

**THE EUMOLPINAE (COLEOPTERA: CHRYSOMELIDAE) OF
SOUTHERN INDIA**

by

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(2015-21-015)



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KERALA, INDIA**

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THESIS

**Submitted in partial fulfilment of the
requirements for the degree of**

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DEPARTMENT OF AGRICULTURAL ENTOMOLOGY

COLLEGE OF AGRICULTURE

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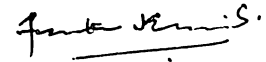
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I, hereby declare that this thesis entitled “**THE EUMOLPINAE (COLEOPTERA: CHRYSOMELIDAE) OF SOUTHERN INDIA**” is a bonafide record of research work done by me during the course of research and the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society.

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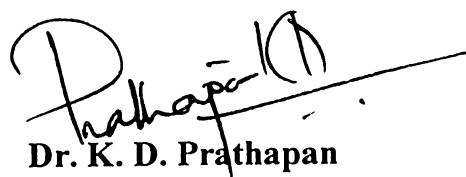
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CERTIFICATE

Certified that this thesis entitled “**THE EUMOLPINAE (COLEOPTERA: CHRYSOMELIDAE) OF SOUTHERN INDIA**” is a record of research work done independently by **Ms. Amritha Kumari S** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to her.

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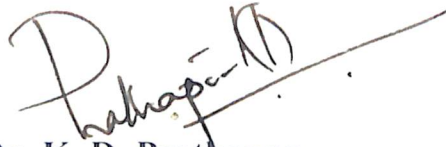
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TABLE OF CONTENTS

Chapter	Title	Page number
1	INTRODUCTION	1–2
2	REVIEW OF LITERATURE	3–15
3	MATERIALS AND METHODS	17–24
4	RESULTS	25–174
5	DISCUSSION	175–183
6	SUMMARY	185–192
	REFERENCES	I–XVII
	APPENDICES	
	ABSTRACT	

LIST OF FIGURES

Figure No.	Title	Between pages
1	Habitus- Dorsal aspect	18 - 19
2	Habitus- Ventral aspect	18 - 19
3	Head- Frontal view	18 - 19
4	Measurements : Dorsal aspect	20 - 21
5	Measurements: Ventral aspect	20 - 21
6	Measurements: Head	20 - 21
7	Aedeagus, dorsal view	22 - 23
8	Aedeagus, ventral view	22 - 23
9	Tergite VIII, Sternite VIII & IX	22 - 23
10	Tegmen	22 - 23
11	Endophallus	22 - 23
12	Female genitalia, ventral view	22 - 23
13	Ovipositor	22 - 23
14	Spermathecal capsule	22 - 23
15	Fused 8th sternite and 8th tergite with tignum	22 - 23
16	Claws bifid	28 - 29
17	Claws appendiculate	28 - 29
18	Tibia entire	28 - 29
19	Tibia emarginated	28 - 29
20	Pronotum with distinct lateral margin	28 - 29
21	Lateral margin of pronotum absent, obsolete or incomplete	28 - 29
22	Lateral margins of pronotum serrate	28 - 29
23	Pygidium exposed	28 - 29
24	Dorsum glabrous	28 - 29
25	Dorsum pubescent	28 - 29
26	Femora with strong tooth	28 - 29
27	Femora with minute or no tooth	28 - 29
28	Compound eyes large, anterior portion of vertex narrow	28 - 29
29	Compound eyes moderate sized, anterior portion of vertex wide	28 - 29
30	Ocular sulcus deep	28 - 29
31	Ocular sulcus weak or absent	28 - 29
32	Elytra transversely rugose laterally	28 - 29
33	Elytra without transverse rugosity laterally	28 - 29
34	<i>Basilepta fulvicornis</i> (Jacoby, 1904)	32 - 33
35	<i>Basilepta subcostata</i> (Jacoby, 1889)	34 - 35
36	<i>Basilepta</i> sp. 1	36 - 37
37	<i>Basilepta</i> sp. 2	38 - 39
38	<i>Basilepta</i> sp. 3	40 - 41
39	<i>Basilepta</i> sp. 4	42 - 43
40	<i>Basilepta</i> sp. 5	46 - 47
41	<i>Bathseba bifasciata</i> (Jacoby, 1895)	50 - 51

42	<i>Bathseba nigra</i> (Jacoby, 1908)	54-55
43	<i>Bathseba picea</i> (Jacoby, 1895)	58-59
44	<i>Bathseba puncticeps</i> (Duvivier, 1891)	60-61
45	<i>Bathseba syzygium</i> n. sp.	62-63
46	<i>Bathseba variabilis</i> Jacoby, 1895	66-67
47	<i>Chrysonopa viridis</i> Jacoby, 1908	70-71
48	<i>Cleoporus inornatus</i> Jacoby, 1908	74-75
49	<i>Cleoporus</i> sp. 1	76-77
50	<i>Colasposoma asperatum</i> Lefevre, 1885a	80-81
51	<i>Colasposoma auripenne</i> Motschulsky, 1860	84-85
52	<i>Colasposoma coromandeliana</i> Jacoby, 1908	86-87
53	<i>Colasposoma downesi</i> Baly, 1862	88-89
54	<i>Colasposoma ornatum</i> Jacoby, 1881	90-91
55	<i>Colasposoma pretiosum</i> Baly, 1860	92-93
56	<i>Colasposoma robustum</i> Jacoby, 1881	94-95
57	<i>Colasposoma splendidum</i> Fabricius, 1792	98-99
58	<i>Colasposoma versicolor</i> Lefevre, 1887	100-101
59	<i>Colasposoma</i> sp. 1	102-103
60	<i>Dermorhytis fulvipes</i> Jacoby, 1903	104-105
61	<i>Dermorhytis speciosa</i> , Jacoby, 1895	108-109
62	<i>Dermorhytis viridinitens</i> Jacoby, 1908	110-111
63	<i>Dermorhytis</i> sp. 1	112-113
64	<i>Edistus indicus</i> Jacoby, 1903	114-115
65	<i>Edistus</i> sp. 1	116-117
66	<i>Eurypelta modesta</i> Fabricius, 1792	120-121
67	<i>Fidia kanaraensis</i> (Jacoby, 1895) n. comb.	122-123
68	<i>Heteraspis dillwyni</i> (Stephens, 1831)	126-127
69	<i>Heteraspis immaculata</i> (Jacoby, 1908)	128-129
70	<i>Macrocoma</i> sp. 1 (Jacoby, 1895)	130-131
71	<i>Malegia</i> sp.1	132-133
72	<i>Mesocolaspis nigrita</i> Jacoby, 1908	136-137
73	<i>Mesocolapsis</i> sp. 1	138-139
74	<i>Microeurydemus</i> sp. 1	140-141
75	<i>Pachnephorus bistriatus</i> Mulsant & Wachanru, 1852	144-145
76	<i>Pagria grata</i> (Baly, 1867)	146-147
77	<i>Pagria ingibbosa</i> Pic, 1929	148-149
78	<i>Pagria</i> sp. 1	150-151
79	<i>Pagria pseudograta</i> Moseyko, 2013	152-153
80	<i>Pagria restituens</i> Walker, 1859	154-155
81	<i>Pagria signata</i> (Motschulsky, 1858)	158-159
82	<i>Pagria ceylonica</i> Pic, 1929	160-161
83	<i>Pseudocolaspis</i> sp. 1	162-163
84	<i>Pseudostonopa palinophaga</i> n. sp.	166-167
85	<i>Scelolanka</i> sp.1	170-171
86	<i>Trichochrysea</i> sp. 1	172-173

LIST OF APPENDICES

Appendix No.	Title
I	<i>Neofidia</i> Strother, a new name for <i>Fidia</i> Baly, 1863 and redescription of <i>Fidia kanaraensis</i> (Jacoby, 1895) with a new host record and notes on natural history (Coleoptera, Chrysomelidae, Eumolpinae)
II	Species composition and diagnoses of leaf- and fruit-scarring beetles (Coleoptera, Chrysomelidae) infesting bananas and plantains (Zingiberales, Musaceae) in the Indian subcontinent

LIST OF ABBREVIATIONS AND SYMBOLS USED

%	Per cent
Mm	Milli metre
GPS	Global positioning system
°C	Degree celcius
<i>et al</i>	And others
♂	Male
♀	Female
<i>viz,</i>	Namely
sp.	Species
°	Degrees
'	Minutes
"	Seconds
N	North
E	East
Coll.	Collection
Fig.	Figure
BP	Basal phallomere
MP	Median phallomere
AP	Apical phallomere
AS	Apical sclerite
CS	Central sclerite

INTRODUCTION

1. INTRODUCTION

Chrysomelidae, the leaf beetles, constitute one of the largest insect families. There are more than 50,000 described species of leaf beetles, with thousands of species still awaiting discovery (LeSage, 1991). According to Bouchard *et al.*, (2009) almost 36,350 species were described under Chrysomelidae which constitute nearly 10 per cent of all described species under Coleoptera. Both larvae and adults being phytophagous, several of them are economically important crop pests. Hardly there is any cultivated plant that is not infested by a leaf beetle species.

Species of *Aulacophora* Chevrolat on cucurbits, *Chaetocnema* Stephens on cereals, and *Phyllotreta* Stephens on crucifers are globally important pests. *Heteraspis dillwyni* (Stephens), the grape flea beetle, is the most destructive pest of the crop in India. The hispa, *Dicladispa armigera* (Olivier) damages rice throughout south-east Asia. Pollu beetle, *Lanka ramakrishnai* Prathapan & Viraktamath, uniquely attacks berries of black pepper and thus reduces the value of the produce significantly. Coconut leaf beetle, *Brontispa longissima* (Gestro) and the cereal leaf beetle *Oulema melanopus* (L.) are dreaded invasive species likely to be introduced into India. A large number of other leaf beetles known to damage crop plants are economically insignificant, yet requires attention. Species of *Acalymma* Barber, *Chaetocnema* Stephens, *Diabrotica* Chevrolat and *Epitrix* Foudras are also known to transmit viral (Fulton *et al.*, 1980) and bacterial (Harrison *et al.*, 1980) plant pathogens. Some chrysomelids are considered highly beneficial for their role in suppressing noxious weeds. Chrysomelidae, with their great diversity, are ideal candidates for ecological studies.

Eumolpinae is the second largest subfamily of leaf beetles, with more than 7000 described species classified in 500 genera (Jolivet & Verma, 2008) and nearly 300 named species occurring in the Indian subcontinent. Eumolpinae are numerous and much diversified in the tropics, with both the attributes declining northward. Economically important pests such as the grape vine flea beetle (*H. dillwyni*), Oriental bean beetle (*Pagria signata* (Motschusky)), banana scarring beetle of north east India (*Basilepta subcostata* (Jacoby)) and cardamom root grub (*Basilepta fulvicornis* (Jacoby)) belong to this subfamily. The banana scarring beetle, that damages fruits,

leaves and roots, is a potential threat to the crop in Kerala and other south Indian states, as its presence is already known in this part of the country (Prathapan *et al.*, 2019).

The treatment of the subfamily under the Fauna of British India series, by Jacoby (1908), is the latest comprehensive study on Eumolpinae of the subcontinent. This monograph has outlived its utility, as the taxonomy of leaf beetles has advanced tremendously over the last century. Gressitt and Kimoto (1961) treated the subfamily for China. After the publication of these two monographs, only isolated treatments at species and generic levels by workers such as Kimoto and Gressitt (1966), Moseyko (2005, 2011a, 2011b 2013, 2014), Moseyko and Medvedev (2005), Medvedev and Moseyko, (2002), Medvedev (2006) and Romansov and Moseyko (2016) exist.

Currently the species level identification and classification of leaf beetles are mainly based on the characters of the male and female genitalia. The descriptions of the Indian Eumolpinae are based only on the external morphology and the genitalic characters are unknown even for economically important species. There are many undescribed species and identity of several economically important crop pests remain uncertain. Currently no taxonomist is working on the Eumolpinae of India, though the group is in urgent need of revision. The proposed work is expected to bridge this gap for south Indian eumolpine fauna.

In this background, the present study was undertaken with the following objectives:

1. collection and identification of the eumolpine leaf beetles (Chrysomelidae) of south India;
2. preparation of illustrated keys to species, with emphasis on characters of male and female genitalia;
3. documentation of host plants in all possible cases.

REVIEW OF LITERATURE

2. REVIEW OF LITERATURE

The megadiverse leaf, seed and longhorned beetles form one of the most speciose clades of the animal kingdom, arranged in the cerambyciform (Cerambycidae, Vesperidae, Oxypeltidae and Disteniidae) and chrysomeliform (Megalopodidae, Orsodacnidae and Chrysomelidae) lineages (Beutel and Leschen 2005; Reid, 2014). Their classification remains contentious, despite achieving significant consensus through the application of modern cladistic methods to morphological and molecular data. Reid (2014) provided a conspectus of the developments in the classification of families and subfamilies of the assemblage.

2.1. A brief history of Chrysomelidae

The earliest attempt on the classification of Chrysomelidae was made by Latreille (1802), who proposed the name Chrysomelines. Later, he split the family into Criocerines and Chrysomelines (Latreille, 1810). Dumeril in 1806, proposed the name Phytophages for the family.

The foundations of modern classification of the leaf beetles date back to Chapuis (1874), who is considered as the father of leaf beetle taxonomy. He divided the family into 15 tribes in four sections based on the characters of head and its appendages, prothorax and abdomen. Jacoby (1908) proposed some modifications and certain nominal changes to the Chapuis system and included five divisions and 18 subfamilies. He revived the family name ‘Chrysomelidae’.

Three major assemblages of Chrysomelidae were recognised – Chrysomelidae, Bruchidae and Cerambycidae – in the first half of twentieth century (Crowson, 1955). Pierce (1917) (cited by Seeno and Wilcox, 1982) proposed the superfamily Chrysomeloidea. Boving and Craighead (1931) followed Pierce (1917) and based on larval morphology, established a classification of Coleoptera in which chrysomelids were split into a number of families including Bruchidae and elevated to the rank of superfamily Chrysomeloidea and some of the subfamilies of Jacoby (1908) to family level. They merged the subfamilies Chlamidinae, Clytrinae, Cryptocephalinae and Lamprosominae into a single subfamily.

Chen (1935) modified Jacoby's classification and rearranged the subfamilies based on morphology. Again in 1940, Chen proposed a new classification and made conclusions based on the general external characters of adults, venation of hind wing, male genitalia and structure and bionomics of larvae. The family was rearranged into six divisions and each one was elevated to family rank as Donaciidae, Crioceridae, Chrysomelidae, Cryptocephalidae, Eumolpidae and Cassididae. Gressitt (1942) arranged Chinese Chrysomelidae into 15 subfamilies, excluding Megascelinae. Crowson (1946), in addition to morphology, used characters such as physiological, zoogeographical and palaeontological data and recognised 11 subfamilies. He suggested a phylogeny for Chrysomelidae. Most of Crowson's works on leaf beetles were presented in the backdrop of larger monographs and compilations on Coleoptera (Seeno and Wilcox, 1982). Chujo (1952) proposed the subfamily Zeugophorinae. In 1953, Chujo regrouped Chrysomelidae into 14 divisions and 17 subfamilies based on adult structures. Edwards (1953) proposed the family Synetinae. Reid (1995) and Flowers (1999) treated Synetini as a tribe under Eumolpinae. Synetinae has been variously placed in the classification of Chrysomelidae by different authors (Monros, 1945; Mann and Crowson, 1981; Lee, 1990; Verma, 1996; Yu *et al.*, 1996). Cladistic analyses point to closeness of Eumolpinae and Synetinae (Lee, 1993; Reid, 1995; Schmitt, 1996; Farrel, 1998). Monros (1959) suppressed Eupodes and treated the family Chrysomelidae under the superfamily Cerambycoidea along with Cerambycidae and Bruchidae. Gressitt and Kimoto (1961) treated the chrysomelid fauna of China and Korea and grouped them into 17 subfamilies, excluding Megascelinae. Jolivet (1959) recognised 20 subfamilies under five sections. Chen (1964) divided the superfamily Chrysomeloidea into two large groups cerambycids and chrysomelids and the later included bruchids. He recognised 20 subfamilies in Chrysomelidae in two natural groups, one comprising Hispinae and Cassidinae (Hispid line) and the rest (Chrysomelid line). Chrysomelid line was again divided into Criocerid subline, Eumolpid subline and Chrysomelid subline. In 1973, Chen erected a new superfamily Cassidoidea, identical to the old group Cryptostoma Chapuis, comprising four families *viz.* Anisoderidae, Hispidae, Callispidae and Cassididae. He treated the families Cerambycidae, Bruchidae, Crioceridae, Eumolpidae and Chrysomelidae under the

superfamily Chrysomeloidea. Jolivet and Petitpierre (1981) (after Jolivet, 1959) divided the family into 19 subfamilies which includes Sagrinae, Orsodacninae, Megalopodinae, Zeugophorinae and Synetinae under 5 sections. Crowson (1981), without formal justification, recognised five families in Chrysomeloidea: Disteniidae, Cerambycidae, Megalopodidae, Bruchidae and Chrysomelidae. Kuschel and May (1990) separated Megalopodidae and Orsodacnidae from Chrysomelidae, erected a new subfamily Palophaginae under Megalopodidae and reunited Bruchidae and Chrysomelidae within Chrysomeloidea.

Molecular studies by Hsiao (1994) supported merging Chlamisinae, and Clytrinae with Cryptocephalinae. In 1995, Lawrence and Newton defined the series Cucujiformia which includes six superfamilies – Cleroidea, Lymexyloidea, Cucujoidea, Tenebrionoidea, Chrysomeloidea, and Curculionoidea. The superfamily Chrysomeloidea is a group of seven beetle families (Beutel and Leschen 2005) arranged in the cerambyciform (Cerambycidae, Vesperidae, Oxypeltidae, Disteniidae) and chrysomeliform (Megalopodidae, Orsodacnidae, Chrysomelidae) lineages. Farrell (1998) conducted large scale molecular studies of chrysomelid subfamilies and segregated them into Chrysomelidae, Megalopodidae and Orsodacnidae.

Reid (2000) reviewed phylogenetic analyses of the chrysomeliform lineage and provided a key to subfamilies based on the characters of adults and larvae. He isolated Aulacoscelidinae and Megalopodinae from Chrysomelidae and separated Spylopyrinae from Eumolpinae as a separate subfamily. Verma and Jolivet (2000) treated Synetinae as a subfamily (not as a tribe Synetini under Eumolpinae) based on male genitalia, wing venation, and many other anatomical and morphological features. The explanation to alleged similarities could be convergence. Gomez-Zurita *et al.* (2005) inferred that Spylopyrinae and Synetinae should be assigned subfamilial status and subordinated megascelines within Eumolpinae by phylogenetic studies based on molecular (nuclear and ribosomal RNA genes) and morphological aspects. Excluding Spylopyrinae and Synetinae, they subdivided Eumolpinae into two major clades corresponding to Colasposomini and Typophorini (Clade I) and Eumolpini (Clade II). Clade I includes Megascelini also. Bouchard *et al.* (2011) placed Chrysomelidae in superfamily Chrysomeloidea under the series Cucujiformia, with the subfamilies Sagrinae,

Bruchinae, Donaciinae, Criocerinae, Cassidinae, Chrysomelinae, Galerucinae, Lamprosomatinae, Cryptocephalinae, Eumolpinae, Spylopyrinae, Synetinae and Protoscelinidae.

Gomez-Zurita *et al.* (2007) investigated the basal relationships in Chrysomelidae using nuclear and mitochondrial rRNA genes and the analyses supported merger of subfamilies such as Cassidinae (cassidines + hispines) and Cryptocephalinae (chlamisines + cryptocephalines + clytrines) and separation of monocot feeding groups. Lobl and Smetana (2010) dealt with the superfamily Chrysomeloidea covering the families Cerambycidae, Megalopodidae, Orsodacnidae and Chrysomelidae. This catalogue covers the subfamilies Sagrinae, Bruchinae, Donaciinae, Criocerinae, Cassidinae, Chrysomelinae, Galerucinae, Alticinae, Lamprosomatinae, Cryptocephalinae, Eumolpinae and Synetinae under Chrysomelidae. Reid (2014) separated Megalopodidae and Orsodacnidae from Chrysomelidae, merged Megascelini with Eumolpinae and Synetinae was assigned a separate subfamilial status. The subfamilies included under Chrysomelidae by Reid (2014) were Bruchinae, Cassidinae, Eumolpinae, Lamprosomatinae, Cryptocephalinae, Criocerinae, Chrysomelinae, Galerucinae, Donaciinae, Sagrinae, Spylopyrinae and Synetinae,

2.2. Subfamily Eumolpinae Thomson, 1859

Despite the abundance, diversity and economic importance, the subfamily Eumolpinae is the least explored group within the family Chrysomelidae. The latest comprehensive work on Eumolpinae of the Indian subcontinent was carried out by Martin Jacoby (1908) under the Fauna of British India series. He treated 414 species of eumolpines in 51 genera. Jacoby (1908) arranged them into 18 groups and provided key to groups based on external characters. He did not provide key to the species. Generic keys were provided for some groups. Descriptions are mostly based on external morphology. Information on genitalia is totally lacking in this monograph. Chen (1935) studied Chinese eumolpines and provided key to the species of select genera. Chujo (1935) reviewed a few species in erstwhile Loo-Choo Archipelago (now in Japan) along with two new species in the collection of Entomological Museum, Taihoku, Formosa (now in Taiwan). Chen (1940) made a detailed note on Chinese Eumolpinae

along with many host records and key to the genera. Chujo (1938) gave an account of eumolpine leaf beetles of erstwhile Formosa based on H. Sauter's collection. Bechyne (1953) provided a catalogue of Neotropic Eumolpinae. Chujo (1956) reviewed the eumolpine fauna in erstwhile Formosa and divided them into 12 tribes and provided key to the tribes. Gressitt and Kimoto (1961) treated the subfamily for China and Korea. As a sequel to this, Kimoto and Gressitt (1982) treated Eumolpinae of Thailand, Cambodia, Laos and Vietnam. Kimoto (1964) dealt with Japanese Eumolpinae along with some host records. Warchalowsky (2010) provided key to the Palearctic eumolpines. Moseyko and Sprecher-Uebersax (2010) treated Eumolpinae in the palaeartic catalogue.

2.3. Taxonomy of select genera of Eumolpinae

2.3.1. *Bathseba* Motschulsky, 1866 (= *Tricliona* Lefèvre, 1885)

Dejean (1836) coined the generic name *Bathseba* for a new species *B. transversalis* from Africa. However, he did not provide a description, definition or indication, hence both the generic and species names remained invalid. Subsequently Motschulsky (1866) adopted the generic name for a new species, *Bathseba ferruginosa* from Sri Lanka. D'Orbigny (1849), Scudder (1882), Sherborn (1924), Jolivet, (1957) and Bousquet and Bouchard (2013), listed Dejean's names. Seeno and Wilcox (1982) and Clavaraeu (1914) listed *Bathseba* Motschulsky as *incertae sedis* in their checklist of eumolpines. Jacoby (1908) in his monumental study on Oriental Eumolpinae under the Fauna of British India series, left out *B. ferruginosa* Motschulsky.

Lefèvre (1885a) described the genus *Tricliona* for two new species *T. fasciata* and *T. nigromaculata* from Sumatra. According to Moseyko (2014), Jacoby (1908) is considered as the author of designation of *T. fasciata* as the type species of *Tricliona*. Currently the genus *Tricliona* is represented by about 70 described species (Romantsov and Moseyko, 2016) from the Oriental Region and adjoining areas (Moseyko and Sprecher-Uebersax, 2010). Medvedev (2006) redescribed the genus *Bathseba* and its type species *B. ferruginea* (sic) and designated lectotype. Information on the natural history of the genus is scanty. Available information suggests trophic relationships with members of Avicenniaceae, Combretaceae, Meliaceae, Lythraceae, Rhizophoraceae and Rubiaceae (Romantsov and Moseyko, 2016; Veenakumari *et al.*, 1997; Remadevi

et al., 2008; Jayanthi and Varghese, 2014; Singh and Thangavelu, 1994; Mishra *et al.*, 1994; Murphy, 1990; Prathapan *et al.*, 2013; Sharma *et al.*, 2006; Siddaiah and Kujur, 2016). Majority of the known host-plants are the larval food plants of the wild silk worms (Saturniidae: *Antheraea* spp.) or mangroves. *Tricliona* is here treated as a junior synonym of *Bathseba*.

2.3.2. *Basilepta* Baly, 1860

The genus *Basilepta* was erected by Baly (1860) as a monotypic genus for *B. longipes* from Borneo. Motschulsky, 1860 described four species placed in a new genus *Nodostoma* from Russia. Weise (1922) synonymised *Nodostoma* Motschulsky, 1860 with *Basilepta* Baly, 1860 as the latter has eight months priority over the former.

The genus is widely distributed in the Oriental and Palaearctic Regions and includes over 300 described species. The highest species diversity of the genus occurs in tropical Asia (Moseyko, 2011a). This is one of the most speciose groups under Eumolpinae and the species under the genus are very difficult to separate due to high variability (Chen, 1935).

Chen (1935) studied *Basilepta* from China and provided key to the species and described six new species. Chujo (1956) studied the group in the erstwhile Formosa and described seven new species and provided key to the species. Gressitt and Kimoto (1961) revised the genus for China and Korea and described six new species. Kimoto (1964) studied *Basilepta* from Japan and provided key to the Japanese species. Kimoto and Gressitt (1982) revised this genus in Thai-Indochina area and described ten new species and provided key to the species. Tan (1988) studied the genus *Basilepta* in China and described twelve new species. Eroshkina (1994) defined the species group 'Binhana' from Vietnam, characterised by the presence of lateral ridges on pronotum and smooth propleura and hind breast. The species group consists of six species including five new. Moseyko (2011a) reviewed *Basilepta* of Russia and provided key to the species. Nearly 35 species are known from south India. Banana scarring beetle of north east India (*Basilepta subcostata*), and the cardamom root grub (*Basilepta fulvicornis*) are economically important pests.

2.3.3. *Chrysonopa* Jacoby, 1908

Chrysonopa is an Oriental genus described by Jacoby (1908) who designated *C. viridis* Jacoby as the type species. *Chrysonopa viridis* and *C. brunnea* Jacoby, 1908 occur in south India. *Nodostoma rotundicollis* Jacoby and *Dermorhytis longipes* Jacoby were shifted to this genus by Jacoby (1908). *Chrysonopa nigroscutella* was described by Tan in 1988. *Chrysonopa apicalis* was described by Takizawa (1989). Bryant (1950) described *C. metallica*, which closely resembles *C. viridis* from New Guinea. Gressitt and Kimoto (1961) described *C. tibetana*, which closely resembles *C. rotundicollis*.

2.3.4. *Cleoporus* Lefèvre, 1884

The genus *Cleoporus* is distributed in the Oriental and south eastern Palaearctic Regions. Currently it comprises about 30 species (Moseyko, 2011b). The genus was described by Lefèvre (1884) for *C. cruciatus* from Philippines. *Typophorus quadripustulatus* was described by Baly (1859) from the Neotropical genus *Typophorus* Chevrolat in Dejean (1836), based on a specimen without a geographical label. On examination of the type species, it was found to be a synonym of *C. cruciatus*. Since this fact has not been published, the species was transferred to the genus *Cleoporus* and the type species of *Cleoporus*, *C. cruciatus* Lefèvre, was downgraded as its synonym (Moseyko, 2011b).

2.3.5. *Colasposoma* Laporte, 1833

Colasposoma is one of the most speciose genera of the subfamily, comprising nearly 350 species distributed along Indo-Malayan subregion, Africa and Australia. It is a paleotropical genus, possibly most difficult in taxonomic point of view. More than 70 species occur in the Oriental region (Medvedev, 2003). Members of this genus are variable in color and external morphology, hence species circumscription is complex (Jacoby, 1908). They feed mostly on members of Convolvulaceae. They are common pests of *Ipomoea* (Gressitt and Kimoto, 1961) and *Argyreia* (Medvedev, 2003). Species descriptions and regional keys are available from the works of Jacoby (1908); Burgeon (1941); Gressitt and Kimoto (1961); Kimoto and Gressitt (1982); Tan (1983); and Medvedev (2003). As the characters used to segregate species are variable, reliability and usefulness of these works are questionable.

2.3.6. *Dermorhytis* Baly, 1861

Baly (1861) described *Dermorhytis igneo-fasciata* from Srilanka and *D. fortunei* from north China. *Dermorhytis igneo-fasciata* was designated as the type species while *D. fortunei* is currently placed in *Abirus*.

2.3.7. *Edistus* Lefevre, 1884

Edistus was described by Lefevre (1884) for *E. fulgidus* from the Bintang Islands in Malayan Archipelago, which is the type species by monotypy. *Edistus indicus*, closely allied to the type species, was described by Jacoby in 1903 from the Nilgiri Hills. A third species *E. caerulens*, was described by Jacoby (1908) from Manipur.

2.3.8. *Eurypelta* Lefevre, 1885

Eurypelta was originally described as *Euraspis* by Chapuis (1874) for a single species *E. vittatus* from Bengal. However, the name was determined to be a typographical error of *Euryaspis* as pointed out by Lefevre (1885), which is a junior homonym of the beetle genus *Euryaspis* Blanchard, 1851. Hence *Euryaspis* Chapuis, 1874 was renamed as *Eurypelta* by Lefèvre in 1885. The species *Chrysomela modesta* described by Fabricius in 1792 was found to be synonymous with *Eurypelta* (= *Euraspis*) *vittata* and *Eurypelta modesta* Fabricius was assigned as the type species for the genus *Eurypelta*. The same was also reported from south India by Jacoby (1908). In 2018, Medvedev added a new species to this genus, *E. splendida* from south India which closely resembles the type species.

2.3.9. *Fidia* Motschulsky, 1861 (= *Lypesthes* Baly, 1863)

The genus group name *Fidia*, coined by Dejean (1836), remained unavailable till Motschulsky (1861) described *Fidia atra* from the Old World, as Dejean (1836) had merely listed two New World species, *F. lurida* Dejean, 1836 and *F. murina* Dejean, 1836, without a description, definition or indication. Motschulsky's species description, in combination with the generic name *Fidia*, unwittingly made this generic group name available. Baly (1863) described the Old World genera *Leprotus* (type species: *Adoxus gracilicornis* Baly, 1861 by original designation) as well as *Lypesthes* (Type species: *Fidia atra* Motschulsky, 1861 by original designation) and provided a description of

Fidia Dejean, 1836 and listed the New World *Fidia lurida* Dejean, 1836 as its type species. Baly's description made both the names *Fidia* and *Fidia lurida* available, in effect making *Fidia* Baly, 1863, a junior homonym of *Fidia* Motschulsky, 1861. Chen (1935) treated *Leprotus* Baly, 1863 as a junior synonym of *Lypesthes* Baly, 1863. Following Baly (1863) and Chen (1935), the name *Lypesthes* has been applied consistently for the Old World genus based on the type species *Fidia atra* Motschulsky, 1861. Similarly, *Fidia* Baly, 1863 has been applied to the New World genus group established on the type species *Fidia lurida* Baly. Strother and Staines (2008) reviewed the New World *Fidia* Baly, 1863 and provided an account of the nomenclatural history of the generic name. Strother *et al.* (2007) applied to the ICZN for suppression of the name *Fidia* Motschulsky, 1861 (not 1860, Griffin 1936) and conservation of the usage of *Lypesthes* Baly, 1863. The Commission, however, rejected this proposal and upheld the priority of *Fidia* Motschulsky, 1861 (ICZN 2009). Löbl (2010) mentioned this issue, however, did not make the nomenclatural changes. The Old World genus *Fidia* Motschulsky, 1861 is distinct from the New World *Fidia* Baly, 1863. Following the ruling of the Commission, reaffirming the priority of *Fidia* Motschulsky, 1861 the junior homonym *Fidia* Baly, 1863 was renamed *Neofidia* Strother in Kumari *et al.* (2020).

Fidia Motschulsky comprises 34 species distributed in the Oriental and Palaearctic Regions (Jacoby, 1908; Pic, 1923, 1924, 1928; Chen, 1935; Eroshkina, 1992; Medvedev and Zoia, 1996; Moseyko and Sprecher-Uebersax, 2010 and Kumari *et al.*, 2020).

2.3.10. *Heteraspis* Chevrolat, 1836

The genus *Heteraspis* includes over 75 species occurring in Oriental, Palaearctic, Afrotropical, and Australian regions. *Scelodonta* Westwood, 1838 is a popular generic name. However, in the Palaearctic Catalogue, Moseyko and Sprecher-Uebersax (2010) considered *Heteraspis* Chevrolat as the valid name instead of *Sceledonta*, as the conditions for reversal of precedence (ICZN Art. 23.9.1.2.) are not met. Species of *Heteraspis* are major pests of Vitaceae, especially grape vine which is attacked severely by *H. dillwyni* all over the world.

