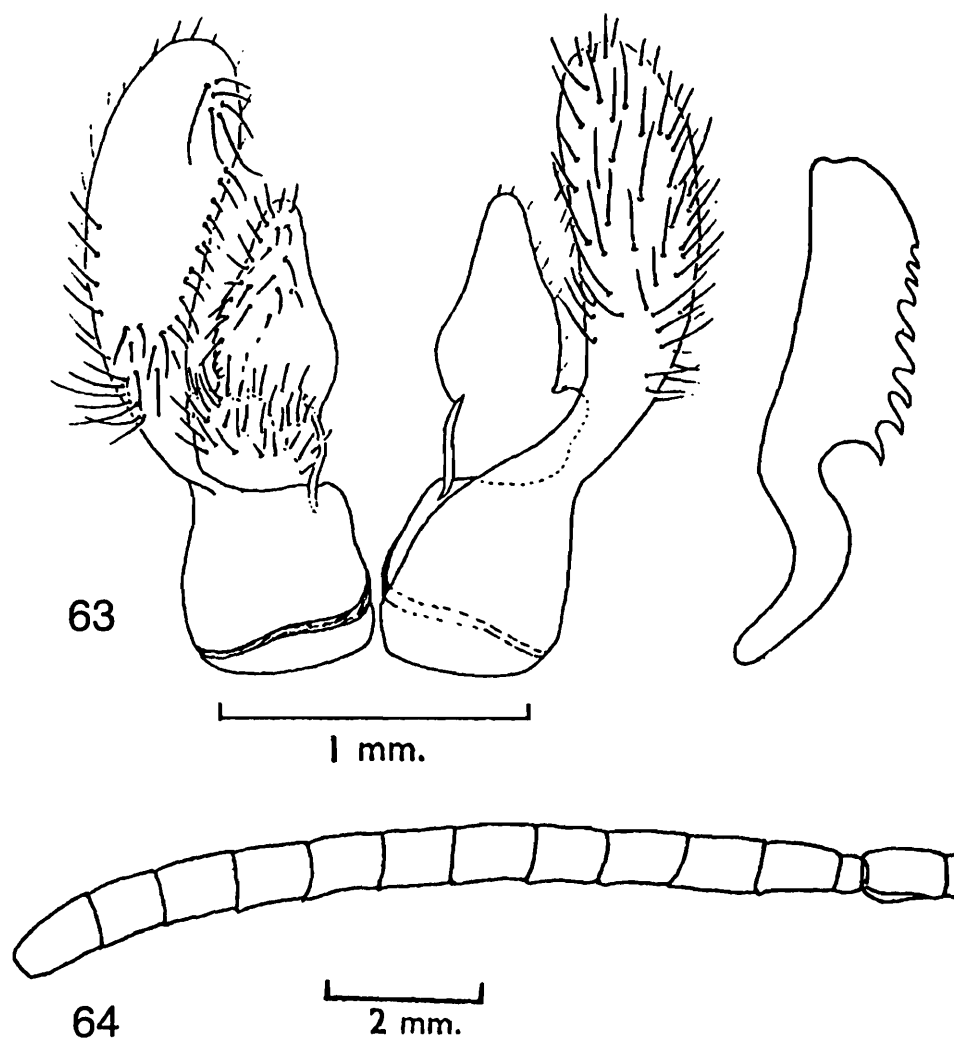
1805. *Scolia analis* Klug, *Beitr. Naturk.*, **1** : 36. Female, Poona (holotype in Berlin Museum) (nec Fabricius, 1804).
1810. *Scolia cruenta* Klug, *Beitr Naturk.*, **2** : 168 (new name for *S. analis* Klug, 1805).
1852. *Scolia fervida* Smith, *Ann. Mag. nat. Hist.*, (2) **9** : 46. Female, Poona, India (holotype in British Museum).
1897. *Scolia cruenta* Klug : Datta-Torre, *Cat. Hym.*, **8** : 154.
1928. *Scolia (Scolia) 6-pustulata* Klug : Betrem, *Treubia*, **9** : (suppl.) : 310-311. Female, Male; India : Pondicherry, Sangli, Assam (the name *6-pustulata* Klug, 1805, misapplied).
1964. *Scolia (Discolia) cruenta* Klug : Betrem & Bradley, *Zool. Meded.*, **40** : 93 (new subgeneric assignment).
1967. *Scolia (Discolia) cruenta* Klug : Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) : 306 (note on holotype of *Scolia fervida* Smith, 1852; *Scolia fervida* synonymised under *Scolia cruenta* Klug).
1968. *Scolia (Discolia) cruenta* Klug : Bradley & Betrem, *Deut. ent. Zeit.*, **15** : 324, 326 (note on holotype of *Scolia cruenta* Klug; incorrect application of *sempustulata* Klug by Betrem, 1928).

This species is widely distributed in India, where it ranges from Tamil Nadu northwards through Karnataka to Uttaranchal, Delhi and Punjab in the west and West Bengal in the east. It breeds in areas of low to heavy rainfall at an altitude from sea level to about 1400 m.

Scolia quadripustulata Fabricius, *Scolia stizus* Saussure and *Scolia cruenta* Klug are distinguished by having, in female, reddish-yellow bands on the abdominal tergites, body black, and a truncate apical margin of the median lobe of the clypeus. *Scolia quadripustulata* is separated by having metapleurum largely with subcontiguous punctures. Whereas in *Scolia stizus* and *Scolia cruenta* the upper plate of metapleurum is closely punctate at upper half and lower plate bears small and sparse punctures except along posterior margin broadly impunctate. *Scolia stizus* can be separated by having evenly subcontiguously punctate first abdominal tergite. In *Scolia cruenta* first tergite is closely punctate at the sides and sparsely punctate in the middle.

The males are in all black to normally maculated forms. The extensively maculated form bears paired reddish-yellow lateral spots on third to fifth tergites. However, they can be distinguished from the males of allied species by having antennal flagellum not clavate towards the apex, upper plate of metapleurum closely punctate at its upper half and lower plate with fine scattered punctures.

Female : Length 16-23 mm. Black, the following reddish-yellow : paired large lateral spots on second tergite, the spots sometimes united in the middle; third to



Figs. 63-64 : *Scolia (Discolia) cruenta* Klug : 63, Male genitalia, dorsal and ventral aspects and aedeagus in profile view; 64, Male antenna.

fifth tergites almost entirely. Vestiture black except for some yellowish pubescence on coloured abdominal areas. Wings dark brown with purplish-blue effulgence.

Anterior margin of the median lobe of the clypeus truncate, median area of the disc raised and impunctate, at sides with large, mostly subcontiguous punctures, a relatively narrow band of small, dense punctures behind anterior rim; frontal area and frontal spatium with moderately large, mostly contiguous punctures; frontal laminae narrow and raised; frontal fissura extended up to anterior ocellus; lower front with large, mostly close punctures, upper front with a few scattered punctures; ocular sinus impunctate; anterior ocellus in a shallow pit; ocellar area with a few close punctures, posterior ocelli margined behind by a shallow groove; vertex impunctate except for a few scattered punctures; occiput with small punctures, mostly separated by the diameter of a puncture.

Scapulae with moderately large, mostly subcontiguous to sparse punctures; mesoscutum with large, deep, contiguous punctures anteriorly and along the posterior

margin, elsewhere with more separated punctures, with a V-shaped impunctate area in the middle; scutellum with large subcontiguous punctures; metanotum with small punctures, close at sides and sparse in the middle; mesopleurum with smaller subcontiguous to contiguous punctures, broadly impunctate posteriorly; upper plate of metapleurum with small, mostly subcontiguous punctures at its upper half, lower plate with small, sparse to scattered punctures and broadly impunctate along posterior margin; dorso-median area of propodeum with moderate sized contiguous to subcontiguous punctures, dorso-lateral areas with similar punctures except impunctate on anterior half, lateral surface with moderate sized sparse punctures, punctures close along upper and posterior margins.

First abdominal tergite with a antero-median tubercle, surface behind tubercle with moderately large, sparse to scattered punctures, posteriorly with small sparse punctures, at sides with mostly subcontiguous punctures.

Male : Length 12-18 mm. Black except third to fifth tergites usually with paired large to small reddish yellow spots, the spots sometimes absent from one or more tergites, rarely the tergites entirely black. Vestiture black except yellowish white on coloured areas of the abdomen. Wings dark brown with purplish effulgence.

Clypeus anteriorly in the middle with a few scattered punctures, posteriorly and at sides with contiguous to subcontiguous punctures; frontal area with mostly subcontiguous punctures; frontal spatium with small, contiguous to subcontiguous punctures; frontal fissura distinct, extending up to anterior ocellus; front with mostly subcontiguous punctures at sides, ocular sinuses punctate; anterior ocellus large, in a moderately deep pit; ocellar triangle with mostly contiguous punctures; occiput with punctures mostly separated by the diameter or more than the diameter of a puncture; flagellum elongate, not clavate towards the apex, apical segments 1.25 times as long as broad (Fig. 64).

Pronotum with moderate sized, subcontiguous to sparse punctures; mesoscutum with moderately large punctures, mostly separated by half the diameter of a puncture, punctures in the middle sparse; scutellum with large, mostly subcontiguous punctures; metanotum with small, mostly subcontiguous punctures, narrowly impunctate in the middle, mesopleurum with mostly subcontiguous punctures, posteriorly with small, sparse punctures along posterior margin; upper plate of metapleurum with moderate-sized, mostly subcontiguous punctures at its upper half, lower plate with small to fine scattered punctures, broadly impunctate along posterior margin; dorso-median area of propodeum with moderately large, mostly subcontiguous punctures, dorso-lateral areas subcontiguously punctate on posterior three-fourths, anterior third impunctate, lateral surface with sparse punctures except along upper margin with closer punctures, posterior surface with sparse punctures on median section, lateral sections with close punctures.

First abdominal tergite with a distinct antero-median tubercle, surface with subcontiguous punctures at sides, elsewhere with punctures mostly separated by half the diameter of a puncture; second sternite without any antero-median tubercle.

Male genitalia as in figure 63.

Distribution : India : Bihar, (Purnea, Nalanda), Delhi (Univ. Ridge), Haryana (Kaithal), Karnataka (Bangalore, Channapatna), Madhya Pradesh (Shivpuri), Maharashtra (Pune), Orissa (Angul), Punjab (Patiala), Tamil Nadu (Coimbatore), Uttaranchal (Dehra Dun, Chilla, Mohand), West Bengal (Kurseong, Jalpaiguri, Mangpo, Calcutta).

24. *Scolia (Discolia) stizus* Saussure

1864. *Scolia (Discolia) stizus* Saussure in Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 118. Female, Tranquebar (type in Copenhagen Museum).
1897. *Scolia stizus* Saussure : Dalla-Torre, *Cat. Hym*, 8 : 184.
1928. *Scolia (Scolia) berlandi* Betrem, *Treubia*, 9 (suppl) : 311. Female, Bellary, Karnataka, India (holotype in Paris Museum).
1964. *Scolia (Discolia) stizus* Saussure : Betrem & Bradley, *Zool. Meded*, 40 : 93 (new subgeneric assignment; *Scolia berlandi* Betrem synonymised).
1974. *Scolia (Discolia) stizus* Saussure : Bradley, *Revue suisse Zool.* 81 (2) : 470-471 (note on type, 1 Female designated and labelled as Lectotype).

This species is known on the basis of female types from Tamil Nadu and Karnataka in southern India. It resembles *Scolia (D.) cruenta* Klug in having similar pattern of body colouration and details of punctation, except the punctation of first tergite. The first tergite in *Scolia (D.) stizus* is punctate uniformly with subcontiguous punctures, whereas in *Scolia (D.) cruenta* the surface is closely punctate at sides and in the middle the punctures are separated mostly by the diameter or more than the diameter of a puncture.

Female : Length 18-20 mm. Black, the following reddish-yellow to red : paired lateral spots on second tergite; third and fourth tergites almost entirely; sometimes fifth tergite also; paired lateral spots on third and fourth sternites. Vestiture black, except some reddish-yellow pubescence on coloured abdominal areas. Wings dark brown with blue reflections.

Median lobe of the anterior margin of the clypeus truncate, disc impunctate in the middle, at sides with mostly subcontiguous punctures; frontal area with a few punctures; frontal spatium with dense punctures along small, raised frontal laminae, elsewhere the punctures being more separated; front with sparse to scattered punctures; vertex impunctate except around the posterior ocelli with some sparse punctures, occiput with small, dense punctures.

Scapulae with moderately large, mostly subcontiguous punctures; mesoscutum with large punctures, subcontiguous punctures anteriorly and along posterior margin, at sides with more separated punctures, impunctate medially except for a few scattered punctures; scutellum with similar sparse punctures, narrowly impunctate along posterior margin; metanotum with similar punctation except being narrowly impunctate in the middle; mesopleurum subcontiguously punctate, broadly impunctate posteriorly; upper plate of metapleurum with subcontiguous punctures on its upper half, lower half impunctate, lower plate with very fine, scattered punctures, impunctate along posterior margin; dorso-median area of propodeum with moderately large, deep, mostly subcontiguous punctures, dorso-lateral areas with similar punctation except for an impunctate area anteriorly, lateral surface with sparse to scattered punctures, the punctures being denser posteriorly.

First abdominal tergite with a distinct tubercle anteriorly in the middle, surface with small, mostly subcontiguous, uniformly distributed punctures.

Distribution : India : Karnataka (Bellary) and Tamil Nadu (Tranquebar).

25. *Scolia (Discolia) fasciatopunctata* Guerin

This is one of the species of *Scolia*, which are mostly black and have red bands or paired lateral spots on some of the abdominal tergites. The amount of red on the abdominal tergites varies considerably, and occurrence of entirely black males is also not uncommon. The female usually has a broad red band on the third abdominal tergite and a narrow band on the fourth, usually interrupted along mid-line, sometimes only third tergite bears a broad to narrow band. In male, usually the third tergite bears a broad red band or paired lateral spots.

Both the sexes of this species can be differentiated from the allied species by having punctation and colour characters, given in the key. A very characteristic male genitalia, having very large volsellae, facilitates the differentiation of entirely black males.

This species, though uncommon, is widely distributed in the Indian subcontinent, where it ranges from Sri Lanka northwards through southern India to northern India.

The population from northern India differs from that from Sri Lanka and southern India, and is treated here as a distinct subspecies. A careful study of the male holotype of *Scolia dunensis* Betrem reveals that it resembles with entirely black male of *Scolia fasciatopunctata* Guerin and is treated here as *Scolia (Discolia) fasciatopunctata dunensis* Betrem.

Two subspecies, viz., *Scolia (Discolia) fasciatopunctata fasciatopunctata* Guerin from Sri Lanka and southern India, and *Scolia (Discolia) fasciatopunctata dunensis* Betrem from northern India, can be distinguished by the following key.

Key to the subspecies of *fasciatopunctata*

Female

1. Third tergite usually with a broad red band, and fourth with a narrow band, band on fourth usually interrupted in the middle. Sri Lanka, southern India ..
.....(a) *fasciatopunctata fasciatopunctata* Guerin
- Third tergite with a broad to narrow red band. northern India
.....(b) *fasciatopunctata dunensis* Betrem

Male

1. Third tergite with a broad red band or paired lateral spots. Wings dark brown with golden to purplish reflections. Sri Lanka, southern India
.....(a) *fasciatopunctata fasciatopunctata* Guerin
- All tergites entirely black. Wings light brown, rosaceous in appearance, with coppery reflections. Northern India(b) *fasciatopunctata dunensis* Betrem

(a) *Scolia (Discolia) fasciatopunctata fasciatopunctata* Guerin

1838. *Scolia (Lacosi) fasciatopunctata* Guerin, *Voy. Coq.* : 254, Female, Indes Orientales, Java (type presumably in Paris Museum).
1864. *Scolia (Discolia) quadripustulata* var. *fasciatopunctata* Guerin : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 114. Female, India.
1867. *Scolia quadripustulata* Fabricius : Saussure, *Hym. In Reise Novara, Zool.*, 2 : 103. Female, Male; Sri Lanka (misidentification).
1897. *Scolia quadripustulata* var. *fasciatopunctata* Guerin : Dalla-Torre, *Cat. Hym.*, 8 : 178. Female, India.
1928. *Scolia (Scolia) peradeniyensis* Betrem, *Treubia*, 9 (suppl.) : 257, 258 (key), 312, 313 (des.). Female, Male, Sri Lanka (holotype in Vienna Museum) (mis-spelled as *paradeniyensis* on pp. 310, 312).
1964. *Scolia (Discolia) peradeniyensis* Betrem : Betrem & Bradley, *Zool. Meded.*, 40 : 93 (new subgeneric assignment).
1965. *Scolia (Discolia) paradeniyensis* Betrem : Guiglia, *Verh. Naturf. Ges. Basel*, 76 : 321-322. Female, Male, Sri Lanka (mis-spelled *paradeniyensis*).
1973. *Scolia (Discolia) fasciatopunctata* Guerin : Bradley, *Bull. Mus. Hist. nat.*, (3), *Zool.*, 86 (112) : 219 (noted that type of *Scolia (Lacosi) fasciatopunctata* Guerin was not available for study, and it will replace *Scolia peradeniyensis* Betrem, in case Betrem was found correct considering the two species as synonyms).
1978. *Scolia (Discolia) fasciatopunctata* Guerin : Krombein, *Smithsonian Contr. Zool.*, 283 : 39-40. Female, Male, Sri Lanka (synonymised *Scolia peradeniyensis* Betrem).

This subspecies is distributed in Sri Lanka and southern India. Both the sexes can be easily separated from their counterparts from northern India with help of the characters given in the key.

Female : Length 17-26 mm. Black, abdomen with faint blue reflections. The following light red : sometimes small lateral marks on second tergite, a broad band on the third, usually a narrowly interrupted band on the fourth tergite and sometimes a pair of small rounded spots on third sternite. Wings dark brown, anterior half of fore wing darker, effulgence dark blue.

Anterior margin of the clypeus broadly rounded, raised median area impunctate, at sides subcontiguously punctate; frontal area with coarse, contiguous punctures; frontal spatium with coarse, contiguous punctures along the moderately broad frontal laminae, elsewhere with sparse to scattered punctures varying from a few to numerous; frontal fissura weak, extending halfway to anterior ocellus; anterior ocellus in a very shallow pit; front impunctate except for a few small scattered punctures around ocellar area; post-ocellar groove shallow and usually bears row of small punctures; vertex impunctate, its declivous portion subcontiguously punctate.

Scapula with mostly subcontiguous punctures; mesoscutum with subcontiguous, deep punctures along anterior margin, punctures becoming sparser towards middle and at sides, with a small to moderately large impunctate space in the middle; scutellum usually with sparse punctures at its anterior half, posterior half being impunctate or sometimes with punctures along anterior margin subcontiguous and scattered elsewhere; metanotum with small, sparse to subcontiguous punctures, narrowly impunctate in the middle; mesopleurum with contiguous to subcontiguous punctures, broadly impunctate along posterior margin; upper plate of metapleurum with small mostly subcontiguous punctures at its upper two-thirds, lower third impunctate, lower plate with fine sparse, sparse punctures, broadly impunctate along posterior margin; dorsum of propodeum with subcontiguous to more separated punctures except the lateral areas with a small impunctate area anteriorly, lateral surface with small, shallow, scattered punctures.

First abdominal tergite with a strong antero-median tubercle, area behind tubercle with coarse, scattered punctures, posteriorly and at sides with small, sparse to close punctures; second tergite at its anterior two-thirds with scattered to sparse punctures except for a smooth transverse strip laterally, posterior third with small and close to dense punctures; second sternum without any tubercle.

Male : Length 14-22 mm. Black, abdomen with faint blue reflections. Abdomen entirely black or with the following light red : usually third abdominal tergite with a broad band or sometimes with a pair of large spots, rarely with a pair of small spots, fourth tergite sometimes with a pair of small spots, very rarely a pair of tiny spots on fifth tergite. Wings dark brown, fore wing anteriorly darker, effulgence usually coppery.

Clypeus in the middle impunctate or with a few scattered punctures, at sides subcontiguously punctate, with a narrow stripe of fine, close punctures above apical margin; frontal spatium with small, subcontiguous punctures; frontal fissura well developed and extending up to anterior ocellus; front with small, shallow, sparse to scattered punctures in middle, at sides impunctate; anterior ocellus in a shallow pit; ocellar area with close punctures; post-ocellar groove shallow punctate, vertex with a few scattered punctures; flagellum not clavate towards apex.

Scapulae and mesoscutum sparsely punctate; scutellum subcontiguously punctate, narrowly impunctate along posterior margin; metanotum with subcontiguous punctures except for an impunctate longitudinal stripe in the middle; mesopleurum with moderately large punctures mostly separated by half the diameter of a puncture; upper plate of metapleurum with small punctures mostly separated by the diameter of a puncture at its upper two-thirds, lower third impunctate, lower plate with very fine, evenly scattered punctures, dorsum of the propodeum with shallow, subcontiguous punctures, lateral areas with a small impunctate area anteriorly, lateral surface with small, shallow, scattered punctures, the punctures becoming closer along upper margin.

First abdominal tergite without any antero-median tubercle, surface with mostly subcontiguous punctures; second sternite without any basal tubercle.

Distribution : India : Karnataka (Bangalore), and Tamil Nadu (Coimbatore, Shevaroy). *Elsewhere* : Sri Lanka.

(b) *Scolia (Discolia) fasciatopunctata dunensis* Betrem, comb. nov.

(Figure 65)

1928. *Scolia (Scolia) dunensis* Betrem, *Treubia*, **9** (suppl.) : 251, (key), 270 (des.). Male, Dehra Dun, India (holotype in Z.S.I., Calcutta).

1964. *Scolia (Discolia) dunensis* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 92 (new subgeneric assignment).

The study of the male holotype from Dehra Dun, India reveals that it resembles *Scolia fasciatopunctata* Guerin in every detail except for the wings rosaceous rather than dark brown. The male genitalia, having very large volsellae, similar to that of *Scolia fasciatopunctata*, which occurs in Sri Lanka and southern India.

The female is similar to that of nomino typical subspecies.

This subspecies is widely distributed in northern India, ranging from Calcutta to Delhi and Kangra in Himachal Pradesh, and occurs both in wet as well as dry zone areas.

Female : Length 16-22 mm. Black, abdomen with faint blue reflections, third tergite with light to dark red, narrow to broad band. Vestiture entirely black. Wings dark brown with coppery or blue reflections.

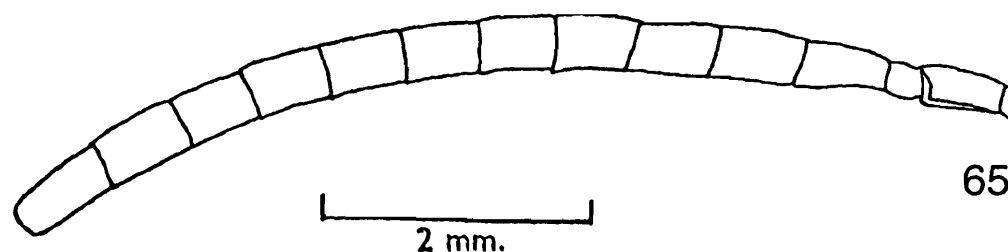


Fig. 65 : *Scolia (Discolia) fasciatopunctata dunensis* Betrem : Male antenna.

Punctuation as in nomino-typical subspecies.

Male : Length 12-15 mm. Integument and vestiture entirely black. Wings light brown, rosaceous in appearance, forewing darker anteriorly, with coppery reflections.

Antenna as in fig. 65.

Punctuation as in nomino-typical subspecies.

Distribution : India : Delhi (University ridge, I.A.R.I. Campus), Himachal Pradesh (Kangra), Orissa (Gopalpur), Uttaranchal (Dehra Dun, Chilla), Uttar Pradesh (Khurja) and West Bengal (Calcutta).

26. *Scolia (Discolia) quadripustulata* Fabricius (Figures 66, 67)

1782. *Scolia 4-pustulata* Fabricius, *Spec. Ins.*, 1 : 453. Male, Malabar, India (holotype in British Museum).
1928. *Scolia (Scolia) obscuropunctata* Betrem, *Treubia*, 9 (suppl.) : 308-309. Male, Sri Lanka, India (holotype from Ceylon in Leiden Museum; paratypes in Z.S.I., Calcutta; Colombo Museum; Paris Museum and Artis Museum).
1928. *Scolia (Scolia) kumaonensis kumaonensis* Betrem, *Treubia*, 9 (suppl.) : 309. Female, India : Kumaon, Kausanie 2000, Male, vii.1914, Tytler (holotype in Z.S.I., Calcutta).
1928. *Scolia (Scolia) kumaonensis calcuttensis* Betrem, *Treubia*, 9 (suppl.) : 309. Female, India : Calcutta; Raipur; Dubhalwala, Dehra Dun (holotype from Calcutta in Z.S.I., Calcutta; paratypes in F.R.I., Dehra Dun and Artis Museum).
1964. *Scolia quadripustulata* Fabricius : Bradley, *Spolia zool. Mus. Haun.*, 21 : 22 (statement that holotype is Male not Female and the correct combination is *Scolia (Discolia) quadripustulata quadripustulata* Fabricius).
1964. *Scolia (Discolia) obscuropunctata* Betrem : Betrem & Bradley, *Zool. Meded.*, 40 : 93 (new subgeneric assignment).
1978. *Scolia (Discolia) quadripustulata* Fabricius : Krombein, *Smithsonian Contr. Zool.*, 283 : 38-39, figure 26. Female, Male, Sri Lanka (synonymised *Scolia (S.) kumaonensis* Betrem and *Scolia (S.) kumaonensis calcuttensis* Betrem; statement that Betrem (in litt., 1974) advised him about the misapplication of Fabricius' name *S. quadripustulata* to *S. binotata* Fabricius, and *Scolia (S.) obscuropunctata* Betrem was a junior synonym).

The name *Scolia quadripustulata* Fabricius was misapplied for a long time to another species now known as *Scolia binotata binotata* Fabricius. Krombein (1978), on the basis of an information from Betrem, applied the names correctly and *Scolia obscuripunctata* Betrem was considered a junior synonym. Krombein (1978) also synonymised *Scolia kumaonensis* Betrem and *Scolia kumaonensis calcuttensis* Betrem.

This species is widely distributed in the Indian subcontinent, where it ranges from Sri Lanka northwards through southern India to Sikkim and Garo Hills in the east and Uttar Pradesh (western Himalaya) in the west. The collection data suggests that this species occurs in areas of moderate to heavy rainfall at an altitude varying from sea level to some 2000m in India.

The female can be distinguished easily by having light red second and third sternites. It resembles *Scolia stizus* Saussure and *Scolia cruenta* Kulg in having extensive reddish maculation on the abdominal tergites and truncate apical margin of the median lobe of the clypeus in the female. *Scolia quadripustulata* female can be easily separated by having most of the metapleurum subcontiguously punctate.

The males are variable in having abdominal integument entirely black to second and third sternites entirely reddish and second to fourth tergites with paired large reddish marks. It can also be separated by having antennal flagellum not clavate towards apex and most of the metapleurum subcontiguously punctate except for a very narrow impunctate stripe below on upper plate.

Female : Length 18-23 mm. Black, abdomen with faint blue reflections, the following orange red or red : paired large rounded spots on second and third tergites, sometimes second and third tergites almost entirely, usually paired antero-lateral spots on fourth tergite sometimes on fourth and fifth sternites also. Vestiture black except brownish to cinereous on occiput and anterior part of pronotum. Wings dark brown with blue reflections.

Anterior margin of median lobe of the clypeus truncate, a band of small, dense punctures above the anterior rim; median surface of the clypeus raised and impunctate, at sides with large, subcontiguous punctures; frontal area and frontal spatium with moderately small, mostly contiguous punctures, punctures becoming dense along the moderately broad and raised frontal laminae; frontal fissura faint but extending up to anterior ocellus; front largely with small, scattered punctures except for some close punctures on lower part; ocellar area with a few small, sparse punctures; posterior ocelli margined by a shallow punctate groove; vertex impunctate except for a few small, scattered punctures, declivous portion with small punctures, mostly separated by the diameter of a puncture.

Scapula with moderately large, contiguous to subcontiguous punctures; mesoscutum with moderately large, subcontiguous punctures anteriorly and along posterior margin, elsewhere with more separated punctures, and a V-shaped impunctate area in the

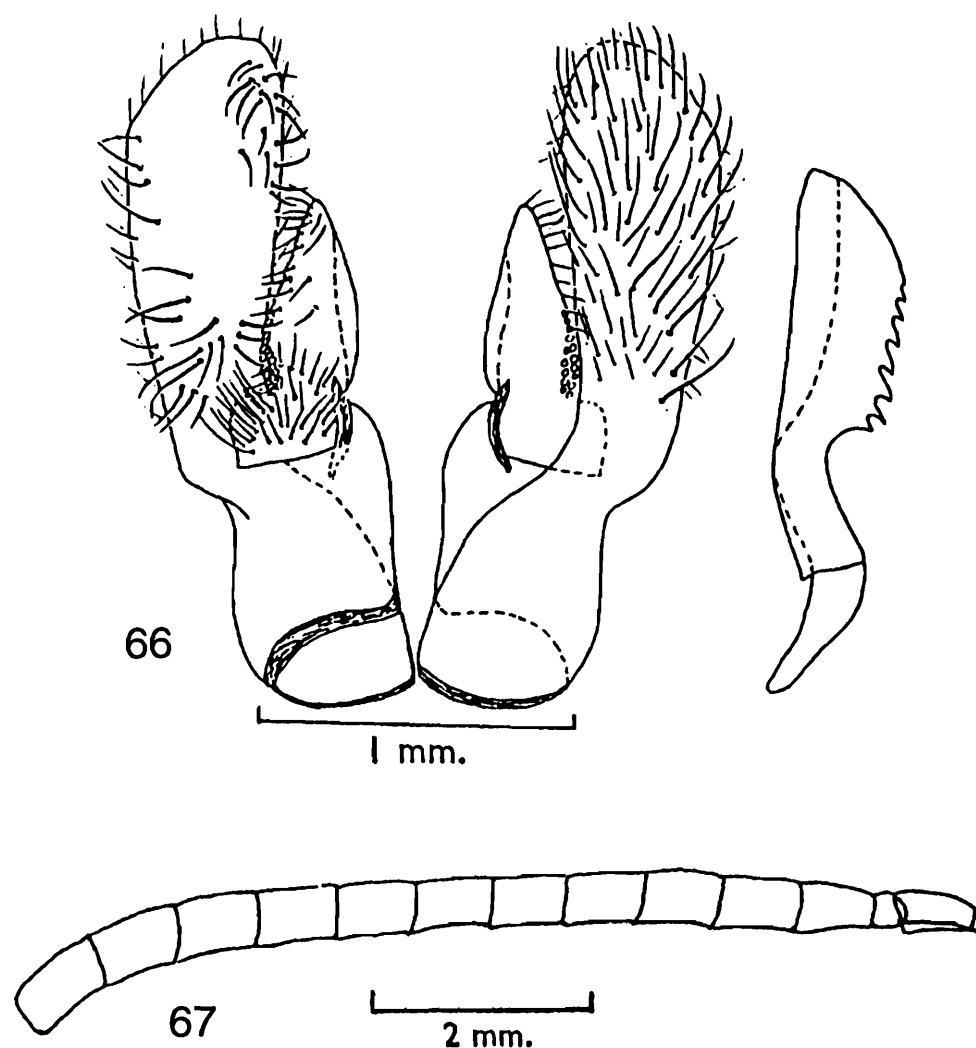
middle; scutellum and metanotum with large contiguous to subcontiguous punctures; mesopleurum with small, contiguous to subcontiguous punctures except being broadly impunctate posteriorly; upper plate of metapleurum with contiguous to subcontiguous punctures except being impunctate narrowly along lower margin, lower plate similarly punctate, narrowly impunctate along upper margin; dorso-median area of propodeum with coarse, contiguous to subcontiguous punctures except for a narrow impunctate longitudinal stripe in the middle, dorso-lateral areas similarly punctate except anterior half being impunctate, lateral surface with coarse, mostly subcontiguous punctures, posterior surface with coarse, mostly subcontiguous punctures on lateral sections, median section with more separated punctures.

First abdominal tergite with a strong antero-median tubercle, surface with moderate-sized, subcontiguous punctures except sometimes for a small impunctate area behind tubercle; second tergite with small to large scattered punctures; second sternite without antero-median tubercle.

Male : Length 15-20 mm. Black, abdomen with very faint blue reflections, red or orange-red markings on abdomen usually present and vary from paired lateral spots on third tergite to second to fourth tergites, and second to fifth sternites almost entirely. Integument very rarely entirely black. Vestiture black except for some interspersed brownish to cinereous setae on occiput. Wings dark brown, effulgence blue.

Clypeus impunctate in the middle, at sides with subcontiguous to contiguous punctures; frontal area with subcontiguous punctures; frontal spatium with small, dense punctures; frontal fissura extending up to anterior ocellus, the latter in a moderately deep pit; front with mostly scattered punctures, ocular sinus with small to close punctures, ocellar triangle with a few close punctures; vertex with punctures mostly separated by the diameter of a puncture; posterior ocelli margined behind by a shallow groove. antennal flagellum not clavate towards apex, apical segments about 1.25 to 1.5x as long as broad (Fig. 67).

Scapula with mostly subcontiguous punctures; mesoscutum with subcontiguous punctures anteriorly and at sides, posteriorly in the middle punctures separated by their own diameter; scutellum and metanotum with subcontiguous to somewhat sparse punctures; mesopleurum subcontiguously punctate, punctures along posterior margins shallow and sparse; upper plate of metapleurum with mostly subcontiguous punctures except being narrowly impunctate along lower margin, lower plate with similar punctation; dorso-median area of propodeum with subcontiguous punctures, dorso-lateral areas similarly punctate except for a large rectangular impunctate area anteriorly, lateral surface with medium sized, deep, close to sparse punctures, posterior surface with contiguous to subcontiguous punctures at lateral sections, median section with more separated punctures.



Figs. 66-67 : *Scolia (Discolia) quadripustulata* Fabricius : 66. Male genitalia, dorsal & ventral aspects and aedeagus in profile view; 67. Male antenna.

First abdominal tergite with a well developed antero-median tubercle, surface with mostly contiguous punctures; second sternite without antero-median tubercle.

Male genitalia as in figure 66.

Distribution : India : Karnataka, (Bangalore, Bellary), Kerala (Walayer, Malabar), Meghalaya (Garo Hills), Sikkim (Melli), Tamil Nadu (Coimbatore), Uttaranchal (Dehra Dun, Mussoorie, Tehri, Uttarkashi, Kausanie), West Bengal (Calcutta, Kalyani), *Elsewhere* : Sri Lanka.