2.3.11. *Macrocoma* Chapuis, 1874

Macrocoma is an Ethiopian genus distributed in African Palaearctic zone (North Africa and Canary Islands), Europe (Andalusia, Greece), Middle East and also in the Indo-Malayan subregion (Jolivet, 1957). The genus was described by Chapuis (1874) for *M. eriophora*.

Baly in 1878 published a short description of the genus *Eubraxis* Dejean (junior synonym of *Pseudocolaspis* Laporte, 1833) and published three species under the genus. Selman (1963) designated *E. cylindrica* (Kust.) as the type species.

Weise (1903) synonymized *Eubraxis* Baly (1878) with *Macrocoma* Chapuis (1874). Selman (1963) clarified the nomenclatural status of the genera *Pseudocolaspis*, *Macrocoma* and *Tanybria* and provided key to separate the three genera.

2.3.12. *Malegia* Lefevre, 1883

The genus *Malegia* was described by Lefevre (1883) for three species *M. striatulla*, *M. obscurella* and *M. letourneuxi*. Currently the genus comprises more than twenty species, distributed in Asia, Africa and the Middle East. *Lahejia* Gahan is a genus close to *Malegia* distributed in Africa and Asia.

2.3.13. *Mesocolaspis* Jacoby, 1908

Jacoby described the genus *Mesocolaspis* in 1908 for two species *M. indica* Jacoby and *M. nigrita* Jacoby, both from south India. *Mesocolaspis indica* was previously placed in *Apolepis* by Jacoby. A third species, *M. spinulosum* was described by Medvedev (1996) from Thailand. Only three species are currently known.

2.3.14. *Microeurydemus* Pic, 1938

The genus was described by Pic (1938) for *Microeurydemus unimaculatus* Pic, known from Africa and the Arabian Peninsula. The genus is similar to *Eurydemus* Chapuis. *Microeurydemus* resembles *Afroeurydemus* especially in the structure of head. *Microeurydemus* is distinguished by very large femoral spines (Selman, 1965) and eyes very close together (Selman, 1972). These genera belong to Typophorini (Zoia, 2019) but were placed in Nodini by Selman (1965, 1972), who provided keys to the genera of continental South-Saharan African Eumolpinae and proposed new combinations. Identity of these genera was otherwise ambiguous. The combinations were again

revised by Zoia (2019) by incorporating the specimens studied by Pic, which were unknown to Selman (1965, 1972).

2.3.15. *Pachnephorus* Chevrolat, 1836

Pachnephorus is widely distributed all over the globe except Australia (Jacoby, 1908). *Pachnephorus bistriatus* Mulsant and Wahanru (= *P. impressus* Rosenhauer) and *P. lewisi* Baly (= *P. bretinghami* Baly) were reported as minor pests of millets, sugarcane and jute from India (Nair, 1975).

2.3.16. *Pagria* Lefèvre, 1884

The palaeotropical genus *Pagria* Lefevre, occur in Africa, Australia, New Britain Islands, continental part of Oriental Region and islands of the Malay Archipelago.

A review of the *Pagria signata* (Motschulsky, 1858) species-group, including 15 species, was done by Moseyko and Medvedev (2005). The range of the species group includes Primorskii Territory of Russia, Korean Peninsula, eastern and central China, Japan (including Ryukyu Islands), Taiwan, Vietnam, Laos, Myanmar, Cambodia, India, Nepal, Sri Lanka, Indonesia, Philippines, Oceania (Bonin Islands and Guam) and Australia (Moseyko and Medvedev, 2005). This species group is widely distributed and is a dangerous pest of many leguminous cultures. The adult insects gnaw leaves and damage leguminous plants. The larvae dwell on roots of the same plants.

Pagria signata was described by Motschulsky from Myanmar in 1858. Baly described three species from the Malay Archipelago and two species from Japan and erroneously included them in the genus *Nodostoma* (at present, *Basilepta*) without comparison with the species described by Motschulsky. At the beginning and in the middle of the 20th century, several more species, variations, and aberrations, similar to the species described by Motschulsky, were described; they are distributed over the entire Oriental, Palaearctic and Australian Regions. Some species names were treated as synonyms of *Pagria signata*. Because of the brevity of descriptions, poor reliability of comparison of species, and absence of keys, the determination of species of *Pagria* is very complicated.

Bryant (1942) divided the genus into six species groups based on color, angles of the lateral margins of pronotum, and range of distribution. Many were synonymized with *P. signata* in the revision of the genus *Pagria* by Gressitt and Kimoto (1982).

Moseyko and Medvedev (2005) reviewed the *Pagria signata* species group and provided genitalia illustrations and key to the species under the group. After examining the types of various species from different museums and new material, Moseyko (2013) synonymized a number of names and revised the distribution ranges of some species.

2.3.17. *Pseudocolaspis* Laporte, 1833

Pseudocolaspis is distributed in Asia and Africa (Jolivet, 1957). Laporte (1833) described the genus for two species, *P. coerulea* Laporte and *P. metallica* Laporte. The name *Eubraxis* was first used by Dejean in 1837 in his catalogue and he enlisted *Pseudocolaspis* Laporte as junior synonym of *Eubraxis* Dejean. As the publication date of *Pseudocolaspis* is 1833 and that of *Eubraxis* is 1837, *Eubraxis* Dejean becomes a junior synonym of *Pseudocolaspis* and is no longer an available name as per International Code of Nomenclature, Article 11d (Selman, 1963).

2.3.18. *Pseudostonopa* Jacoby, 1903

Jacoby (1903) described the genus *Pseudostonopa* for a new species *P. bicolor* from the Nilgiri Hills in south India. This endemic genus of the Indian subcontinent is currently represented by five named species. *Pseudostonopa bicolor* is the type species of the genus by monotypy. Later the species was reported from Nepal (Takizawa, 1987 and 1989) and Srilanka (Medvedev, 1999). *Nodostoma biplagiatum* described by Jacoby (1889) from Myanmar is now placed in *Pseudostonopa*. *Pseudostonopa castanea* and *Pseudostonopa picea* were described by Jacoby (1908) from Darjeeling and Sikkim respectively. In 1999, *P. picea* was reported from Nepal by Medvedev and Sprecher-Uebersax (1999). Finally, Kimoto described *P. flaviventris* from Nepal in 2004.

2.3.19. *Scelolanka* Medvedev, 1974

The genus *Scelolanka* was described by Medvedev in 1974 from Srilanka. The type species is *S. besucheti* by monotypy. Again Medvedev (1982) described two more species from the genus and provided a key to species.

2.3.20. *Trichochrysea* Baly, 1861

The genus *Trichochrysea* is restricted to Asia and is represented by more than 50 species. The Central Asian species of *Trichochrysea* are significantly different from the Oriental representatives of the genus (Moseyko, 2012).

MATERIAL AND METHODS

3. MATERIAL AND METHODS

The present study deals with taxonomy of the subfamily Eumolpinae of south India. The detailed methods adopted during the course of the study are given below.

3.1. Collection and documentation of Eumolpinae of south India

3.1.1. Field collection

Specimens of eumolpine leaf beetles were collected from various ecosystems in south India which includes Kerala, Karnataka, Tamil Nadu and Goa covering different seasons during 2015 – 2020. Intensive collections were made in the southern Western Ghats (*sensu* Nair, 1991).

3.1.2. Collection methods

Eumolpines occur on various kinds of vegetation *viz.* herbs, shrubs, trees, grasslands etc. Large sized beetles were collected by hand picking while very small ones were collected using an aspirator and those on canopy and grass lands were collected using sweep net. They were also collected by locating plants with characteristic feeding symptoms, mostly on the leaves. Majority of the eumolpines were active during early morning and late evening and hence the collections were timed accordingly. The beetles thus collected were transferred to vials filled with 70 per cent ethyl alcohol with pertinent labels as to their host plant, date and locality of collection and were brought to the laboratory for further processing.

Apart from these collection techniques, specimens procured on loan basis from various institutions in India and abroad were also studied.

Material examined are from the following collections:

BMNH	Natural History Museum, London
KAU	Travancore Insect Collection, Kerala Agricultural University, Vellayani
NBAIR	National Bureau of Agricultural Insect Resources, Bengaluru
UASB	University of Agricultural Sciences, Bengaluru
USNM	National Museum of Natural History, Smithsonian Institution, Washington D.C.
ZIN	Zoological Institute, Russian Academy of Sciences

3.1.3. Processing of specimens

Mounting and labelling

The specimens, killed in alcohol, were transferred to a Petri dish, cleaned using a soft brush and kept for a while for the alcohol to evaporate. The specimens were glued singly on triangular paper points mounted on Number 3 stainless steel, nylon headed insect pins. Fevicol® was used to glue the beetles on the paper points. All the specimens were labelled giving details of locality, date of collection, GPS co-ordinates, name of collector and host plants. All the identified beetles were provided with a determination label with species name and name of the person who identified it. The gender of the specimen was indicated by male/female symbols (♂/♀). These were then stored in insect cabinet boxes and used during the studies.

3.2. Ecological data

Efforts were made to document the ecological and biological information as much as possible. Type of vegetation, season of occurrence, host plants and behaviour were documented in all possible cases.

Attempts were made to study the biology of a few species. Live beetles were collected from the field and a pair each of the beetles were released into a transparent plastic jar in which a layer of top soil and a twig of the host plant with new flushes were kept. The mouth of the jar was covered with a piece of cloth and fastened by a rubber band. Beetles were allowed to mate and oviposit. The leaves were changed at three days interval and the layer of soil was maintained moist by spraying water.

3.3. Preparation of genitalia

Dissection. The specimens were relaxed by immersing in soap solution for about 10 to 20 minutes. Fifty per cent Iso propyl alcohol solution was also tried for relaxing the specimen for 5 – 10 minutes before dissection. We got better results with the latter method. Abdomen was cut off from the body by inserting a No. 3 sized insect pin between metasternum and the abdomen and then severing the membranous connections and tissues in between. The severed abdomen was macerated in 10 per cent KOH solution by keeping it overnight in hot air oven, set at 50°C. Alternatively, for quick processing, the specimens were boiled in 10 per cent KOH for about two minutes. The former method yielded better results as all the relevant structures, including ducts of

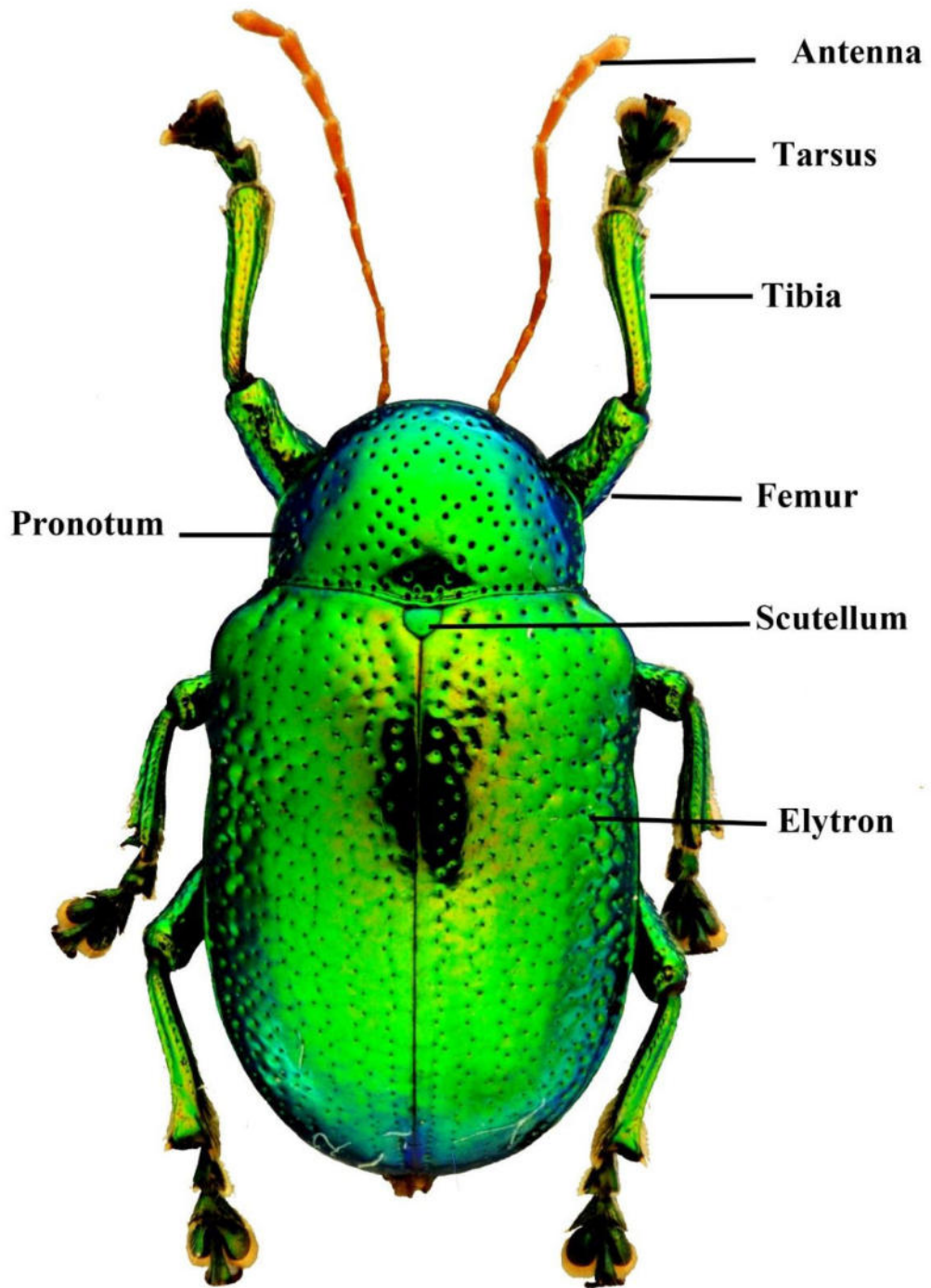


Figure. 1: Habitus- Dorsal aspect

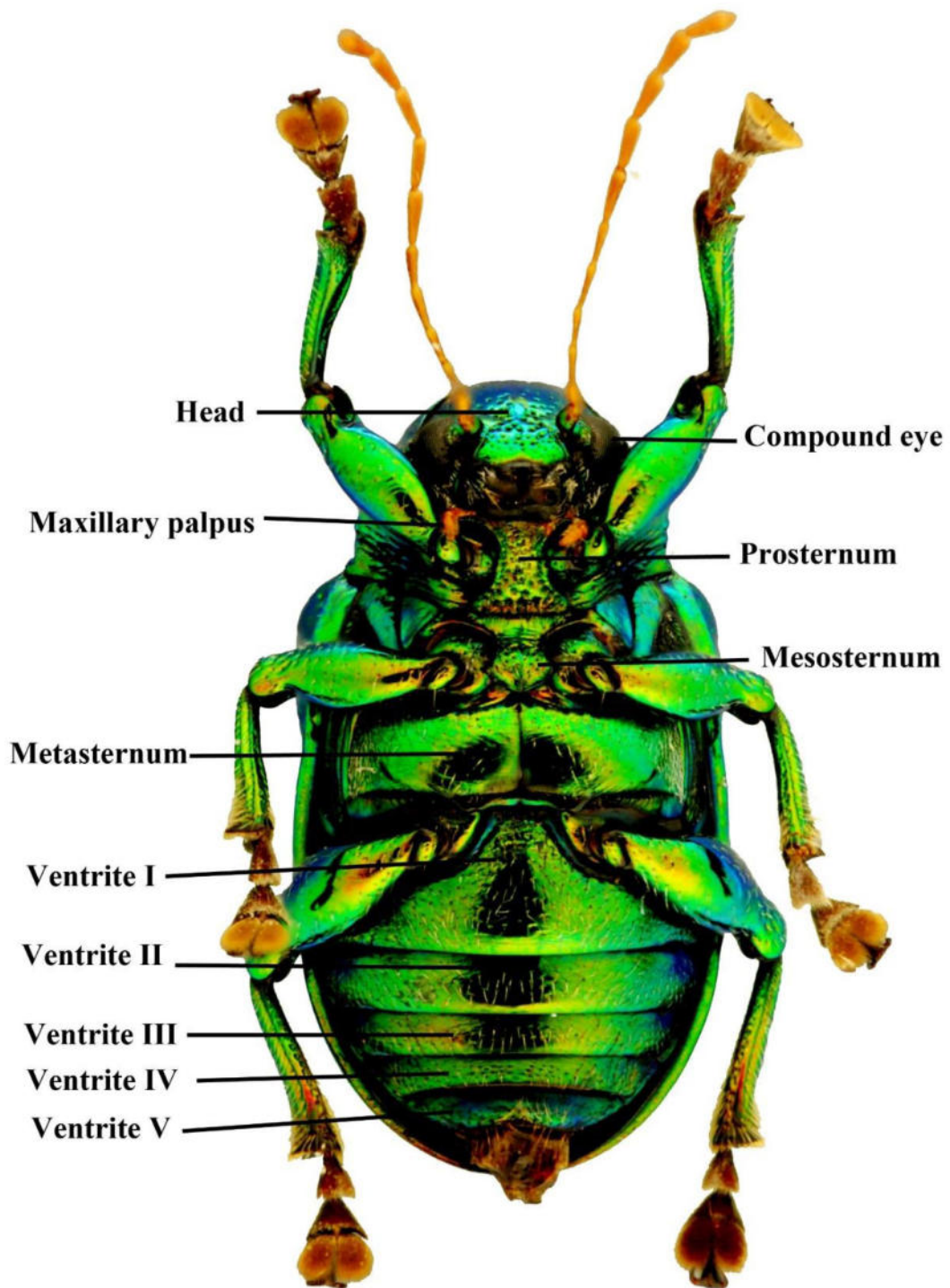


Figure. 2: Habitus- Ventral aspect

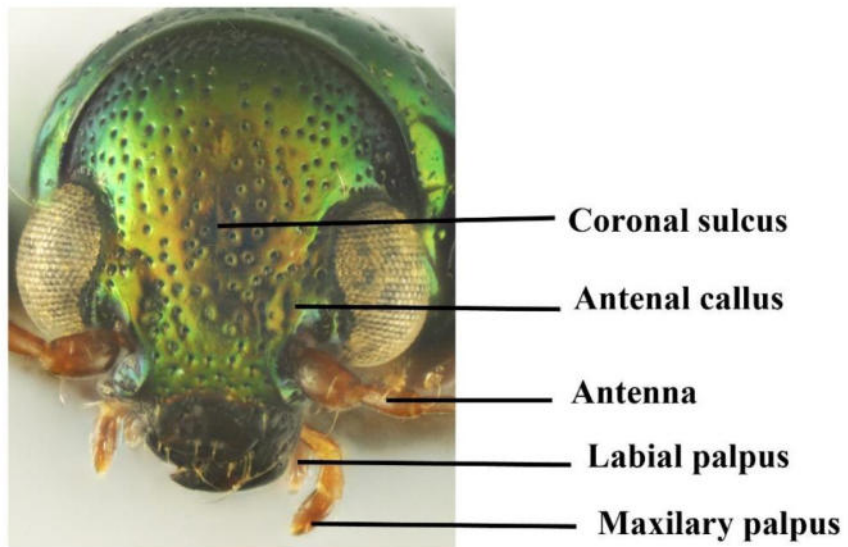
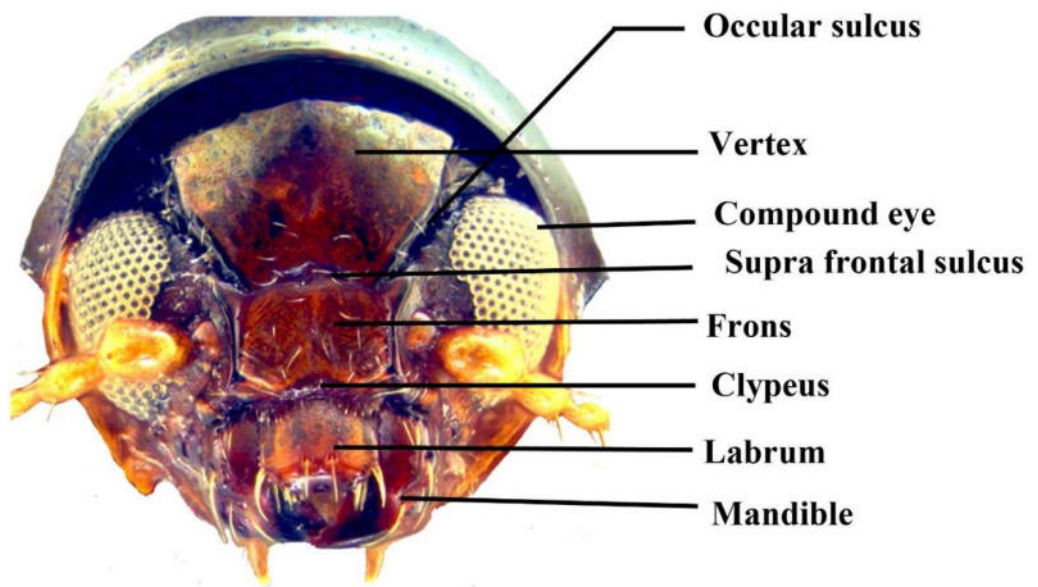


Figure. 3: Head- Frontal view

the reproductive system, were intact, especially in females. The digested abdomen was thoroughly washed in water, followed by immersion in 2 per cent acetic acid to remove excess alkali. One more round of washing with water was done to get rid of excess chemicals. The tergites and sternites were detached and the genitalia was completely pulled out of the muscles and tissues. The transparent membranous structures were stained with acid fuchsin and then transferred to glycerin for observation, photography and preservation.

Endophallus (Fig. 11). The endophallus was everted and or inflated in a few cases. Eversion was done through the apical opening (ostium) as well as inflated through basal opening. Inflation of endophallus follows Yamasako & Obhayashi (2011) with appropriate modification. A TSK STERiJECT hypodermic needle 0.2 x 9 mm (3/8”) (The invisible needles TM Japan) was mounted on a syringe filled with K-Y® gel. The tip of the needle was inserted into the apical opening and affixed with the cyanoacrylate glue Fevikwik®. After allowing for five minutes to dry up, the aedeagus was kept in water for a minute, then immersed in K-Y® gel in a cavity slide and inflated by pushing the plunger flange slowly under controlled pressure. Eversion of endophallus was carried out using KK-3 type C fine nozzle. The endophallus was pushed towards the apical opening using the blunt end of a flexible fine needle through the basal opening. The tip of the fine nozzle, filled with K-Y® gel, was affixed at the base of the aedeagus proper with the cyanoacrylate glue (Fevikwik®). The assembly was allowed to dry up for five minutes and kept in water for one minute to relax the endophallic membrane. Then the aedeagus was immersed in K-Y® gel in a glass slide. The endophallus was then everted under controlled pressure of a syringe filled with K-Y® gel.

After examination, the dissected parts were placed in the abdomen of the specimen and preserved in a drop of glycerine held in genitalia vials and closed tightly with a stopper.

3.4. Illustrations and Photographs

All the species studied were colour photographed using Nikon D3000 or Canon EOS SLR camera mounted on a Wemacro stackrail. Multiple images at different depths of plane were taken and were stacked together using Combine ZM /Zerene Stacker 1.04 /Helicon focus software to get a high resolution image. Photographs and stacked images

were edited with Adobe Photoshop CS4. Line diagrams of genitalia in a few cases were drawn using Adobe Illustrator.

3.5. Identification of specimens

Basic identity upto the generic level was done using generic keys by Jacoby (1908) and Kimoto & Gressitt (1982). Species level identification in Eumolpinae was very difficult due to variation in color and external morphology as well as paucity of information on the genitalia of Eumolpinae of the Indian subcontinent especially that of south India. Common species were identified by checking the specimens with the descriptions in Fauna of British India by Jacoby (1908). Complex, rare or new species were confirmed with the help of Dr. Alexey G Moseyko of the Russian Academy of Sciences, St. Petersburg. Those species which did not agree with descriptions and figures of already known species were considered as new however, they are denoted only by numbers. They will be named after examination of the relevant types to ensure their identity, in the ensuing publications.

3.5.1. Measurements (Figs. 4 – 6)

Two males and two females of each species were measured. All available specimens were measured when the specimens were less in number. Measurements of various body parts, as mentioned below, were made with a calibrated ocular micrometer placed inside one of the eyepieces of a stereoscopic microscope (Leica DM 1000). All measurements are expressed in millimetres.

Body length: Distance between the anterior most point of head excluding antennae and the apex of elytra or abdomen whichever is greater

Elytral length: Maximum linear distance between anterior margin and posterior margin of elytra

Elytral width: Maximum width of the specimen in dorsal view measured across the widest part of elytra

Pronotum length: Maximum linear dimension of prothorax measured along imaginary mesal line of the pronotum

Pronotum width: Maximum transverse dimension of pronotum

Length of anterior margin of pronotum: Transverse length of anterior margin of pronotum

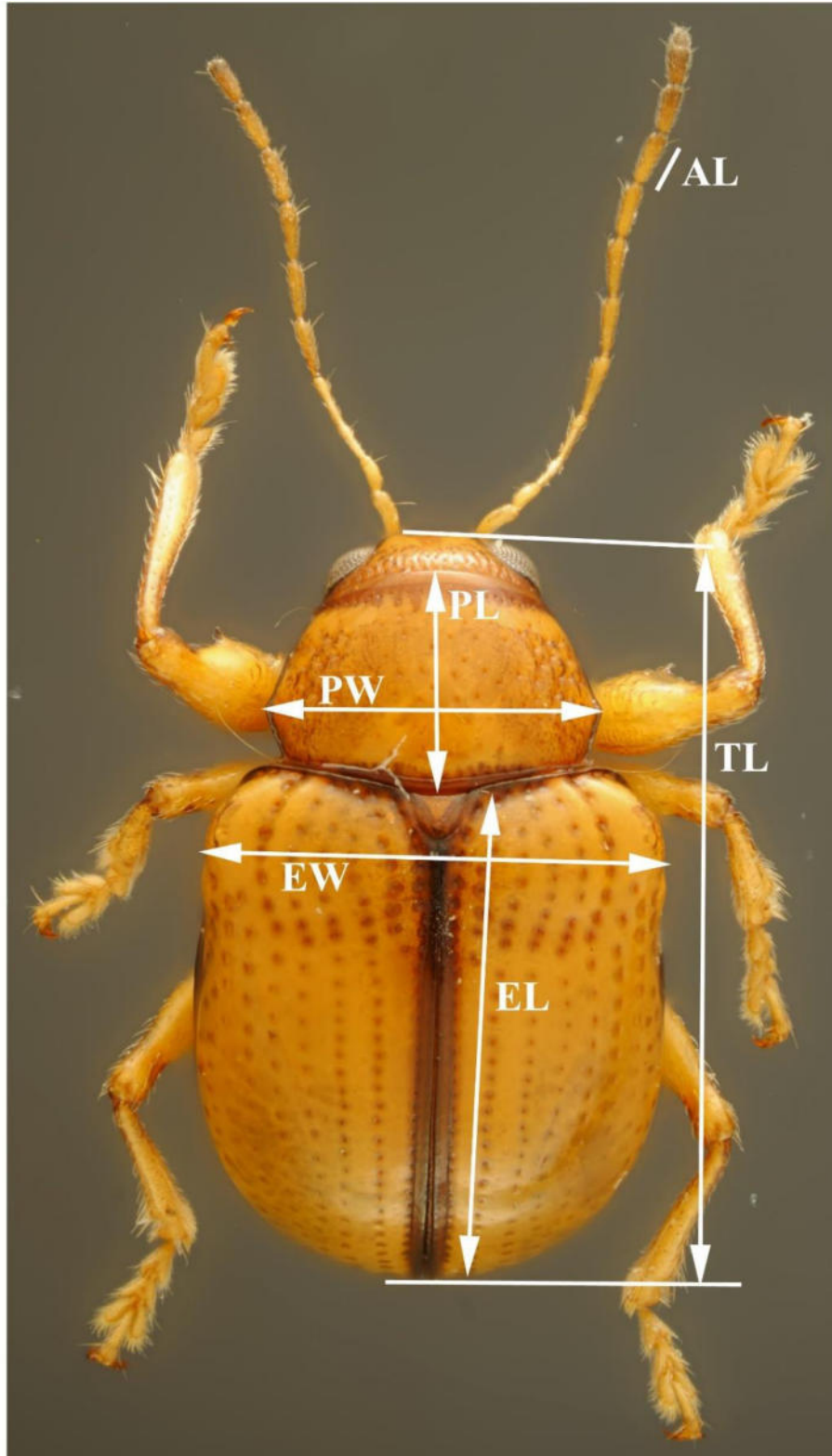


Figure. 4: Measurements dorsal aspect: AL- each antennomere length; PL- Length of Pronotum; PW- Width of Pronotum; EL- Elytral Length; HW- Humeral Width; TL- Total length.

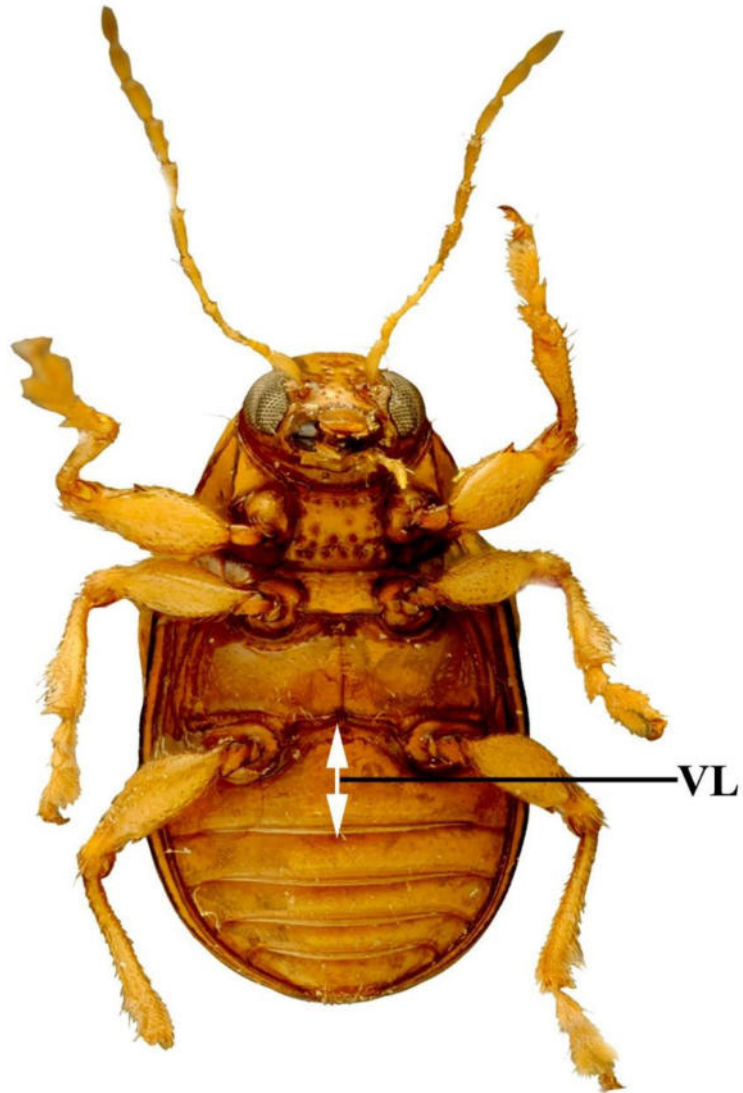


Figure. 5: Measurements ventral aspect: VL- Length of each ventrite.



Figure. 6: Measurements: Head, frontal view: LE- Length of lower eye lobes; **LG-** Length of gena.

Length of posterior margin of pronotum: Transverse length of posterior margin of pronotum

Transverse diameter of compound eye

Vertical diameter of compound eye

Length of antennomeres: Length of each antennomere from 1 to 11

Interocular space (distance between eyes): Narrowest transverse dimension between eyes; measured across narrowest space between eyes.

Interantennal space: Transverse distance between antennal sockets

Distance between antennae and eye: Maximum distance between antennal socket and inner margin of the adjacent compound eye

Width of head: Maximum transverse dimension of head across compound eyes

Length of aedeagus: Diagonal distance between the anterior most point and the posterior most point of aedeagus; measured longitudinally

Length of spermatheca: Maximum effective length of spermathecal receptacle

Width of spermatheca: Maximum width of the spermathecal receptacle

3.5.2. Ratios:

Elytral length to width

Pronotal length to width

Length of anterior margin of pronotum to that of posterior margin of pronotum

Vertical diameter of eye to transverse diameter of eye

Interocular space to transverse diameter of eye

Interantennal space to transverse diameter of eye

Maximum width of head to transverse diameter of eye

Maximum width of head to Interocular space

Maximum width of head to Interantennal space

Medial length to width of prosternum

Medial length of ventrites

Antennomeres

Length to width of spermatheca

3.6. Descriptions

Brief diagnostic descriptions of genera are provided, while detailed accounts of species, including external morphology, male and female genitalia and endophallus are provided in possible cases. Taxa are arranged in alphabetical order by genus and species.

3.6.1. Terminology

The terminology for morphology, genitalia and associated structures follows Jolivet & Verma (2008), Konstantinov (1998) and Moseyko (2008) and are illustrated in figures 1 to 15.

General morphology (Figs. 1 – 3)

Antennal calli: A pair of raised areas above the antennal socket on the lower side of the vertex.

Antennomere: Individual unit of antenna, usually 11 antennomeres for Eumolpinae

Clypeus: Transverse sclerite between frons and vertex, reduced in eumolpines

Coronal suture: A longitudinal suture along the mid line of head

Elytra: Anterior pair of chitinised wings in beetles

Elytral sutural margin: Mid dorsal line formed between closed elytra

Frons: Upper anterior portion of the head capsule, region between vertex and clypeus

Humeral calli: Prominently developed outer anterior angles of elytra

Hypomeron: The inflexed edge of pronotum

Labrum: Sclerite attached to clypeus forming a roof over mouth and covers base of the mandible

Mandibles: Lateral appendages immediately beneath labrum

Mesosternum: Ventral sclerite of mesothorax positioned between mesopleura

Metasternum: Ventral sclerite of metathorax

Pleuron: Lateral sclerites between dorsal tergum and ventral sternum

Proepisternum: The anterior most pleural sclerite of prothorax, triangular in eumolpines

Pronotum: Dorsal surface of first thoracic segment

Prosternum: Anterior most sternal sclerite between forelegs

Pygidium: Last abdominal tergite exposed beyond elytra

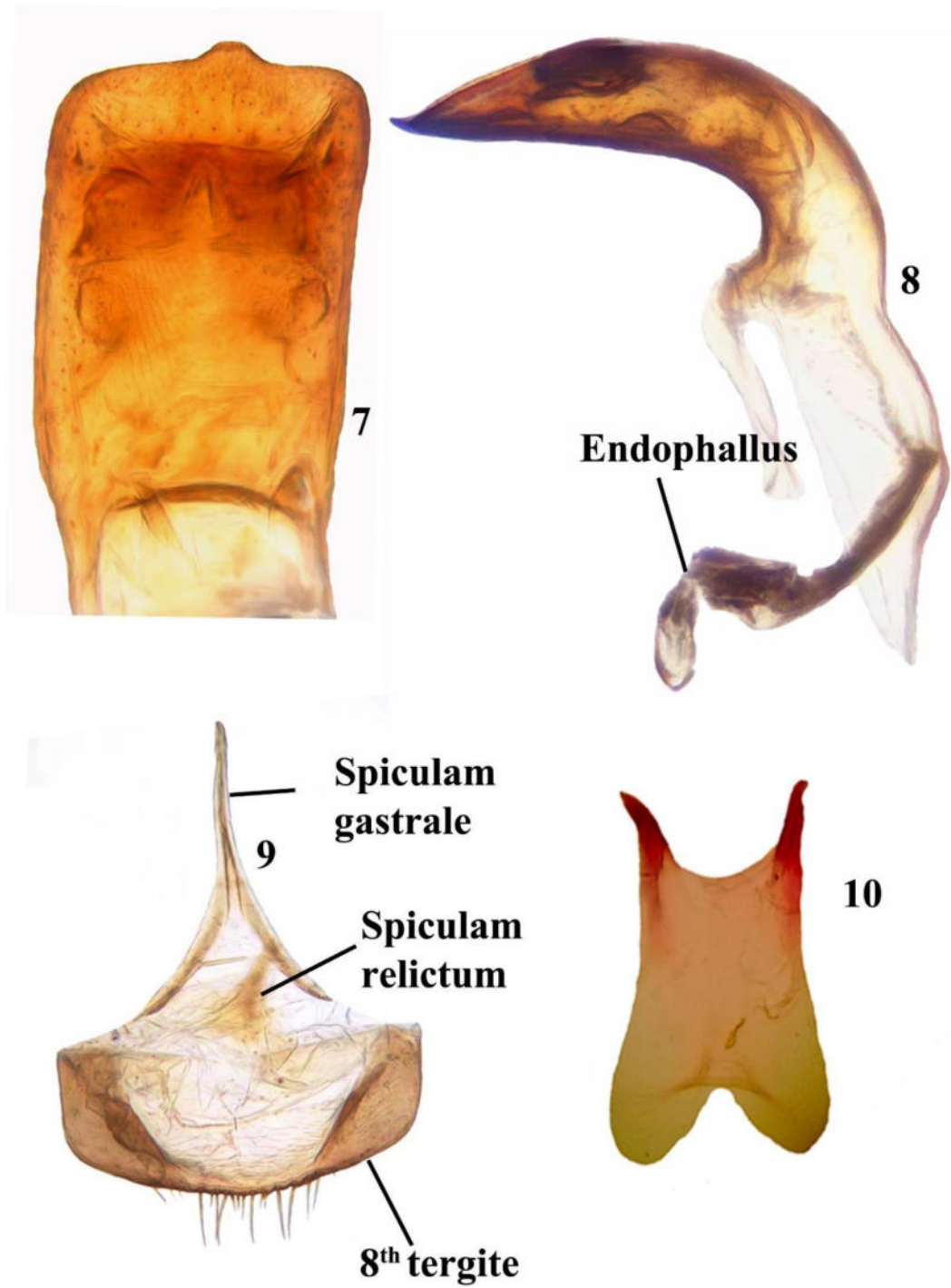


Figure. 7 – 10. Male genitalia: 7. Aedeagus, dorsal view. 8. Aedeagus, ventral view. 9. Tergite VIII, Sternite VIII & IX. 10. Tegmen

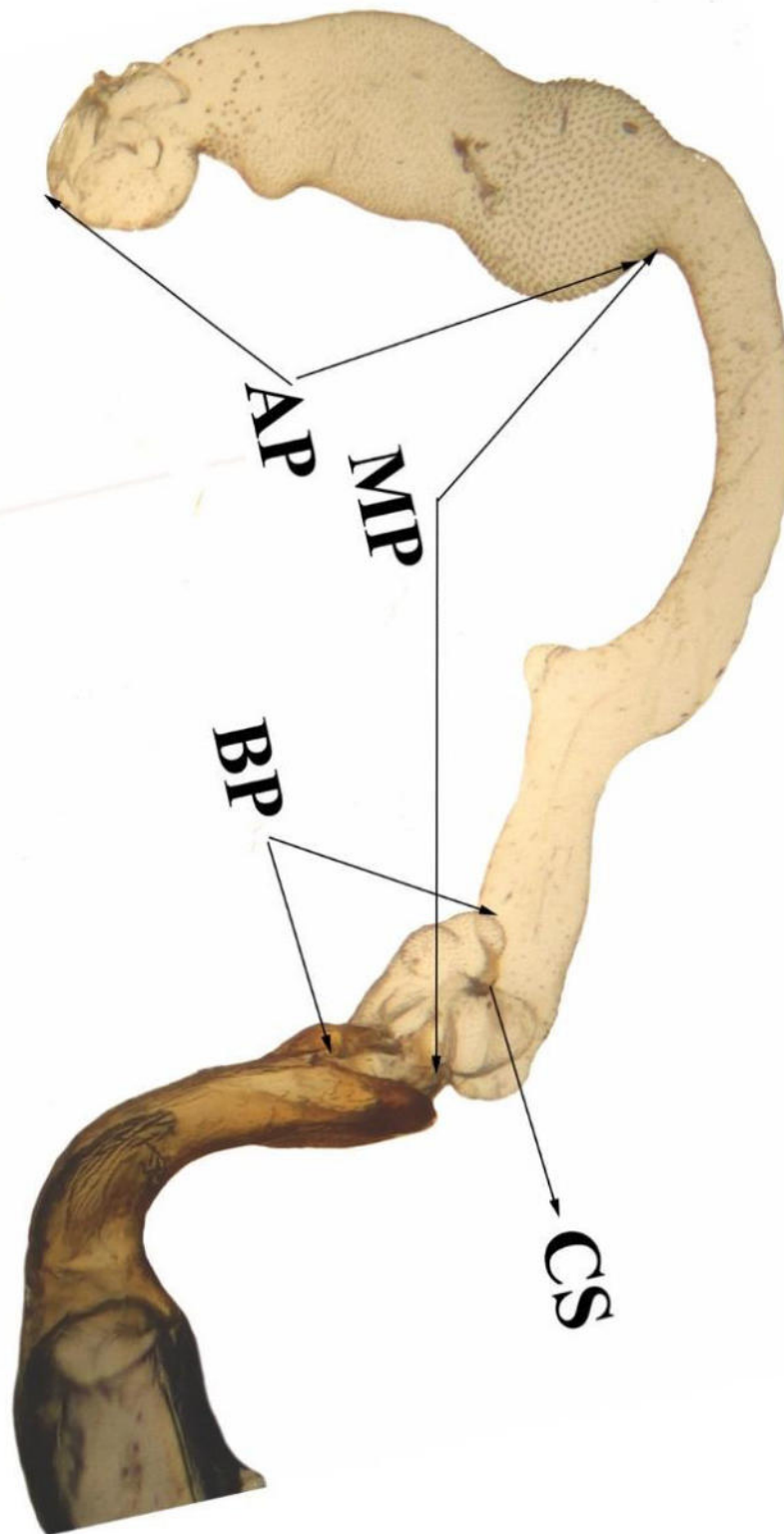
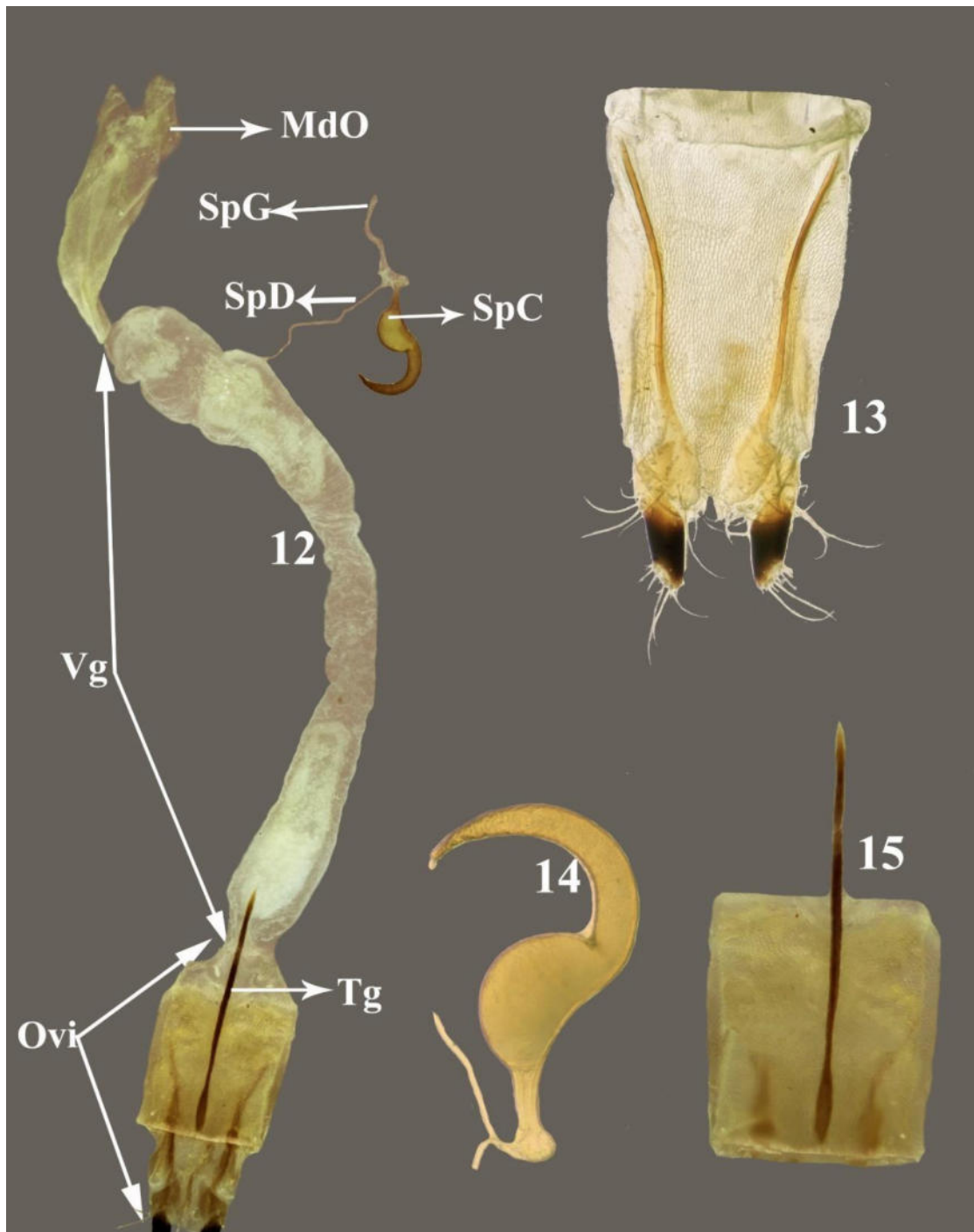


Figure. 11 Endophallus. Abbreviations. BP = Basal phallomere, MP = Median phallomere, AP = Apical phallomere. CS = Central Sclerite



Figures 12 – 15. Female genitalia. 12. Ventral view. 13. Ovipositor, 14. Spermathecal capsule, 15. Fused 8th sternite and 8th tergite with tignum. Abbreviations: SpG = Spermathecal gland, SpC = Spermathecal capsule, SpD = Spermathecal duct, MdO = Median oviduct, Vg = Vagina, Ovi = Ovipositor, Tg = Tignum

Scutellum: Shield like exposed portion of mesothorax situated between the elytra, immediately behind the pronotum

Supra frontal sulcus: The sulcus bordering frons that separates it from vertex

Ventrites: Visible abdominal sternites in beetles

Vertex: Top of head between compound eyes, frons, and occiput

Male genitalia (Fig. 7 – 10)

Aedeagus: Male intromittent organ, typically a sclerotized tube, enclosing the ejaculatory duct

Tegmen: Tegmen or first spiculum is triangular or quadrangular dorsoventrally flattened plate attached at the base of aedeagus proper. Its paired arms extend upward behind or across the basal ring of the aedeagus proper

Spiculum gastrale: Y or V-shaped structure formed by modified 9th sternite, associated near the terminal portion of aedeagus

Spiculum relictum: Modified 8th sternite, mildly sclerotized, V / Y shaped, sometimes spoon shaped, present in association with spiculum gastrale in male

Female genitalia (Figs. 12 – 15)

Bursa copulatrix: Copulatory pouch of the female

Coxite: Apical sclerotized area of ovipositor

Ovipositor: Elongate, partially sclerotized, paired structures with several apical setae, or an extension of median oviduct (egg laying tube)

Spermathecal capsule: The sclerotized receptaculum seminis; the sac in the female genitalia that receives sperm during mating

Spermathecal duct: Tubular process leading from spermatheca to bursa copulatrix or genital tract

Spermathecal gland: A special gland opening into spermatheca

Stylus: A short articulated sclerotized process at the apex of coxite

Tignum: A slender chitinised elongated apodeme attached to the eighth sternite in female.

3.7. Illustrated key

Based on the comparative study of morphological characters and genitalia, an illustrated key to select genera and species of Eumolpinae of southern India were prepared. Only those taxa studied were included in the keys.

Disclaimer

None of the nomenclatural acts proposed in this thesis should be treated as available in the sense of the International Code of Zoological Nomenclature, till they are validly published elsewhere.

RESULTS

4. RESULTS

Results of the study on Eumolpinae (Coleoptera: Chrysomelidae) of south India carried out from September 2015 to March 2020 is presented here. One thousand five hundred and two specimens of 53 species in 20 genera were studied.

4.1. List of eumolpine leaf beetles collected

1. *Basilepta* Baly, 1860
 1. *Basilepta fulvicornis* (Jacoby, 1904)
 2. *Basilepta subcostata* (Jacoby, 1889)
 3. *Basilepta* sp. 1
 4. *Basilepta* sp. 2
 5. *Basilepta* sp. 3
 6. *Basilepta* sp. 4
 7. *Basilepta* sp. 5
2. *Bathseba* Motschulsky, 1866 (= *Tricliona* Lefèvre, 1885)
 8. *Bathseba bifasciata* (Jacoby, 1895)
 9. *Bathseba nigra* (Jacoby, 1908)
 10. *Bathseba picea* (Jacoby, 1895)
 11. *Bathseba puncticeps* (Duvivier, 1891)
 12. *Bathseba syzygium* **n. sp.**
 13. *Bathseba variabilis* Jacoby, 1895
3. *Chrysonopa* Jacoby, 1908
 14. *Chrysonopa viridis* Jacoby, 1908
4. *Cleoporus* Lefèvre, 1884
 15. *Cleoporus inornatus* Jacoby, 1908
 16. *Cleoporus* sp. 1
5. *Colasposoma* Laporte, 1833
 17. *Colasposoma asperatum* Lefevre, 1885
 18. *Colasposoma auripenne* Motschulsky, 1860
 19. *Colasposoma coromandeliana* Jacoby, 1908
 20. *Colasposoma downesi* Baly, 1862
 21. *Colasposoma ornatum* Jacoby, 1881

22. *Colasposoma pretiosum* Baly, 1860
23. *Colasposoma robustum* Jacoby, 1881
24. *Colasposoma splendidum* Fabricius, 1792
25. *Colasposoma versicolor* Lefevre, 1887
26. *Colasposoma* sp. 1
6. *Dermorhytis* Baly, 1861
27. *Dermorhytis fulvipes* Jacoby, 1903
28. *Dermorhytis speciosa*, Jacoby, 1895
29. *Dermorhytis viridinitens* Jacoby, 1908
30. *Dermorhytis* sp. 1
7. *Edistus* Lefevre, 1884
31. *Edistus indicus* Jacoby, 1903
32. *Edistus* sp. 1
8. *Eurypelta* Lefevre, 1885a
33. *Eurypelta* (= *Chrysomela*) *modesta* Fabricius, 1792
9. *Fidia* Motschulsky, 1861 (= *Lypesthes* Baly, 1863)
34. *Fidia kanaraensis* (Jacoby, 1895)
10. *Heteraspis* Chevrolat, 1836
35. *Heteraspis dillwyni* (Stephens, 1831)
36. *Heteraspis immaculata* (Jacoby, 1908)
11. *Macrocoma* Chapuis, 1874
37. *Macrocoma* sp. 1 (Jacoby, 1895)
12. *Malegia* Lefevre, 1883
38. *Malegia* sp.1
13. *Mesocolaspis* Jacoby, 1908
39. *Mesocolaspis nigrita* Jacoby, 1908
40. *Mesocolaspis* sp. 1
14. *Microeurydemus* Pic, 1938
41. *Microeurydemus* sp. 1
15. *Pachnephorus* Chevrolat, 1836
42. *Pachnephorus bistriatus* Mulsant & Wachanru, 1852

16. *Pagria* Lefèvre, 1884
- 43. *Pagria grata* (Baly, 1867)
 - 44. *Pagria ingibbosa* Pic, 1929
 - 45. *Pagria* sp. 1
 - 46. *Pagria pseudograta* Moseyko, 2013
 - 47. *Pagria restituens* Walker, 1859
 - 48. *Pagria signata* (Motschulsky, 1858)
 - 49. *Pagria zeylonica* Pic, 1929
17. *Pseudocolaspis* Laporte, 1833
- 50. *Pseudocolaspis* sp. 1
18. *Pseudostonopa* Jacoby, 1903: 98
- 51. *Pseudostonopa palynophaga* **n. sp.**
19. *Scelolanka* Medvedev, 1974
- 52. *Scelolanka* sp.1
20. *Trichochrysea* Baly, 1861
- 53. *Trichochrysea* sp. 1

4.2. Subfamily Eumolpinae Thomson, 1859

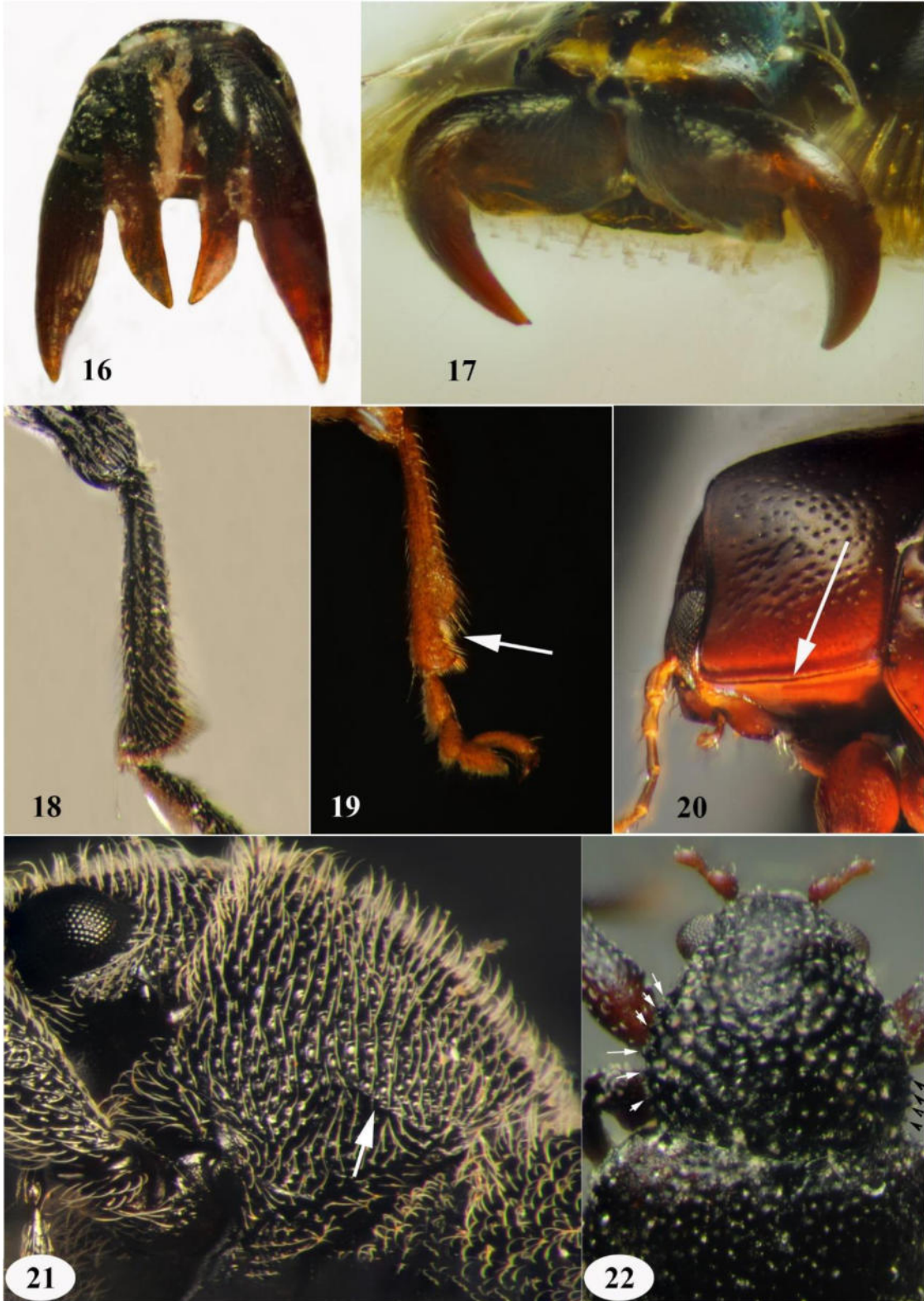
Diagnostic characters. Body oblong, convex or globose, rarely elongated. Head hypognathus, mostly retracted into prothorax; antennae widely separated at base, generally subfiliform with distal joints dilated in some genera; compound eyes sinuate or entire; mandibles bidentate apically. Thorax with or without lateral margins; prosternum distinct, rarely narrow; proepisternum straight, concave or convex; procoxal cavity closed behind; elytra with well defined humeral calli, femur mostly dilated with or without tooth ventrally; tarsal claws bifid or appendiculate. Pygidium rarely exposed,

Bioecology and life history. All eumolpines lays eggs in soil, covered with excreta or soil or mixture of both. All larval instars are subterranean, scarabeiform or C-shaped. Early instars are very active and move forward by anal pseudopod. Pupate in soil.

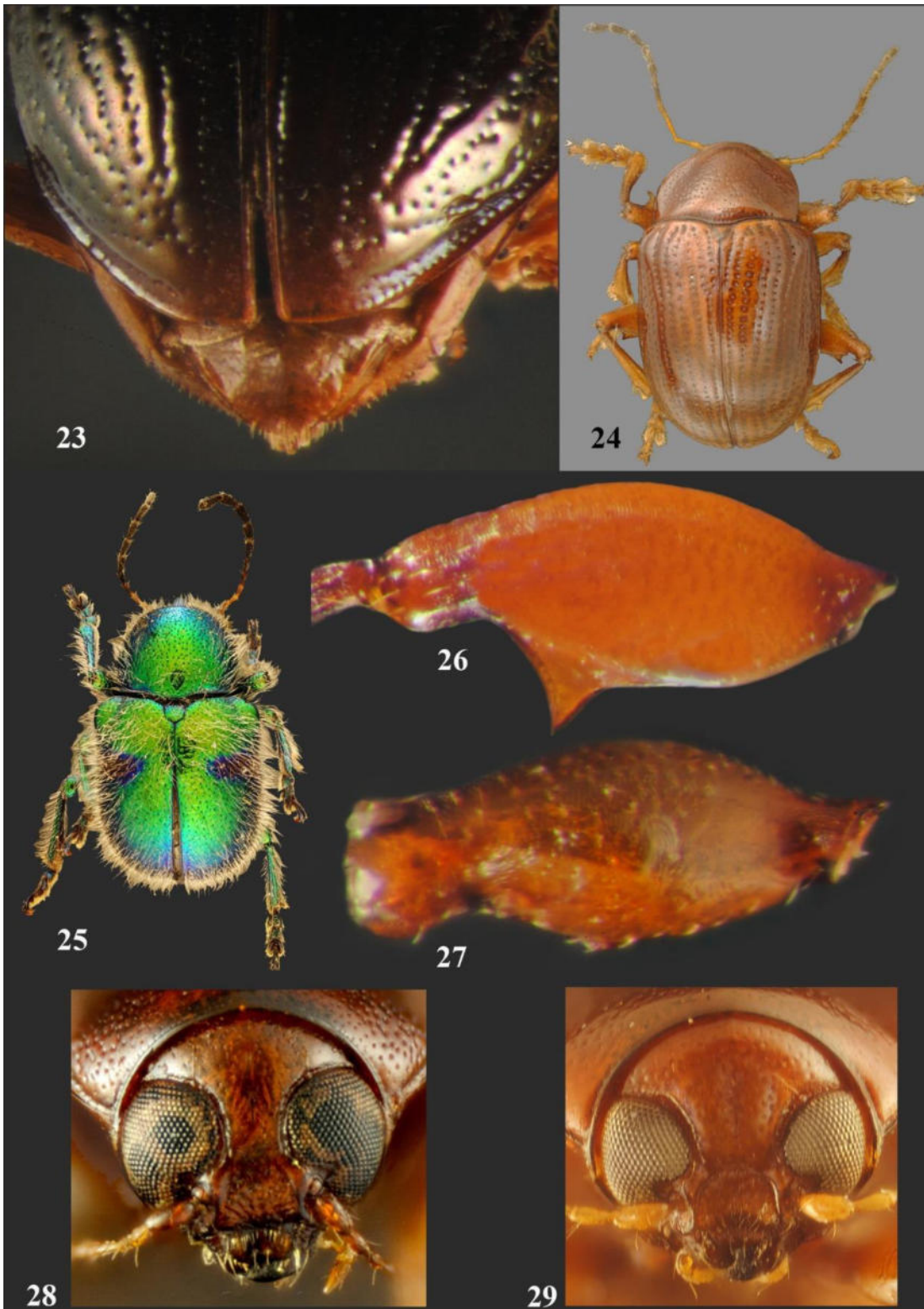
Key to select Eumolpine genera of south India

- 1. Claws bifid (Fig. 16).....**2**
- 1'. Claws appendiculate (Fig. 17).....**13**

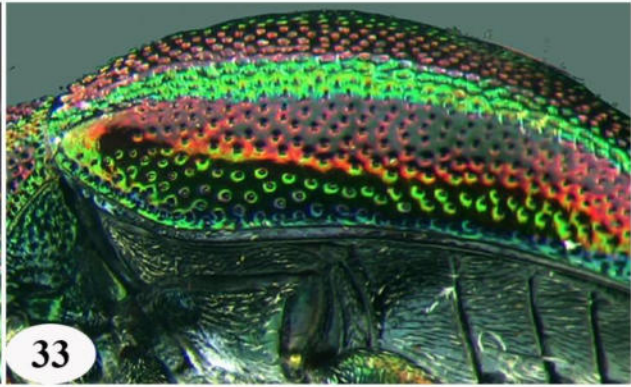
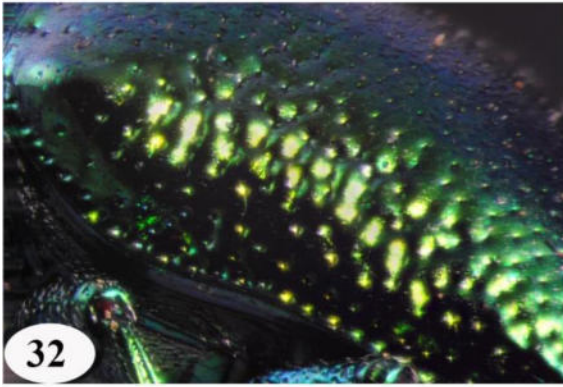
2. Intermediate and posterior tibia entire (Fig. 18).....	3
2'. Intermediate and posterior tibia emarginate preapically (Fig. 19).....	7
3. Pronotum with distinct lateral margins (Fig. 20).....	4
3'. Pronotum with lateral margins absent, obsolete or incomplete (Fig. 21).....	5
4. Lateral margins of pronotum serrate (Fig. 22).....	<i>Mesocolaspis</i> Jacoby
4'. Lateral margins of pronotum not serrate	<i>Colasposoma</i> Laporte
5. Lateral margins of pronotum incomplete or obsolete.....	6
5'. Lateral margins of pronotum obsolete except near base...	<i>Fidia</i> Motschulsky
6. More than half part of pygidium exposed (Fig. 23)....	<i>Pseudocolaspis</i> Laporte
6'. Pygidium almost concealed.....	<i>Macrocoma</i> Chapuis
7. Dorsum glabrous (Fig. 24).....	8
7'. Dorsum pubescent (Fig. 25).....	10
8. Anterior femora with a strong tooth beneath (Fig. 26).....	9
8'. Anterior femora with a minute tooth beneath or tooth absent (Fig.27).....	<i>Cleoporus</i> Lefèvre
9. Compound eyes extremely large and anterior portion of vertex much narrowed (Fig. 28).....	<i>Microeurydemus</i> Pic
9'. Compound eyes moderate sized and anterior portion of vertex wide (Fig. 29).....	<i>Bathseba</i> Motschulsky
10. Lateral margins of pronotum distinct	<i>Pachnephorus</i> Chevrolat
10'. Lateral margins of pronotum incomplete or obsolete	11
11. Head with a deep sulcus above eyes (Fig. 30).....	12
11'. Head without a deep sulcus above eyes (Fig. 31).....	13
12. Femora distinctly dentate beneath.....	<i>Heteraspis</i> Chevrolat
12'. Femora not toothed beneath.....	<i>Scelolanka</i> Medvedev
13. Lateral margins of pronotum obsolete.....	<i>Malegia</i> Lefevre
13'. Lateral margins of pronotum weakly formed anteriorly...	<i>Trichochrysea</i> Baly
14. Intermediate and posterior tibia emarginated preapically	15
14'. Intermediate and posterior tibia not emarginated preapically.....	19
15. Femora toothed beneath.....	16
15'. Femora not toothed beneath	18



Figures 16–22: Key Characters: 16. Claws bifid, 17. Claws appendiculate, 18. Tibia entire, 19. Tibia emarginated, 20. Pronotum with distinct lateral margin, 21. Lateral margin of pronotum absent, obsolete or incomplete, 22. Lateral margins of pronotum serrate.



Figures 23–29: Key Characters: 23. Pygidium exposed, 24. Dorsum glabrous, 25. Dorsum pubescent, 26. Femora with strong tooth, 27. Femora with minute or no tooth, 28. Compound eyes large, anterior portion of vertex narrow, 29. Compound eyes moderate sized, anterior portion of vertex wide.