27. *Scolia (Discolia) fichteli* Betrem (Figure 68)

1928. *Scolia (Scolia) fichteli* Betrem, *Treubia*, 9 (suppl.) : 257, 258, 313-314 Female, Male; India, Malabar and unknown locality (types in Vienna Museum).

1964. *Scolia (Discolia) fichteli* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 93 (new subgeneric assignment).

Betrem (1928) described this species on the basis of a female from Malabar coast (Mahe) and a female and three males from some unknown localities of India.

This species is widely distributed in India, where it ranges from Malabar coast (Mahe) northwards to Meghalaya and Arunachal Pradesh in the east and Delhi and Punjab in the west. It occurs in areas of moderate to heavy rainfall at an altitude ranging from sea-level to 925 m. Large populations were observed at Darugiri in Garo Hills, Meghalaya and also at Salt Lake area in Calcutta, West Bengal.

The female of this species has reddish spots on some of the abdominal tergites and rest of the integument black; anterior margin of the median lobe of the clypeus rounded or subtruncate. It is further differentiated from allied species by having front subcontiguously punctate medially, weak frontal fissura, which is not extending up to anterior ocellus and upper plate of metapleurum very narrowly punctate along upper margin only.

The males are variable in having number of paired red spots on abdominal tergites. Third and fourth tergites are usually marked with paired reddish spots, sometimes only third tergite is marked with paired reddish spots, and some males with entirely black abdomen. The male is distinguished by having antennal flagellum not capitate towards the apex and upper plate of metapleurum only narrowly punctate along upper margin.

Female : Length 14-20 mm. Black, except antennae reddish-brown on the underside, the following red : paired large lateral spots on third and fourth tergites, spots on third tergite large and usually united in the middle, sometimes paired small lateral spots on second or/and fourth tergites also. Vestiture black, except on occiput with mostly white pubescence and yellowish on coloured abdominal area. Wings dark brown with blue reflections.

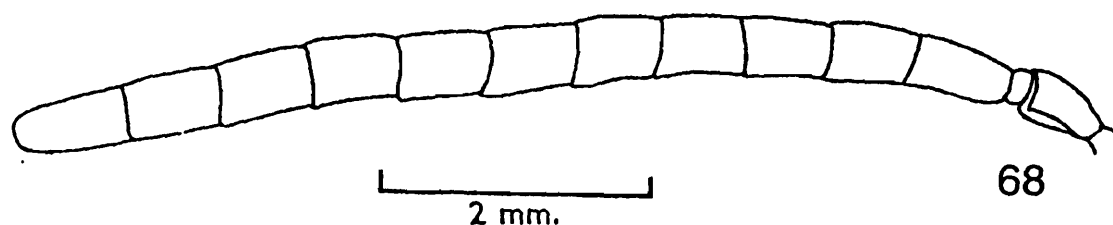
Anterior margin of the clypeus broadly rounded anteriorly, median lobe subtruncate, median raised area of the disc impunctate, at sides with coarse, subcontiguous punctures, a narrow band of small, dense punctures behind anterior rim; frontal area with contiguous punctures; frontal spatium with coarse, mostly contiguous punctures medially, at sides along narrow and raised frontal laminae with punctures being confluent; frontal fissura very weak, extending halfway to anterior ocellus; front medially, above the frontal spatium, with coarse, subcontiguous punctures, elsewhere with moderately large sparse to scattered punctures except for some close punctures laterad of posterior ocelli; anterior ocellus in a shallow pit; posterior ocelli margined behind by a shallow groove, vertex with large, deep, scattered punctures, occiput with smaller, sparse to close punctures.

Scapulae with coarse, contiguous to subcontiguous punctures; mesoscutum with coarse, subcontiguous punctures along the anterior and posterior margins, elsewhere

with more separated punctures, with a V-shaped impunctate area posteriorly in the middle; scutellum with similar, sparse to close punctures; metanotum with smaller, sparse punctures; mesopleurum broadly impunctate posteriorly, elsewhere with moderately large, deep, subcontiguous to contiguous punctures; upper plate of metapleurum with small, close punctures narrowly along upper margin, elsewhere impunctate, lower plate with small, deep sparse to close punctures on lower two-thirds, upper third impunctate; dorso-median area of propodeum with moderately large, deep, punctures mostly separated by half to a diameter of a puncture, dorso-lateral areas with similar punctation except for a large impunctate area anteriorly, lateral surface with moderate-sized, deep punctures, becoming closer along upper margin; posterior surface with sparse to scattered punctures.

First abdominal tergite with a distinct, obtuse tubercle anteriorly in the middle, surface in the middle anteriorly, behind the tubercle impunctate, except for a few large, scattered punctures, posteriorly with small and close punctures, laterally with small, close punctures; second sternite without basal tubercle.

Male : Length 10-17 mm. Integument entirely black or the following reddish-yellow : paired large to small lateral spots on third and fourth tergites, that on fourth tergite usually very small or absent. Vestiture black, except being black intermixed with white on the head, pronotum, mesoscutum and mesopleurum. Wings dark brown with bluish or coppery reflections.



Figs. 68 : *Scolia (Discolia) fichteli* Betrem : Male antenna.

Clypeus with subcontiguous punctures at sides, elsewhere with scattered punctures; frontal area subcontiguously punctate; frontal spatium with small, contiguous punctures; frontal fissura weak, present on frontal spatium only; lower front with small, contiguous to subcontiguous punctures, upper front with sparse to scattered punctures; anterior ocellus in a shallow pit; posterior ocelli margined by a very shallow groove, vertex with moderate sized, sparse punctures; antennal flagellum elongate, not clavate towards apex, apical segments about one and half times as long as broad (Fig. 68).

Scapula with shallow punctures, mostly separated by half the diameter of a puncture; mesoscutum with larger punctures, mostly separated by half to a diameter of a puncture; scutellum with large, subcontiguous punctures; metanotum with smaller, more separated punctures; mesopleurum with large, subcontiguous to somewhat more

separated punctures; upper plate of metapleurum with small, sparse punctures at its upper third, lower plate with small to fine, sparse to scattered punctures; dorso-median area of propodeum with punctures mostly separated by half to a diameter of a puncture, dorso-lateral areas with smaller, subcontiguous punctures except for a large impunctate area anteriorly, lateral surface with small, sparse punctures, the punctures closer along upper margin, posterior surface with sparse to close punctures.

First abdominal tergite with a tubercle anteriorly in the middle, anterior half of the surface with large, mostly subcontiguous punctures, posterior half with smaller and more separated punctures; second sternite without any basal tubercle.

Distribution : India : Andhra Pradesh (Naguldevpadu), Arunachal Pradesh (Magaown), Bihar (Pusa), Delhi, Meghalaya (Darugiri), Pondicherry (Mahe), Punjab (Hoshiarpur), West Bengal (Calcutta, Salt Lake).

28. *Scolia (Discolia) binotata* Fabricius

Fabricius (1775) described *Scolia binotata* on the basis of two males from Tranquebar, India. The name *Scolia quadripustulata* Fabricius had been consistently misapplied to *Scolia binotata* Fabricius, until Krombein (1978) made correct application of these names to the respective species.

This polytypic species is widely distributed in the Oriental Region, where it ranges from Sri Lanka through India to East Indies and Southeast Asia, and also occurs in China, Taiwan and Japan.

Betrem (1928, 1941) differentiated different subspecies and varieties on the basis of differences in the integumental markings and vestiture.

Krombein (1978) placed the population from Sri Lanka and Southern India under typical *S. b. binotata*. The present study, based on series of specimens from various parts of India, reveals that the population from Indian subcontinent belongs to typical *S. b. binotata*, which differs from its counterpart from Myanmar and Thailand in having the integument on head and thorax, in both the sexes, usually entirely black. Whereas, in the population from Thailand the female has most of the head and scapulae reddish and males bear red marks on head and scapulae. However, the females and males with red marks on the head and scapulae were also noticed from North east India and Myanmar. The occurrence of such females and males, with such colour pattern may be due to mixing of population from Thailand. The only subspecies known from India is detailed as below.

(a) *Scolia (Discolia) binotata binotata* Fabricius (Figure 69)

1804. *Scolia binotata* Fabricius, *Syst. Peiz.* : 244 Male, Tranquebar (type in Copenhagen).

1805. *Scolia bipunctata* Klug, *Beitr. Nat.*, 1 : Male, Ost. Indian; Berlin Museum. (Doubtful synonym).

1897. *Scolia (Discolia) cucullata* Bingham, *Fauna British India, Hym.*, **1** : 82. Female, Sikkim; West Bengal (Types in British Museum).
1907. *Scolia quadripustulata* Fabricius : Paiva., *Rec. Indian Mus.*, **1** : 14. Male, India : Siliguri, West Bengal.
1908. *Scolia quadripustulata* var. *binotata* Fabricius : Bingham, *Rec. Indian Mus.*, **2** (4) : 352, Male, Sri Lanka.
1928. *Scolia (Scolia) quadripustulata* Fabricius : Betrem, *Treubia*, **9** (suppl.) : 314-316 (*S. binotata* erroneously placed under the synonymy of *S. quadripustulata* Fabricius) Female, Male, from India.
1928. *Scolia (Scolia) 4-pustulata* var. *bipunctata* Klug : Betrem, *Treubia*, **9** (suppl.) : 316.
1928. *Scolia (Scolia) 4-pustulata kansarensis* Betrem, *Treubia*, **9** (suppl.) : 318. Male, India : U.P. : Chakrata, Kansari, F.R.I., Dehra Dun. **New synonymy.**
1964. *Scolia binotata* Fabricius : Bradley, *Spolia zool. Mus. Haun.*, **21** : 11 (designation of a lectotype).
1965. *Scolia (Discolia) quadripustulata* Fabricius : Guiglia, *Verh. Naturf. Ges. Basel*, **76** : 322 (in part) (misdet).
1965. *Scolia (Discolia) quadripustulata* var. *bipunctata* Klug : Guiglia, *Verh. Naturf. Ges. Basel*, **76** : 322. Male, Sri Lanka (in part).
1968. *Scolia binotata* Klug : Bradley and Betrem, *Deut. Ent. Zeits.*, **15** : 325 (*S. binotata* placed under *S. quadripustulata quadripustulata* Fabricius).
1978. *Scolia (Discolia) binotata binotata* Fabricius : Krombein, *Smithsonian Contr. Zool.*, **283** : 41-43. Female, Male; localities from Sri Lanka.

This subspecies is distributed throughout the Indian subregion.

The females are usually uniform in having integument black, except for a paired of large spots on third and fourth tergites. However, one female from Kameng (Arunachal Pradesh : India) has head and scapulae, except clypeus, red and one female from Bijanbari (Darjeeling dist. India) has front and a long line behind upper eye lobe, red. The males usually have paired red spots on third and fourth tergites, sometimes fourth tergite entirely black, rarely red spots altogether missing. One male from Manipur (India) has following red markings : frontal saptium above, ocular sinuses, paired spots behind posterior ocelli and scapulae entirely, paired spots on third and fourth tergites.

Female : Length 14-20 mm. Black, third and fourth tergites with paired, large rounded red or light red spots, rarely head, variously variegated with red, and very rarely scapulae also red. Vestiture black, except white on the occiput. Wings medium to dark brown, fore wing anteriorly darker, with blue reflections.

Anterior rim of the clypeus broadly rounded anteriorly, raised median area of the disc impunctate, at sides contiguously punctate; frontal spatium impunctate except

for a few close punctures along the relatively broad but slightly raised frontal laminae; frontal fissure extending halfway to anterior ocellus, the latter in a shallow pit; front and vertex impunctate, post ocellar furrow very weak.

Scapulae with a few scattered punctures except anteriorly being closely punctate; mesoscutum anteriorly and along posterior margin with close punctures, at sides with sparse punctures, with a very large impunctate area in the middle; scutellum with a few scattered punctures; metanotum with sparse to scattered punctures; upper plate of mesopleurum anteriorly with subcontiguous punctures; in the middle

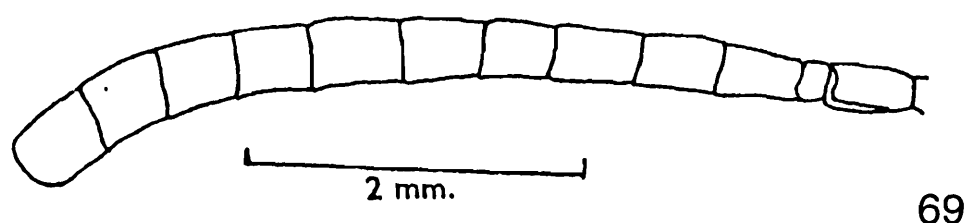


Fig. 69 : *Scolia (Discolia) binotata binotata* Fabricus : Male antenna.

impunctate, lower plate anteriorly with subcontiguous and posteriorly with small, sparse punctures; upper plate of mesopleurum impunctate except for a narrow area along upper margin being subcontiguously punctate, lower plate impunctate except for some small, sparse punctures along anterior margin; dorso-median area of propodeum with moderately large, deep punctures, mostly separated by half the diameter of a puncture, dorso-lateral area impunctate at its inner half, outer half with small, sparse to close punctures, lateral surface with small and scattered punctures, the punctures becoming larger and closer above, postero-median area impunctate except for some small, sparse punctures below, postero-lateral areas with small, sparse punctures.

First abdominal tergite with a prominent antero-median tubercle, a small area behind tubercle impunctate, surface anteriorly with coarse scattered punctures, posteriorly with small close punctures, punctures along apical region smaller and denser; second sternite with a weak basal tubercle.

Male : Length 11-17 mm. Black, usually third and fourth tergites with paired, rounded, light red spots, sometimes only third or fourth tergites with such spots, rarely abdomen entirely black. The males from Eastern Himalaya and Northeast India having, sometimes, red marks on front, vertex and scapula. Vestiture black mixed with white, that on head, thorax anteriorly, legs and ventral side of abdomen predominantly white. Wings dark brown, fore wing dark brown at base and anterior half elsewhere paler, with bluish purple effulgence, forewing membrane beyond cells devoid of microtrichiae except for a small patch adjacent to apex of marginal cell.

Frontal spatium contiguously punctate; frontal fissura linear and extending upto

anterior ocellus, the latter in a relatively shallow pit; flagellum clavate towards apex (Fig. 69); front with subcontiguous to contiguous punctures.

Scapulae with punctures separated by one to two times the diameter of a puncture; mesoscutum with large, deep punctures, mostly separated by less than the diameter of a puncture, with contiguous punctures along the posterior margin; scutellum with large, subcontiguous punctures except for a very small smooth area posteriorly in the middle; mesonotum with relatively smaller and sparser punctures; mesopleurum with punctures mostly separated by the diameter of a puncture; upper plate of mesopleurum with contiguous to subcontiguous punctures at its upper half, lower half impunctate, lower plate with smaller and more separated punctures, broadly impunctate above and along posterior margin; dorso-median area of propodeum with moderately large, subcontiguously punctures at its posterior half, punctures at anterior half mostly separated by half the diameter of a puncture, dorso-lateral area similarly punctate at its posterior two-thirds, anterior third being impunctate, lateral surface sparsely punctate except along upper margin, where the punctures become closer, postero-median area with coarse, subcontiguous to scattered punctures, postero-lateral areas with somewhat closer punctures, without any impunctate space.

First abdominal tergite with a weak antero-median tubercle, surface with moderate sized punctures mostly separated by half the diameter of a puncture; second tergite sparsely punctate except at sides and narrowly along posterior margin, where the punctures become closer and smaller; second sternite with a weak median tubercle near the base.

Distribution : India : Arunachal Pradesh (Kameng), Delhi (Univ. ridge), Karnataka (Bangalore, Sandur, Channapatna), Kerala (Calicut), Manipur (Chura Chandpur), Rajasthan (Sambhar Lake area), Tamil Nadu (Coimbatore), Uttaranchal (Dehra Dun, Motichur, Chilla) and West Bengal (Singla, Bijanbari, Kalimpong, Teesta Bridge, Siliguri). *Elsewhere* : Sri Lanka.

29. *Scolia (Discolia) wagneri* Betrem (Figures 70, 71)

1928. *Scolia (Scolia) wagneri* Betrem, *Treubia*, **9** (suppl.) : 251, 258 (key), 312 (des.). Female, Male; India : Sikkim, Darjeeling (types in Hamburg Museum).
1964. *Scolia (Discolia) wagneri* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 93 (new subgeneric assignment).

Betrem (1928) described this small sized species with a series of specimens of both the sexes from Sikkim and Darjeeling from India. It is recorded here, for the first time, from western Himalaya and southern India.

Both the sexes are distinguished by the abundance of white erect vestiture covering most of the body and by the presence of small paired red spots on third tergite, the

spots may be very small in some males. Superficially, the males resemble the two spotted form of *Scolia binotata binotata* Fabricius. These can be differentiated by having the fore wing membrane entirely dark brown and broadly clothed with microtrichiae beyond cells. Whereas, in *Scolia binotata binotata*, the fore wing membrane is pale apically on posterior half with microtrichiae confined to a small area adjacent to the marginal cell.