Figures 30–33: Key Characters: **30.** Ocular sulcus deep, **31.** Ocular sulcus weak or absent, **32.** Elytra transversely rugose laterally, **33.** Elytra without transverse rugosity laterally.

16. Head deeply sulcate above eyes*Pagria* Lefèvre
 16'. Head gently or not sulcate above eyes.....17
 17. Thorax widest at base, often angulate at sides.....*Basilepta* Baly
 17'. Thorax not widest at base, never angulate at sides.....*Chrysonopa* Jacoby
 18. Compound eyes sulcate above.....*Edistus* Lefevre
 18'. Compound eyes not sulcate above.....*Pseudostonopa* Jacoby
 19. Elytra strongly transversely rugose laterally (Fig. 32).....*Dermorhytis* Baly
 19'. Elytra not strongly transversely rugose laterally (Fig. 33)..*Eurypelta* Lefevre

4.2.1. *Basilepta* Baly, 1860

(Type species: *Basilepta longipes* Baly, 1860 from Borneo).

Basilepta Baly, 1860: 23; Weise, 1922: 47; Chen, 1934: 320; 1935: 302; 1940: 488; Chujo, 1956: 18; Gressitt & Kimoto, 1961, 215; Kimoto, 1964: 244; Kimoto & Gressitt, 1982: 26; Tan, 1988: 26; Eroshkina, 1994: 65; Moseyko, 2012: 369–370.

Nodostoma Motschulsky, 1860: 176 (Type species: *Nodostoma fulvipes*); Chapuis, 1874: 261; Jacoby, 1908: 301; Clavaraeu, 1914: 49 (catalogue).

Mimoparascela Pic, 1935: 1 (Type species: *Mimoparascela viridis* Pic, from Tonkin); Kimoto & Gressitt, 1982: 26 (synonymy).

Falsoiphimoides Pic, 1935: 2 (Type species: *Falsoiphimoides bicoloripes* Pit, from Tonkin); Kimoto & Gressitt, 1982: 26 (synonymy).

Generic diagnosis. Body oblong; head feebly sulcate above eyes; antenna filiform or distal antennomeres widened; pronotum wider than long, widest posteriorly, lateral margins often angulate; anterior margin of proepisternum concave; legs long, all femora dilated, minutely dentate ventrally, tibia longitudinally sulcate with a sharp ridge along dorsal side; intermediate and posterior tibiae emarginated preapically; metatibia with a pair of short apical spines; claws appendiculate. Prosternum broader than long. Female genitalia with bursa sclerites.

Remarks. *Basilepta* Baly is one of the most speciose genera of Eumolpinae. Species of *Basilepta* are closely related, and are often very difficult to differentiate due to high degree of variability. They often vary in the shape of pronotum and prosternum. Most species of *Basilepta* are characterized by anteriorly narrowed and distinctly angulated lateral margins of pronotum, however, there are exceptions. *Pseudostonopa* Jacoby

closely resembles *Basilepta*. However, in *Pseudostonopa*, all femora lack a ventral tooth (all femora ventrally dentate in *Basilepta*) and the lateral margins of pronotum are never dentate (lateral margins of pronotum are often dentate in *Basilepta*).

Autolampra possess most of the characters of *Basilepta*, except only the posterior tibiae are emarginate in *Autolampra* and the emargination is placed on the inner side (*Basilepta* with emargination on both intermediate and posterior tibiae on its outer side). *Nodostella* is very closely allied to *Basilepta*, however, differs by elongate elytra, less transverse and gently narrowed pronotum with discoidal depressions, and prosternum longer than broad (*Basilepta* is characterized by shorter elytra, pronotum transverse without discoidal depressions and generally prosternum broader than long). Small species of *Basilepta* resembles *Pagria*, however, can be separated by the broad and deep sulcus above the eyes (*Basilepta* with narrow and shallow sulcus above eyes).

One hundred and five species of *Basilepta* are known from the Indian subcontinent (Jacoby, 1908), of which 38 species occur in south India.

Key to select species of *Basilepta* of south India

1. Color metallic blue, black, green or red brown.....2
 - Colour yellow or yellow brown.....4
- 2(1). Lateral margins of pronotum distinctly angulate.....3
 - Lateral margins of pronotum obseletely angulate.....*Basilepta* sp. 5
- 3(2). Elytra with a distinct lateral costa.....*B. subcostata*
 - Elytra with a weakly represented lateral costa*B. fulvicornis*
- 4(1) Ocular sulcus distinct and deep especially near the inner margin of eye.....*Basilepta* sp. 3
 - Ocular sulcus weak.....5
- 5(4). Lateral margins of aedeagus proper straight.....*Basilepta* sp. 2
 - Lateral margins of aedeagus proper distinctly concave.....6
- 6(2). Lateral margins of tegmen distinctly notched..... *Basilepta* sp. 1
 - Lateral margins of tegmen gently notched.....*Basilepta* sp. 4

4.2.1.1. *Basilepta fulvicornis* (Jacoby, 1904) (Figs. 34a–q)

Nodostoma fulvicorne Jacoby, 1904: 387; 1908: 303; Clavaraeu, 1914: 52

Description

Body length 3.6 –4.4 mm; width 2.5 –3.1 mm; ovate; entirely metallic, shiny green, blue, brown purple or mixtures of color, except labrum, mandibles, anterior and posterior parts of legs, palpomeres and antennae red brown; proximal area of first antennomere concolorous with body.

Head profusely punctured with short, fine setae, interstices with minute punctures and impunctate areas on vertex and frons, size of punctures variable, a few coarse punctures in middle and posterior areas; **vertex** broad, feebly rugose posterolaterally, coronal suture weak but distinct near anterior portion, suprafrontal sulcus weak but distinct with a few punctures, hardly differentiating frons and vertex; antennal calli distinct, raised and trapezoidal with a few setae; supracallinal sulcus well developed with a row of punctures; **clypeus** narrow, anteriorly emarginate; **labrum** broader than long with a pair of setose punctures in middle and a pair of setae anterolaterally, anterior margin with a row of setae absent in middle, apical margin emarginate medially; **mandibles** bidentate apically; **maxillary palpi** with last palpomere longest, penultimate palpomere less than half as long as last; **labial palpi** with last two palpomeres subequal, first segment being very short; **compound eyes** almost spindle shaped in lateral view, inner margin feebly emarginate, vertical diameter 1.4 times transverse diameter, distance between eyes 1.7–2 times distance between antennal sockets, supraorbital pore adjacent to dorsal margin of eye, round, with a long seta; orbital sulcus weak near antennal calli with a few bold punctures, very strongly sulcate near posterolateral margin of vertex; **antenna** extends beyond middle of elytra, subfiliform, first antennomere thicker and longer than second, second shortest, antennomeres 2–4 thinner, rest thicker than preceding ones; basal four antennomeres smooth, shiny with a few long setae, distal seven thickly covered with short, pointed setae.

Pronotum 1.5–1.6 times broader than long, posteriorly 1.5 to 1.6 times wider than anteriorly, densely punctured, punctures stronger and coarser laterally with convex interstices producing a honey comb appearance; lateral margins angulate at posterior one third, posterior margin slightly lobed; posterolateral callosity gently projects laterally; anterior and antibasal sulci distinct with a row of punctures, anterior sulcus

deeper than posterior; **scutellum** longer than broad, broadly rounded with small setose punctures.

Elytra nearly as long as broad, punctation semiregular, interstices with minute punctures, humeral calli distinct with a few setae, basal calli distinct with well developed post basal depression; punctures stronger laterally, weaker posteriorly; a costa arises from lateral margin of humeral calli scarcely reaching middle of elytra, costa vary in prominence; sutural angle subacute; **epipleura** outwardly oblique with a row of fine punctures, narrowing post medially, not reaching apex.

Prosternum broader than long, subquadrate, broader posteriorly than anteriorly with bold or coarse punctures and setae; **mesosternum** nearly two times broader than long with setose punctures.

Proepisternum with a few bold punctures and setae; **hypomeron** with a setose bold punctures.

Legs with femur dilated, ventrally minutely dentate a little beyond middle; **tibia** with eight longitudinal carinae; **tarsomeres** ventrally fringed with diverse forms of setae, basitarsomere with closely arranged capitate setae bordered by long pointed setae in males, only pointed setae in females; second tarsomere with pointed setae; and bilobed third tarsomere with triangular or inverted arrowhead-shaped setae.

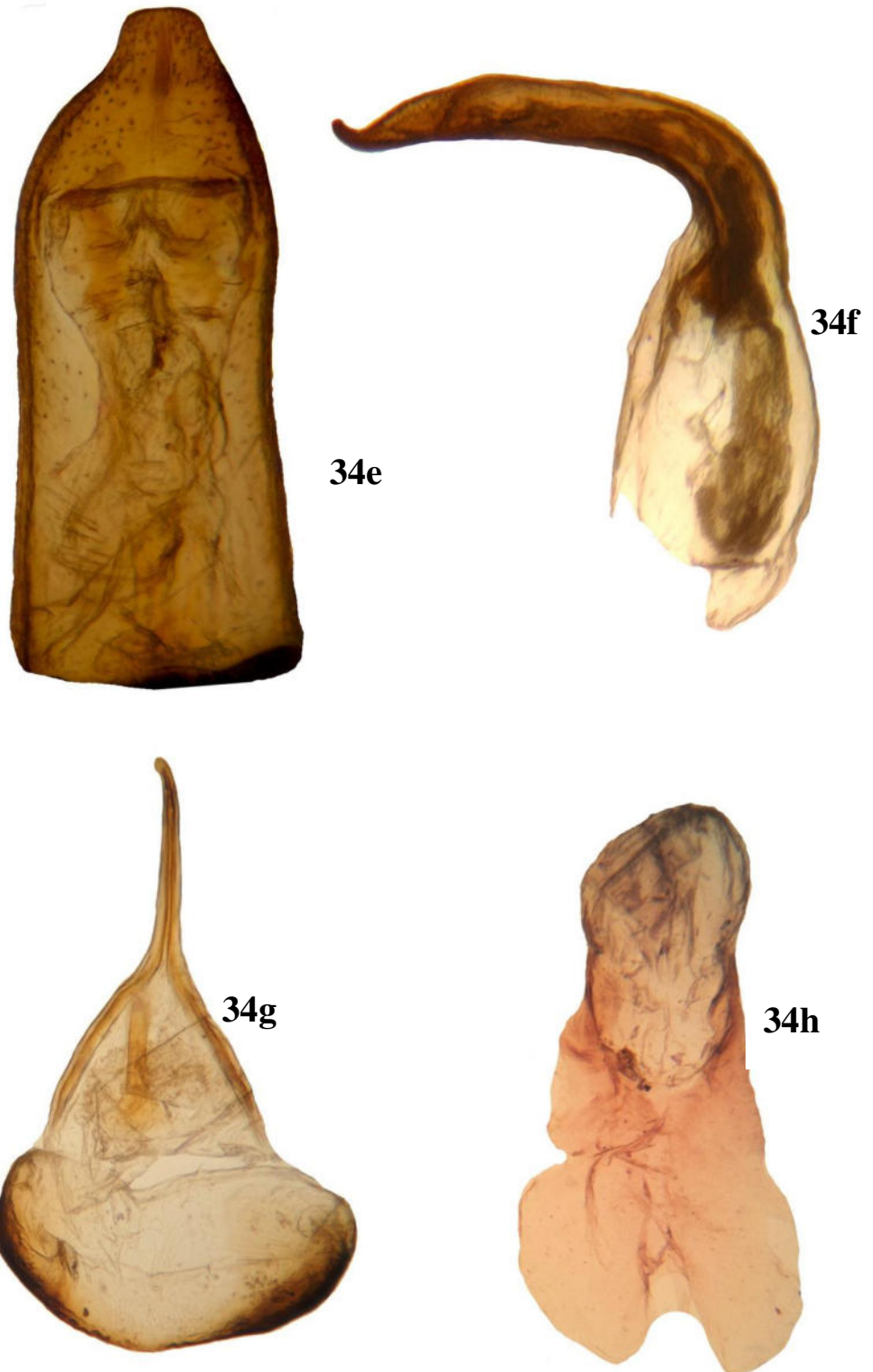
Ventrites pubescent, first ventrite longer than following two combined medially, rest subequal.

Male genitalia with **aedeagus** in lateral view sharply bent almost at right angle near base of aedeagus proper, apical one fourth abruptly narrowed forming an acute denticle recurved dorsally; in ventral view apex narrowed, subacute, lateral margins gently concave medially. **Tegmen** flat and membranous or mildly sclerotized, distal area bilobed, proximally with a pair of arms, narrowed and encircles base of aedeagus proper by means of membranous connections; **spiculum gastrale** (second spiculum of Jolivet & Verma 2008) Y-shaped with a bent on extreme apex of median arm; tergite VIII semicircular with spindle shaped sclerotization on either side with a few very short setae apically; spiculum relictum proximally dilated, distinct.

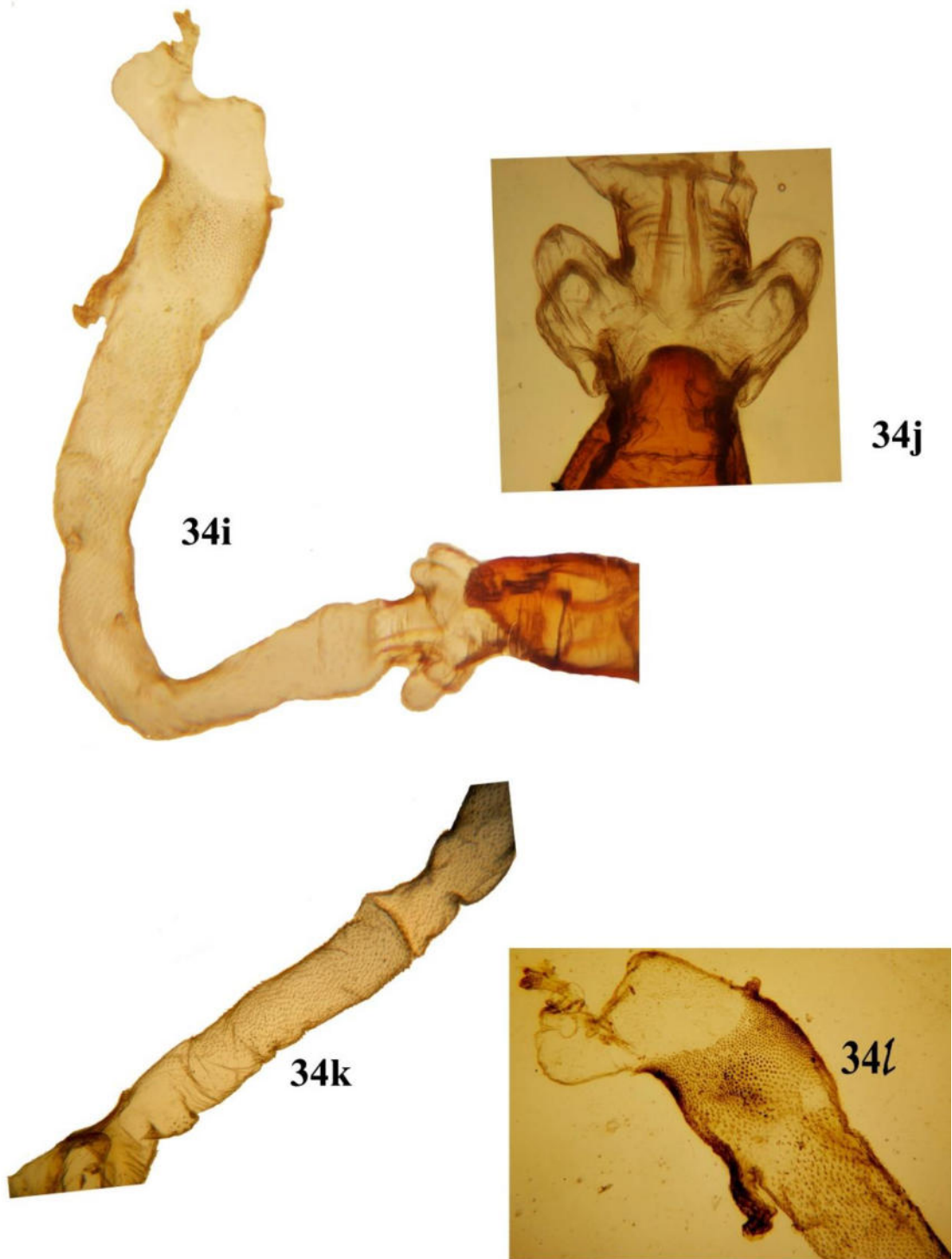
Endophallus long, membranous, tubular with three distinct regions: basal phallomere, median phallomere and apical phallomere; basal phallomere very short with paired



Figures 34a–d: *Basilepta fulvicornis* Habitus: **34a.** Dorsal view, **34b.** Ventral view, **34c.** Lateral view, **34d.** Head, frontal view



Figures 34e–h: Male genitalia of *Basilepta fulvicornis*: **34e–f:** Aedeagus, **34e.** Dorsal view, **34f.** Lateral view. **34g.** Spiculum gastrale, spiculum relictum & 8th tergite, **34h.** Tegmen



Figures 34i–l: Endophallus of *Basilepta fulvicornis*: **34i.** Endophallus everted through ostium, **34j.** BP, **34k.** MP, **34l.** AP.

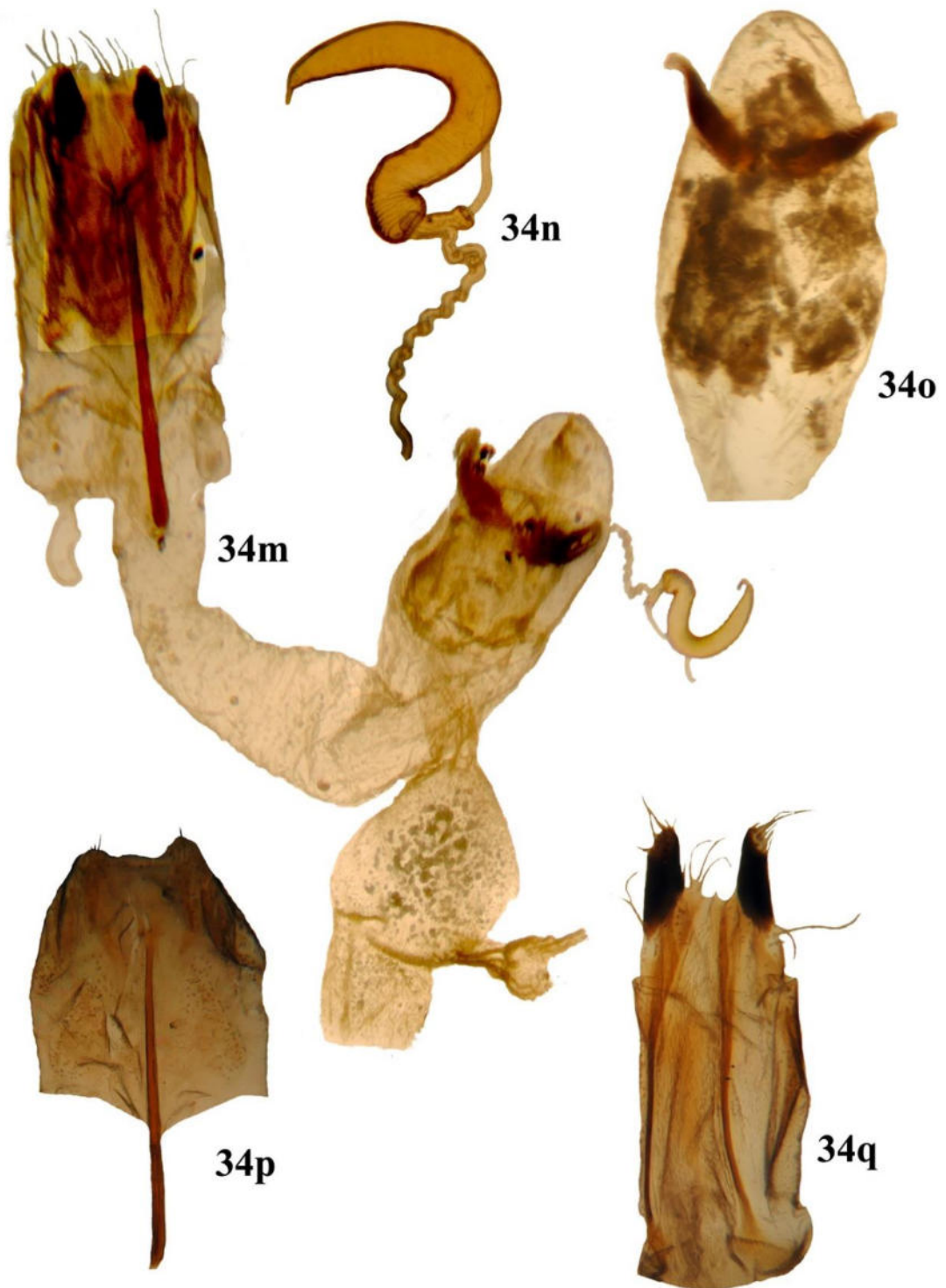


Figure 34m–q: Female genitalia of *Basilepta fulvicornis*: **34m.** Female genitalia ventral view, **34n.** Spermatheca, **34o.** Bursa sclerites, **34p.** Eighth sternite & tignum, **34q.** Ovipositor

lobes on either side; median phallomere starts with paired central sclerites dorsally, long tubular, longest portion with setae or hair-like spicules with a few circular spicules medially; apical phallomere wider than median lobe, asymmetrical, bears different types of spicules such as hair-like ones in basal area followed by triangular ones along with a few circular spicules, triangular spicules of varying sizes, circular spicules and diamond shaped spicules closely arranged along with a side lobe with triangular sclerites; extreme apex with one small lobe on one side and one large lobe on other side adorned with circular and hair like spicules.

Female genitalia with spermathecal capsule S-shaped; proximal area narrow, gently curved; spermathecal gland tubular, attached at base of proximal area; spermathecal duct coiled, attached laterally on proximal area; distal region curved like a question mark, subacutely narrowed towards distal end; spermathecal gland long, tubular; spermathecal capsule 4.7 times longer than maximum width; bursa copulatrix sac like, with paired bursa sclerites, spermathecal duct joins bursa copulatrix in between these sclerites, median oviduct attached at base of vagina; ovipositor elongate, sclerotized distally with long setae, stylus absent. 8th sternite and 8th tergite fused laterally and form a membranous tube with mild sclerotizations laterally. 8th sternite bears a long tignum, longer than ovipositor.

Distribution. India (Karnataka, Kerala, Tamil Nadu).

Remarks. *Basilepta fulvicornis* (Jacoby) closely resembles *B. subcostata* Jacoby and *B. viridipennis* Motschulsky. *Basilepta subcostata* is characterized by a distinct humeral ridge on the lateral area of elytra and is smaller in size, body length 2.34 –3.00 mm, width 1.36 – 1.86 mm (*Basilepta fulvicornis* has a weak humeral ridge laterally and is comparatively larger in size, body length 3.6 –4.4 mm; width 2.5 –3.1 mm). *Basilepta viridipennis* has lateral margins of pronotum forming a distinct obtuse angle posterolaterally and its lateral margins abruptly converge anteriorly (*B. fulvicornis* has lateral margins acutely angulate and converging anteriorly to a lesser degree).

Material examined (104 specimens). 18♀, 11♂ & 32 unsexed “India: Kerala/ CRS, Pampadumpara/ 23.iv.2018 /9⁰48’ 23.7” N 077⁰ 10’ 4.9”E/ AKS & SRH Coll./ Ex. Cardamom” 8♀, 9♂ & 26 unsexed with same collection data except date 25/iv/2018.

Host plants. *Elettaria cardamomum* (L.) (Cardamom), *Schumannianthus virgatus* Rolfe

Nature of damage. Adult beetles feed on leaves and make round or irregular holes. Grubs are root feeders of cardamom (Nair, 1989).

4.2.1.2. *Basilepta subcostata* (Jacoby, 1889) (Figs. 35 a–x)

Nodostoma subcostatum Jacoby, 1889: Jacoby 1889: 164; Jacoby 1908: 334.

Nodostoma cyanipenne: Lefèvre 1893: 120; Kimoto and Gressitt 1982:

51 (synonymy).

Basilepta subcostatum: Kimoto 1967: 69; Medvedev 1990: 8–9; Chûjô 1964: 268–269.

Basilepta subcostata: Kimoto and Gressitt 1982: 51; Sprecher-Uebersax 1997: 144; Medvedev and Sprecher-Uebersax 1999: 288; Kimoto 2001: 27; Medvedev 2001: 608; Kimoto 2005: 31–32; Moseyko and Sprecher-Uebersax 2010: 639; Prathapan *et al.*, 2019: 179–202.

Description. Refer Prathapan *et al.*, 2019

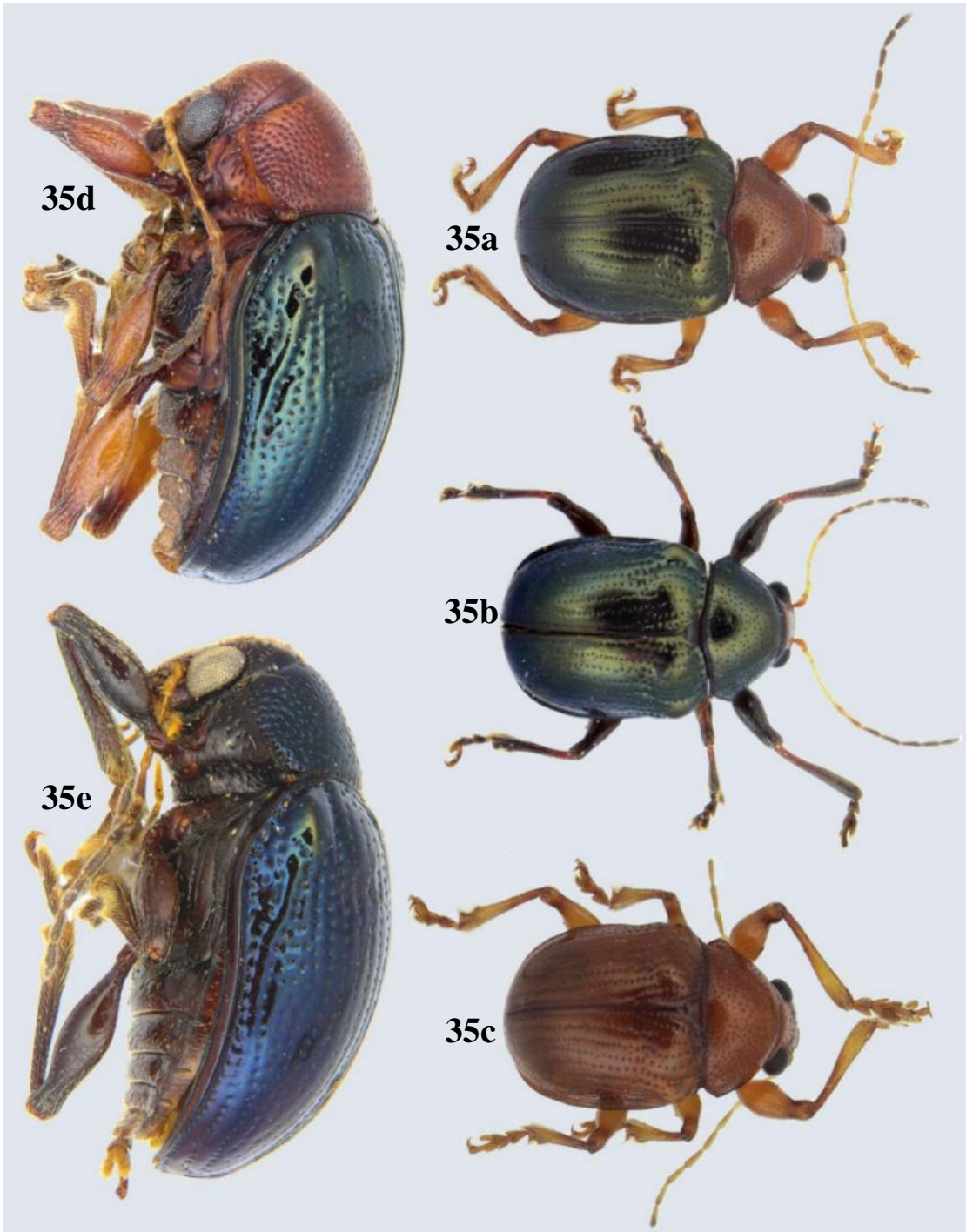
Host plants & Bioecology. Refer Prathapan *et al.*, 2019

4.2.1.3. *Basilepta* sp.1 (Figs. 36 a–r)

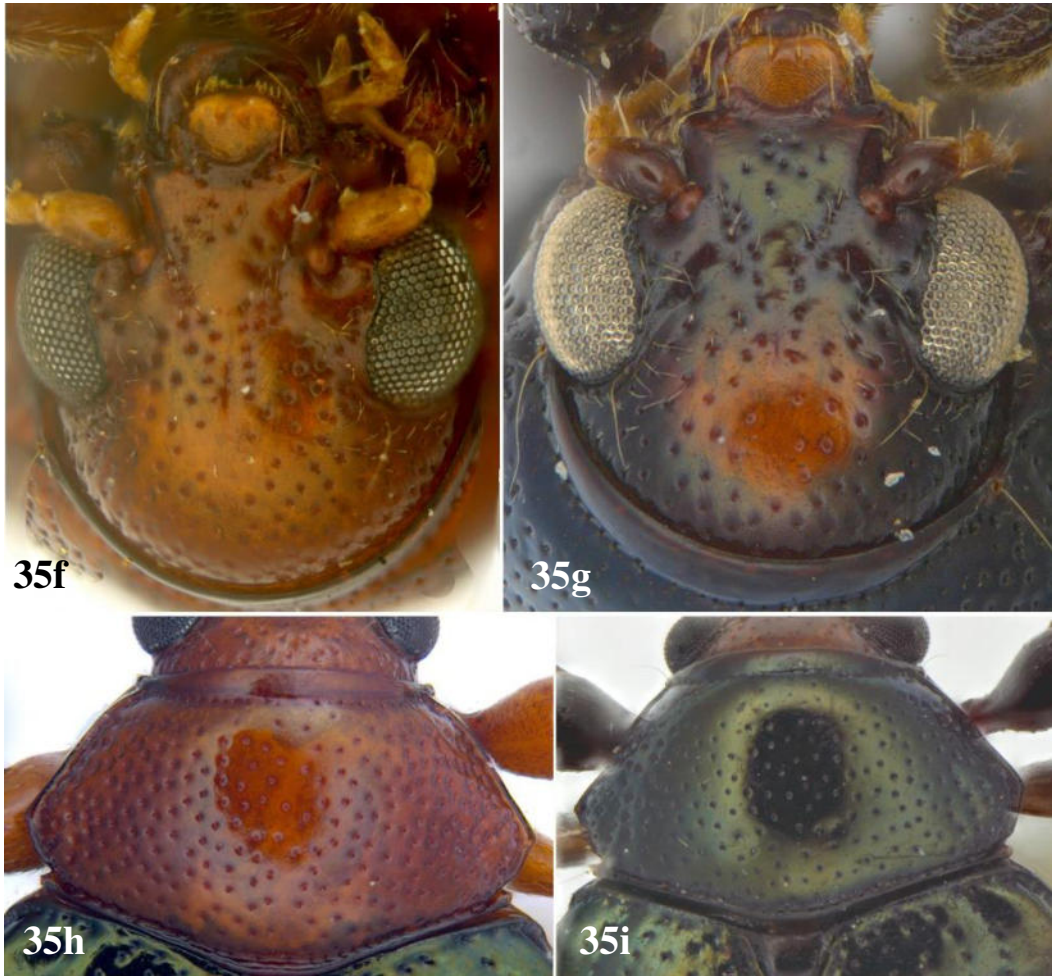
Description

Body length 3.9 – 4.7 mm; width 2.2 – 2.6 mm, oblong, shiny; light yellow to orange brown, except tip of antennae and mandibles piceous.