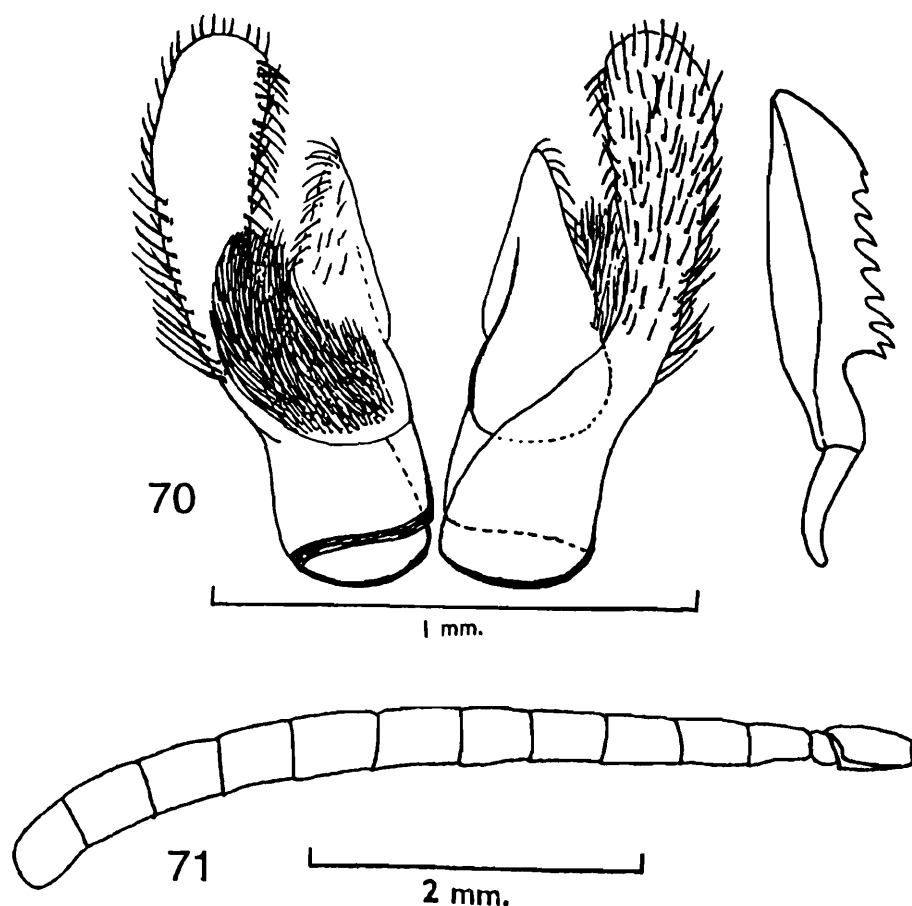
This species also shows affinities with *Scolia keiseri* Krombein of Sri Lanka, in having similar integument and vestiture in both the sexes. The female differs in having vertex laterally with some sparse punctures, rather than entirely impunctate, as in *Scolia keiseri* Krombein. The males of both the species are, more or less, identical.

Female : Length 12-15 mm. Black, abdomen with faint blue reflections, third tergite with paired, large, oval lateral red spots. Erect vestiture white on the head, thorax except dorsally, legs and on first tergite anteriorly; abdomen dorsally with mostly black setae, except sternites having black inter-mixed with white pubescence. Wings dark brown with purplish effulgence.

Anterior margin of the clypeus broadly round, median area raised and impunctate, at sides and narrowly behind anterior rim with contiguous to subcontiguous punctures; frontal fissura extending halfway to anterior ocellus; frontal spatium sparsely punctate except the punctures along the slightly raised frontal laminae closer; front impunctate at sides, in the middle with sparse to scattered punctures; ocular sinuses impunctate; anterior ocellus in a shallow pit; ocellar triangle sparsely punctate; vertex impunctate except areas laterad of posterior ocelli being sparsely punctate, post-ocellar furrow shallow, occiput with relatively coarse, dense punctures.

Scapulae sparsely punctate, except the punctures dense anteriorly; mesoscutum with close punctures along its anterior and posterior margins, elsewhere with sparse to scattered punctures, with a large to small impunctate larea in the middle; scutellum impunctate except for a few coarse, scattered punctures; metanotum with a few sparse punctures; mesopleurum with coarse, deep, mostly subcontiguous punctures, broadly impunctate along anterior and posterior margins; upper plate of metapleurum impunctate except for some moderate-sized, close to sparse punctures along its upper margin, lower plate impunctate except for some small, shallow, sparse punctures along anterior margin; dorso-median area of propodeum with subcontiguous to somewhat more separated punctures dorso-lateral area with broadly impunctate anteriorly and along inner margin, elsewhere with close to sparse punctures, lateral surface with very small, scattered punctures, the punctures closer along upper margin, posterior surface with sparse to scattered punctures.

First abdominal tergite with a weak antero-median tubercle, surface with large to small sparse punctures, without any concentration of punctures at the apical region, second tergite sparsely punctate, without densely punctate apical margin.



Figs. 70-71 : *Scolia (Discolia) wayneri* Betrem : 70, Male genitalia : dorsal & ventral aspects and aedeagus in profile; 71, Male antenna.

Male : Length 11-12 mm. Black. The third abdominal tergite with a pair of small round antero-lateral reddish-yellow spots, sometimes abdomen entirely black. Erect vestiture white on the head, thorax ventrally and on first tergite, elsewhere mostly black, intermixed with white.

Clypeus with moderately large, subcontiguous punctures at sides, elsewhere with sparse punctures, except for a small impunctate area anteriorly in the middle and small dense punctures behind anterior margin laterally; frontal area at sides contiguously punctate; frontal spatium not well defined posteriorly, surface with moderate sized, mostly subcontiguous punctures; frontal fissura extending up to anterior ocellus; front with moderately large close to scattered punctures, ocular sinuses with small, close to scattered punctures, anterior ocellus in a large shallow pit; ocellar area with some close punctures, post-ocellar furrow indistinct, vertex with some large, scattered punctures, declivous portion with small, shallow, sparse punctures; flagellum clavate towards the apex (Fig. 71).

Scapulae with moderately large punctures, mostly separated by half to a diameter of a puncture; mesoscutum with large, deep punctures, mostly separated by half to a diameter of a puncture, except in the middle more separated punctures; scutellum

with coarse, contiguous punctures, except in the middle with a few scattered punctures; metanotum with moderately large subcontiguous punctures at sides, narrowly longitudinally impunctate in the middle; mesopleurum with moderately large, subcontiguous to somewhat more separated punctures, broadly impunctate posteriorly; upper plate of metapleurum largely impunctate, narrowly along upper margin with moderate sized, mostly contiguous punctures, lower plate with similar, dense to sparse punctures at its anterior half, posterior half impunctate; dorso-median area of propodeum, with large, deep, mostly subcontiguous punctures, except in the middle punctures widely separated, dorso-lateral areas with smaller, subcontiguous punctures at posterior half, anterior half impunctate, vertical surface with small, shallow, sparse to scattered punctures, except along upper margin with close punctures, posterior surface with large, mostly scattered punctures, except along upper and lateral margins the punctures close to dense. Fore wing membrane beyond cells broadly clothed with microtrichiae.

First abdominal tergite without any tubercle anteriorly on the horizontal surface, surface medially with large, mostly sparse punctures on anterior half, posterior half with small, sparse punctures, laterally with mostly subcontiguous punctures; second and third tergites largely sparsely punctate, except at sides with close punctures; second sternite without basal tubercle.

Male genitalia as in figure 70.

Distribution : India : Himachal Pradesh (Solan, Chail, Twaghat, Kashimpur), Karnataka (Bangalore, Channaptana), Sikkim (Melli, Manjitar), Uttaranchal (Almora, Kausani, Tehri, Uttarakashi) and West Bengal (Darjeeling, Rambhi, Melli, Kalimpong).

30. *Scolia (Discolia) nobilis* Saussure

1858. *Scolia (Lacosi) nobilis* Saussure, *Ann. Soc. ent. France*, (3) **6** : 214. Female, Indes Orientales (holotype in Copenhagen Museum).
1864. *Scolia (Discolia) nobilis* Saussure : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 117. Female, Indes Orientales; Cameron.
1892. *Scolia (Discolia) nobilis* Saussure : Cameron, *Mem. Proc. Manch. Lit. Phil. Soc.*, (4) **5** : 106.
1897. *Scolia nobilis* Saussure : Dalla-Torre, *Cat. Hym.*, **8** : 171.
1897. *Scolia (Discolia) nobilis* Saussure : Bingham, *Fauna British India. Hym.*, **1** : 81, Female, India.
1928. *Scolia (Scolia) nobilis* Saussure : Betrem, *Treubia*, **9** (suppl.) : 282-283. Female, India : Sikkim.
1934. *Scolia (Scolia) nobilis* forma *hopponis* Matsumura : Uchida, 1934. *J. Fac. Agric. Hokkaido Imp. Univ.*, **32**(6) : 250. Female, Taiwan.

1936. *Scolia nobilis* forma *hopponis* Matsumura : Uchida, *Scoliidae* : In *Ins. Jehol. Rep.* : 38.
1941. *Scolia (Scolia) nobilis nobilis* Saussure : Betrem, *Notes Ent. Chinoise*, 8(4) : 139-140. Female, Male, China (unknown Male described).
1964. *Scolia (Discolia) nobilis* Saussure : Betrem & Bradley, *Zool. Meded.*, 40 : 92 (new subgeneric assignment).
1972. *Scolia (Discolia) nobilis* Saussure : Tsuneki, *Etizenia*, 62 : 35. Female, Taiwan (*S. nobilis* Saussure and *S. inouyei* Okamoto treated as distinct species).
1974. *Scolia (Discolia) nobilis* Saussure : Bradley, *Revue suisse Zool.*, 81 (2) : 457 (a note on holotype female).

Saussure (1858) described *S. nobilis* from Sikkim in India. Betrem (1941) recorded two subspecies, viz., *nobilis nobilis* Saussure from China, Taiwan and northern India; and *nobilis inouyei* Okamoto from Korea. Tsuneki (1972) treated *S. nobilis* Saussure and *S. inouyei* Okamoto as two distinct species.

This species has a wide distribution, ranging from Taiwan through China to northern India. It is known from Sikkim and Darjeeling district of West Bengal in India. The impunctate front and vertex, and propodeal dorsum with small, shallow, scattered punctures easily distinguish the female from female of other Indian species of *Scolia* marked with yellow on the head and some of the abdominal tergites.

Female : Length 21-30 mm. Black, except scape, two basal antennal segments, frontal laminae, tegulae and legs reddish-brown. The following yellow; frontal spatium posteriorly, front, ocular sinus partly, vertex except ocellar triangle, paired large spots on third and fourth tergites, that on fourth almost united in the middle. Vestiture yellowish to reddish-brown except black on abdominal tergites. Wings yellowish hyaline, fore wing brown anteriorly, reflections purplish.

Anterior rim of the clypeus broadly rounded anteriorly, median lobe subtruncate, raised median area of the disc impunctate, at sides with subcontiguous punctures; frontal area with coarse, contiguous punctures; frontal spatium with coarse, subcontiguous punctures, posteriorly not defined; frontal laminae moderately broad and raised; frontal fissura extending halfway to anterior ocellus; front entirely impunctate; anterior ocellus in a shallow pit; posterior ocelli margined behind by a shallow punctate groove; vertex impunctate, occiput with fine, scattered punctures.

Scapulae with coarse, mostly subcontiguous punctures except for a small impunctate area in front of tegula; mesoscutum broadly impunctate in the middle, anteriorly with coarse, subcontiguous punctures, posteriorly sparse to scattered punctures; scutellum impunctate except for a few scattered punctures along anterior margin; metanotum impunctate in the middle, at sides with sparse punctures; upper plate of mesopleurum with coarse, subcontiguous punctures, lower plate with smaller and sparser punctures, broadly impunctate along anterior and posterior margins; upper

plate of metapleurum with small, sparse punctures along upper margin, elsewhere impunctate, lower plate impunctate, except for a few fine, scattered punctures anteriorly below; dorso-median area of propodeum with small, shallow, sparse to scattered punctures, dorso-lateral areas impunctate except for some small, scattered punctures in the middle, lateral surface impunctate except upper margin being with small, scattered punctures, posterior surface impunctate.

First abdominal tergite with a moderately strong antero-median tubercle, anterior two-thirds of the surface with scattered punctures, posterior third with small, sparse punctures; second tergite with sparse to scattered punctures except being impunctate at sides in the middle; second sternite without any anterior tubercle.

The male has not been collected, so far, from India. The following account is based on a description given by Betrem (1941).

Male : Length 20 mm. Black, usually clypeus anteriorly with a brown spot, the following yellow : clypeus, frontal area, sometimes paired small spots on frontal spatium posteriorly, scapulae entirely, tegulae partly, a more or less interrupted band on third abdominal tergite. Vestiture white except being black on apical abdominal segments. Wings as in the female.

Clypeus punctate except in the middle being impunctate; frontal spatium distinctly defined posteriorly, surface densely punctate; front and vertex anteriorly with deep punctures, the punctures not fine, vertex posteriorly with very fine punctures.

The pronotum and mesoscutum uniformly punctate, the punctures being not dense; scutellum similarly punctate, slightly convex; upper plate of metapleurum with small, deep punctures, lower plate impunctate except for some very fine punctures; propodeum with very fine, sparse punctures.

Abdominal tergites uniformly sparsely punctate.

Distribution : India : Sikkim, West Bengal (Singla in Darjeeling Dist.).

31. *Scolia (Discolia) dehraensis* Betrem (Figure 72)

1928. *Scolia (Scolia) dehraensis* Betrem, *Treubia*, **9** (suppl.) : 325-326. Male, Dehra Dun, India (holotype in Leiden Museum).
1964. *Scolia (Discolia) dehraensis* Betrem : Betrem & Bradley, *Zool. Meded.*, **40** : 94 (new subgeneric assignment).
1997. *Scolia (Discolia) dehraensis* Betrem : Gupta, *Zool. Surv. India, Fauna of Nanda Devi Bio. Reserve* : 99, Female. India : Uttaranchal.

Betrem (1928) described this species on the basis of a pair of males from Dehra Dun. Some males and females have been collected recently from western Himalayan ranges of Uttar Pradesh and Himachal Pradesh.

This species is very close to *Scolia sikkimensis* Bingham, in having, more or less, similar integument and vestiture, in both the sexes, but can be differentiated by the distinguishing characters as given in the key. Previously unknown female is also described.

The distributional records for this species are restricted to western Himalayan ranges in Uttar Pradesh, except for the record of a female from a neighbouring district of Himachal Pradesh. This species occurs in areas of heavy rainfall, and at an altitude of 920 m to 3500 m.

Female : Length 19-23 mm. Black except the tarsi and tegulae brownish-red. The following yellow : a broad rectangular mark on front; elongate narrow mark along the posterior margins of upper eye lobes; a broad band on the second abdominal tergite anteriorly covering three-fourths of the surface, the band being invaginated postero-laterally; paired large spots on third tergite, narrowly separated in the middle. Vestiture entirely reddish brown. Wings yellow hyaline, forewing with a fuscous apical mark anteriorly.

Apical margin of clypeus broadly rounded anteriorly, median lobe subtruncate, median area of the disc strongly raised and impunctate, at sides with coarse close punctures, a narrow band of small dense punctures behind anterior rim; frontal area densely punctate; frontal spatium with contiguous punctures along moderately broad and strongly raised frontal laminae, elsewhere with moderate-sized, subcontiguous punctures; frontal fissura faint but extending up to anterior ocellus, indistinct at frontal spatium; anterior ocellus in a shallow pit; front impunctate except for a few small, scattered punctures and some close punctures around ocelli; ocellar triangle with a few small, sparse punctures; vertex impunctate except for a few small, scattered punctures, its declivous portion with small, close punctures.

Scapulae with coarse, deep, dimpled, subcontiguous to contiguous punctures; mesoscutum with moderately large, deep punctures, contiguous along anterior and posterior margins, and more separated elsewhere, with a large V-shaped impunctate area posteriorly in the middle; scutellum with moderate-sized punctures, subcontiguous at sides and sparse in the middle; metanotum with similar subcontiguous punctures; mesopleurum with moderately large, deep, contiguous to subcontiguous punctures, broadly impunctate along posterior margin; upper plate of metapleurum with moderate-sized, deep, subcontiguous punctures except for a triangular smooth area anteriorly along lower margin, lower plate with close punctures at its anterior two-thirds, posterior third impunctate; dorsum of propodeum with moderately large, deep, mostly contiguous punctures, lateral surface with similar punctures mostly separated by half the diameter of a puncture, posterior surface largely contiguously punctate.

First abdominal tergite with a distinct antero-median tubercle, small area behind tubercle impunctate except for a few coarse punctures, rest of the surface with

moderate-sized close punctures, the punctures becoming smaller and closer at sides and along posterior margin; second and third tergites with sparse punctures except punctures dense along posterior margin.

Male : Length 14-16 mm. Black, the following yellow : clypeus, except for small area along anterior margin in the middle, frontal area, a thin line on scrobes extending to ocular sinuses, ocular sinuses, a transverse band on front (usually extended up to ocular sinuses), scapulae, sometimes paired small rounded antero-lateral spots on first tergite, a broad band anteriorly on second tergite, and third tergite almost entirely. The following ferruginous : legs almost entirely except the trochanters and coxae anteriorly, tegulae. Vestiture predominantly brown yellow except being black on fourth to seventh abdominal tergites and apical two sternites. Wings dark brown with golden reflections.

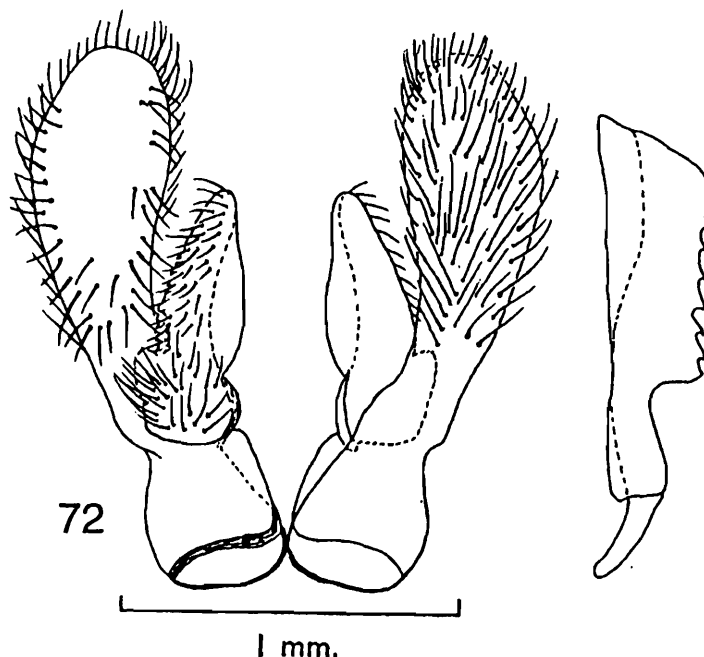


Fig. 72 : *Scolia (Discolia) dehraensis* Betrem : Male genitalia : dorsal & ventral aspects and aedeagus in profile view.

Clypeus with coarse, subcontiguous punctures except for a large, smooth area anteriorly in the middle; frontal spatium with mostly contiguous punctures; frontal fissura extending upto anterior ocellus; anterior ocellus large and in a deep pit; front with coarse, subcontiguous to somewhat more separated punctures; distance between the posterior ocelli and anterior ocellus not more than the diameter of anterior ocellus; ocellar triangle contiguously punctate; vertex with small to fine, sparse punctures.

Scapulae with moderate-sized punctures, mostly separated by half the diameter of a puncture; mesoscutum with deep, moderately coarse punctures, mostly separated by half the diameter of a puncture; scutellum with coarse, mostly subcontiguous punctures except for a small impunctate area posteriorly in the middle; metanotum

with similar but somewhat more separated punctures; upper plate of mesopleurum with coarse punctures, mostly separated by half to a diameter of a puncture, lower plate with smaller and more separated punctures, impunctate along its anterior and posterior margins; upper plate of metapleurum with moderate sized, deep, close to sparse punctures, lower plate with small to fine, sparse to scattered punctures, broadly impunctate along its upper and posterior margins; dorso-median area of propodeum with moderately large punctures, mostly separated by half to a diameter of a puncture, dorso-lateral areas with similar, subcontiguous punctures and with a large impunctate area anteriorly, lateral surface with smaller, deep punctures, mostly separated by about the diameter of a puncture.

First abdominal tergite without any tubercle anteriorly in the middle, surface with coarse punctures, mostly separated by half the diameter of a puncture at its anterior half, posterior half with smaller and more separated punctures; second and third tergites with moderate sized, sparse punctures; second sternite without any basal tubercle.

Male genitalia as in figure 72.

Distribution : India : Himachal Pradesh (Renuka) and Uttaranchal (Dehra Dun, Kalsi, Malari, Tehri).

32. *Scolia (Discolia) sikkimensis* Bingham

1896. *Scolia (Discolia) sikkimensis* Bingham, *J. Linn. Soc. Zool.*, **25** : 423. Female, Male; India : Sikkim (types in British Museum).
1897. *Scolia (Discolia) sikkimensis* Betrem : Bingham, *Fauna British India, Hym.*, **1** : 85-86, Female, Male; India : Sikkim, West Bengal.
1903. *Discolia erythropoda* Cameron, *Ann. Mag. nat. Hist.*, (7) **9** : 323. Female, Male; India : Meghalaya : Khasi Hills (types in British Museum).
1915. *Scolia (Discolia) sikkimensis* Bingham : Meade-Waldo *et al.*, *Ann. Mag. Nat. Hist.*, (8) **16** : 332 (synonymised *Discolia erythropoda* Cameron, 1903).
1928. *Scolia (Scolia) sikkimensis* Bingham : Betrem, *Treubia*, **9** (suppl.) : 324-325. Female, Male; India : Sikkim, Khasi Hills, Pedong nr. Darjeeling.
1928. *Scolia (Scolia) sikkimensis* var. *erythropoda* Cameron : Betrem, *Treubia*, **9** (suppl.) : 325. Female, Male; India : Khasi Hills. **New Synonymy.**
1964. *Scolia (Discolia) sikkimensis* Bingham : Betrem & Bradley, *Zool. Meded.*, **40** : 94 (new subgeneric assignment).

This species, previously known from Sikkim and Meghalaya in India, is recorded here from Nepal, for the first time. It mostly occurs at relatively higher altitudes, from 1450 m to 2100 m, in central and eastern Himalaya.

It is very close to *Scolia (D.) dehraensis* Betrem, in having, more or less, similar vestiture and integumental markings in both the sexes. The males can be distinguished by the presence of a distinct antero-median tubercle on the first abdominal tergite.

Female : Length 22-24 mm. Black, except scapus and legs reddish-brown, the following yellow : usually a pair of small spots at the clypeus, usually frontal area below, upper half of frontal spatium, front and vertex entirely except ocular sinuses partly and ocellar area, paired marks at scapulae, a spot on the upper plate of mesopleurum, dorso-lateral and postero-lateral areas of propodeum, paired antero-lateral marks on first tergite, second tergite at its anterior three-fourths, third tergite entirely, usually paired postero-lateral marks on fourth tergite. Vestiture reddish brown except fourth to sixth tergites with black setae. Wings yellowish hyaline, fore wing somewhat dark anteriorly, effulgence golden.

Anterior rim of the clypeus broadly rounded anteriorly, median lobe truncate, raised area of the disc impunctate, at sides with coarse, close punctures; frontal area with coarse, close punctures; frontal spatium densely punctate along the raised and moderately broad frontal laminae, elsewhere with a few scattered punctures; frontal fissura extending halfway to anterior ocellus; anterior ocellus in a shallow pit; front and vertex impunctate.

Scapulae subcontiguously punctate, mesoscutum at its anterior half with coarse and close punctures, posterior half with coarse punctures mostly separated by the diameter of a puncture, with a large impunctate area in the middle; scutellum with coarse, deep and scattered punctures; metanotum with small, sparse punctures; upper plate of mesopleurum with coarse subcontiguous punctures, lower plate with small and sparse punctures; broadly impunctate posteriorly; upper plate of metapleurum with close to sparse punctures, lower plate with fine sparse punctures; dorsal surface of propodeum with moderately small punctures, mostly separated by the diameter of a puncture, dorso-lateral areas with similar punctation except for a small impunctate area anteriorly along inner margin, lateral surface with small, very sparse punctures.

First abdominal tergite with a well developed antero-median tubercle, surface area behind tubercle with a few coarse, scattered punctures, elsewhere with moderate sized punctures, mostly separated by the diameter of a puncture; second tergite sparsely punctate; second sternite without any basal tubercle.

Male : Length 16-22 mm. Black. The following yellow : Clypeus, frontal area, scrobes, a transverse band on front including ocular sinuses, a line along outer eye margin, scapulae almost entirely, tegulae, paired thin lines on mesoscutum along lateral margin, paired large marks on scutellum, usually united in the middle, metanotum entirely, upper plate of mesopleurum except anteriorly, lower plate of mesopleurum above, paired marks on metapleurum, lateral segments of propodeum entirely, all the femora largely, first and second tibiae on outer side, paired spots on first tergite, usually united in the middle, bands on second to fifth tergites, third tergite almost, bands on fourth and fifth tergites sometimes absent, usually paired spots on second to fifth sternites. Vestiture predominantly yellowish white except on sixth and seventh abdominal segments, black. Wing yellowish hyaline, fore wing darker along upper margin, with a subapical mark.

Clypeus impunctate in the middle, at sides with coarse, subcontiguous punctures; frontal spatium with small, contiguous punctures; frontal fissura extending up to anterior ocellus; anterior ocellus in a shallow pit; lower front impunctate, upper front and areas laterad of ocelli closely punctate.

Scapulae subcontiguously punctate; mesoscutum with moderate-sized punctures, mostly separated by half the diameter of a puncture; scutellum subcontiguously punctate; metanotum with smaller and sparser punctures; mesopleurum with punctures mostly separated by half the diameter of a puncture; upper plate of metapleurum with punctures mostly separated by the diameter of a puncture, lower plate with fine, sparse puncture; dorsal surface of propodeum with moderate-sized punctures, separated by half to a diameter of a puncture, lateral surface with small, sparse punctures.

First abdominal tergite with a well developed tubercle, anteriorly in the middle, surface with moderately large, somewhat sparse punctures; second tergite with small, sparse punctures; first sternite without any basal tubercle.

Distribution : India : Meghalaya (Shillong), Sikkim and West Bengal (Darjeeling Hills). *Elsewhere*: Bhutan and Nepal.

33. *Scolia (Discolia) watanabei* (Matsumura)

This polytypic species is widely distributed, and ranges from Taiwan westwards to Myanmar and North-East India and northwards to China.

Betrem (1928) described *Scolia kempi* from female holotype from Assam, India, and *Scolia pekingensis* from two females (holotype and a paratype) from Peking, China. Both the species resemble each other in almost every respect except in *Scolia pekingensis* Betrem the vertex is black rather than having yellow maculation and the vestiture on thorax predominantly black rather than reddish-brown.

Betrem (1941) redescribed *Scolia watanabei* (Matsumura, 1912), and recorded five varieties based on the differences in number and extent of yellow maculation on the abdominal tergites and colour of vestiture, viz., *S. watanabei* var. *shirakii* Uchida (1933) and *S. watanabei* var. *horni* Betrem (1928) from Taiwan; and *S. watanabei* var. *pekingensis* Betrem (1928), *S. watanabei* var. *claropilosa* Betrem (1941) and *S. watanabei* var. *basimaculata* Betrem (1941) from China. *Scolia kempi* Betrem was considered a doubtful synonym of *Scolia watanabei* var. *pekingensis* Betrem.

Tsuneki (1972), on the basis of his study on a series of males from Taiwan, observed that the yellow maculation on head and abdominal segments varies in different specimens, and recorded two subspecies, the nomino-typical subspecies *S. watanabei watanabei* (Matsumura, 1912) from Taiwan and *S. watanabei pekingensis* Betrem (1928) from China.

The present studies, based on the female holotype of *Scolia kempī* Betrem from Assam, India and four male specimens from Myanmar, reveal that the population from North-east India and Myanmar belongs to a distinct subspecies, *Scolia watanabei kempī* Betrem.

The female of *Scolia watanabei kempī* Betrem, new combination, can be differentiated, from that of its allied subspecies from China, by having vertex (except ocellar triangle) maculated with yellow rather than entirely black, and thoracic vestiture reddish-brown rather than predominantly black mixed with some white. The males, from Myanmar, can be separated by having yellow maculation on the front comparatively more extended transversely, and third and fourth tergites maculated with yellow rather than yellow maculation confined mainly to third tergite.

(a) *Scolia (Discolia) watanabei kempī* Betrem

1928. *Scolia (Scolia) kempī* Betrem, *Treubia*, 9 (suppl.) : 294. Female, Kobo, Assam, India (holotype in Z.S.I., Calcutta).
1941. *Scolia (Scolia) watanabei* var. *pekingensis* Betrem : Betrem, *Notes Ent. Chinoise*, 8(4) : 149. Female, Male; China (*Scolia kempī* Betrem, 1928 recorded as doubtful synonym).

This subspecies is known by female holotype from Assam in North-east India, and four males from Myanmar.

Female : Length 19 mm. Black, the following yellow : front, vertex except ocellar triangle, third abdominal tergite entirely, paired elongated lateral spots on third sternite. Vestiture on head and thorax predominantly reddish-yellow mixed with some white, and black on abdomen except being white on first tergite anteriorly and reddish brown on sternites. Wings yellowish hyaline, fore wing dark anteriorly.

Anterior margin of the clypeus broadly rounded anteriorly, median lobe subtruncate, disc impunctate at its median raised area, at sides with coarse, subcontiguous punctures; frontal laminae moderately broad and raised; frontal spatium with subcontiguous punctures; frontal fissura weak extending up to anterior ocellus; anterior ocellus in a moderately deep pit; front and vertex impunctate.

Scapulae with coarse, deep, mostly subcontiguous punctures; mesoscutum with coarse, mostly contiguous punctures along anterior and posterior margins, elsewhere with punctures more separated and with a V-shaped impunctate area posteriorly in the middle; scutellum with coarse, close to scattered punctures, broadly impunctate posteriorly; metanotum with mostly subcontiguous punctures; mesopleurum with moderate sized, mostly subcontiguous punctures, broadly impunctate along anterior and posterior margins; upper plate of metapleurum with moderate sized, deep, mostly close punctures except being broadly impunctate along anterior margin, lower plate with smaller, sparser punctures, broadly impunctate posteriorly; dorso-median area of propodeum with moderately large, deep, mostly contiguous punctures, dorso-lateral

areas with similar, contiguous to subcontiguous punctures, vertical surface with coarse, deep punctures, mostly separated by the diameter of a puncture except along upper margin the punctures being contiguous, posterior surface with most of the punctures contiguous.

First abdominal tergite with a distinct antero-median tubercle, surface with coarse, deep, subcontiguous punctures anteriorly, posteriorly with smaller, somewhat more separated punctures; second sternite without any basal tubercle.

Male : Length 14-21 mm. Black, the following yellow : front in the middle, third and fourth abdominal tergites almost entirely, paired large and elongated lateral spots on third and fourth sternites. Vestiture golden except on fifth to last abdominal segments being black. Wings medium brown with coppery effulgence.

Clypeus with coarse, subcontiguous punctures at sides, in the middle with more separated punctures; frontal area with small, mostly subcontiguous punctures; frontal spatium with moderately small, contiguous punctures; frontal fissura extending up to anterior ocellus; anterior ocellus in a moderately deep pit; front with coarse punctures, mostly separated by the diameter of a puncture.

Scapulae with moderate sized, shallow punctures, mostly separated by the diameter of a puncture; mesoscutum with moderate sized, deep punctures, separated by one to two times the diameter of a puncture; scutellum with similar punctation; metanotum with smaller punctures, mostly separated by the diameter of a puncture; upper plate of mesopleurum with coarse, deep, mostly subcontiguous punctures, lower plate with smaller and more separated punctures; upper plate of metapleurum with moderate sized, deep punctures, mostly separated by the diameter of a puncture at its upper three-fourths, lower plate with small, sparse to scattered punctures; dorsum of propodeum with coarse, deep, subcontiguous to contiguous punctures, vertical surface with similar punctures, separated by once to twice the diameter of a puncture, posterior surface with coarse, deep, mostly subcontiguous punctures.

First abdominal tergite without any tubercle anteriorly on the horizontal surface, surface with coarse, contiguous to subcontiguous punctures.

Distribution : India : Assam (Kobo). *Elsewhere* : Myanmar.

34. *Scolia (Discolia) venusta* Smith (Figure 73)

1855. *Scolia venusta* Smith, *Cat. Hym. British Mus.*, 3 : 90. Female, Male; India (types in Oxford Museum).
1864. *Scolia (Discolia) venusta* Smith : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 120. Female, Male; India.
1897. *Scolia venusta* Smith : Dalla Torre, *Cat. Hym.*, 8 : 186.

1897. *Scolia (Discolia) venusta* Smith : Bingham, *Fauna British India. Hym.*, 1 : 88. Female, Male; India : Kumaon Hills; Myanmar : Tenasserim.
1904. *Discolia erythrotrichia* Cameron, Z. *Syst. Dipt. Hym.*, 4 : 9 Male, India : Simla (type in Oxford Museum).
1915. *Scolia (Discolia) venusta* Smith : Meade-Waldo et al., *Ann. Mag. nat. Hist.*, (8) 16 : 332 (synonymised *Discolia erythrotrichia* Cameron, 1904).
1928. *Scolia (Scolia) venusta* Smith : Betrem, *Treubia*, 9 (suppl.) : 92-93. Female, Male; India : Kumaon, Simla, Darjeeling, Sikkim.
1941. *Scolia (Discolia) venusta* Smith : Betrem, *Notes Ent. Chinoise*, 8 (4) : 147.
1967. *Scolia (Discolia) venusta* Smith : Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, 20(7) : 324 (a note on types).

This montane species is widely distributed in India and also occurs in Myanmar and Nepal. It is recorded here, for the first time, from Nepal. In India, this species ranges from Sikkim westwards, through Himalayan ranges of central and western Himalaya to Kangra Valley in North-west Himalaya and occurs at an attitude of 1400 m to 2000 m.

Female : Length 19-21 mm. Black, except the legs and tegulae ferruginous. The following yellow : large rectangular quadrate mark on front; usually elongate marks on temples along upper outer eye margin; second tergite at its anterior three fourths except at sides, paired large spots on third tergite, narrowly separated in the middle. Vestiture reddish-golden. Wings yellowish, fore wing with a brownish area at apex, along upper margin beyond cells.