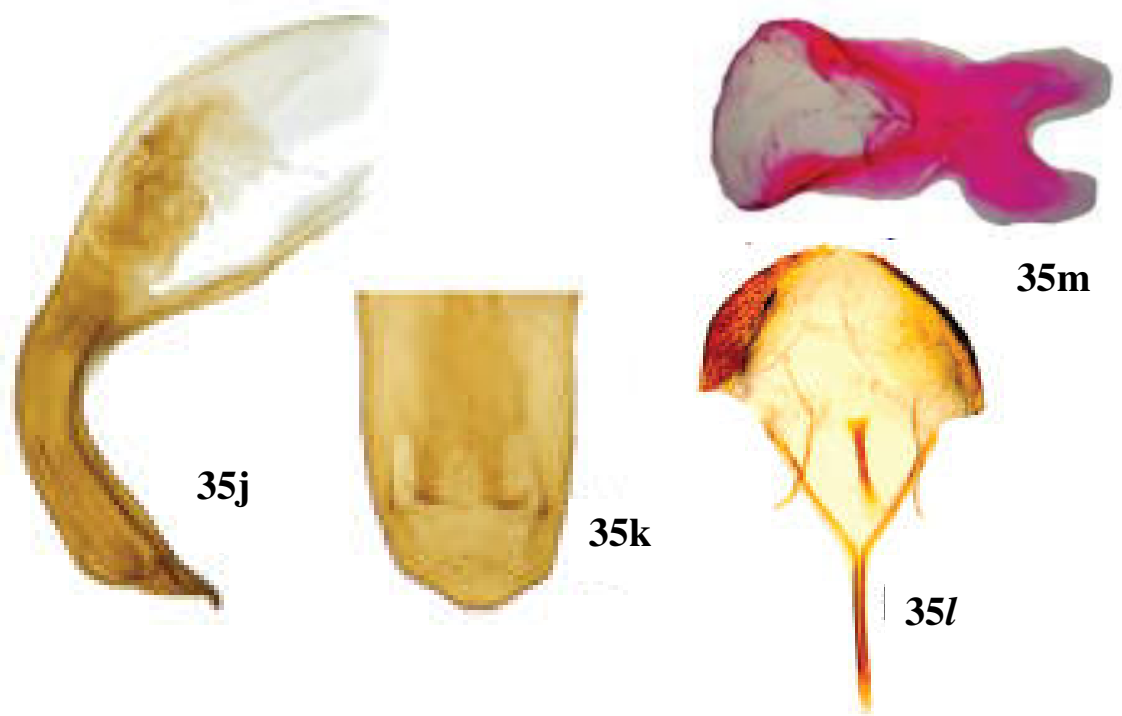
Head with small, profuse punctures bearing short setae; punctures smaller than those on pronotum; coronal sulcus weak but evident, frons and vertex hardly differentiated; punctures on frons stronger than those on vertex; suprafrontral sulcus indistinct; antennal calli distinct, raised, trapezoidal; supracallinal sulcus distinct with a few bold punctures; orbital sulcus weak but distinct; supraorbital pore adjacent to dorsal margin of eye, raised, rounded with a short seta; clypeus reduced to a narrow strip, gently emarginated anteriorly; labrum broader than long, with a pair of widely placed setose punctures in middle and a pair of setae anterolaterally; anterior margin with short setae, absent in middle, apical margin emarginate medially; mandibles with two denticles, laterally with a few setae; **compound eyes** situated laterally on head, with inner margin feebly emarginate, transverse diameter 1.5 – 1.8 times vertical, distance between



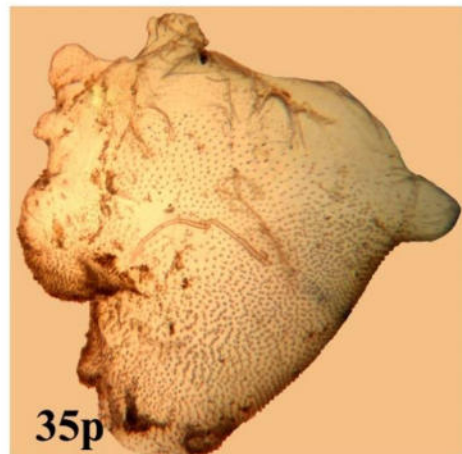
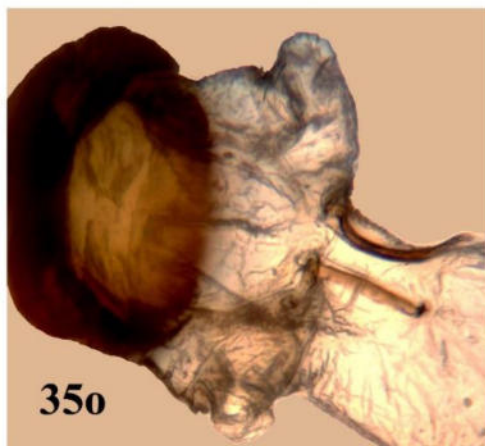
Figures 35a–e: *Basilepta subcostata* Habitus: **35a–c.**Dorsal view of variants 1, 2 & 3; **35d–e** Lateral view of variants



Figures 35f–i: *Basilepta subcostata* Head and pronotum: 35f –g. Head front view; 35h–i. Pronotum



Figures 35j–m: Male genitalia of *Basilepta subcostata*: **35j–k:** Aedeagus; **35j.** Lateral view, **35k.** Ventral view; **35l.** Eighth tergite, Spiculum gastrale & Spiculum relictum, **35m.** Tegmen.



Figures 35n–q.Endophallus of *Basilepta subcostata*: **35n.** Endophallus completely everted, lateral view, **35o.** Basal phallomere and central sclerite, dorsal view; **35q.** Median phallomere, lateral view, **35p.** Apical phallomere, dorsolateral view.

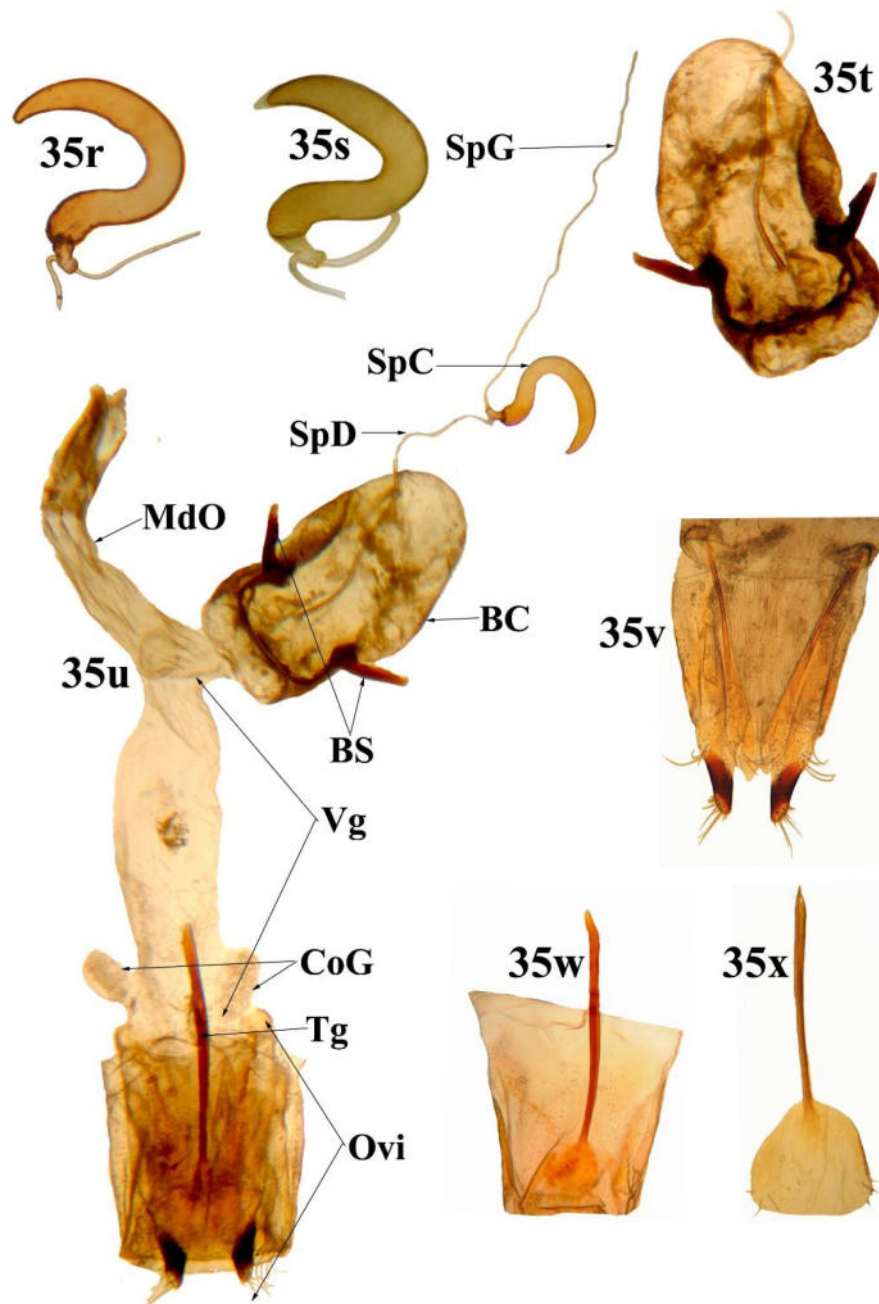


Figure 35r–x. Female genitalia of *Basilepta subcostata*: **35r–s.** Spermatheca, **35t.** Bursa copulatrix; **35u.** Female genitalia, **35v.** Ovipositor, **35w.** Eighth sternite and 8th ventrite along with tignum, **35x.** Eighth sternite and tignum. Abbreviations: SpG = spermathecal gland; SpC = spermathecal capsule; SpD = spermathecal duct; MdO = median oviduct; BC = Bursa copulatrix; BS = bursa sclerite; Vg = vagina; CoG = collateral gland; Tg = tignum; ovi = ovipositor.

compound eyes 1.4 times distance between antennal sockets and 1.7 – 2.5 times transverse diameter of one eye. Antenna subfiliform, extends upto middle of elytra or slightly longer in females and upto 3/4th or even more in males, first antennomere thickest, second shortest, thicker than antennomeres 3 and 4; rest of antennomeres gradually broadened; proximal ones yellow, gradually turns dark brown or piceous distally; proportionate length of antennomeres I to XI 1 : 0.6–0.7 : 1.2 : 1.2–1.5 : 1.3 : 1.3 : 1.2–1.3 : 1–1.3 : 1.1–1.3 : 1.1–1.2 : 1.3–1.4.

Pronotum 1.6 – 1.7 times broader than long, posteriorly 1.3 – 1.5 times wider than anteriorly, lateral margins distinctly angulate after middle giving an octagonal appearance, densely punctured; punctures stronger than those on head, weaker than those on elytra; posterior margin gently lobed, scutellum broader than long, broadly rounded posteriorly with triangular sclerotized impression without setae or punctures, punctures apparently stronger and coarser laterally.

Elytra 1.3 – 1.4 times longer than broad, punctate striate with a few countable rows in middle, semiregular or partially confused with some oblique or incomplete striae laterally, punctures turn weaker towards apex; humeral calli prominent, raised with a few punctures and oblique markings; basal calli distinct, post basal depression present; sutural margins subacute; epipleura outwardly oblique, broadest basally, narrowed posteriorly, hardly reaching apex.

Proepisternum depressed; hypomeron with a few bold punctures posteriorly.

Prosternum longer than broad, broader posteriorly than anteriorly with a few punctures; mesosternum broader than long, sparsely setose.

Legs long, femora dialated, minutely dentate ventrally behind middle, longitudinally carinate with rows of setae in between; metatibia with paired, short apical spurs.

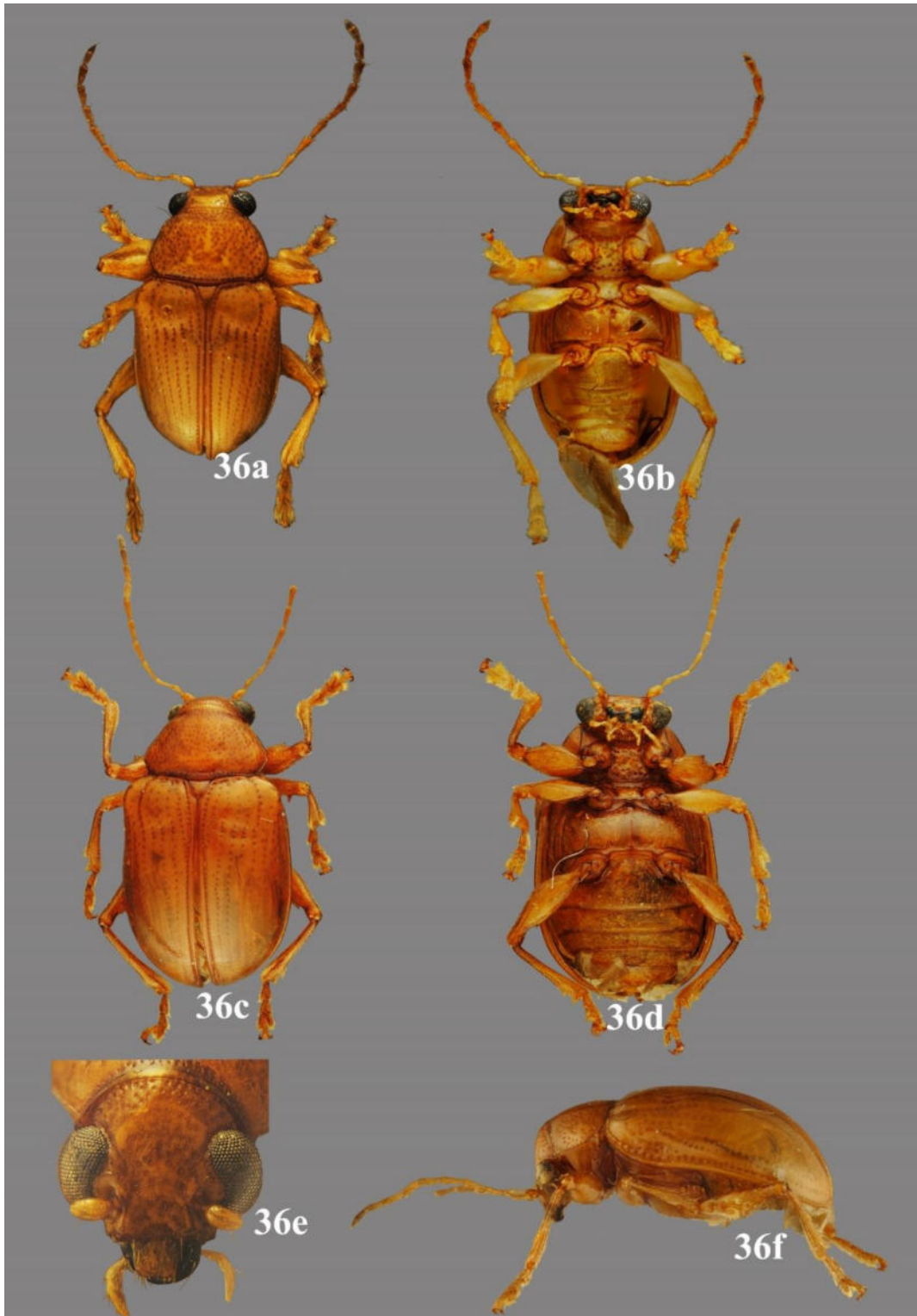
Tarsomeres ventrally fringed with diverse forms of setae; in males pro- and mesobasitarsomeres with closely arranged capitate setae bordered by a row of long pointed setae, meta basitarsomere with a few capitate setae centrally surrounded by numerous pointed setae; in females all basitarsomeres fringed with pointed setae only, second tarsomeres ventrally with pointed setae, bilobed third tarsomeres with triangular or inverted arrow-head-shaped setae ventrally.

Ventrites sparsely pubescent; first ventrite medially longer than following two combined; ventrites 3 and 4 subequal, rest variable in length; last ventrite sexually dimorphic with apex gently concave in females and slightly convex in males; last tergite without longitudinal groove medially.

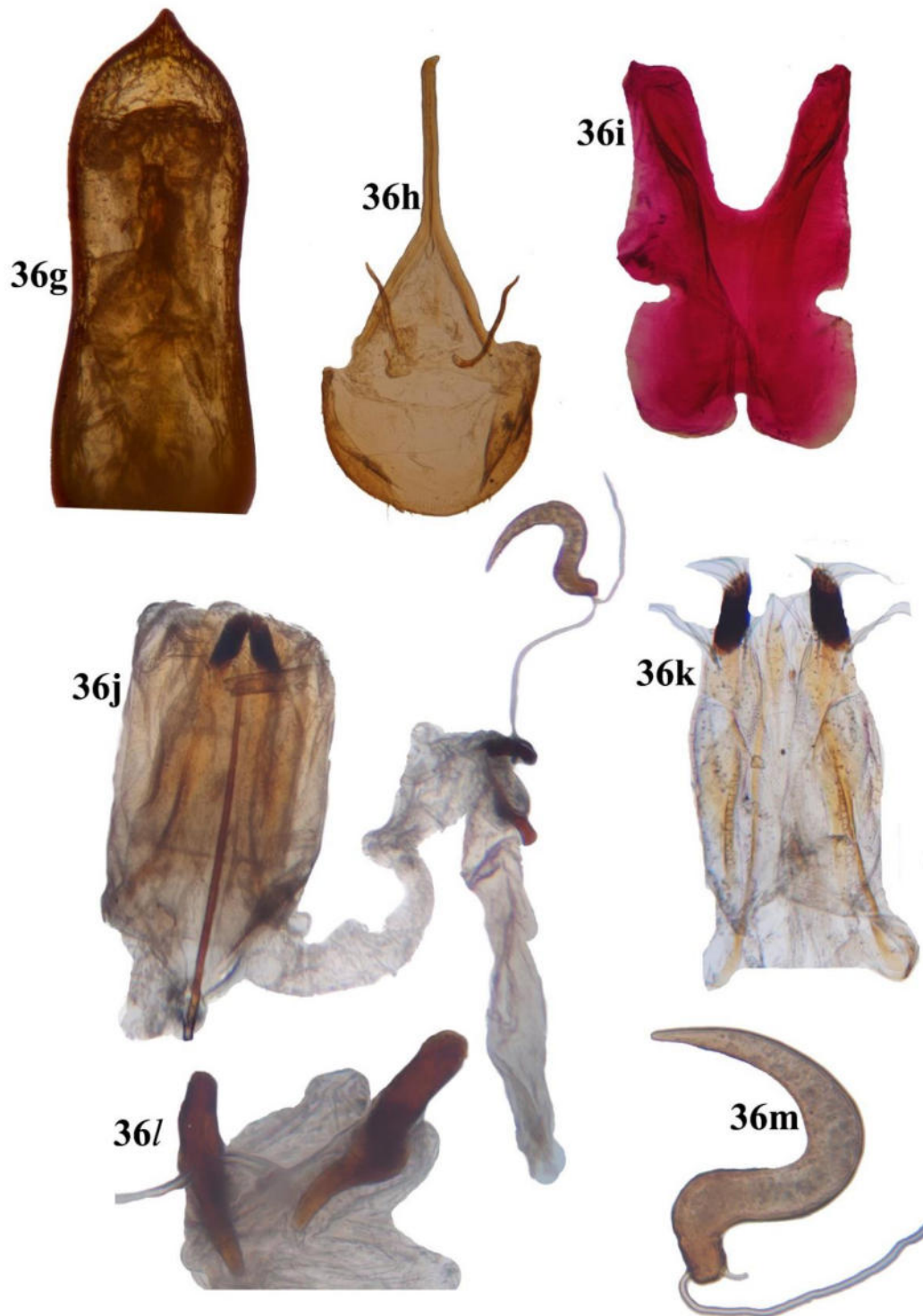
Male genitalia. **Aedeagus**, in lateral view, sharply bent almost at right angle near base of aedeagus proper, apical portion acutely narrowed, slightly recurved dorsad; ventral surface almost flat, dorsal portion slightly concave medially; apex narrowed forming acute denticle, anterolateral angle arcuate. **Tegmen** flat, membranous, lightly sclerotized, bilobed distally, proximally with a pair of arms turning narrow and encircling base of aedeagus proper. **Spiculum gastrale** (second spiculum of Jolivet & Verma 2008) Y-shaped, sclerotized. Tergite VIII semicircular with spindle shaped sclerotization on either side, with short setae apically. Spiculum relictum spoon shaped, distally dilated.

Female genitalia. Spermathecal capsule sickle shaped, proximal portion very short, constricted medially, dumbbell- shaped where spermathecal duct and spermathecal gland joins side by side; distal portion sickle-shaped, sharply curved, subacutely narrowed towards apex, spermathecal gland long, tubular; spermathecal capsule 6.7 times longer than maximum width; bursa copulatrix sac like, longer than wide, with a pair of bursa sclerites on either side; spermathecal duct joins bursa copulatrix between bursa sclerites, median oviduct attached on other side of bursa copulatrix. Ovipositor elongate, sclerotized distally, stylus absent. 8th sternite and 8th tergite fused laterally to form a membranous tube with mild sclerotizations laterally. 8th sternite with a long tignum longer than ovipositor.

Remarks. This species is closely allied to *Basilepta* sp. 4 except mild differences in punctuation and size of the beetle. Both the species with elytra punctate striate, *Basilepta* sp. 1 with reduced punctures on posterior half but in sp. 4, punctures are distinct throughout. Aedeagus of both species are almost similar in structure but shape of apices are different from each other. Tegmen of these two species are entirely different and it can be confirmed that both are distinct.



Figures 36a–f: *Basilepta* sp.1, Habitus: **36a.** Male, Dorsal view. **36b.** Male, Ventral view, **36c.** Female, Dorsal view. **36d.** Female, Ventral view **36e.** Head, frontal view. **36f.** Lateral view.



Figures 36g–m: Genitalia of *Basilepta* sp.1: **36g–i:** Male genitalia. **36g.** Aedeagus Ventral view, **36h.** Eighth tergite, Spiculum gastrale & Spiculum relictum, **36i.** Tegmen. : **36j–m:** Female genitalia. **36j.** Female genitalia, ventral view. **36k.** Ovipositor. **36l.** Bursa sclerite. **36m.** Spermatheca

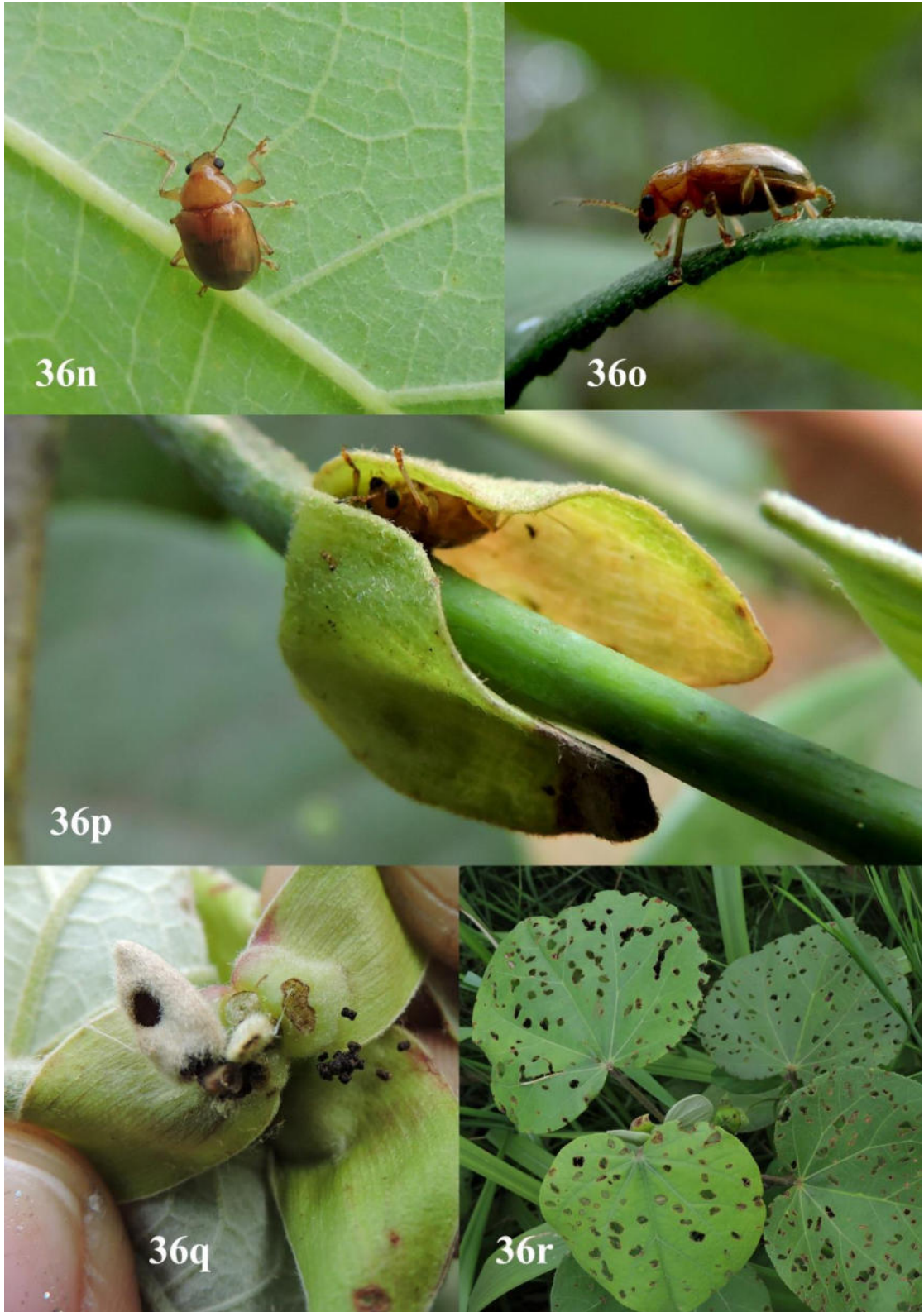


Figure 36n–r: Field photographs of *Basilepta* sp. 1 on *Hibiscus tiliaceus*

Material examined (40 specimens).

25 ♂ and 15 ♀ “India: Kerala/Vellayani/0.08° 24’ 47.5” N 76° 59’ 8.3”/ 15.ix.2017/Amritha & Sangamesh Coll./Ex. *Hibiscus tiliaceus*”.

Host plant. *Hibiscus tiliaceus* L. (Malvaceae).

Nature of damage. Adult beetles feed on the adaxial surface of leaves and make round or irregular feeding troughs leaving the lower epidermis intact. However, the lower epidermis gets torn off after drying, forming round or irregular holes on the lamina. Besides leaves, they were also found feeding on leaf bracts and the terminal buds enclosed inside the bracts, leaving excreta inside the bracts.

4.2.1.4. *Basilepta* sp. 2 (Figs. 37a–h)

Description

Body length 4.4–5.2 mm; width 2.4–2.9 mm, oblong, entirely yellow or yellow brown except mandibles piceous.

Head inserted; sparingly punctate with small and minute punctures; coronal suture short, weak but distinct; suprafrontal sulcus weakly indicated; **frons** almost subquadrate, slightly convex; **clypeus** distinct, reduced; supracallinal sulcus distinct with a row of punctures, often indistinct; **labrum** broader than long with a pair of widely spaced setae in middle, apex sinuate, apical margin with a row of short setae absent in middle; **mandibles** bidentate; **maxillary palpi** with three palpomeres, first and third subequal, middle almost half as long as apical; **labial palpi** with last palpomere subequal to penultimate palpomere, basal palpomere shortest. **Compound eyes** lateral, distinctly sinuate at its inner angle; **orbital sulcus** weak but distinct, vertical diameter of eye 1.5–1.6 times transverse diameter; distance between compound eyes almost twice transverse diameter of eye, 1.3–1.6 times distance between antennal sockets, maximum width of head 3.2–3.5 times transverse diameter of one eye, 1.6–1.7 times distance between eyes and 2.0–2.5 times distance between antennal sockets. **Antennae** long, subfiliform, extends upto 3/4th of elytra; 1st antennomere curved, thick, longer than second, second shortest, 3rd and 4th thin, rest gradually widened, first four antennomeres sparsely setose, apparently smooth, rest thickly covered with short, pointed setae. Proportionate length of antennomeres I to XII: 1 : 0.72 : 1.25 : 1.59 : 1.69 : 1.72 : 1.56 : 1.25 : 1.34 : 1.19 : 1.25.

Pronotum 1.5 times broader than long, posteriorly 1.4–1.6 times wider than anteriorly, profusely covered with small punctures, lateral margin weakly or obtusely angulate post medially, anterolateral and posterolateral callosities slightly project laterally; anterior margin almost straight, posterior margin slightly convex medially; anterior and posterior sulci distinct with a row of punctures; scutellum nearly as broad as long with a triangular sclerotized impression medially, apex broadly rounded.

Elytra 1.3–1.4 times longer than broad, punctate striate, punctures regular in middle of disc, semiregular laterally, reduced in posterior half of elytra; punctures stronger than those on head and pronotum; humeral calli prominent with a few minute punctures; basal calli, post basal depression weak but distinct; **epileura** outwardly oblique, widest basally, gradually narrowed posteriorly, hardly reaching elytral apex.

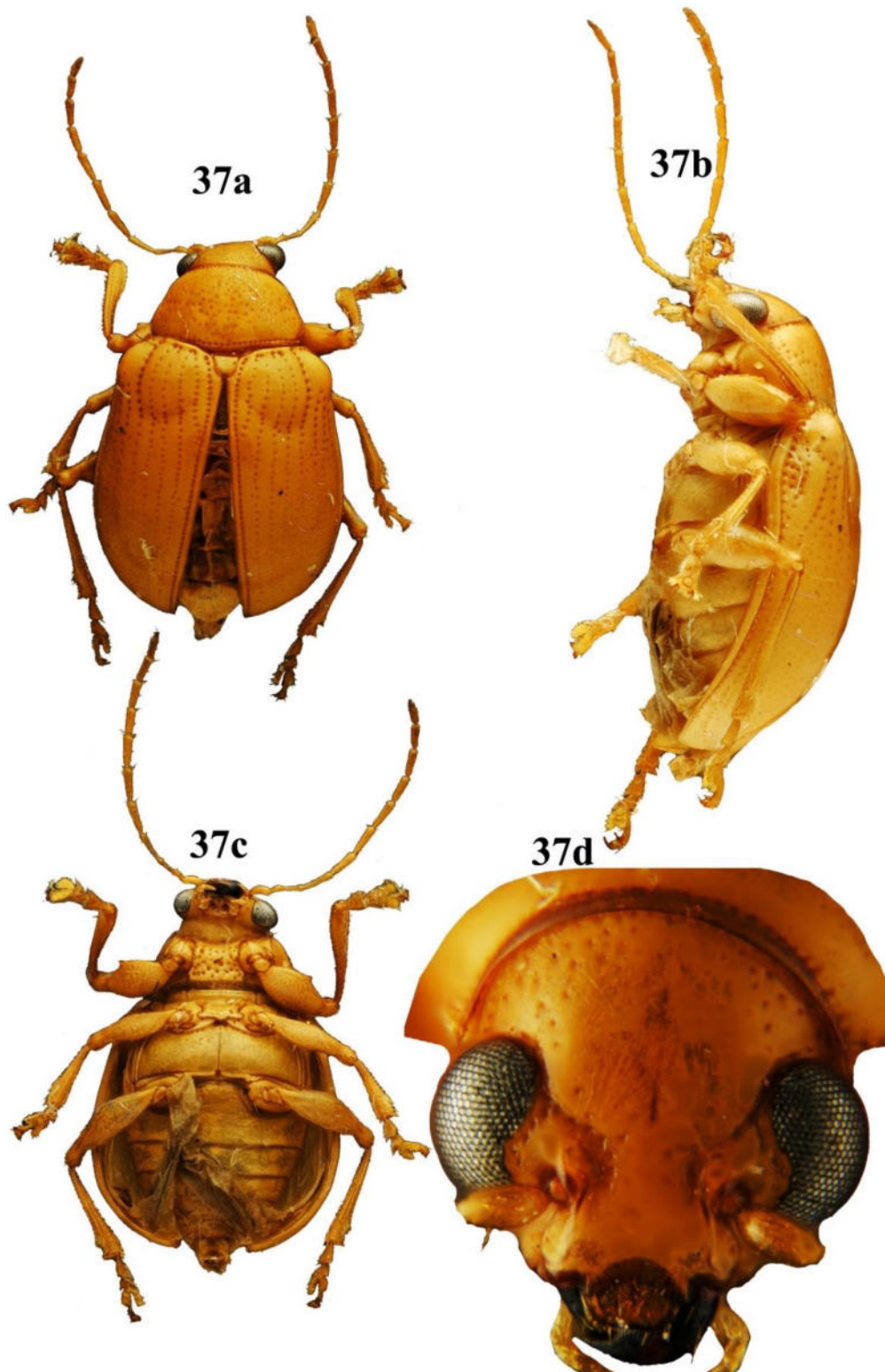
Prosternum broader than long, subquadrate, margins concave except posterior almost straight; punctures bold, setose; mesosternum twice broader than long with a few small punctures.

Propleura concave without setae or punctures, hypomeron with a few punctures on depressed posterior area.