Anterior rim of the clypeus broadly rounded, not differentiated in to median and lateral lobes, raised median area of the disc impunctate, at sides with subcontiguous punctures, with small dense punctures behind the anterior rim; frontal area with coarse, contiguous punctures; frontal spatium contiguously punctate, not marked posteriorly; frontal fissura extending halfway to anterior ocellus, anterior ocellus in a shallow pit; front impunctate except, sometimes, with a few small, scattered punctures; vertex impunctate except for a few scattered punctures laterad of posterior ocelli; post-ocellar furrow shallow and punctate; occiput with sparse punctures.

Scapulae contiguously punctate; mesoscutum with contiguous punctures along the anterior and posterior margins, elsewhere with coarse and deep subcontiguous punctures except for a V-shaped impunctate area in the middle; scutellum with subcontiguous punctures at its anterior half, posterior half with scattered punctures; metanotum contiguously punctate; upper plate of mesopleurum with moderately large, mostly contiguous punctures, lower plate with smaller and subcontiguous punctures, broadly impunctate along posterior margin; upper plate of metapleurum with moderate-sized, deep, contiguous to subcontiguous punctures at its anterior half, posterior half

impunctate; dorsal and posterior surfaces of propodeum with moderately large, deep mostly contiguous punctures, lateral surface with similar but subcontiguous punctures except the punctures being contiguous along upper margin.

First abdominal tergite with a strong antero-median tubercle, surface area behind tubercle with some scattered punctures, posterior half and laterally with small close punctures; second tergite with sparse punctures anteriorly and small somewhat close punctures posteriorly, in the middle with scattered punctures; second sternite without any basal tubercle.

Male : Length 15-17 mm. Black. The following yellow : usually a small narrow transverse spot on the front, just above frontal spatium; scapulae; second to fourth tergites almost entirely, usually paired small lateral spots on fifth tergite, paired large lateral spots on second and third sternites and small spots on fourth sternite. Vestiture reddish golden. Wings yellowish, forewing with a brownish apical area. Clypeus with contiguous to subcontiguous punctures except for an impunctate area in the middle above the anterior rim; frontal spatium with small, contiguous punctures, distinctly marked posteriorly; frontal fissura distinct, extending up to anterior ocellus; front with moderate-sized close to sparse punctures, anterior ocellus in a shallow pit; ocellar triangle with dense punctures, area around posterior ocelli closely punctate.

Scapula subcontiguously punctate; mesoscutum with moderate-sized deep, contiguous to subcontiguous punctures; scutellum and metanotum with mostly contiguous punctures; upper plate of mesopleurum contiguously punctate, lower plate subcontiguously punctate; dorsal and posterior surfaces of propodeum with moderate-sized, deep, mostly contiguous punctures, lateral surface with similar but subcontiguous punctures.

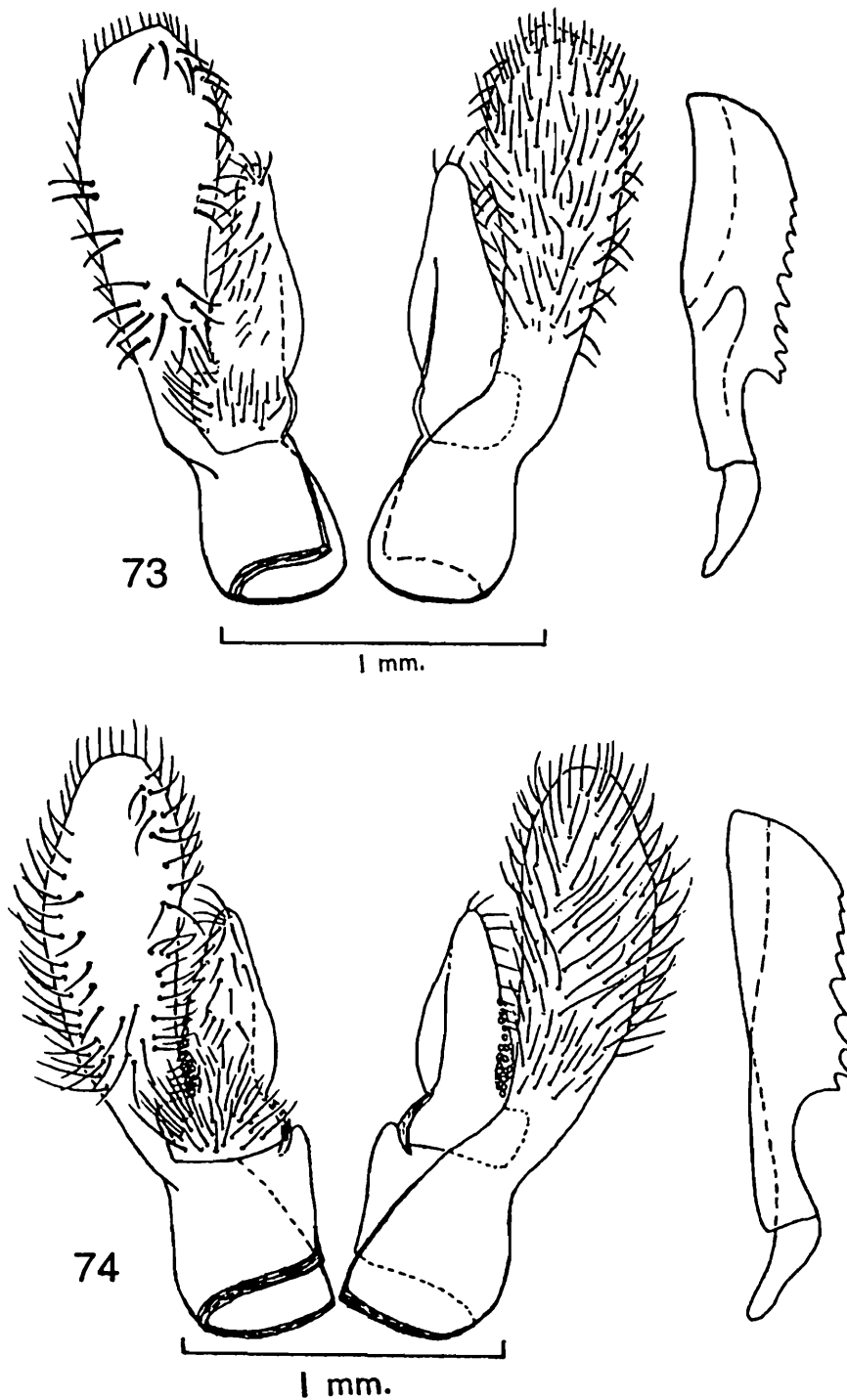
First abdominal tergite without any tubercle anteriorly in the middle, surface with moderate to small punctures, mostly separated by half the diameter of a puncture; second tergite sparsely punctate.

Male genitalia as in figure 73.

Distribution : India : Uttaranchal (Kumaon and Mussoorie Hills), Himachal Pradesh (Shimla, Kangra, Jaspa Hills), Sikkim and West Bengal (Darjeeling). *Elsewhere* : Myanmar (Tenasserim) and Nepal.

35. *Scolia (Discolia) pseudosinensis* Betrem (Figure 74)

1928. *Scolia (Scolia) pseudosinensis* Betrem, *Treubia*, **9** (suppl.) : 293-294. Female, Male, Sidapur, Coorg, India (holotype Female and allotype Male in Betrems' colln., Leiden Museum).
1964. *Scolia (Discolia) pseudosinensis* Betrem : Betrem & Bradley, *Zool. Meded*, **40** : 93 (new subgeneric assignment).



Figs. 73-74 : Male genitalia : dorsal aspect on left, ventral in middle and aedeagus in profile at right. 73, *Scolia (Discolia) Venusta* Smith; 74, *Scolia (Discolia) pseudosinensis* Betrem.

This uncommon species occurs in southern India, where it breeds in areas of heavy rainfall and at an altitude of about 600 to 1200m.

Both the sexes are easily distinguished, from congeners from India, by having entirely reddish-yellow vestiture, largely reddish-yellow head and abdominal tergites, and dark brown wings.

Female : Length 18-22 mm. Black, the following yellow to reddish-yellow : frontal spatium narrowly posteriorly; front entirely; vertex entirely except ocellar triangle; occiput above and outer margin of upper eye lobe; paired large antero-lateral spots on second to fifth tergites, spots on third to fifth more or less united in the middle. Vestiture reddish-golden. Wings dark brown, fore wing darker anteriorly, effulgence blue.

Anterior margin of the clypeus broadly rounded anteriorly, median lobe subtruncate, median area of the disc strongly raised and impunctate, at sides with coarse, subcontiguous punctures; frontal area with coarse, confluent punctures; frontal spatium with large, close punctures, narrowly impunctate in the middle, along the broad and raised frontal laminae with small, dense punctures; frontal fissura somewhat deep, present only on frontal spatium; front and vertex entirely impunctate, posterior ocelli margined behind by a shallow groove, occiput with small, sparse punctures along occipital carina.

Scapulae with coarse, deep, contiguous to subcontiguous punctures; mesoscutum with a very large impunctate area in the middle, anteriorly and narrowly along the posterior margin with large, deep, subcontiguous punctures, at sides with similar, sparse punctures; scutellum with similar sparse to scattered punctures except subcontiguously punctate along anterior margin; metanotum with smaller, sparse punctures; mesopleurum with moderately large, deep, contiguous to subcontiguous punctures, broadly impunctate along anterior and posterior margins; upper plate of metapleurum with coarse, deep, contiguous to subcontiguous punctures except being impunctate along lower margin, lower plate with smaller subcontiguous to more separated punctures, broadly impunctate along posterior margin; dorso-median area of propodeum with moderately large, deep, contiguous to subcontiguous punctures, dorso-lateral areas with subcontiguous to somewhat more separated punctures, lateral surface with similar subcontiguous punctures on posterior half, anterior half with more separated punctures, posterior surface with similar contiguous punctures on lateral areas, median section with similar contiguous punctures on upper half, lower half with more separated punctures.

First abdominal tergite with well developed antero-median tubercle, anterior half of the surface with coarse, scattered punctures in the middle, at sides with small, close punctures, posterior half with small, sparse punctures in the middle, at sides with close punctures; second tergite with coarse, scattered punctures anteriorly in the middle, impunctate in the middle, posteriorly with small punctures, the punctures sparse in the middle and close at sides; second sternite without any antero-median tubercle, surface with large, scattered punctures except postero-laterally, where the punctures become closer.

Male : Length 15-18 mm. Black, the following yellow to reddish-yellow; clypeus; scrobes; frontal area; a transverse band on front, extending from one ocular sinus to

another; scapulae; paired antero-lateral spots on second and third abdominal tergites, that on third united in the middle; fourth to seventh tergites almost entirely. Vestiture entirely reddish-golden. Wings dark brown with coppery reflections.

Clypeus with coarse, close punctures except for a small impunctate area anteriorly in the middle; frontal area with subcontiguous punctures; frontal spatium with small, contiguous punctures; front impunctate at sides, in the middle with moderately large, close punctures, and also a few close punctures laterad of anterior ocellus; frontal fissura extending up to anterior ocellus, the latter in a deep pit; flagellum elongate, not clavate towards apex.

Scapulae with medium-sized, contiguous to subcontiguous punctures; mesoscutum with coarse, deep mostly subcontiguous punctures; scutellum and metanotum with similar punctation; mesopleurum with medium-sized, contiguous to subcontiguous punctures; upper plate of metapleurum with moderately large, contiguous to subcontiguous punctures, lower plate with small, sparse punctures; propodeum with coarse, deep, subcontiguous to contiguous punctures.

First abdominal tergite without any antero-median tubercle, surface with moderately coarse to moderately small, contiguous to subcontiguous punctures; second and third tergites largely sparsely punctate.

Male genitalia as in figure 74.

Distribution : India : Karnataka (Kodagu, Chikmagalur and Shimoga dists.), Kerala (Idduki dist.) and Tamil Nadu (Nilgiri dist.).

36. *Scolia (Discolia) desidiosa* Bingham

1896. *Scolia desidiosa* Bingham, *J. Linn. Soc, Zool*, **25** : 424. Female; Ranjeet Valley, Sikkim, India (holotype in British Museum).
1897. *Scolia (Discolia) desidiosa* Bingham : Bingham, *Fauna British India, Hym.*, **1** : 86-87, fig. 16. Female, Male; Sikkim, India; Myanmar : Tenasserim.
1928. *Scolia (Scolia) decorata desidiosa* Bingham : Betrem, *Treubia*, **9** (suppl.) : 321. Female, Male; Taiwan, Indo-China, Myanmar; India : Sikkim, Darjeeling.
1934. *Scolia (Scolia) decorata desidiosa* Bingham : Uchida, *J. Fac. Agric. Hokkaido Imp. Univ.*, **32**(6) : 249. Female, Male, Taiwan.
1941. *Scolia (Scolia) histrionica histrionica* (Fabricius) : Betrem, *Notes Ent. Chinoise*, **8**(4) : 63-164. Female, Male, China (*Scolia desidiosa* Bingham placed under it).
1972. *Scolia (Discolia) desidiosa* Bingham : Tsuneki, *Etizenia*, **62** : 24. Male, Taiwan (*S. desidiosa* Bingham treated as a distinct species).

This species is widely distributed in the Oriental Region, ranging from Taiwan Westwards through Indo-China to eastern Himalayan ranges of India. The characteristic extensive yellow maculation in both sexes easily distinguish this species

from other highly maculated species from India, where the colour of basic integument is, more or less, yellow in female.

The males are very similar to that of *Scolia picteti* Saussure, in having almost similar integument and vestiture. These can be separated by the shape of clypeus, which is much broader than high in *Scolia desidiosa* and as broad as high in *Scolia picteti*.

Female : Length 20-29 mm. Black, the following yellow : paired spots on frontal spatium, along upper margin; scapulae; a large spot on upper plate of mesopleurum, above; scutellum at its anterior three-fourths; metanotum almost entirely; dorso-lateral areas of propodeum entirely except for a small area anteriorly; apical bands on first to fourth abdominal tergites, the band on second tergite very broad and broadly and deeply emarginate in the middle. Vestiture white, except black on posterior margin of first and entirely on second to last abdominal tergites, and on fifth and sixth sternites. Wings yellowish hyaline, fore wing dark anteriorly.

Anterior margin of the clypeus broadly rounded, not differentiated into median and lateral lobes, subapical band of small dense punctures, median area of the disc gently raised and impunctate or striated, at sides with coarse contiguous punctures; frontal fissura faint but extending up to anterior ocellus; frontal laminae narrow and raised, divergent posteriorly; frontal area not differentiated from the clypeus, surface with small close to sparse punctures; frontal spatium raised in the middle, surface with fine dense punctures along frontal laminae, elsewhere with small subcontiguous punctures; front with small, scattered punctures; post-ocellar furrow very narrow and shallow, interrupted in middle; vertex with small close to scattered punctures.

Scapulae with small subcontiguous to sparse punctures; mesoscutum with moderate-sized subcontiguous punctures anteriorly, posteriorly with small, sparse punctures, the punctures becoming denser along posterior margin; scutellum with moderate-sized, close punctures along anterior margin, elsewhere with scattered punctures; metanotum with subcontiguous punctures; mesopleurum with moderate-sized to small mostly subcontiguous punctures, broadly impunctate along posterior margin; upper plate of metapleurum with contiguous punctures at its upper half, lower half impunctate, lower plate with small subcontiguous punctures, broadly impunctate along upper and posterior margins; dorso-median area of propodeum with moderate-sized, mostly contiguous punctures, dorso-lateral areas with similar, subcontiguous punctures, with a small impunctate area anteriorly, lateral surface with small scattered punctures, the punctures becoming closer along upper and posterior margins, posterior surface with small, sparse punctures, the punctures being larger along upper and lateral margins.

First abdominal tergite with a well-developed antero-median tubercle, surface with coarse, scattered punctures, the punctures becoming smaller and denser along posterior margin and laterally; second tergite with small scattered punctures, the punctures becoming denser along posterior margin.

Male : Length 15-21 mm. Black, the following yellow : clypeus except along anterior margin, sometimes paired spots on frontal spatium above; scapula largely; postero-lateral streaks on mesoscutum; a spot on tegula anteriorly; scutellum and metanotum almost entirely; a large spot on mesopleurum above dorso-lateral area of propodeum except for a small area anteriorly, lateral surface of propodeum along upper and posterior margins, postero-lateral area of propodeum along outer margin (sometimes entirely), sometimes a posterior spot on dorso-median area extending behind an postero-median area; broad and long streaks on outer surface of first and second femora, apical broad mark on the underside of first femur, a tiny mark at the apex of second femur, apical bands on first to fourth tergites, rarely a narrow band on fifth tergite, bands on second and third tergites broadly emarginate in the middle, narrow apical bands on second to fifth sternites, widely interrupted in the middle. Vestiture white, except on apical two abdominal segments black. Wings hyaline, fore wing slightly infumated along anterior margin.

Clypeus with moderate-sized mostly subcontiguous punctures; frontal area and frontal spatium with small, contiguous punctures; frontal fissura extending up to anterior ocellus, punctation on the thorax of the pattern as in the female, flagellum not clavate towards apex.

First abdominal tergite with a antero-median tubercle, surface with moderate-sized subcontiguous punctures. Male genitalia as in figure.

Distribution : India : Assam (North Cachar, Dehangi), Arunachal Pradesh (Tamen, Tipi), Sikkim, Uttaranchal (Nainital, Bhowali), West Bengal (Singla, Darjeeling). **Elsewhere** : Myanmar, Taiwan.