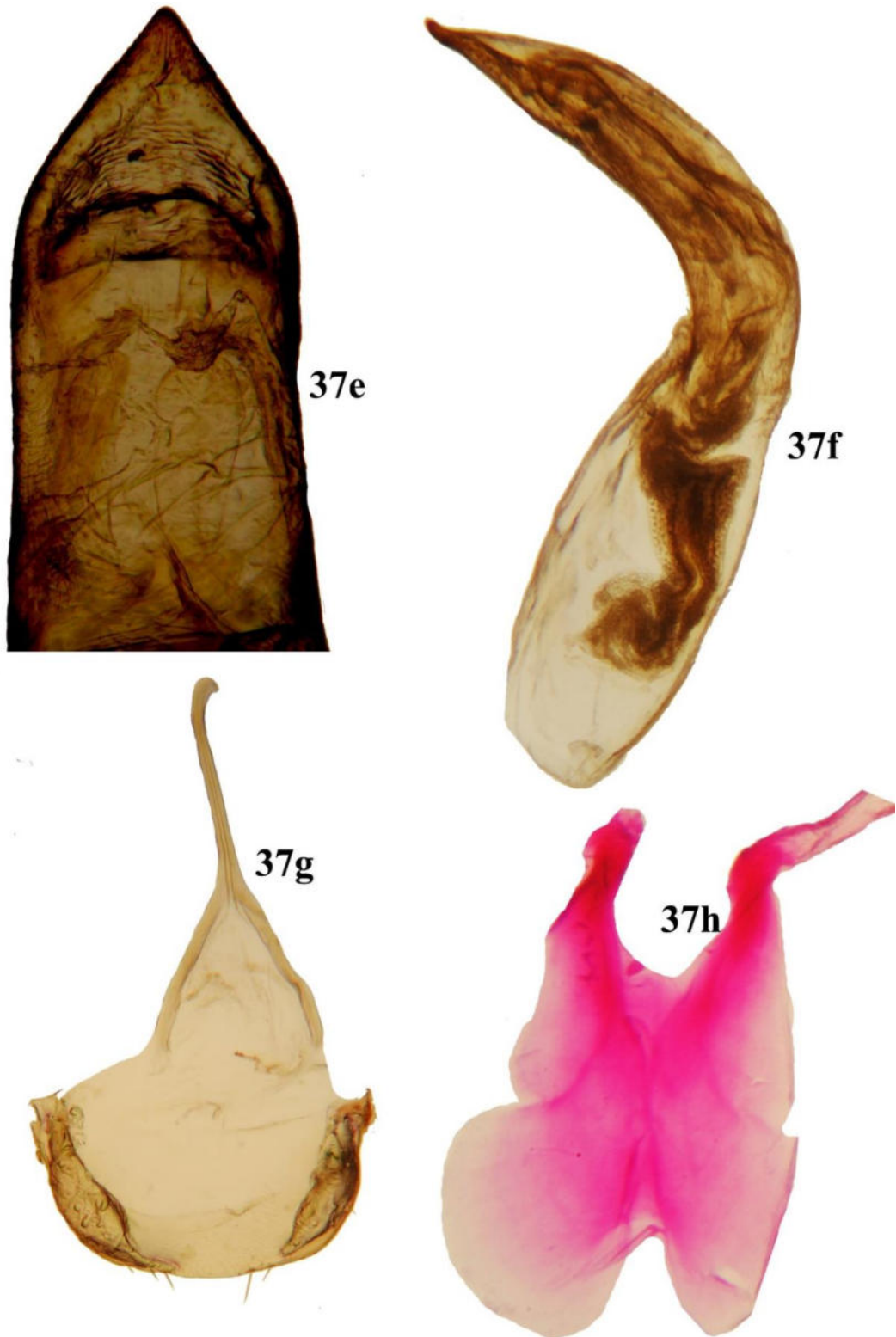
Legs long; femora dilated; toothed beneath; tooth on anterior femur triangular, larger than those on mid- and hind femora; tibia long, longitudinally carinate, posterior and intermediate tibiae with paired short apical spines; **tarsomeres** ventrally fringed with diverse forms of setae: in males, pro- and mesobasitarsomeres with closely arranged capitate setae bordered by long pointed setae, and metabasitarsomere with pointed setae; in females, all basitarsomeres fringed with only pointed setae, second tarsomere ventrally with pointed setae, bilobed third tarsomere with triangular or inverted arrow-head shaped setae ventrally.

Ventrites sparsely, minutely punctate; first ventrite medially longer than following two combined; second slightly longer than rest, 3–5 subequal, apical margin of last ventrite distinctly concave in male, almost straight or slightly convex in female, last tergite without longitudinal groove medially.

Male genitalia with aedeagus in lateral view, sharply bent almost at right angle near base of aedeagus proper, dorsal and ventral sides almost parallel with a narrowed apex ending in acute denticle, slightly recurved dorsad; in ventral view margins parallel,



Figures 37a–d: *Basilepta* sp.2 Habitus: **37a.** Dorsal view, **37b.** Lateral view, **37c.** Ventral view, **37d.** Head, frontal view



Figures 37e–h: Male genitalia of *Basilepta* sp.2: **37e–f:** Aedeagus, **37e.** Ventral view, **37f.** Lateral view. **37g.** Spiculum gastrale & 8th tergite, **37h.** Tegmen

distal 1/4th abruptly narrowed into an acute apex; in dorsal view, apical opening wide. **Tegmen** flat, membranous, lightly sclerotized, bilobed distally with distinctly notched lateral margins, proximally with a pair of narrowed arms encircling base of aedeagus proper through membranous connectives. **Spiculum gastrale** Y-shaped, gently sclerotized. Tergite VIII semicircular with mild sclerotization on either side, with short setae apically.

Female genitalia with spermathecal capsule question-mark-shaped, differentiated into two parts: proximal portion narrow, short, knob-like where spermathecal duct and spermathecal gland attached; distal area curved, sickle-shaped with subacute apex, widened proximally, narrowed distally; bursa copulatrix hardly differentiated from vagina, sac like with a pair of bursa sclerites; spermathecal duct long, attached to bursa copulatrix between bursa sclerites, spermathecal duct short, tubular; median oviduct longer than vagina, eighth tergite and eighth sternite membranous, fused laterally forming a tube with mild sclerotizations laterally; tignum longer than ovipositor.

Material examined: (7 specimens)

1♂ & 1♀ “India:Kerala/COA Vellayani/ 8°25’47.5”N 76°59’8.3”E/ 27.viii.2018 18m/Viswajyothi Coll./Ex. Mango”. 1♂ & 2♀ “India:Kerala/COA Vellayani/ 8°25’47.5”N 76°59’8.3”E/ 28.viii.2018/Amritha Kumari S Coll./Ex. Mango”. 1♀ “India:Kerala/COA Vellayani/20.v.2019/Amritha Kumari S Coll”. 1♀ “India:Karnataka/COH Mudigere/13.1152°N75.6328°E/3.x.2017/Amritha Kumari S Coll.”.

Host plant. *Mangifera indica* L. (Anacardiaceae)

Distribution. India (Karnataka, Kerala).

4.2.1.5. *Basilepta* sp. 3 (Figs. 38a–l)

Description

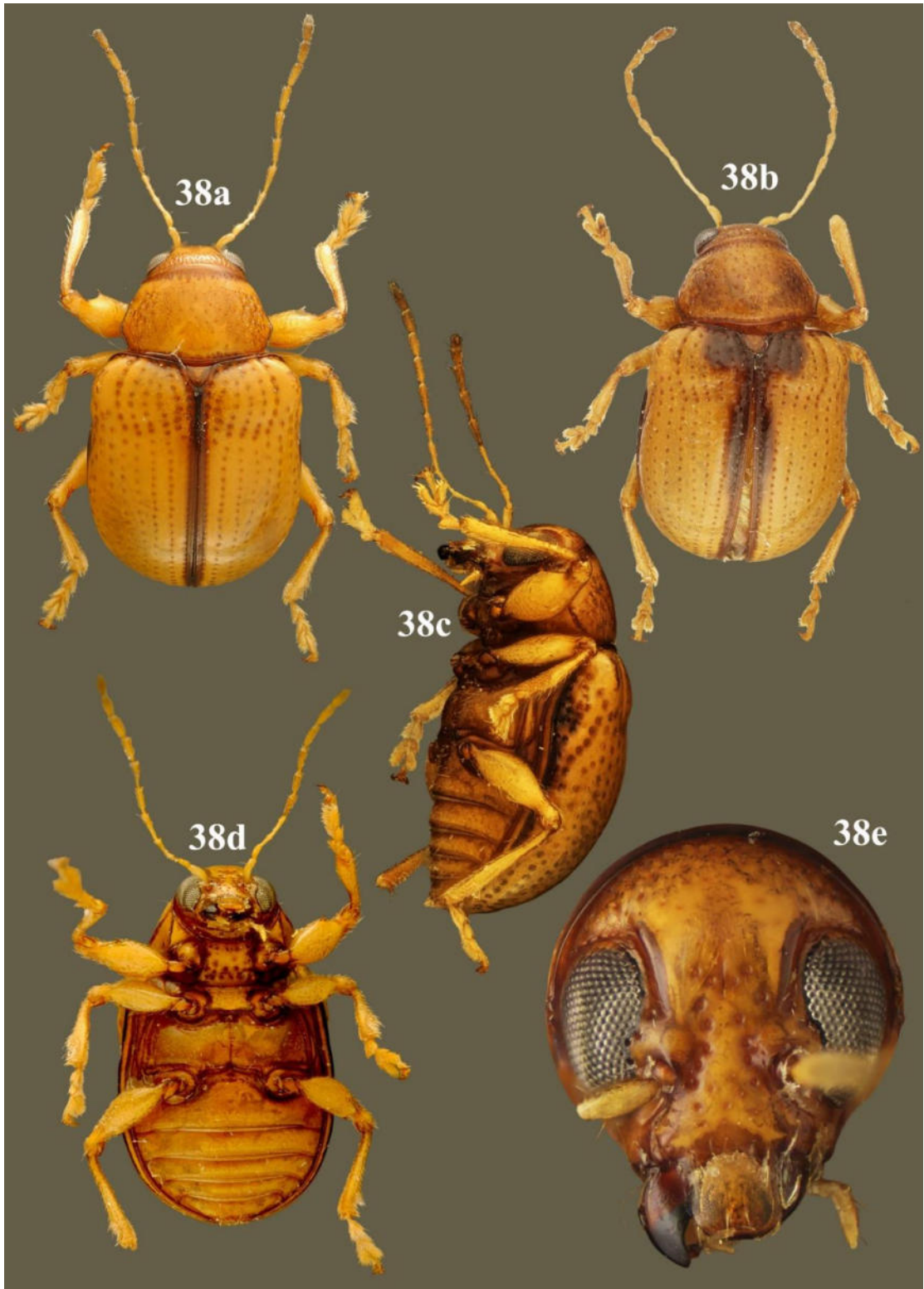
Body length 2.4–3.3 mm, width 1.4– 1.9 mm, ovate, shiny, generally yellow with black or brown margins.

Head with random, bold punctures bearing short, fine setae; frons and vertex with impunctate areas, size of punctures vary; coronal sulcus weak but distinct; suprafrontal sulcus weak, frons and vertex hardly differentiated; antennal calli subquadrate; supraorbital pore distinct, round with a long seta; orbital sulcus deep, marked with a

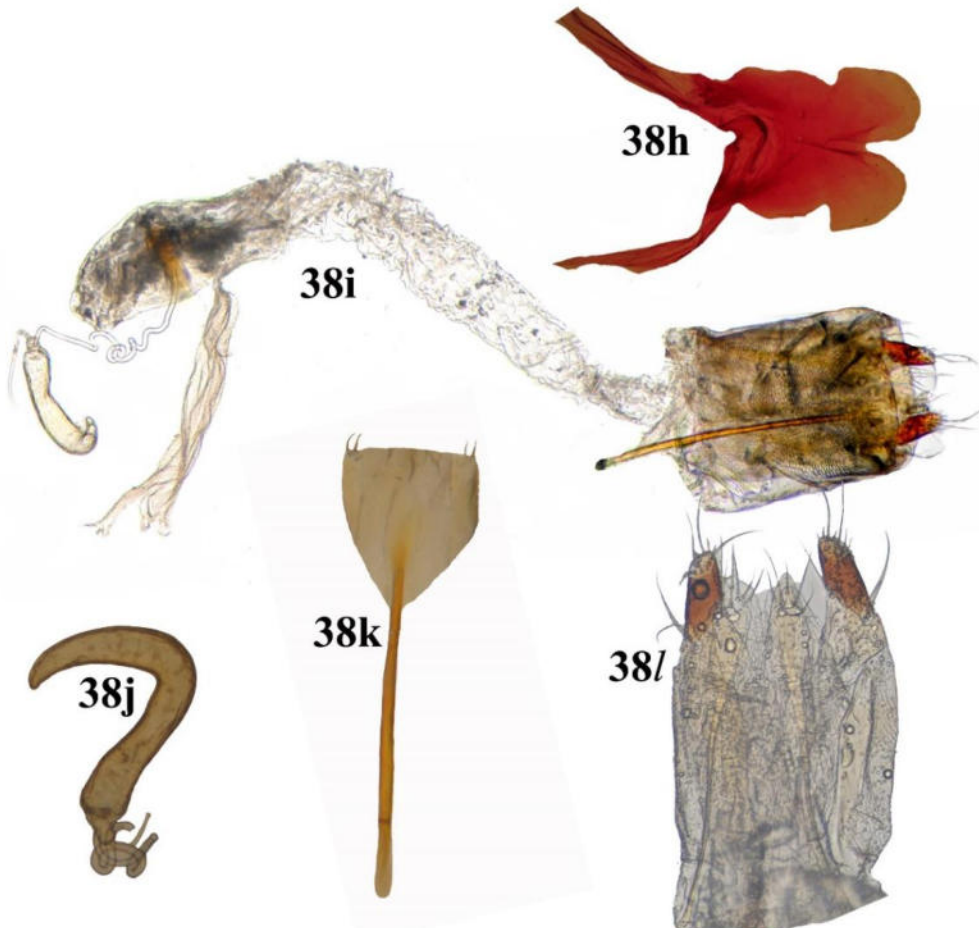
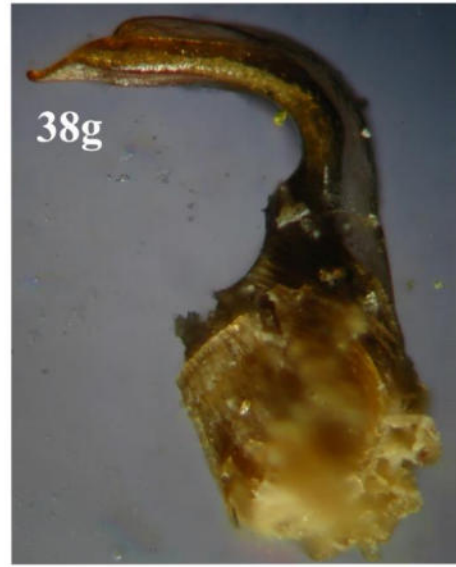
row of punctures, supraorbital pore round, placed near dorsal margin of eye; antennal calli trapezoidal; supracallinal sulcus with a row of setae; **clypeus** reduced, curved, strip-like, anteriorly emarginate; frontoclypeal sulcus distinct with a row of small punctures; **labrum** broader than long with a pair of widely spaced setae preapically, anterolateral corners with a pair of setae each, apex gently sinuate with a row of setae absent in middle; **vertex** granulose with small and minute punctures; frons with a few bold and coarse punctures with impunctate areas in between, **compound eyes** lateral, gently emarginated at inner angle, transverse diameter of eye $1/2$ to $2/3^{\text{rd}}$ vertical diameter, interocular space 1.8–1.9 times transverse diameter of eye, 1.7 times interantennal space, maximum width of head 1.5–2.1 times interocular space, **antenna** subfiliform, extend beyond middle of elytra, rarely beyond $3/4^{\text{th}}$ of elytra; first antennomere thick, longer than second; second shortest, 3^{rd} and 4^{th} thin, rest progressively broadened; **maxillary and labial palpi** with last palpomere longest; maxillary palpi with last palpomere more than two times as long as penultimate, which is shortest; labial palpi with its first palpomere shortest, last palpomere as long as 1.3 times penultimate; **mandible** bidentate apically.

Pronotum 1.4–1.5 times broader than long, posteriorly 1.2–1.3 times wider than anteriorly, with small and medium sized punctures with fine setae; punctures stronger laterally; posteriorly 1.6–1.7 times wider than anteriorly, lateral margins angulate in posterior half; posterior margin gently lobed, anterolateral and posterolateral callosity distinct; anterior sulcus distinct and complete, posterior sulcus deeper with a row of punctures. **Scutellum** broader than long, narrowly rounded posteriorly, with minute punctures.

Elytra 1.25 times longer than broad, regularly punctate; punctures small, bearing short fine setae; in posterior half, punctures weak, partially confused or semiregular with incomplete or broken striae; punctures on elytra broader than those on pronotum, distance between rows of punctures more than distance between adjacent punctures in a row; humeral calli prominent with oblique marks and a few punctures; basal calli distinct with rows of punctures; post medial depression distinct, rarely with a brown spot medially; a weak costa arise from posterolateral margin of elytra.



Figures 38a–e: *Basilepta* sp.3 Habitus: **38a–b.** Dorsal view, **38c.** Lateral view, **38d.** Ventral view, **38e.** Head, frontal view



Figures 38f–l: Genitalia of *Basilepta* sp.3: **38f–h:** Male genitalia. **38f.** Aedeagus dorsal view, **38g.** Aedeagus, lateral view, **38h.** Tegmen. : **38i–l:** Female genitalia. **38i.** Female genitalia, ventral view. **38j.** Spermatheca. **38k.** Eighth sternite & tignum. **38l.** Ovipositor.

Proepisternum with anterior margin concave with a few punctures; hypomeron posteriorly depressed with a few bold punctures.

Legs with all femora dilated with a minute tooth beneath, tooth on fore femur larger, tibiae longitudinally carinate with rows of punctures; intermediate and posterior femora emarginate preapically; metatibia with small, paired apical spurs, tarsomeres ventrally fringed with setae of varying shape, basitarsomere in males with capitate setae and pointed setae in females.

Prosternum slightly longer than broad medially; strongly punctate, setose; mesosternum distinctly broader than long with small punctures.

Ventrites finely pubescent, first ventrite almost equal to following two combined medially, ventrites 1 to 4 each shorter than preceding one, apex of last ventrite concave.

Male genitalia with aedeagus in lateral view, sharply bent almost at right angle near base of aedeagus proper, apical portion acutely narrowed, slightly recurved dorsad; ventral plate depressed, apex narrowed forming obtuse denticle; dorsal apical opening wide, partially covered by a lamina with a pair of sclerotized stripes fused basally and joining dorsal surface. **Tegmen** flat, membranous, lightly sclerotized, bilobed distally, proximally with a pair of arms narrowed and encircle base of aedeagus proper. **Spiculum gastrale** (second spiculum of Jolivet & Verma 2008) Y-shaped, sclerotized. Tergite VIII semicircular with spindle shaped sclerotization on either side, with short setae apically. Spiculum relictum spoon shaped, distally dilated.

Female genitalia with spermathecal capsule sickle shaped, proximal portion very short, dumbbell-shaped where spermathecal duct and spermathecal gland joins side by side; distal portion sickle-shaped, sharply curved, subacutely narrowed towards apex, spermathecal gland long and tubular; bursa copulatrix sac like, longer than wide, with a pair of bursa sclerites on either side, spermathecal duct joins bursa copulatrix between these sclerites, median oviduct attached on other side of bursa copulatrix; ovipositor elongate, sclerotized distally, stylus absent. 8th sternite and 8th tergite fused laterally to form a membranous tube with mild sclerotizations laterally. 8th sternite with a long tignum longer than ovipositor.

Remarks. *Basilepta* sp. 3 has a deep orbital sulcus, especially near the inner margin of the eyes. Deep and wide orbital sulcus is the distinguishing feature of *Pagria*, hence

this species is an intermediate between *Basilepta* and *Pagria* (Alexey Moseyko, personal communication).

Material examined: (98 specimens)

2 ♀ & 4 unsexed “India:Goa/Cavelossim/N 15°10’15.0”/E 73°56’41.8 8m/4.x.2015/Prathapan K D Coll.” 1 ♂, 1 ♀ and 15 unsexed same data with host recoed Ex. Cashew. 3 ♀ and 9 unsexed same data except host Ex. Mango. 8 ♂, 3 ♀ and 14 unsexed “India:Kerala/Kasarkode/COA Padnekkad/5.i.2018/Amritha Kumari S Coll./Ex. Cashew” 7 ♂, 4 ♀ and 14 unsexed same data except host Ex. Mango. 1 ♀ & 11 unsexed “India:Kerala/COA Vellayani/29.i.2018/Amritha Kumari S Coll./Ex. Mango”. 1 ♀ “India:Kerala/Kayamkulam/Kandalloor North/10.iv.2018/ Amritha Kumari S Coll.

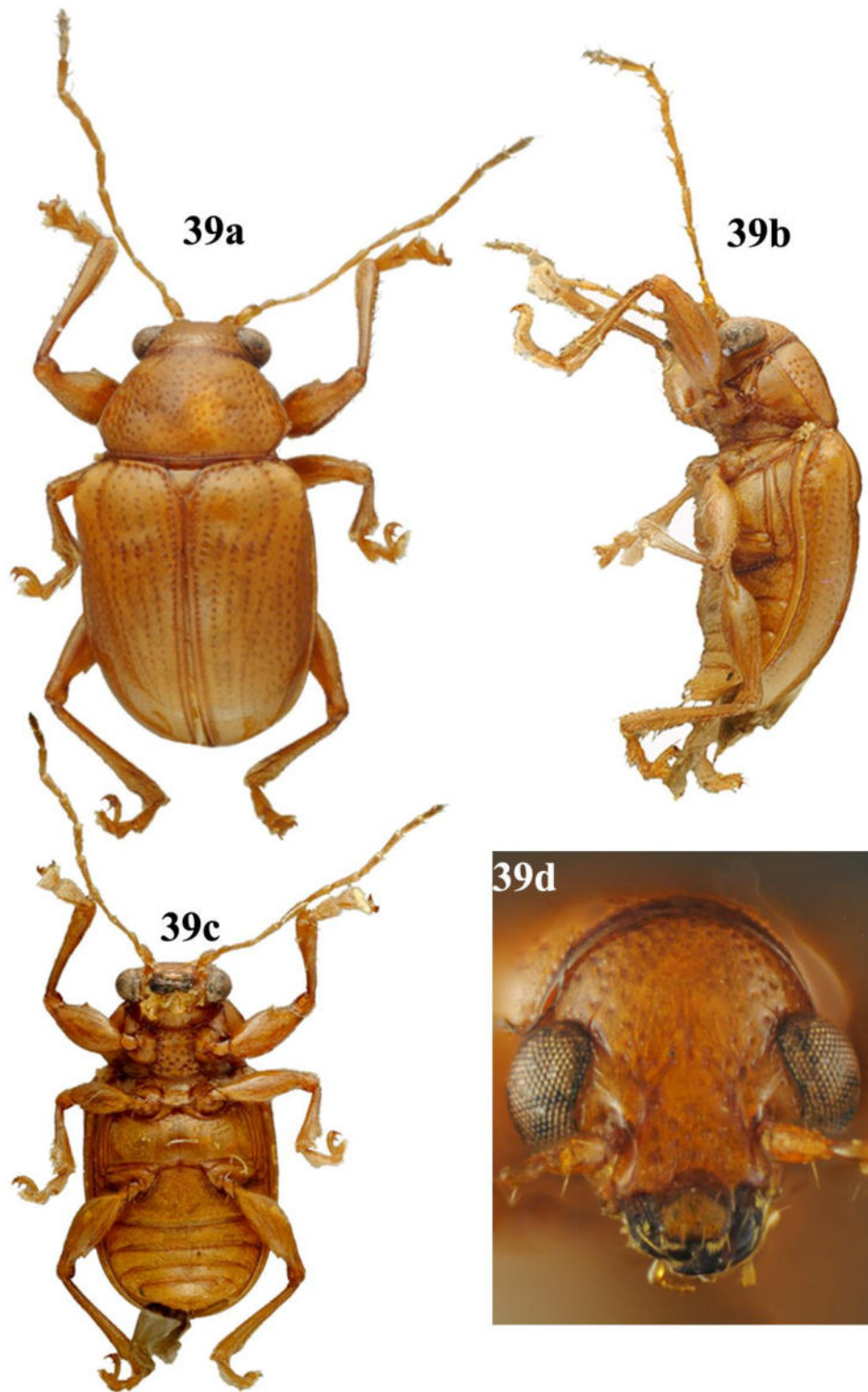
Host plants. *Anacardium occidentale* L., *Mangifera indica* L. (both Anacardiaceae).

Distribution. India (Goa, Kerala).

4.2.1.6. *Basilepta* sp. 4 (Figs. 39a–m)

Description

Body length 4.3–5.1 mm, width 2.3– 2.9 mm, oblong, shiny, entirely red brown except last two antennal segments and mandibles piceous; **head** profusely punctured with impunctate areas on frons and vertex, punctures as strong as those on prothorax and elytra; coronal sulcus weak but distinct; supraorbital pore raised, round, smaller than other punctures on head; orbital sulcus distinct; antennal calli distinct, raised, almost trapezoidal; supracallinal sulcus with a row of punctures; suprafrontal sulcus indistinct, frons and vertex hardly differentiated; frons sloping anteriorly; clypeus reduced, anterior margin emarginated; labrum broader than long with a pair of broadly placed setose punctures in middle and a pair of setae anterolaterally; anterior margin with a row of thick short setae discontinuous in middle, anterior margin emarginate medially; mandibles stout, bidentate apically; antenna long, subfiliform, extends beyond half of elytra; first antennomere thick, longer than second; second shortest, thicker than third and fourth; rest gradually broadened; last 2 or 3 antennomeres piceous; proportionate length of antennomeres I to XI 1 : 0.5–0.6 : 0.75–0.95 : 1.25–1.35 : 1.2 : 1 : 1.2 : 1 : 1–1.1 : 0.9–0.1 : 1.1–1.2. Compound eyes lateral, inner margin emarginate, vertical diameter of eye 1.3–1.6 times transverse diameter, distance between eyes 1.9–2.0 times



Figures 39a–d: *Basilepta* sp.4 Habitus: **39a.** Dorsal view, **39b.** Lateral view **39c.** Ventral view, **39d.** Head, frontal view.

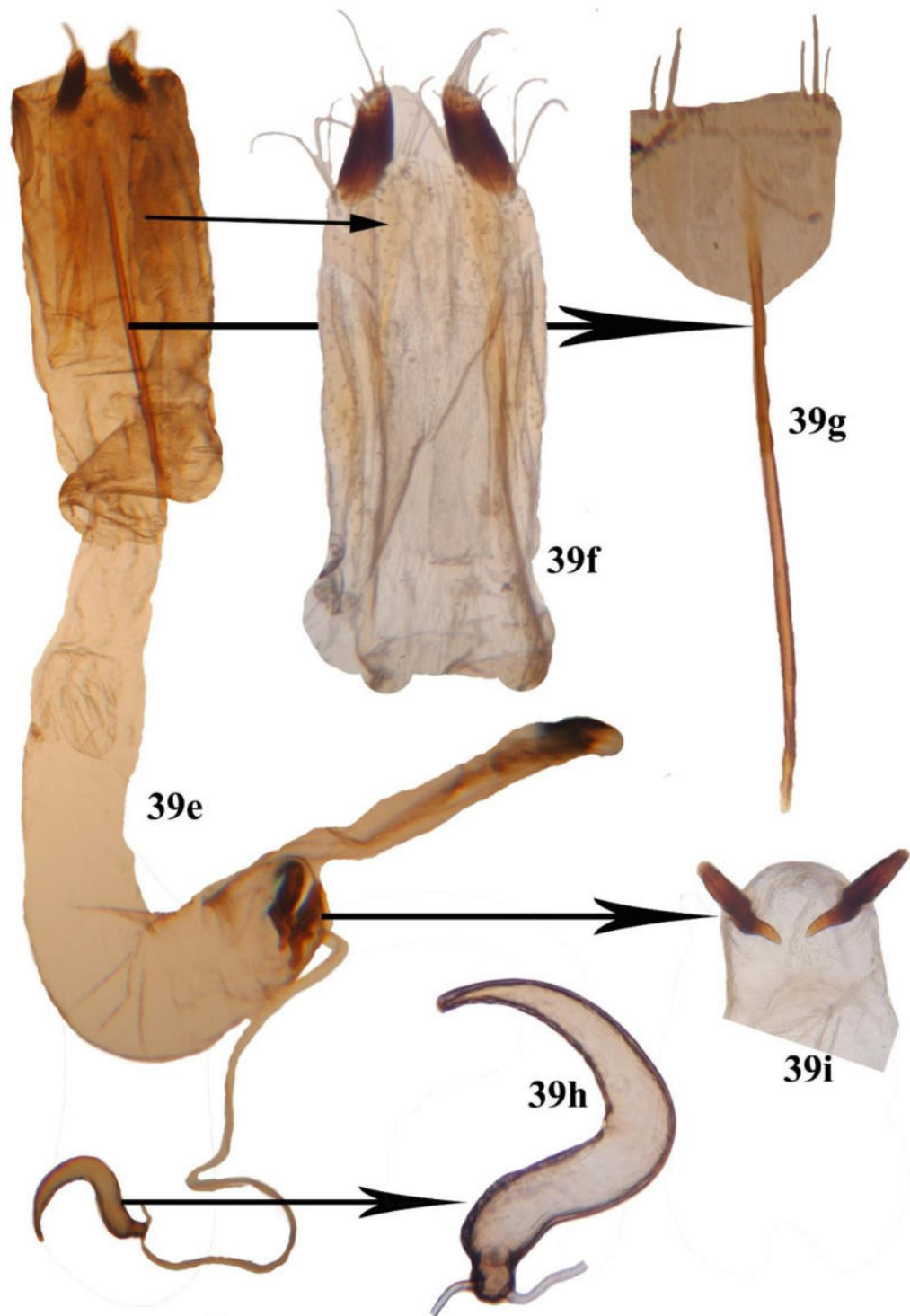
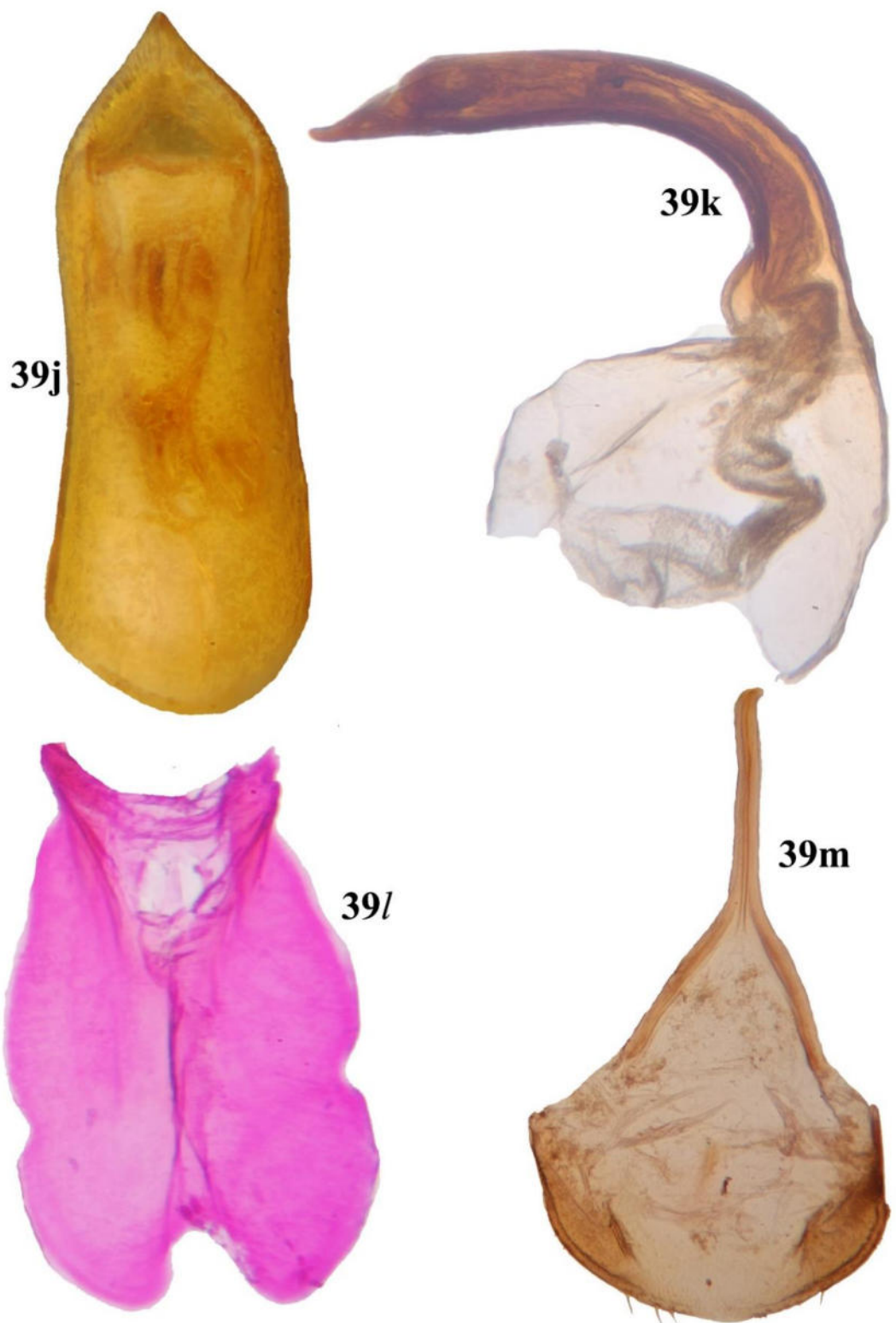


Figure 39e–i: Female genitalia of *Basilepta* sp. 4: **39e.** Female genitalia ventral view, **39f.** Ovipositor, **39g.** Eighth sternite & tignum **39h.** Spermatheca, **39i.** Bursa sclerites.