37. *Scolia (Discolia) picteti* Saussure

1798. *Scolia histrionica* Fabricius, *Suppl. Ent. Syst.*, : 256. Female, India : Tranquebar (type probably lost).
1855. *Scolia (Lacosi) picteti* Saussure, *Mem. Soc. Phys. Hist. nat. Geneve*, **14** : 42. Female, Indes Orientales (holotype in Geneva Museum).
1855. *Scolia pulchra* Smith, *Cat. Hym. British Mus.*, **3** : 88. Female, India (type in British Museum).
1864. *Scolia (Discolia) histrionica* Fabricius : Saussure & Sichel. *Cat. Spec. Gen. Scolia* : 121-122. India orientali (synonymised *S. picteti* Saussure and *S. pulchra* Smith).
1897. *Scolia (Discolia) histrionica* Fabricius : Bingham, *Fauna British India, Hym.*, **1** : 86. Female from Bangalore only.
1928. *Scolia (Scolia) histrionica* Fabricius : Betrem, *Treubia*, **9** (suppl.) : 330-331. Female; India : Bangalore, Trivandrum, Barkul in Orissa; Sri Lanka : Kandy.
1941. *Scolia (Scolia) picteti* Saussure : Betrem, *Notes Ent. Chinoise*, **8**(4) : 165-166 (notes that the valid name for *S. histrionica* Fabricius, 1798 is *S. picteti* Saussure, 1855, and *Tiphia histrionica* Fabricius, 1787 is a different species).

1964. *Scolia (Discolia) picteti* Saussure : Betrem & Bradley, *Zool. Meded.*, **40** : 94 (new subgeneric assignment).
1965. *Scolia (Discolia) picteti* Saussure : Guiglia, *Verh. Naturf. Ges. Basel*, **76** : 323. Female, Sri Lanka.
1967. *Scolia (Discolia) picteti* Saussure : Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** (7) 318 (confirm synonymy of *Scolia pulchra* smith).
1974. *Scolia (Discolia) picteti* Saussure : Bradley, *Revue suisse Zool.*, **81** (2) : 461 (a note on the type).
1978. *Scolia (Discolia) picteti* Saussure : Krombein, *Smithsonian Contr. Zool.*, **283** : 47-48. Female, Male; Sri Lanka (previously unknown Male described).

This species is one of the Indian representatives of Betrem's group of *Scolia erythrocephala* Fabricius. This group represents brightly marked species that ranges from the southern Palaearctic Region to India and Sri Lanka.

The female differs from allied species in having, in addition to its large size, a dark mark in the second discoidal cell, differences in details of punctation and colour pattern are as given in the key. The male remained unknown, until Krombein (1978) described from Sri Lanka. Males from Walayer Forest (Kerala) in India also possess abundant yellow markings and resemble superficially to the males of *Scolia desidiosa* Bingham. However, it differs in having a weak dark mark in the second discoidal cell and clypeus almost as high as wide. In *Scolia desidiosa* the second discoidal cell is without any mark and the clypeus is much wider than high.

This species is widely distributed in Sri Lanka and southern India. It also occurs in Orissa in India.

Female : Length 17-25 mm. Head predominantly bright yellow, except mandibles, clypeus, antennae and genae being ferruginous; and frontal spatium medially, ocellar triangle and temples underneath being black. Thorax including legs ferruginous except scapulae largely being bright yellow, and the following usually black : mesoscutum anteriorly and a spot in the middle, rarely almost entirely, pronotum at sides, mesopleurum rarely, metapleurum and lateral surface of propodeum rarely. Abdomen predominantly black, the following bright yellow : large paired spots or a band on second tergite, large paired spots on the third and relatively smaller paired spots on the fourth tergite, rarely paired small spots on fifth tergite also. The following ferruginous : anterior half of the horizontal surface of first tergite, second sternite entirely, third to last sternites apically. Vestiture almost entirely reddish-golden with fiery tinge on certain parts. Wings strongly yellowish, fore wing with a large dark apical area, and a small elliptical dark mark in second discoidal cell.

Anterior rim of the clypeus broadly rounded, raised median area of the disc impunctate, at sides with coarse, subcontiguous punctures; frontal area contiguously punctate; frontal spatium with coarse, contiguous punctures; frontal fissura extending

up to anterior ocellus; lower front with coarse, mostly contiguous punctures, upper front impunctate except for a few small, scattered punctures and some close punctures laterad of posterior ocelli; anterior ocellus in deep pit; post-ocellar furrow shallow but punctate; vertex with small scattered punctures, its declivous portion with close punctures.

Scapulae subcontiguously punctate; mesoscutum with small to coarse, mostly subcontiguous punctures, without any impunctate area; scutellum with coarse, close to scattered punctures; metanotum with similar, but mostly subcontiguous punctures; mesopleurum with coarse, subcontiguous punctures, broadly impunctate along posterior margin; upper plate of metapleurum with smaller, contiguous punctures at its upper three-fourths, lower plate with similar punctures mostly separated by half the diameter of a puncture, broadly impunctate along posterior margin; dorsal surface of propodeum with moderate sized, contiguous punctures except for a small impunctate area anteriorly on the dorso-lateral area, lateral surface with similar subcontiguous to more separated punctures, posterior surface subcontiguously punctate.

First abdominal tergite with a tiny antero-median tubercle, surface with large, scattered punctures anteriorly, posteriorly with smaller and closer punctures; second sternite without any basal tubercle.

Male : Length 15-20 mm. Black. Pale yellow are : clypeus at sides and above; a small obliterated mark on frontal area, a very tiny mark on genae near the base of mandible; pronotum almost entirely except below; anterior half of tegulae; longitudinal postero-lateral streaks on mesoscutum; disc of scutellum entirely; metanotum except very narrowly along anterior margin, posterior area of upper plate of mesopleurum almost entirely; usually a small spot in the middle posteriorly on dorso-median area of propodeum, this spot extended on postero-median area above; dorso-lateral areas entirely except for a small quadrate area anteriorly, lateral surface narrowly and posteriorly above, upper half of the postero-lateral areas; a very small apical spot on the fore femur, long streaks on outer surfaces of fore and mid tibiae, a very narrow streak on upper half of hind tibiae; relatively broad apical bands on first five abdominal tergites, that on first covering almost the entire surface of the tergite, and narrowly and shallowly emarginate in the middle along anterior margin, that on second covering almost entire surface, except anteriorly along anterior margin at sides emarginated, and narrowly and deeply emarginate in the middle anteriorly; that on third covering apical three-fourths of surface, broadly emarginate in the middle anteriorly, that on fourth narrowed and covering almost apical fourth of the surface, that on fifth very narrow and usually interrupted in the middle. Vestiture white on head, slightly yellowish white on thorax, and abdomen except the apical fringes of second to fourth abdominal tergites and last three abdominal segments being entirely with black hair. Wings light brown, forewing slightly darker anteriorly and also with a very weak darkened mark in second discoidal cell, with coppery effulgence; flagellum not clavate

towards apex, most of the segments longer than broad.

Clypeus with moderately large scattered punctures, at sides with smaller close punctures, frontal area contiguously punctate, frontal spatium with small contiguous to subcontiguous punctures, distinctly defined posteriorly; frontal fissura extending up to anterior ocellus; front with moderate sized close punctures medially, at sides the punctures becoming sparser, ocular sinuses with close to sparse punctures; anterior ocellus large-sized, in a shallow pit; posterior ocelli not margined behind by any groove, vertex with small depressed areas laterad of posterior ocelli, its declivous portion medially with moderate-sized, dimpled punctures, at sides the punctures smaller and sparser; antennal flagellum elongate, not clavate towards apex, most of the segments longer than broad.

Scapulae with shallow, subcontiguous to somewhat more separated punctures; mesoscutum with moderately large, deep punctures, the punctures close anteriorly and along posterior margin, elsewhere sparser; scutellum and metanotum with similar sparse punctures; upper plate of mesopleurum with moderately large punctures, mostly separated by the diameter of a puncture, lower plate with similar punctation except posteriorly, with smaller, sparser punctures; upper plate of metapleurum with moderately small, mostly subcontiguous punctures on its upper half, lower half impunctate, lower plate with small, shallow, sparse punctures; dorso-median area of propodeum with moderately large punctures, mostly separated by half to a diameter of a puncture, dorso-lateral areas with similar punctation, lateral surface with moderate-sized shallow, mostly scattered punctures, the punctures being closer along upper margin, posterior surface with moderately large, close punctures along upper margin, elsewhere sparsely punctate.

First abdominal tergite with a very weak and indistinct antero-median tubercle, surface anteriorly with moderately large, subcontiguous punctures, posteriorly with smaller and sparser punctures; second sternite without any basal tubercle. Male genitalia as in figure.

Distribution : India : Karnataka (Bangalore), Kerala (Calicut, Walayer), Orissa (Baripada) and Tamil Nadu (Coimbatore, Tranquebar). **Elsewhere** : Sri Lanka.

38. *Scolia (Discolia) mixta* (Fabricius)

1798. *Tiphia mixta* Fabricius, *Suppl. Ent. Syst.* : 254. Female, Tranquebar, India (holotype in Copenhagen Museum).

1964. *Scolia (Discolia) mixta* (Fabricius) : Bradley, *Spolia zool. Mus. Haun.*, **21** : 17 (new combination; female type labelled as holotype and redescribed).

Fabricius (1798) described this species under genus *Tiphia* on a female holotype from Tranquebar, India. This species remained unknown for a long time, until Bradley (1964) published his study on Fabricius types. He noted that a female was found in

the Fabricious collection in Kiel, which agreed precisely with original description, but was placed in the genus *Larra* under Fabricious manuscript label reading *mixta*, and on the reverse in Fabricious hand-writing "S. n. sp. A Tranquebara" Bradley labelled this as type of *Tiphia mixta* Fabricius, and redescribed it with remarks that it was very close to *Scolia ceylonicola* Betrem, which may probably be a subspecies of it.

The female holotype has been examined, and is found to agree fully with redescription of *Scolia ceylonicola* given by Krombein (1978). Presently *Scolia mixta* Fabricius and *Scolia ceylonicola* Betrem are treated as separate species.

Superficially, the female also resembles *Scolia picteti* Saussure in having similar appearance. It can be easily differentiated by lacking a dark mark in second discoidal cell, in addition to its smaller size (about 16-18 mm. in body length) and difference in details of punctation as given in the key.

This species is also very close to *Scolia vivida* Smith, which differs from it narrowly, particularly in details of punctation.

Female : Length 16-18 mm. Integument reddish-brown and yellow. Head almost entirely bright yellow, the following ferruginous : mandibles; scapus and antennal flagellum except flagellum apically; frontal area; a streak behind posterior ocelli extended between upper eye orbits; gena and temple partly. Thorax predominantly ferruginous, the following bright yellow : pronotum entirely; scutellum; metanotum except sometimes being ferruginous. Abdomen ferruginous with broad yellow bands on second to fourth tergites, that on second and third covering almost entire dorsal surface, that on fourth very broad but usually interrupted in the middle. Vestiture almost entirely reddish except for the apical fringes on second to last abdominal tergites, having fiery tinge. Wings yellowish hyaline, forewing with a well defined dark apical mark and lacking dark mark in the second discoidal cell.

Anterior margin of the clypeus broadly rounded anteriorly, disc gently raised and impunctate in the middle, at sides with some close punctures; frontal area with dense punctures; frontal spatium with dense punctures along narrow and raised frontal laminae, elsewhere the punctures mostly sparse; front impunctate except for a few scattered punctures and some close punctures around ocelli; frontal fissura weak, extending halfway to anterior ocellus; anterior ocellus in a shallow pit; vertex with mostly scattered punctures, except for some dense punctures at some areas.

Scapula anteriorly with coarse, close punctures, the punctures being sparser posteriorly; mesoscutum with large, mostly subcontiguous punctures except for a small impunctate area in the middle; scutellum with coarse, scattered punctures, varying from 8 to 20 in number; metanotum with dense punctures; mesopleurum anteriorly with moderate sized, close punctures except being impunctate narrowly along anterior margin, posterior area largely impunctate except for a few sparse punctures below; upper plate of metapleurum with small, close punctures at its upper

third, lower two-thirds impunctate, lower plate with smaller, sparser punctures, broadly impunctate along posterior margin; dorsum of the propodeum with moderate sized mostly subcontiguous punctures, vertical surface sparsely punctate, posterior surface impunctate except for a few scattered punctures.

First abdominal tergite without any tubercle anteriorly on the horizontal surface, surface anteriorly with coarse, mostly scattered punctures in the middle, posteriorly with small, close to sparse punctures, laterally with closer punctures.

Distribution : India : Karnataka (Bangalore, Channapatna), Gujarat (Deesa) and Tamil Nadu (Tranquebar).

39. *Scolia (Discolia) pila* Nurse

1902. *Scolia pila* Nurse, *J Bombay nat. Hist. Soc.*, **14** : 81. Male, India : Deesa (holotype in British Museum).
1903. *Scolia pila* Nurse : Nurse, *Ann. Mag. nat. Hist.*, (7) **11** : 402. Female, India : Deesa (allotype in British Museum).
1928. *Scolia (Scolia) pila* Nurse : Betrem, *Treubia*, **9** (suppl.) : 329. Female, Male; India : Deesa; Pakistan : Karachi.
1964. *Scolia (Discolia) pila* Nurse : Betrem & Bradley, *Zool. Meded.*, **40** : 94 (new subgeneric assignment).

Nurse (1902) described this small species on the basis of males from Deesa, and subsequently (1903) described previously unknown female from Deesa. Betrem (1928) redescribed both the sexes and recorded it from Karachi, Pakistan also. It is recorded here, for the first time, from the Jaisalmer district of Rajasthan, India.

This species inhabits dry to very dry region in India having sparse to very scanty rainfall. The basic black body colour, in female, has been replaced mostly by reddish-brown. It can be distinguished from similar, abundantly yellow marked species, by the apical third of the fore wing, in both sexes fuscous.

Female : Length 12-13 mm. The basic integument reddish-brown. The following yellow : head almost entirely except mandibles and usually antennae; callosities; pronotum; tegulae; scutellum; metanotum in the middle; paired large to small lateral spots on first to fifth or sixth tergites. Vestiture reddish-brown mixed with yellowish-white. Wings yellowish hyaline, apical third of the fore wing fuscous, in hind wing apical third lightly infumated.

Clypeus impunctate in the middle, at sides with scattered punctures; frontal area impunctate in the middle, at sides with close punctures; frontal spatium with medium-sized punctures, mostly separated by half to one time the diameter of a puncture; frontal laminae narrow; front with mostly sparse punctures in the middle, at sides impunctate, ocular sinuses impunctate; frontal fissura extending halfway to anterior ocellus; anterior ocellus in a shallow pit; vertex impunctate; occiput with fine punctures in the middle, at sides impunctate.

Scapulae with coarse, close punctures, mostly separated by half the diameter of a puncture; mesoscutum with punctures mostly separated by half to one time the diameter of a puncture except for a small impunctate area posteriorly in the middle; scutellum with coarse punctures mostly separated by the diameter of a puncture; metanotum impunctate except for a few coarse punctures; anterior half of mesopleurum with punctures mostly separated by half the diameter of a puncture except being impunctate along anterior margin, posterior half largely impunctate; upper plate of metapleurum with a few scattered punctures above, elsewhere impunctate, lower plate impunctate; dorso-median area of propodeum with punctures separated by half to one time the diameter of a puncture, dorso-lateral areas impunctate on anterior half, posterior half with punctures mostly separated by half the diameter of a puncture except being impunctate posteriorly, lateral surface with shallow, scattered punctures, posterior surface impunctate.

First abdominal tergite with a small, narrow antero-median tubercle, surface with scattered punctures, at sides the punctures becoming closer; second tergite with small, scattered punctures.

Male : Length 10 mm. Black, the following yellow : clypeus except a small area in the middle; frontal area; scrobes partly; ocular sinuses; lower part of the front widely; frontal spatium posteriorly; pronotum; tegulae; mesoscutum at sides; scutellum, metanotum in the middle; upper plate of mesopleurum above in the middle; paired small marks on lateral areas of propodeal dorsum; abdominal tergites marked as in the female except for the spots on first tergite being larger; paired postero-lateral spots on second to fifth sternites; fore legs almost entirely. The following light red : mandibles except apically; fore; mid and hind legs; and apical abdominal segment. Wings yellowish hyaline, apical third of the forewing moderately fuscous. Vestiture yellowish white.

The head, thorax and abdomen somewhat sparsely punctate : frontal fissura distinct and extending up to anterior ocellus; propodeum short, broad and truncate apically.

Distribution : India : Gujarat (Deesa) and Rajasthan (Nokh in Jaisalmer), *Elsewhere* : Pakistan (Karachi).

40. *Scolia (Discolia) vivida* Smith

- 1855. *Scolia vivida* Smith, *Cat. Hym. British Museum*, 3 : 89. Male, Madras, India (types in British Museum).
- 1864. *Scolia (Discolia) vivida* Smith : Saussure & Sichel, *Cat. Spec. Gen. Scolia* 123. Male, Madras, India.
- 1897. *Scolia vivida* Smith : Dalla Torre, *Cat. Hym.*, 8 : 187.
- 1897. *Scolia (Discolia) vivida* Smith : Bingham, *Fauna British India, Hym.*, 1 : 87. Male, India.
- 1903. *Scolia vivida* Smith : Nurse, *Ann. Mag. nat. Hist.*, (7) 11 : 401. Female, Deesa, India (description of female).