Figures 39j–m: Male genitalia of *Basilepta* sp.4: **39j.** Aedeagus, dorsal view, **39k.** Aedeagus, Lateral view. **39l.** Tegmen **39m.** Spiculam gastrale & 8th tergite.

distance between antennal sockets, 2.2–2.5 times transverse diameter of one eye; maximum width of head 1.5 times distance between eyes, 2.8–3.0 times distance between antennal sockets .

Pronotum 1.4–1.7 times broader than long, posteriorly 1.5–1.6 times broader than anteriorly, lateral margin distinctly angulate at posterior 1/3rd, octagonal, punctuation profuse with fine setae; posterior margin almost straight, anterior and posterior (antibasal) sulci with a row of punctures.

Elytra 1.2–1.4 times longer than wide, punctate striate, punctures regular with countable rows in anterior half, except punctuation semiregular in lateral area, partially confused towards apex; striae broken or incomplete laterally; distance between adjacent punctures in a row less than distance between rows; scutellar striae more than three times longer than scutellum, scutellum as broad as long, U-shaped with a distinct triangular, sclerotized impression in middle; humeral calli prominent with a few punctures, basal calli distinct with rows of punctures, post basal depression prominent; epipleura outwardly oblique, widest basally, gradually narrowing distally, hardly reaching apex.

Prosternum longer than broad, with bold punctures, with long and fine setae; broader posteriorly than anteriorly; posterior margin straight. mesosternum broader than long, with fine setae,

Proepisternum concave without setae or punctures; hypomeron posteriorly depressed with a few bold punctures.

Ventrites pubescent with long hair like setae; first ventrite medially longer than following two combined, rest of them subequal,

Legs long, femora dialated, all femora with minute teeth ventrally behind middle; tibiae with multiple longitudinal carinae with rows of setae between carinae.

Tarsomeres ventrally fringed with diverse forms of setae, pro- and mesobasitarsomeres with closely arranged capitate setae bordered by long pointed setae and metabasitarsomere with pointed setae in males; in females, all basitarsomeres with only pointed setae, second tarsomere ventrally with pointed setae, bilobed third tarsomere with triangular or inverted arrow-head shaped setae ventrally.

Male genitalia. **Aedeagus**, in lateral view, sharply bent almost at right angle near base of aedeagus proper, acutely narrowed distally, dorsal surface convex, lateral margins concave medially, apical fourth strongly narrowed forming an acute denticle; **tegmen** flat, membranous, lightly sclerotized, distinctly lobed distally, lateral margins sinuate. **Spiculum gastrale** Y-shaped, sclerotized, median arms subequal to lateral arms, median arm gently curved at apex. Tergite VIII semicircular with spindle shaped sclerotization on either side, with short setae apically.

Female genitalia Spermathecal capsule sickle shaped, proximal portion short, almost semicircular where spermathecal duct and spermathecal gland attached side by side; distal portion sickle-shaped, sharply curved medially, proximal half almost subparallel sided, distal half acutely narrowed towards apex, spermathecal gland tubular; bursa copulatrix sac like, with a long sclerite on either side, spermathecal duct joins bursa copulatrix between these sclerites, median oviduct attached on opposite side of bursa copulatrix. Ovipositor elongate, sclerotized distally, stylus absent. 8th sternite and 8th tergite fused laterally to form a membranous tube with mild sclerotizations laterally. 8th sternite with a long tignum longer than ovipositor.

Material examined (21 specimens).

3♂ 3♀ “India: Kerala/Kollam, Kappil/3.vii.2015/Prathapan. K. D. Coll. /Ex. *Rhizophora* sp.” 12♂ 3♀ same collection data except host *Bruguiera* sp.

Host plants. *Rhizophora* sp. and *Bruguiera* sp. (Rhizophoraceae).

Distribution. India (Kerala).

Remarks. This species is closely allied to *Basilepta* sp. 1 except mild differences in punctuation and size of the beetle. Both the species with elytra punctate striate, *Basilepta* sp. 1 with reduced punctures on posterior half. Aedeagus of both species are almost similar in shape of apex differs. Tegmen of these two species are entirely different and it can be confirmed that both are distinct.

4.2.1.7. *Basilepta* sp. 5 (Figs. 40a–m)

Description

Body length 5–5.3 mm; width 3.3–3.4 mm, oblong ovate, shiny, elytra lustrous green; head, pronotum, pleural and sternal regions, mouth parts red brown except labrum yellow; sternal and pleural regions adorned with golden setae, legs with proximal joints

yellow or red brown; tibiae and tarsomeres piceous; antennae with first four antennomeres yellow brown, rest piceous.

Head profusely punctured with very short, fine setae; punctures bold, slightly smaller than those on pronotum; coronal suture very weak but evident near anterior margin of vertex; supraorbital pore adjacent to dorsal margin of eye, smaller than other punctures on head, rounded with a long seta; orbital sulcus weak but distinct with a row of bold punctures; **frons** hardly differentiated from vertex with a long suberect seta on its anterolateral angle; suprafrontal sulcus weak, frons less densely punctured compared to vertex; antennal calli distinct, subquadrate, impunctate, gently raised; supracallinal sulcus with a few bold punctures; **clypeus** distinct, form a narrow curved band with strongly emarginate anterior margin; **labrum** broader than long with a pair of broadly placed setose punctures in middle near apex and a pair of setae anterolaterally; **antenna** subfiliform, extends beyond middle of elytra, first antennomere longer than second, second antennomere shortest, antennomeres 2–4 thin, 5–11 progressively thickened; basal four antennomeres smooth, shiny, sparsely setose, distal seven thickly covered with short pointed setae. Proportionate length of antennomeres I to XI 1 : 0.62–0.74 : 0.86–0.92 : 0.95–1.16 : 0.95–1.16 : 0.90–1.07 : 0.93–1.18 : 0.93–1.13 : 1.07–1.21 : 0.95–1.05 : 1.19–1.26. **Compound** eyes with inner margin slightly emarginated, vertical diameter of eye 1.4 times transverse diameter; distance between eyes 1.8 times distance between antennal sockets and almost $\frac{2}{3}$ rd of maximum width of head; **mandibles** bidentate apically; maxillary palpi with last palpomere longest, about two times as long as penultimate; **labial palpi** with penultimate palpomere longest.

Pronotum 1.4–1.5 times broader than long, posteriorly 1.4 times wider than anteriorly, lateral margins weakly angulate after middle, densely punctate, punctures larger than those on head and elytra, posterior margin gently lobed in middle, posterolateral callosity slightly extends laterally. **Scutellum** wider than long, broadly rounded, almost parallel sided, without setae or punctures.

Elytra 1.2 times longer than wide, punctate striate; punctures small, minute, smaller than those on head and pronotum, partially confused, semiregular, more than 10 rows of punctures, punctation turning weaker posteriorly and stronger laterally; distance between punctures in a row smaller than distance between rows; humeral calli very

prominent with a few minute punctures; basal calli distinct, post basal depression evident; a strong costa arise from posterior margin of humeral calli, curved basally, extends up to middle of elytra, in some cases weak rugosities radiate from costa; sutural angle acute; **epipleura** outwardly oblique with sparse, fine punctures, narrowing post medially, hardly reaching elytral apex.

Prosternum broader than long, with bold punctures bearing setae, lateral margin slightly angulate, **mesosternum** nearly two times broader than long with a few very minute punctures.

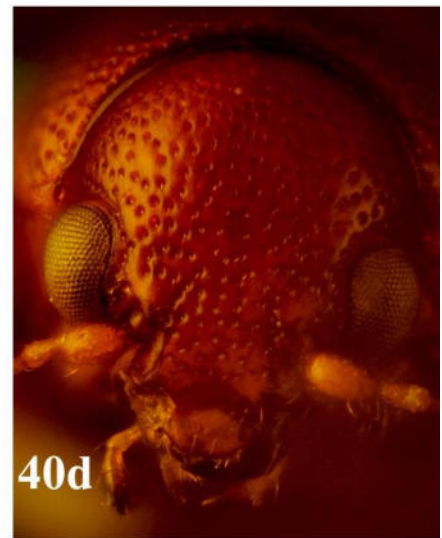
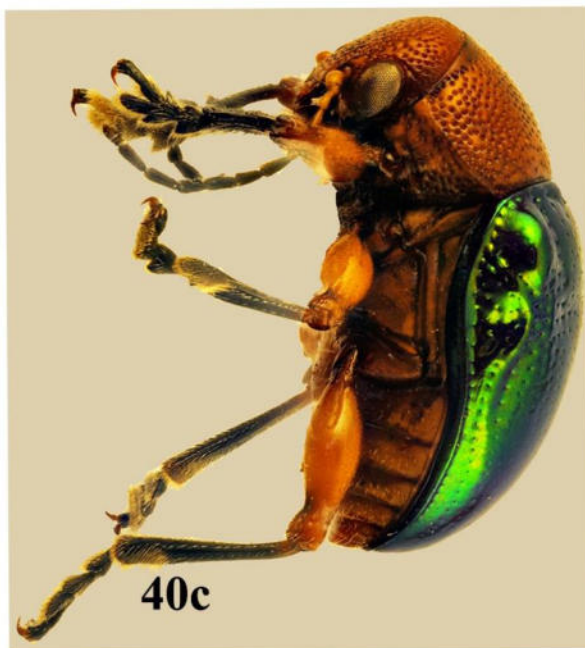
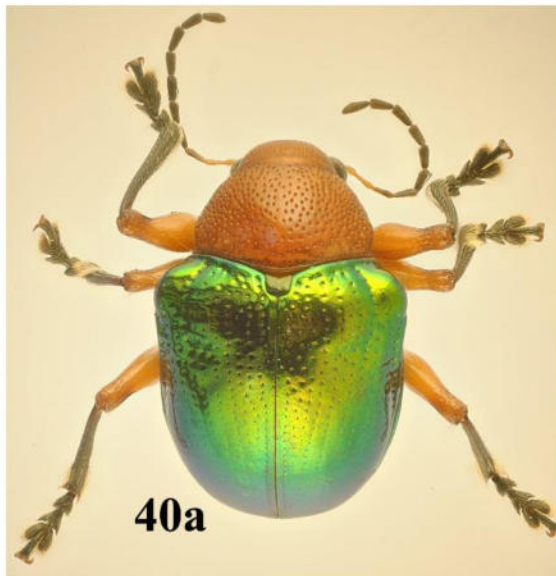
Proepisternum with a few punctures near anterior margin; **hypomeron** with bold punctures.

Legs long, all femora dilated, weakly dentate ventrally beyond middle; **tibia** with 8 longitudinal carinae; **tarsomeres** ventrally fringed with diverse forms of setae, basitarsomere with closely arranged capitate setae bordered by long pointed setae in males; only pointed setae in females; second tarsomere with pointed setae, bilobed third tarsomere with triangular or inverted arrow-head shaped setae.

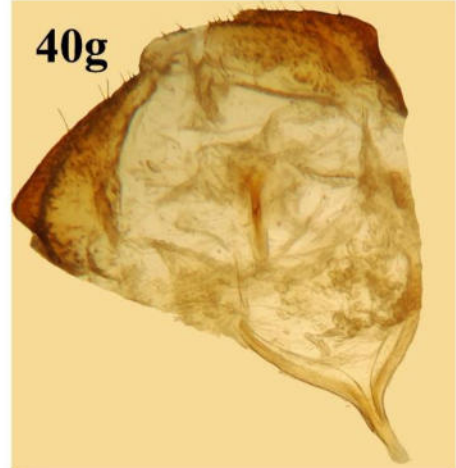
Ventrites sparsely punctate, pubescent; first ventrite medially longer than following two combined, last ventrite hardly dimorphic sexually, last tergite without longitudinal groove medially.

Male genitalia with **aedeagus**, in lateral view, sharply bent almost at right angle near base of aedeagus proper, aedeagus proper slightly curved and almost uniform in width up to apical third, apex narrowed sharply with an acute tip; ventral surface with an excavation or depression at proximal 1/3rd of aedeagus proper; lateral margins gradually narrowed, apex rounded with an acute denticle at apex; median orifice or apical opening wide dorsally; **tegmen** bifurcated distally with U-shaped sclerotization basally, attached at base of aedeagus proper by weak membranous connections.

Female genitalia with spermathecal capsule shaped like a question mark; proximal area very short where spermathecal duct and spermathecal gland attached side by side, distal area sharply curved, acutely narrowed towards distal end; spermathecal gland long, tubular; length of spermathecal capsule 3.2 times its maximum width; bursa copulatrix membranous with a long sclerite on either side and spermathecal duct joins bursa copulatrix in between these sclerites; median oviduct attached at base of vagina where



Figures 40a–d: *Basilepta* sp.5 Habitus: **40a.** Dorsal view, **40b.** Ventral view, **40c.** Lateral view, **40d.** Head, frontal view



Figures 40e–g: Male genitalia of *Basilepta* sp.5: **40e.** Aedeagus, ventral view, **40f.** Aedeagus, Lateral view, **40g.** Spiculam gastrale, spiculam relictum & 8th tergite.

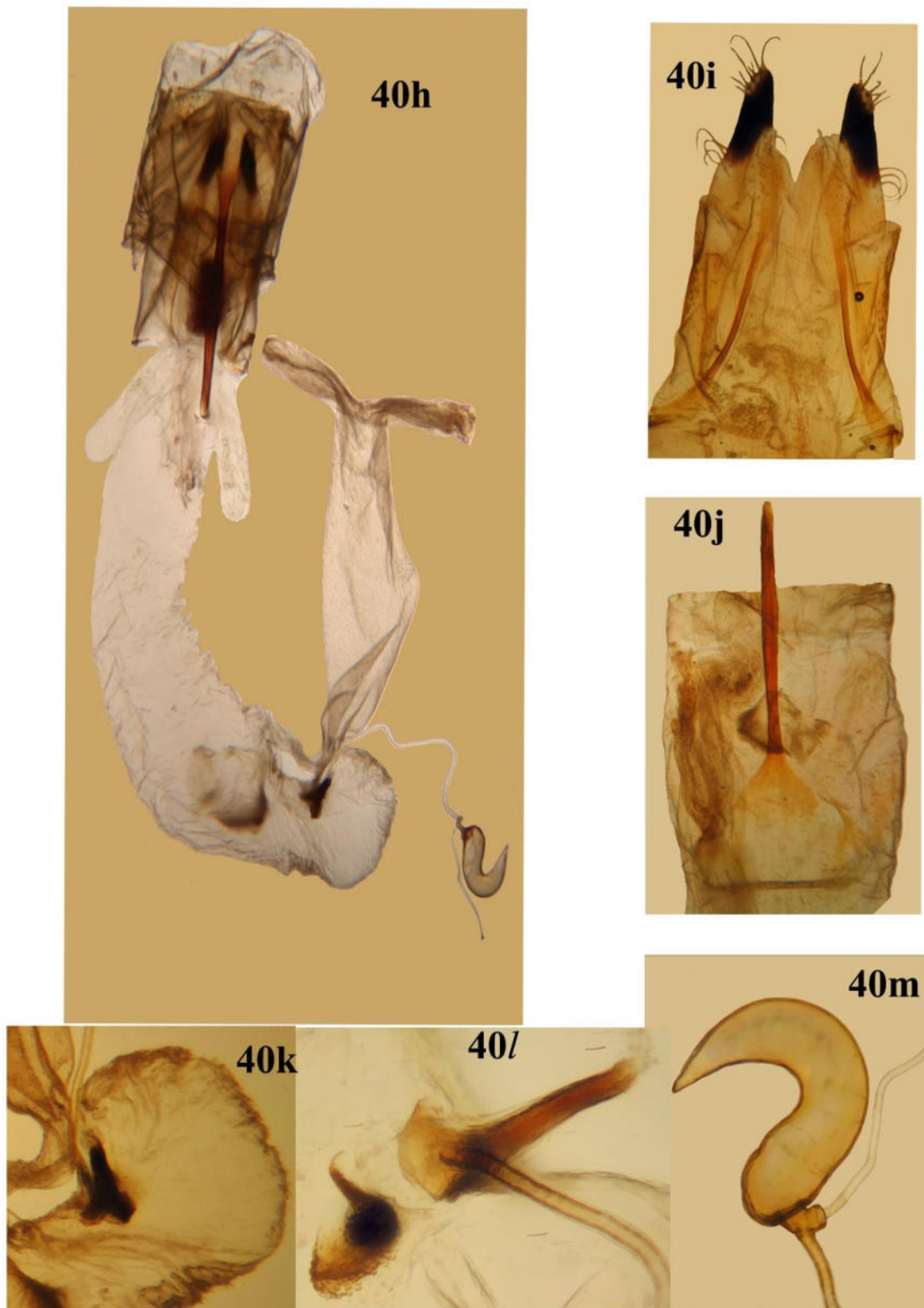


Figure 40h–m: Female genitalia of *Basilepta* sp. 5: **40h.** Female genitalia ventral view, **40i.** Ovipositor, **40j.** Eighth sternite & tignum **40k.** Bursa copulatrix, **40l.** Bursa sclerites, **40m.** Spermatheca

bursa copulatrix attached; ovipositor elongate, sclerotized distally, stylus absent. 8th sternite and 8th tergite fused laterally to form a membranous tube with mild sclerotizations laterally. 8th sternite bears a long tignum, longer than ovipositor.

Distribution. India (Kerala).

Remarks. *Basilepta* sp. 5 is closely related to *B. viridipennis* Motschulsky. The photos of the types of *B. viridipennis* were compared with specimens of *Basilepta* sp. 5, and the only difference noticed was in the shape of pronotum. The lateral margins of pronotum are weakly angulate posterolaterally in *Basilepta* sp. 5 while the same are strongly but obtusely angulate posterolaterally in *B. viridipennis*.

Material examined (2 specimens)

1 ♂ and 1 ♀ “India: Kerala/CRS, Pampadumpara/23.iv.2018/Amritha Kumari S Coll./Ex. *Schumannianthus virgatus*.”

Host plant. *Schumannianthus virgatus* Rolfe. (Marantaceae)

4.2.2. *Bathseba* Motschulsky, 1866

(Type species *B. ferruginosa* Motschulsky, 1866 from Srilanka))

Bathseba Motschulsky, 1866: 412; — de Marschall, 1873; 175 — Geminger & Harold, 1874; 3402 — Scudder, 1882; 37 — Clavareau, 1914; 178 (catalogue) — Seeno & Wilcox, 1982: 65 (checklist) — Medvedev, 2006; 413.

nec Bathseba Dejean, 1836: 411 (Type species *B. transversalis* by monotypy) *Nomen nudum* — D’Orbigny, 1849: 499 — Scudder, 1882; 37 — Sherborn, 1924; 672— Bousquet & Bouchard, 2013: 100.

Tricliona Lefèvre, 1885a (Type species *Tricliona fasciata* Lefèvre, 1885a) **New**

Synonym

Tricliona Lefèvre, 1885: 147 — 1885a: 141 — Clavareau, 1914: 151 (catalogue) — Jacoby, 1908: 469 — Chen, 1935: 289 — 1940: 489 — Jolivet, 1957: 136 — Gressitt & Kimoto, 1961: 202 — Kimoto & Gressitt, 1982: 101 — Seeno & Wilcox, 1982: 53 (check list) — Kimoto, 1985: 176 — Tan, 1994: 94, 97 — Kimotto, 2005: 37 — Tan *et al*, 2005: 10, 12, 15, 17, 18, 136, 333, 353 — Moseyko & Sprecher-Uebersax, 2010:643 — Moseyko, 2011:321 — Romantsov & Moseyko, 2016: 306 & 312 — Moseyko & Romantsov, 2018: 45.

Generic diagnosis. Body oblong, not strongly convex; anterior margin of proepisternum strongly convex; compound eyes sinuate at inner angle, sulcate above; antennae subfiliform; thorax broader than long, narrower than elytra with lateral margins entire and rounded; elytra punctate striate; all femora toothed, tooth on anterior femora very prominent and strongly triangular, intermediate and posterior tibiae emarginated preapically, without apical tibial spurs; claws bifid.

Remarks. Medvedev (2006) redescribed and figured the claw of *B. ferruginosa* as simple. However, on examination of the type specimen, it was observed that there is indeed a shorter and narrower inner lobe of claw as in a few other species of *Tricliona* (A.G. Moseyko, personal communication). The development of the inner lobe of the claw is variable and can not be used to reliably separate these genera. This apart, there is no character to reliably separate *Tricliona* from *Bathseba*. Genera closely related to *Bathseba* are *Rhyparida* Baly, 1861 and *Cleoporus* Lefèvre, 1884. *Rhyparida* is an Australian and Indo-Malayan genus. *Bathseba* and *Cleoporus* are Oriental. All the three belong to the Tribe Typophorini. *Bathseba* and *Rhyparida* differs from each other in the following characters: propleura is convex in *Bathseba* while concave in *Rhyparida*. *Bathseba* has a very large tooth on forefemora while *Rhyparida* has a small or no tooth beneath forefemora. *Cleoporus* has a minute or no tooth on forefemora, while in *Bathseba*, forefemora has a well developed tooth ventrally. In *Cleoporus*, the lateral margins of pronotum and elytra are deflexed or not visible from above and the ocular sulci are very broad, while in *Bathseba*, the lateral margins of pronotum and elytra are visible from above and the ocular sulci are narrow. These characters are variable with in genera. Here *Tricliona* is synonymised with *Bathseba*.

Of the 45 species of *Bathseba* reported from the subcontinent, 13 are known to occur in south India.

Key to select species of *Bathseba* of southern India

1. Head finely and rugosely punctured.....***B. pincticeps* comb. n.**
- Head not rugosely punctured.....**2**
2. Elytra distinctly costate and aedeagus distinctly lobed ventrally.....***B. nigra* comb. n.**
- Elytra feably costate and aedeagus not lobed ventrally.....**3**

3. Aedeagus distinctly concave ventrally, femora armed with a strong triangular tooth.....*B. picea* **comb. n**
- Aedeagus feably or seldom concave, femora distinvly armed with a less strong tooth.....**4**
4. Body ovate, strongly and regularly punctured , adeagal apex spatulate.....*B. variabilis* **comb. n**
- Body oblong with punctures confused and feable, adeagal apex pointed.....**5**
5. Orbital sulcus with evenly rounded dorsal margin, aedeagus is shorter with lateral margins subparallel, compound eyes comparatively smaller and legs shorter*B. bifasciata* **comb. n**
- Orbital sulcus with subacutely angulate dorsal margin above supraorbital pore, aedeagus is longer with lateral margins concave, compound eyes larger and legs are longer.....*B. syzygium* **n. sp.**

4.2.2.1. *Bathseba bifasciata* (Jacoby, 1895) New Combination (Figs. 41a–ad)

(=*Tricliona bifasciata* **Jacoby, 1895**)

Tricliona bifasciata Jacoby, 1895: 284; 1908: 474; Clavareau, 1914: 151 (catalogue); Medvedev & Sprecher-Uebersax, 1999a: 293 (catalogue); Medvedev, 2001:167; Kimoto, 2005: 37 (catalogue); Moseyko & Sprecher-Uebersax, 2010: 643 (catalogue).

Description

Body: Length 3.2–4.0 mm; width 2.0–2.5 mm. Body oblong, shiny, color highly variable: entirely yellow brown without dark spots or maculations to black with yellow brown elytral apex. Head, elytral apex always red brown or lighter. Color of pronotum vary from yellow or red brown to black. Intermediate forms with a median macula and a lateral spot absent in some specimens. Some specimens with dark black maculation with black elytral stripes on a red brown background. Size and shape of dark stripe variable. Elytral suture red brown to black. Venter of lighter specimens generally light brown. Ventrites piceous in dark forms. **Legs** yellow or red brown, often with tinges of black near joints. **Head** inserted, glabrous. **Vertex** broad with a mixture of small and minute punctures, coronal suture indicated by a depression in middle of vertex; suprafrontal sulcus weakly indicated. **Frons** minutely punctate, posteriorly depressed

with minute setae, anterolateral corners slightly projecting. **Clypeus** indistinct with numerous fine short setae, merging with frons. **Labrum** with a pair of widely placed setae in middle and a group of three setae each on either side anterolaterally, broader than long, apex slightly sinuate, apical margin with a row of setae discontinuous in middle. **Mandibles** red brown with a few long curved setae laterally. Maxillary and labial palpi light yellow with apical palpomere longest. Maxillary palpi with penultimate palpomere less than half as long as apical; last labial palpomere longer than penultimate. **Compound eyes** lateral, deeply notched at its inner angle. Orbital sulcus deep, bordered with a row of minute setae on lateral margin of vertex. Antennae generally yellow or yellow brown, with first four antennomeres light yellow or orange, distal ones being darker; length of antenna variable, not reaching half of elytra or extends upto $3/4^{\text{th}}$. First antennomere thicker than second, third and fourth separately thinner than second, 5–11 progressively and slightly broadened. Ratio of length of antennomeres 1 to 11 equals 1: 0.63–0.68: 0.72–0.79: 0.84–1: 0.94–1.21: 0.91–1.15: 0.94–1.2: 0.94–1.23: 1–1.27: 0.97–1.19: 1.25–1.38. Ratio of interantennal space, interocular space, maximum width of head, transverse diameter of eye and vertical diameter of eye equals 1 : 1.1–1.78 : 2.7–3 : 1–1.16 : 1.4.

Pronotum 1.5–1.8 times wider than long, anteriorly 1.4–1.6 times narrower than posteriorly, convex with mixture of fine and small punctures. Lateral margins evenly curved, anterolateral callosity projects forward, posterolateral callosity protruding beyond lateral margin. Anterior margin straight medially, concave on either side, posterior margins indistinctly lobed in middle. Scutellum longer than broad with broadly rounded apex, without setae or punctures.

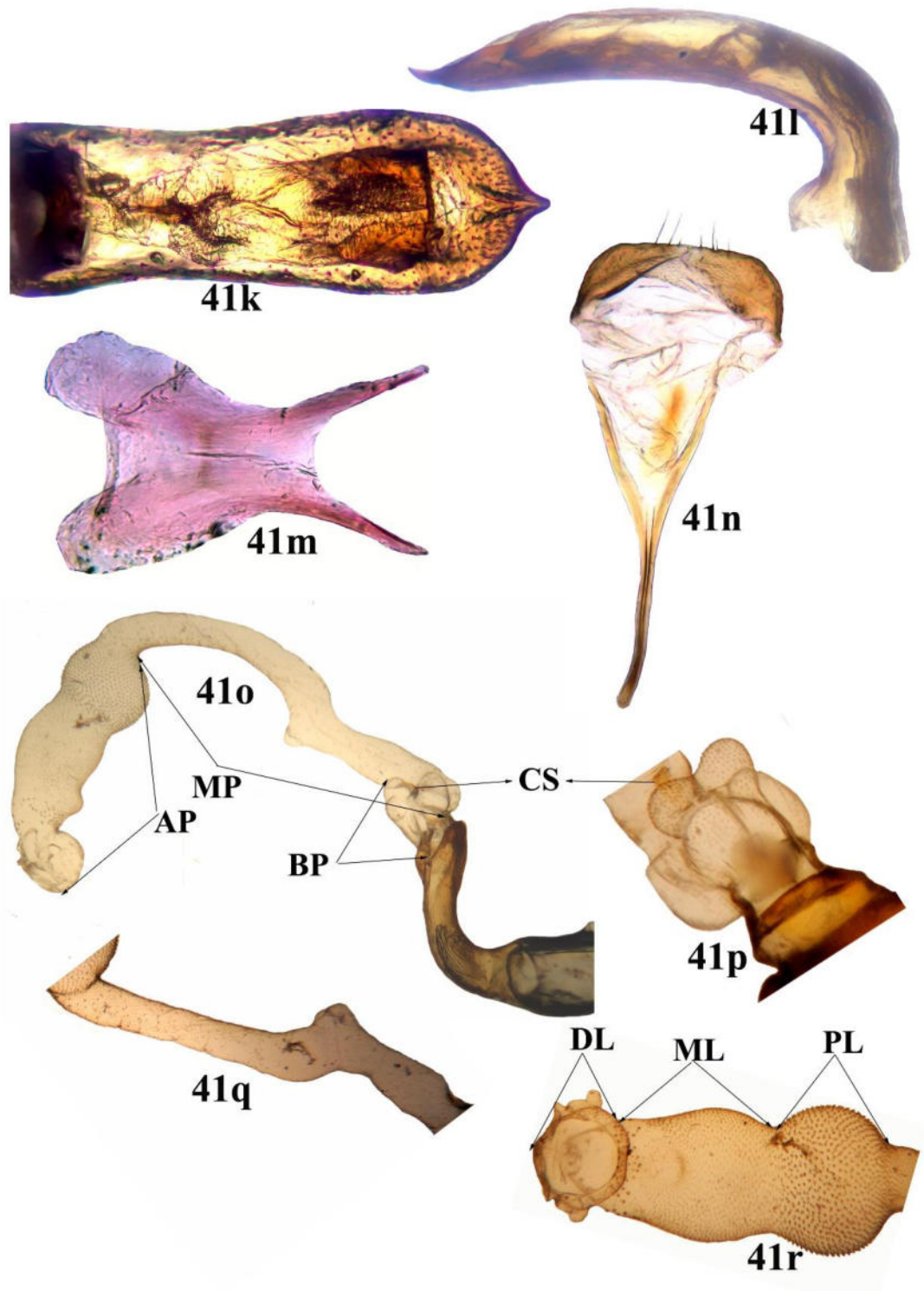
Elytra 1.1–1.3 times longer than wide, regularly punctate striate, indistinct beyond apical third, scutellar striae a little longer than three times length of scutellum, elytra with ten rows of punctures excluding scutellar row, distance between adjacent rows two times distance between adjacent punctures in a row in middle of elytra; distance between adjacent punctures 3–6 times diameter of a puncture in middle of elytra; humeral calli well developed with a weak depression posteriorly; basal calli, post basal depression obsolete; humeral angle subobtuse; apical angle obtuse, apex convex. Epipleura outwardly oblique, narrowed beyond middle, narrowly reaching apex.



Figures 41a–d: *Bathseba bifasciata* Habitus: **41a.** Dorsal view, **41b.** Ventral view, **41c.** Lateral view, **41d.** Head, frontal view



Figures 41e–j: *Bathseba bifasciata* colourmorphs



Figures 41k–r: Male genitalia & endophallus of *Bathseba bifasciata*: **41k–l:** Aedeagus, **41k.** Ventral view, **41l.** Lateral view. **41m.** Tegmen, **41n.** Spiculum gastrale, spiculum relictum & 8th tergite. **41o–r:** Endophallus: **41o.** Endophallus everted through ostium, **41p.** BP, **41q.** MP, **41r.** AP.