1908. *Discolia nigrobimaculata* Cameron, *J. Bombay nat. Hist. Soc.*, **18** : 300. Male, Deesa, India (types in British Museum).
1915. *Scolia histrionica* var. *nigrobimaculata* Cameron : Meade-Waldo *et al.*, *Ann. Mag. nat. Hist.*, (8) **16** : 331 (new Combination).
1928. *Scolia (Scolia) vivida* Smith : Betrem, *Treubia*, **9** (suppl.) : 329-330. Female, Male; Madras, Deesa, India.
1928. *Scolia (Scolia) vivida* var. *nigrobimaculata* (Cameron) Betrem, *Treubia*, **9** (suppl.) : 330. Male, Deesa (type in British Museum).
1964. *Scolia (Discolia) vivida* Smith : Betrem & Bradley *Zool. Meded.*, **40** : 94 (subgeneric assignment).
1967. *Scolia (Discolia) vivida* Smith : Betrem in Bradley & Betrem, *Bull. British Mus. (Nat. Hist.) Ent.*, **20** : (7) : 325 (type study notes).

Betrem (1928) redescribed both sexes from the specimens from Deesa and a male type from Madras, and applied the name *nigrobimaculata* (Cam. in litt.) to a variety described on the basis of a male from Deesa. The variety *nigrobimaculata* was differentiated by having first tergite reddish-brown rather than having a broad yellow band, second to fourth tergites with paired large yellow spots rather than having very broad bands, and fifth tergite with small yellowish marks. This variety is considered here as a junior synonym.

Betrem (1928) gave the following description :

Female : Length 13 mm. Integument reddish-brown, the following black : the propleurae partly, first tergite posteriorly, the non yellowish parts of second and third tergites, fourth tergite anteriorly; mandibles partly dark brown. The following yellow : clypeus partly, scrobes, frontal spatium above, front, vertex in the middle, temples above, broad bands on second to fourth tergites in the middle, the band on the second tergite emarginated anteriorly and posteriorly and with paired black spots at the sides, the band on the third tergite emarginated anteriorly only; antennal flagellum yellow, except for the first two segments, vestiture reddish-brown. Wings yellow hyaline, fore wing anteriorly dark yellow with a very dark subapical mark.

Male : Length 11 mm. Black, the following yellow : mandibles at the bases, clypeus, frontal area, scrobes, ocular sinuses, outer margins of eye orbits, pronotum posteriorly, tagulae largely, upper part of mesopleurum, lower part similarly above in the middle, metanotum, first to fourth tergites with broad bands posteriorly, the bands anteriorly in the middle broadly emarginated, except very narrowly black along posterior margin; outer surface of tibiae, fore femur above on outer side. The following reddish-brown : femora largely, metapleurum, propodeum, except anterior part of dorso-median area and inner parts of dorso-lateral areas. Vestiture white; wings hyaline, fore wing anteriorly yellow with a very dark subapical mark.

Distribution : India : Gujarat (Deesa) and Tamil Nadu (Chinnai).

**DISTRIBUTION TABLE OF THE
INDIAN SPECIES AND SUBSPECIES
OF FAMILY SCOLIIDAE**

Name of the Taxa	Andhra Pradesh	Arunachal Pradesh	Assam	Bihar	Goa	Gujarat	Haryana	Himachal Pradesh	Karnataka	Kerala
Family SCOLIIDAE										
Subfamily SCOLIINAE										
I. Tribe Campsomerini										
1. Genus <i>Colpacampsomeris</i> Betrem										
1. <i>Colpacampsomeris indica</i> (Saussure)										
(a) <i>C. indica indica</i> (Saussure)	-	+	-	-	-	-	-	+	-	-
(b) <i>C. indica deccanensis</i> , subsp. nov.	-	-	-	-	-	-	-	-	+	+
2. <i>Colpacampsomeris peterseni</i> , sp. nov.	-	-	-	-	-	-	-	-	+	-
2. Genus <i>Tristimeris</i> Betrem										
3. <i>Tristimeris javana</i> (Lepelletier)										
(a) <i>T. javana albopilosa</i> , subsp. nov.	-	-	-	-	-	-	-	-	-	-
3. Genus <i>Micromeriella</i> Betrem										
4. <i>Micromeriella marginella</i> (Klug)										
(a) <i>M. marginella marginella</i> (Klug)	+	-	-	+	-	+	-	-	+	+
4. Genus <i>Campsomeriella</i> Betrem										
1. Subgenus <i>Campsomeriella</i> Betrem										
5. <i>Campsomeriella (C) collaris</i> (Fabricius)										
(a) <i>C. (C.) collaris collaris</i> (Fabricius)	+	+	+	+	+	+	+	+	+	+
(b) <i>C. (C.) collaris insularis</i> , subsp. nov.	-	-	-	-	-	-	-	-	-	-
6. <i>Campsomeriella (C) rajasthanensis</i> , sp. nov.	-	-	-	-	-	-	-	-	-	-
7. <i>Campsomeriella (C) rubricata</i> (Nurse)	-	-	-	-	-	+	-	-	-	-

					+													Madhya Pradesh / Chattisgarh
					+													Maharasthra
	+		+							+			+			+		Meghalaya
																		Mizoram
																		Nagaland
					+													Orissa
																		Punjab
					+													Rajasthan
	+									+			+			+		Sikkim
		+			+			+	+					+				Tamil Nadu
+										+						+		Uttar Pradesh / Uttaranchal
	+									+				+		+		West Bengal
							+		+									Andaman & Nicobar Is
																		Chandigarh
					+													Delhi
																		Lakshdweep
									+									Pondicherry
										+				+		+		Tripura
	+															+		Manipur
																+		Jammu & Kashmir

[illegible]

																				Madhya Pradesh / Chattisgarh
																				Maharasthra
	+				+									+		+				Meghalaya
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					+	+					+			+					+	Sikkim
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										+	+			+						West Bengal
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																				Chandigarh
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																				Lakshdweep
																				Pondicherry
																				Tripura
											+			+	+					Manipur
														+						Jammu & Kashmir

Name of the Taxa	Andhra Pradesh	Arunachal Pradesh	Assam	Bihar	Goa	Gujarat	Haryana	Himachal Pradesh	Karnataka	Kerala
11. Genus <i>Austroscolia</i> Betrem										
33. <i>Austroscolia ruficeps</i> (Smith)										
(a) <i>A. ruficeps ruficeps</i> (Smith)	-	-	-	-	-	-	-	-	+	-
(b) <i>A. ruficeps cupreoviolacea</i> (Micha)	-	-	-	-	-	-	-	-	-	-
34. <i>Austroscolia nudata</i> (Smith)	-	-	+	-	-	-	-	+	+	-
12. Genus <i>Megascolia</i> Betrem										
1. Subgenus <i>Megascolia</i> Betrem										
35. <i>Megascolia (Megascolia) procer</i> (Illiger)										
(a) <i>M. (M.) procer procer</i> (Illiger)	-	+	-	-	-	-	-	-	-	-
2. Subgenus <i>Regiscolia</i> Betrem & Bradley										
36. <i>Megascolia (Regiscolia) fulvifrons</i> (Saussure)	-	-	+	-	-	-	-	-	-	-
37. <i>Megascolia (Regiscolia) rubida</i> (Gribodo)	-	-	-	-	-	-	-	+	-	-
38. <i>Megascolia (Regiscolia) azurea</i> (Christ)										
(a) <i>M. (R.) azurea christiana</i> (Betrem & Guiglia)	-	+	+	-	-	-	-	+	-	-
(b) <i>M. (R.) azurea hindostana</i> (Micha)	-	-	-	-	-	-	-	-	+	+
39. <i>Megascolia (Regiscolia) almoraensis</i> , sp. nov.	-	-	-	-	-	-	-	-	-	-
13. Genus <i>Scolia</i> Fabricius										
1. Subgenus <i>Scolia</i> Fabricius										
2. Subgenus <i>Discolia</i> Saussure & Sichel										
40. <i>Scolia (Discolia) cyanipennis</i> Fabricius	-	-	-	-	-	-	-	+	-	-
41. <i>Scolia (Discolia) laeviceps</i> Smith	-	-	-	-	-	-	-	-	-	-
42. <i>Scolia (Discolia) rubrosinuata</i> Betrem	-	-	-	-	-	+	-	-	+	-
43. <i>Scolia (Discolia) suratensis</i> Betrem	-	-	-	-	-	+	-	-	-	-

																			Madhya Pradesh / Chattisgarh
																			Maharashtra
									+										Meghalaya
																			Mizoram
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																			Rajasthan
		+	+												+				Sikkim
			+					+									+		Tamil Nadu
							+		+						+				Uttar Pradesh / Uttaranchal
	+		+						+						+		+		West Bengal
																+			Andaman & Nicobar Is
																			Chandigarh
																			Delhi
																			Lakshdweep
																			Pondicherry
									+										Tripura
									+								+		Manipur
			+																Jammu & Kashmir

Name of the Taxa	Andhra Pradesh	Arunachal Pradesh	Assam	Bihar	Goa	Gujarat	Haryana	Himachal Pradesh	Karnataka	Kerala
44. <i>Scolia (Discolia) coimbatorensis</i> , sp. nov.	-	-	-	-	-	-	-	-	+	-
45. <i>Scolia (Discolia) gilgitensis</i> Betrem	-	-	-	-	-	-	-	-	-	-
46. <i>Scolia (Discolia) superciliaris</i> Saussure										
(a) <i>S. (D.) superciliaris staudingeri</i> Betrem	-	-	+	-	-	-	-	-	-	-
47. <i>Scolia (Discolia) affinis</i> Guerin	-	+	+	+	-	-	-	+	+	+
48. <i>Scolia (Discolia) sinensis</i> Saussure	-	-	-	-	-	-	-	-	-	-
49. <i>Scolia (Discolia) felderi</i> Betrem	-	-	+	-	-	-	-	-	+	+
50. <i>Scolia (Discolia) rugifrons</i> Betrem	-	-	-	-	-	-	-	-	-	-
51. <i>Scolia (Discolia) carmichaeli</i> Betrem	-	+	-	-	-	-	-	-	-	-
52. <i>Scolia (Discolia) elizabethae</i> Betrem	-	-	-	-	-	-	-	-	-	-
53. <i>Scolia (Discolia) vollenhoveni</i> Saussure										
(a) <i>S. (D.) vollenhoveni vollenhoveni</i> Saussurev	-	-	-	-	-	-	-	-	-	-
54. <i>Scolia (Discolia) chumponi</i> Betrem										
(a) <i>S. (D.) chumponi wickwari</i> Krombein, comb. nov.	-	-	-	-	-	-	-	-	+	-
55. <i>Scolia (Discolia) clypeata</i> Sickmann										
(a) <i>S. (D.) clypeata rufohirta</i> Betrem	-	-	-	-	-	-	-	-	-	-
56. <i>Scolia (Discolia) kamengensis</i> , sp. nov.	-	+	-	-	-	-	-	-	-	-
57. <i>Scolia (Discolia) formosicola</i> Betrem										
(a) <i>S. (D.) formosicola malaisei</i> , subsp. nov.	-	-	-	-	-	-	-	-	-	-
58. <i>Scolia (Discolia) lebongensis</i> Betrem	-	-	-	-	-	-	-	-	-	-
59. <i>Scolia (Discolia) kangraensis</i> Betrem	-	-	-	-	-	-	-	+	+	-
60. <i>Scolia (Discolia) bilunata</i> Saussure	-	-	-	+	-	-	-	-	+	-

															+					Madhya Pradesh / Chattisgarh
+															+					Maharashtra
			+								+		+	+		+	+			Meghalaya
																				Mizoram
													+			+				Nagaland
+																+				Orissa
+																				Punjab
																				Rajasthan
											+	+	+	+		+				Sikkim
+																+				Tamil Nadu
+	+		+			+										+	+			Uttar Pradesh / Uttaranchal
		+							+		+	+				+				West Bengal
								+												Andaman & Nicobar Is
																				Chandigarh
																+				Delhi
																				Lakshdweep
																+				Pondicherry
																+				Tripura
+						+														Manipur
														+	+			+		Jammu & Kashmir

Name of the Taxa	Andhra Pradesh	Arunachal Pradesh	Assam	Bihar	Goa	Gujarat	Haryana	Himachal Pradesh	Karnataka	Kerala
61. <i>Scolia (Discolia) trivandrumensis</i> Betrem	-	-	-	-	-	-	-	-	-	+
62. <i>Scolia (Discolia) cruenta</i> Klug	-	-	-	+	-	-	+	-	+	-
63. <i>Scolia (Discolia) stizus</i> Saussure	-	-	-	-	-	-	-	-	+	-
64. <i>Scolia (Discolia) fasciatopunctata</i> Guerin										
(a) <i>S. (D.) fasciatopunctata fasciatopuncta</i> Guerin	-	-	-	-	-	-	-	-	+	-
(b) <i>S. (D.) fasciatopunctata dunensis</i> Betrem, comb. nov.	-	-	-	-	-	-	-	+	-	-
65. <i>Scolia (Discolia) quadripustulata</i> Fabricius	-	-	-	-	-	-	-	-	+	+
66. <i>Scolia (Discolia) fichteli</i> Betrem	+	+	-	+	-	-	-	-	-	-
67. <i>Scolia (Discolia) binotata</i> Fabricius										
(a) <i>S. (D.) binotata binotata</i> Fabricius	-	+	-	-	-	-	-	-	+	+
68. <i>Scolia (Discolia) wagneri</i> Betrem	-	-	-	-	-	-	-	+	+	-
69. <i>Scolia (Discolia) nobilis</i> Saussure	-	-	-	-	-	-	-	-	-	-
70. <i>Scolia (Discolia) dehraensis</i> Betrem	-	-	-	-	-	-	-	+	-	-
71. <i>Scolia (Discolia) sikkimensis</i> Bingham	-	-	-	-	-	-	-	-	-	-
72. <i>Scolia (Discolia) watanabei</i> (Matsumura)										
(a) <i>S. (D.) watanabei kempi</i> Betrem	-	-	+	-	-	-	-	-	-	-
73. <i>Scolia (Discolia) venusta</i> Smith	-	-	-	-	-	-	-	+	-	-
74. <i>Scolia (Discolia) pseudosinensis</i> Betrem	-	-	-	-	-	-	-	-	+	+
75. <i>Scolia (Discolia) desidiosa</i> Bingham	-	+	+	-	-	-	-	-	-	-
76. <i>Scolia (Discolia) picteti</i> Saussure	-	-	-	-	-	-	-	-	+	+
77. <i>Scolia (Discolia) mixta</i> Fabricius	-	-	-	-	-	+	-	-	+	-
78. <i>Scolia (Discolia) pila</i> Nurse	-	-	-	-	-	+	-	-	-	-
79. <i>Scolia (Discolia) vivida</i> Smith	-	-	-	-	-	+	-	-	-	-

[illegible]

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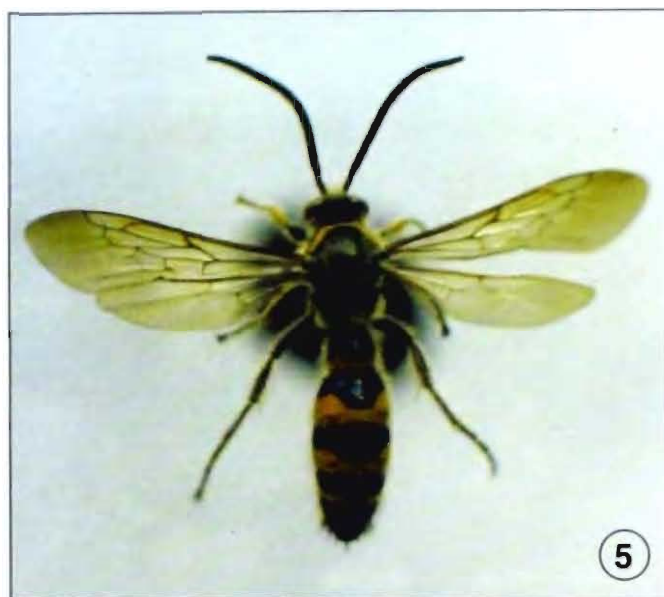
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PLATE I



Figs. 1-4: 1 & 2. *Colpacampsomeris indica indica* (Saussure) : 1. Female, 2. Male; 3. *Colpacampsomeris peterseni*, sp. nov. : Male; 4. *Campsomeriella (C) collaris collaris* (Fabricius) : Female.

PLATE II



Figs. 5-8: 5. *Campsomeriella (Annulimeris) annulata* Fabricius : Male; 6. *Phalerimeris phalerata turneri* (Betrem) : Female; 7. *Magacampsomeris dehraensis* (Betrem) : Female; 8. *Megacampsomeris asiatica himalayana* (Betrem) : Female.

PLATE III



Figs. 9.12 : 9. *Megacampsomeris prismatica* (Smith) : Female; 10. *Megascolia (Regiscolia) azurea christiana* (Betrem & Guiglia) : Female; 11. *Scolia (Discolia) fasciatopunctata dunensis* (Betrem) : Female; 12. *Scolia (Discolia) quadripustulata* Fabricius : Female.

PLATE IV



Figs. 13-16 : 13 & 14. *Scolia (Discolia) dehraensis* Betrem : 13. Female, 14. Male; 15. *Scolia (Discolia) desidiosa* Bingham : Female; 16. *Scolia (Discolia) picteti* Saussure : Female.



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