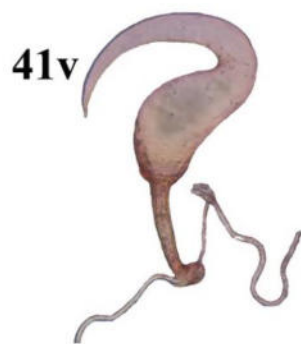
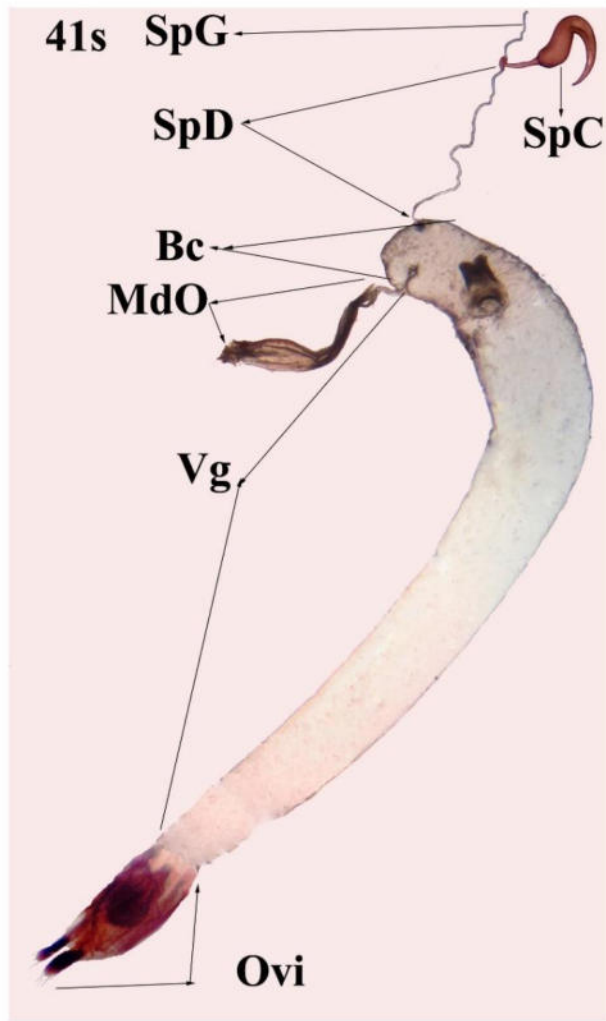
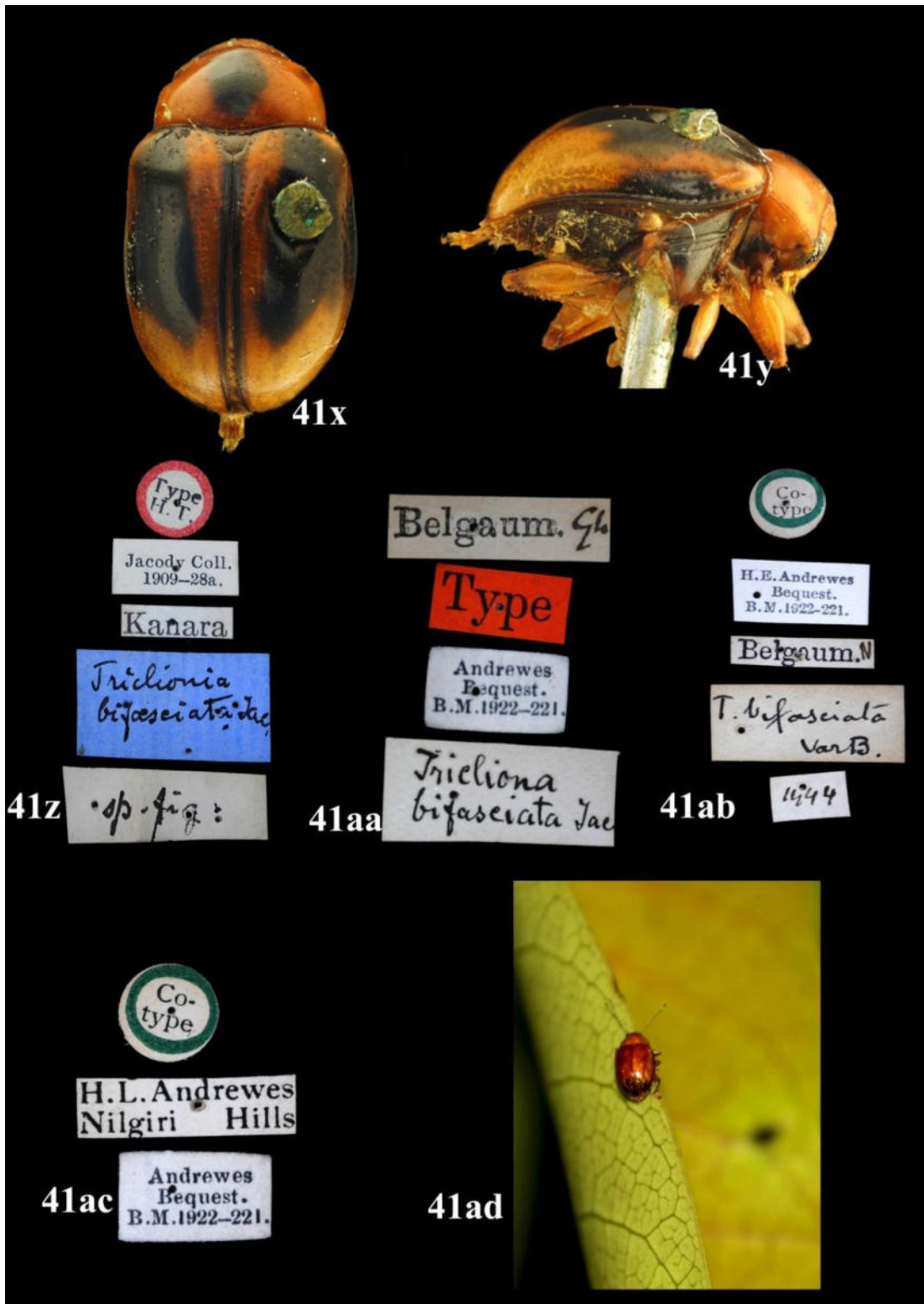


Figure 41s–w: Female genitalia of *Bathseba bifasciata*: **41s.** Female genitalia. **41t.** Ovipositor, **41u.** Eighth sternite, 8th tergite & tignum **41v.** Spermatheca, **41w.** Eighth sternite & tignum



Figures 41x–ad. Syntype photos, type series labels and field photograph of *Bathseba bifasciata*. **41x.** Syntype (dorsal view), **41y.** Syntype (lateral view). **41z.** Syntype labels, **41aa–ac:** Paratype labels. **41ad.** Field photograph.

Prosternum broad, subquadrate with concave lateral margins, finely setose.

Propleura impunctate, nonsetose, proepisternum distinctly convex. **Legs** with all femora dentate, middle one weakly dentate, all tibiae dorsally sulcate with a sharp ridge along sulcus, meso- and metatibia distinctly emarginate preapically. Claws bifid.

Ventrites finely setose, first ventrite medially longer than following two combined, ventrites 2–4 each shorter than preceding one, 5th longer than 4th. Apical margin of last ventrite slightly emarginate. **Pygidium** with preapical line placed far from apical edge.

Male genitalia. **Tegmen** flat, almost X-shaped with a pair of arms anteriorly and posteriorly, anterior arms narrowly acute, posterior arms broad. **Aedeagus** in lateral view, sharply bent at right angle near base, apex acutely narrowed and gently recurved, slightly curved from base to apex. In ventral view, aedeagus gently narrowed in middle, broader towards apex with acute apical denticle. Ventral surface of aedeagus depressed medially, preapical region depressed. Dorsal surface with arrowhead-shaped depression preapically. **Spiculum gastrale** Y-shaped with lateral arms almost straight, stem distinctly bent at proximal end. Tergite VIII with spindle shaped sclerotization on either side and a few setae on posterior margin; spiculum relictum weakly sclerotized.

Endophallus long and tubular, almost three times length of aedeagus proper with three distinct regions: basal phallomere, median phallomere and apical phallomere. Basal phallomere (BP) short; in dorsal view, apex bilobed, lateral sides each with a pre-apical short oval lobe. Central sclerite (CS) single, thick, weakly sclerotized, present at junction of basal and median phallomeres. Median phallomere (MP) longest, half as long as entire endophallus; dorsal margin with a pair of convex lobes before middle, corresponding ventral margin concave; post median membrane of median phallomere bearing spicules of varying shapes *viz.* hair-like, spine-like and circular. Apical phallomere (AP) oblong, demarcated into three lobes: proximal lobe (PL) spherical with densely arranged triangular spicules having circular base; median lobe (ML) almost cylindrical with ventral margin curved while dorsal margin simple, with a small, weakly projected lobe pre-apically, membrane ornamented with two kinds of spicules: basal two third covered with multiple units of uniseriate spicules, apical third randomly covered with circular spicules; distal lobe (DL) spherical with several bulged portions

on lateral sides, membrane covered with irregularly shaped spicules intermixed with a few circular spicules.

Female genitalia. Spermathecal capsule (SpC) weakly differentiated into basal receptacle and apical pump, proximal area of receptacle rod like with extreme base capitate where spermathecal duct and duct of spermathecal gland (SpG) joins, distal area flask-like with gently concave outer side and convex inner side, pump curved like a beak with acutely narrowed distal end, receptacle longer than pump. Bursa copulatrix (Bc) differentiated from vagina (Vg) by an inward inflection on base of vaginal wall, spermathecal duct (SpD) and median oviduct (MdO) attached to lateral side of bursa copulatrix. Vaginal wall long, slightly curved proximally. Ovipositor (OP) long and stylus absent. 8th sternite and 8th tergite fused laterally, form a membranous tube with sclerotizations laterally. 8th sternite bears a long tignum longer than ovipositor.

Distribution: India (Assam, Darjeeling, Karnataka, Kerala, Tamil Nadu), Nepal, Bhutan (First report in north-east India and Bhutan).

Remarks. *Bathseba bifasciata* (Jacoby, 1895) is closely related to *B. syzygium* n. sp. They can be separated as discussed under *B. syzygium* n. sp. *Bathseba syzygium* n. sp. can be differentiated from the latter by the orbital sulcus with subacutely angulate dorsal margin above supraorbital pore (in *B. bifasciata*, orbital sulcus with evenly rounded dorsal margin). Compound eyes are larger and legs are longer in *B. syzygium* n. sp., compared to *B. bifasciata*. Anterior half of vertex is narrower in *B. syzygium* n. sp. than in *B. bifasciata*. Aedeagus is shorter with lateral margins subparallel in *B. syzygium* n. sp. where as in *B. bifasciata*, aedeagus is longer and gently narrowed in the middle. Spermatheca of *B. syzygium* n. sp. is with pump longer than the receptacle (in *B. bifasciata*, pump is shorter than the receptacle).

Bathseba bifasciata resembles *B. semivittata* Baly superficially. However, *B. bifasciata* can be differentiated from *B. semivittata* by shorter body and weakly punctured elytra (body longer and elytra strongly punctate in *B. semivittata*). Preapical line of pygidium is convex medially and distinctly concave on either side in *B. bifasciata* while it is distinctly notched medially and weakly concave on either side in *B. semivittata*. *Bathseba nigra* Jacoby, 1908 is distinctly different from *B. bifasciata* in having costate elytra; colored red brown to aeneous; and ventral plate of aedeagus

bisinate with paired, arcuate, transverse lobes and triangular spicules, while in *B. bifasciata*, elytra lacks costa; color vary from yellow to piceous with yellow elytral apex; and the ventral plate of aedeagus is depressed medially without spicules.

Material examined.

Types.

Syntype. Labels: (1) Type/H. T. (red disc); (2) Jacody Coll./1909-28a; (3) Kanara; (4) Triclionia/bifasciata Jac.; (5) sp. (BMNH).

“Cotype”. Labels 1: (1) Belgaum.G4; (2) Type (red label); (3) Andrewes/Bequest./ B.M. 1922 – 221. (4) Triclionia/bifasciata Jac. (BMNH).

“Cotype”. Labels 2: (1) Co-/type (green disc); (2) Andrewes/Bequest./ B.M. 1922 – 221; (3) Belgaum.N; (4) T. bifasciata/VarB.; (5) 1444. (BMNH).

“Cotype”. Labels 3: (1) Co-/type (green disc); (2) H. L. Andrewes/Nilgiri Hills; (3) Andrewes/Bequest./ B.M. 1922 – 221. (BMNH).

Images of a ‘Cotype’: Labels: (1) Belgaum.G4; (2) Jacoby 2nd/Coll.; (3) bifasciata Jac.; (4) Type/9911 (http://140.247.96.247/mcz/Species_record.php?id=9530)

Non-type material

7♂, 5♀ “India: Kerala/Vellayani/ N 08° 25’ 47.5” E 76° 59’ 8.3”/19.v.2017 18 m/AKS & SRH Coll./Ex. *Mangifera indica*”. 1♀ same data except date 23.v.2017. 7♂, 5♀ same data except date 24.v.2017. 7♂, 5♀, 4 unsexed same data except date 26.v.2017. 13♂, 1♀, 4 unsexed same data except date 02.vi.2017. 1♀ same data except date 22.vi.2017 and Ex. *Cashew*. 1♀ same data except Sangamesh R H Coll from light. 1♀ same data except Sangamesh R H Coll. From light. 26♂, 10♀, 4 unsexed “India: Kerala/JNTBGRI, Palode/ N 08° 45’ 10.1” E 77° 1’ 30.8”/17.iv.2018/K D Prathapan Coll./Ex. Light”. 7♂, 8♀ same data except Ex. *Mesua ferrea* and Amritha Kumari S Coll. 7♂, 1♀ same data except Coll. Amritha Kumari S and no host record. 9♂, 7♀ same data except Sangames R H Coll. 6♂, 3♀ same data except date 23.v.2019, S R Hiremath Coll. and Ex. At MV light (20 KAU, 100 NBAIR, 29 UASB).

1♂ & 5♀ “Bhutan: Samchi, 300 m/7-11.5.1972/ L.Medvedev coll./Nat-Hist. Museum Basel – Bhutan Expedition 1972. 1♂ & 1♀ “Nepal, W.Wittmer, C. Baroni Urbani /Pokhara 820 m/15-18.6.1976/ L.Medvedev coll.”. 1♂ “E-Nepal, Arun-Valley/ Khandabari-Bhotebas 1000-1750 m./ 5.VI.1988/ Lebisch & Probat Coll.”. 2♂ & 3♀

“Kerala, Thekkady, Periyar Lake/ 9,34N, 77,10E, 900-1000 m./ 19-27.iv.1997/ Demlický & Pacholátko Coll.”. 4♀ “Kerala, Trivandrum Pt./ Poonmudi Range, 3000 Ft./ V.1992/ Nathan T.R. Coll.”. 1♀ “India: Darjeeling/Renok/ 7-11.IV.1987/D. Ch. J. Rai”. Assam, W. Kazirani, V.1961, 1 female (?) (**ZIN**) (examined by A.G. Moseyko and compared with specimens in Travancore Insect Collection).

3 ♀ “India, Mangalore/ JCBridwell coll/ Jun1926” (**USNM**).

Host plants. *Anacardium occidentale* L. and *Mangifera indica* L. (both Anacardiaceae).

Specimens were also collected on *Combretum indicum* (Combretaceae), *Terminalia arjuna* (Combretaceae) and *Macaranga peltata* (Euphorbiaceae) near mango orchards and *Mesua ferrea* (Calophyllaceae).

4.2.2.2. *Bathseba nigra* (Jacoby, 1908) New combination (Figs. 42a–l)

Tricliona nigra Jacoby, 1908: 477; Clavaraeu, 1914: 151; Jayanthi & Verghese, 2014: 53-54 (mis identification).

Description

Body length 2.7 to 3.5 mm; width 1.7 to 2.1 mm; oblong, shiny, color vary from dark red to brown black

Head inserted, glabrous; **Vertex** comparatively narrow with a mixture of small and minute punctures, finely setose with minute setae, coronal suture indicated by a longitudinal weak shallow depression between eyes; suprafrontal sulcus weakly indicated or indistinct. **Frons** almost semicircular or subtriangular, anteriorly sloping or depressed with minute setose punctures, anterolateral corners slightly projecting. Some variants found to have impunctate, non setose frons and vertex. **Clypeus** less distinct, narrow, strip-like, with a row of comparatively long setae on its concave apex, merging with frons. **Labrum** with a pair of widely placed setae in middle, a pair of setae each on anterolateral angle, apex gently sinuate; apical margin with a few setae on either side, absent medially. **Mandibles** stout, bidentate apically. **Maxillary** and **labial palpi** light yellow with apical palpomere being longest, penultimate palpomere almost half length of apical one. **Compound eyes** large, transverse diameter exceeds distance between compound eyes, deeply notched at inner angle, vertical diameter of eye 1.25 to 1.40 times transverse diameter, supraocular sulcus deep, bordered by a row



Figures 42a–d: *Bathseba nigra*, habitus: **42a.** Dorsal view, **42b.** Lateral view **42c.** Ventral view, **42d.** Head, frontal view



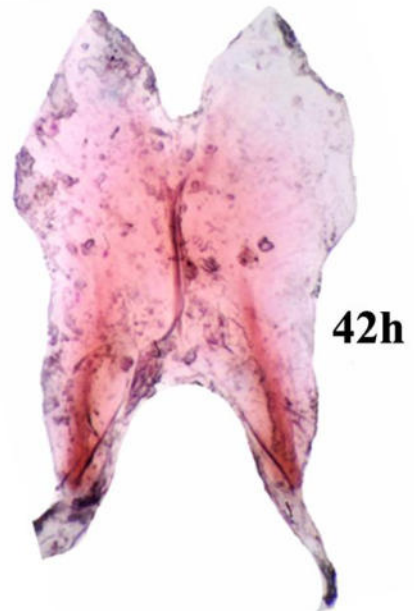
42e



42f



42g



42h

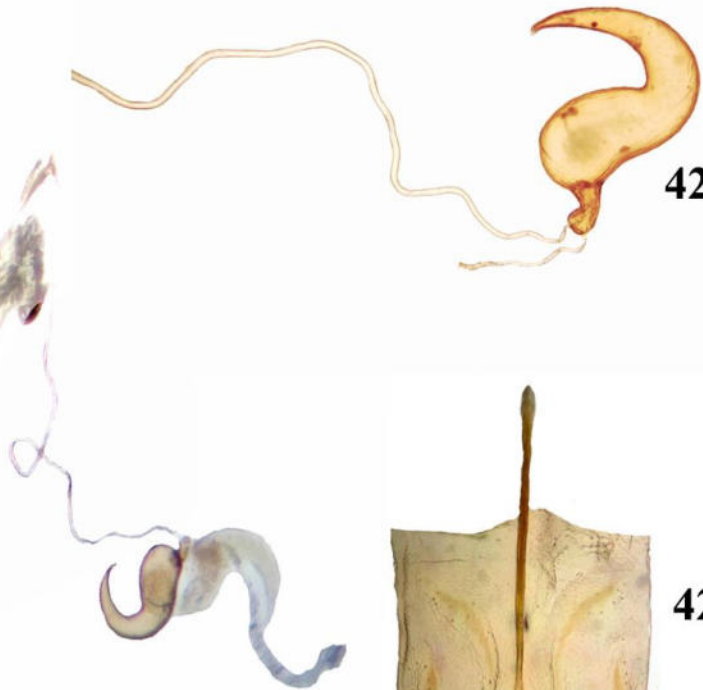
Figures 42e–h. Male genitalia of *Bathseba nigra*.. **42e.** Aedeagus, ventral view, **42f.** Aedeagus, Lateral view. **42g.** Spiculam gastrale, spiculam relictum & 8th tergite. **42h.** Tegmen.



42i



42j



42k



42l

Figure 42i–l: Female genitalia of *Bathseba nigra*: **42i.** Female genitalia. **42j.** Ovipositor, **42k.** Spermatheca, **42l.** Eighth sternite & tignum

of fine setae on lateral margin of vertex. Antennae generally yellow or yellow brown, reaching middle of elytra, first two antennomeres light yellow; distal antennomeres brown; first antennomere thick and elliptical, second thinner and shorter than first; second and third antennomeres subequal, shorter than fourth; 4 – 10 progressively broadened and subequal in length, apical antennomere being longest. Proportionate length of antennomeres I to XI 1 : 0.68–0.76 : 0.68–0.8 : 0.91–0.96 : 0.91–0.1 : 0.96–1.05 : 0.91–0.96 : 0.91–0.92 : 0.91–0.96 : 0.91–0.96 : 1.23–1.36. Antennal calli distinct, subquadrate, small. Ratio of interocular space to inter antennal space to distance between antennae and eye to maximum width of head to transverse diameter of eye to vertical diameter of eye as follows: 1 : 1.3–1.9 : 0.16–0.2 : 3.6–5.5 : 1.3–1.8 : 1.8–2.2. **Pronotum** transverse, 1.6 to 1.9 times wider than long, anteriorly 1.4 to 1.5 times narrower than posteriorly, convex with a mixture of small and minute punctures. Lateral margins evenly curved, anterolateral callosity merging with proepisternum, posterolateral callosity project laterally, anterior margin convex medially, concave on either side and then merging with proepisternum anterolaterally, posterior margin almost straight; scutellum broader than long without setae or punctures, apex broadly rounded.

Elytra 1.2 to 1.25 times longer than wide, regularly punctate striate, interspaces slightly convex presenting costate appearance, distinctly costate laterally, punctures distinct and deeper towards lateral margins, scutellar striae twice longer than length of scutellum, elytra with 9 complete striae excluding scutellar striae, distance between adjacent rows twice distance between punctures; distance between adjacent punctures twice diameter of punctures in middle of elytra. Elytra distinctly margined laterally, humeral angle broadly obtuse, sutural angle subacute; humeral calli prominent without setae or punctures, basal calli distinct as the post basal depression distinct, rarely weak; humeral angle broadly obtuse, sutural angle subacute; epipleura outwardly oblique, narrowed before middle, narrowly reaching apex.

Prosternum broad, subquadrate, punctate, pubescent. **Ventral aspect** finely and distantly pubescent. **Propleura** impunctate, nonsetose. **Legs** brown to brown black from coxa to tibia, tarsomeres light yellow, all femora distinctly dentate, tibiae longitudinally sulcate with rows of setae. **Ventrites** finely setose, first ventrite medially

longer than following two combined, ventrites 1 to 4 each longer than succeeding ones, ventrite V longer than preceding one. Apical margin of last ventrite straight.

Female genitalia. Spermathecal capsule differentiated into proximal dumbbell shaped part where spermathecal duct and duct of spermathecal gland joins and sickle shaped distal part with swollen base and acutely narrowed towards apex. Length of spermathecal capsule almost 1.3 to 1.5 times maximum width. Bursa copulatrix indistinct or absent and spermathecal duct directly attached near base of vaginal wall. Common oviduct connected near base of vaginal wall; vagina long, slightly curved proximally; ovipositor long, stylus absent; 8th sternite and 8th tergite fused laterally to form a membranous tube with sclerotizations laterally. 8th sternite with long tignum, longer than ovipositor.

Male genitalia. **Tegmen** membranous with mild sclerotization basally and medially, bifurcated distally, basal region narrow, encircles aedeagus. **Aedeagus** in lateral view bent near base of aedeagus proper, ventral surface bisinuate with paired arcuate transverse lobes, acutely narrowed apically, apex recurved dorsally. In ventral view, aedeagus with uniform width throughout, except near apex abruptly narrowed to form denticle with subacute apex, anterolateral corners rounded or obtuse. **Spiculum gastrale** Y-shaped with gently curved lateral arms and stem. Tergite VIII with spindle shaped sclerotization on either side with short setae apically; spiculum relictum less sclerotized.

Remarks. Differs from the related species *B. indica*, (Jacoby) in its smaller size and less elongate body (*B. indica* larger and longer than *B. nigra*); compound eyes are larger and closely approximated in *B. nigra* (*B. indica* with comparatively smaller eyes which are separated). *B. nigra* Jacoby is distinctly different from *B. bifasciata* in having costate elytra; colored red brown to aeneous; and ventral plate of aedeagus bisinuate with paired, arcuate, transverse lobes and triangular spicules, while in *B. bifasciata*, elytra lacks costa; color vary from yellow to piceous with yellow elytral apex; and the ventral plate of aedeagus is depressed medially without spicules. In most species of *Bathseba* ventral plate of aedeagus concave or depressed without lobes.

Material examined (4 specimens):

2 ♀ “India: Kerala/Thenmala/28.ix.2017/Amritha Kumari S Coll.”. 1 ♀ “India: Kerala/Ponmudi/ N8⁰45’58.5”E77⁰6’38.9”/1.ix.2017/Amritha Kumari S Coll.”.1 ♂ “India:Karnataka/Kalaza,Mavinakere/N13⁰14’16.4”E75⁰22’45.1”/4.x.2017/ Amritha Kumari S Coll.”.

Distribution: India (Karnataka, Kerala, Tamil Nadu).

4.2.2.3. *Bathseba picea* (Jacoby, 1895) New combination (Figs. 43a–l)

Tricliona picea Jacoby, 1895: 284; 1908: 475; Clavaraeu: 1914: 152; ZSI, 1986: 147.

Description

Body length 3.8 to 4.1 mm; width 2.4 mm; broadly oblong, shiny; color variable from light yellow to red brown.

Head inserted, sparsely and minutely punctate with very short fine setae; **Vertex** broad with minute punctures, coronal suture indicated by short longitudinal sulcus anteriorly in middle of vertex, suprafrontal sulcus less distinct. **Frons** almost semicircular or subtriangular, indistinctly separated from vertex, punctate, finely setose, slightly depressed anteriorly. **Clypeus** indistinct, narrow, strip-like, with numerous fine short setae facing labrum. **Labrum** broad and short, longer in some examples, with pair of widely placed setae in middle, a group of two or three setae each on either side anterolaterally; slightly sloping anteriorly, apex feebly sinuate, apical margin with a row of setae discontinuous in middle. **Mandibles** stout, terminally black, with a black spot and a long bent setae laterally. **Maxillary, labial palpi** light yellow brown with apical palpomere longest. Maxillary palpi with penultimate palpomere nearly half as long as apical. Labial palpi with last labial palpomere slightly longer than penultimate. **Compound eyes** anterolateral, with deeply notched inner angle giving a cordiform shape, supraocular sulcus distinct, bordered with a few setae on lateral margin of vertex. **Antennae** with first four or five antennomeres light yellow, distal antennomeres darker, exceeds half length of elytra, first antennomere thicker and longer than second; third and fourth long, thinner than second; rest of antennomeres progressively broadened. Proportionate length of antennomeres I to XI 1: 0.63-0.68: 0.72-0.79: 0.84-1: 0.94-1.21: 0.91-1.15: 0.94-1.2: 0.94-1.23: 1-1.27: 0.97-1.19: 1.25-1.38. Ratio of

interantennal space to interocular space to maximum width of head to transverse diameter of eye to vertical diameter of eye 1 : 1.1 – 1.78 : 2.7 – 3 : 1 – 1.16 : 1.4.

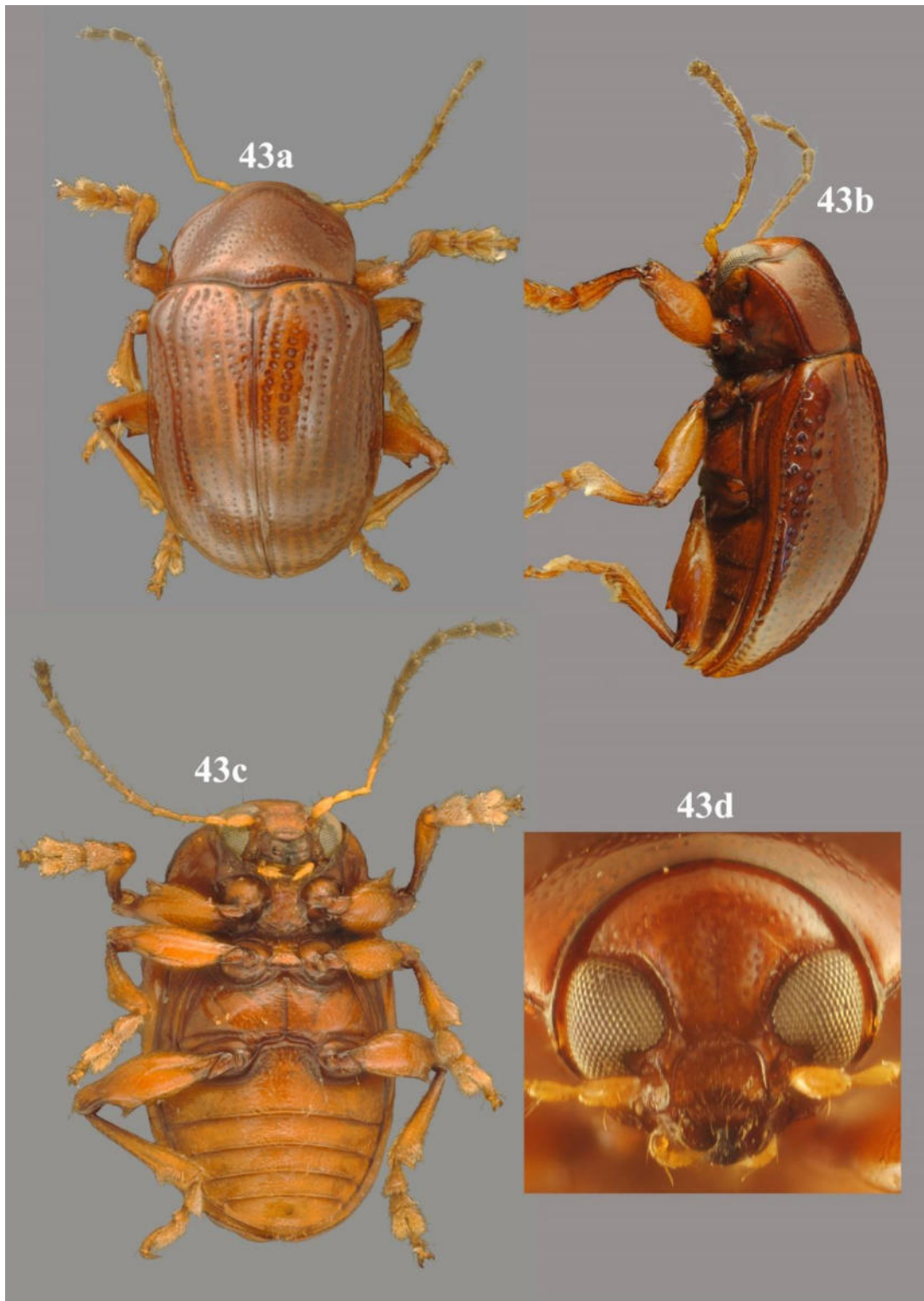
Pronotum transverse, subquadrate, more than 1.75 times wider than long, anteriorly 1.56 times narrower than posteriorly, less convex, irregularly punctate with small punctures, punctures reduced towards apex, punctures stronger than those on head, weaker than those on elytra; anterolateral angles deflexed anteriorly, posterolateral angles slightly project laterally; posterior margins gently lobed, lateral margins entire, evenly curved. **Scutellum** almost U-shaped.

Elytra 1.2 to 1.3 times longer than broad, punctate striate with minute setae, becomes slightly irregular post medially near lateral margins, punctures turn weaker towards apex; distance between punctures almost twice distance between adjacent rows of punctures; scutellar striae three times longer than scutellum; a short broken stria near lateral margin behind the humeral calli; about ten striae near middle of elytra; humeral calli distinct with or without minute punctures; basal calli weak, postbasal depression feeble; sutural angle subacute; **epipleura** outwardly oblique with minute punctures, broad basally, narrowed towards apex.

Anterior margin of proepisternum convex, wavy, sparsely punctate, setose; hypomeron smooth and impunctate; prosternum subquadrate, broader anteriorly than posteriorly, lateral margins almost concave and slightly angulate, punctate with fine setae, metasternum distinct with sparse setose punctures.

Legs stout, anterior and posterior femora distinctly dilated, forefemora with strong acute triangular tooth, dentation on posterior femora less stronger with a small tooth, tibia long and longitudinally sulcate with rows of setae. **Ventrites** finely setose, first ventrite longest, longer than following two combined medially, ventrites 2 to 4 each shorter than preceding one.

Male genitalia. Aedeagus in ventral view distinctly concave, entire ventral area forming a furrow or channel; anterolateral angle rounded or obtuse with apex narrowly acute and slightly recurved; aedeagus distinctly curved in lateral view. In dorsal view, aedeagus proper slightly wider distally than proximally, apex subacute, slightly recurved.



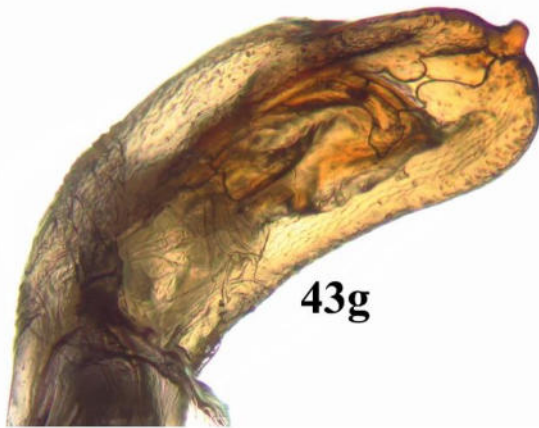
Figures 43a–d: *Bathseba picea*, habitus: **43a.** Dorsal view, **43b.** Lateral view, **43c.** Ventral view, **43d.** Head, frontal view



43e



43f

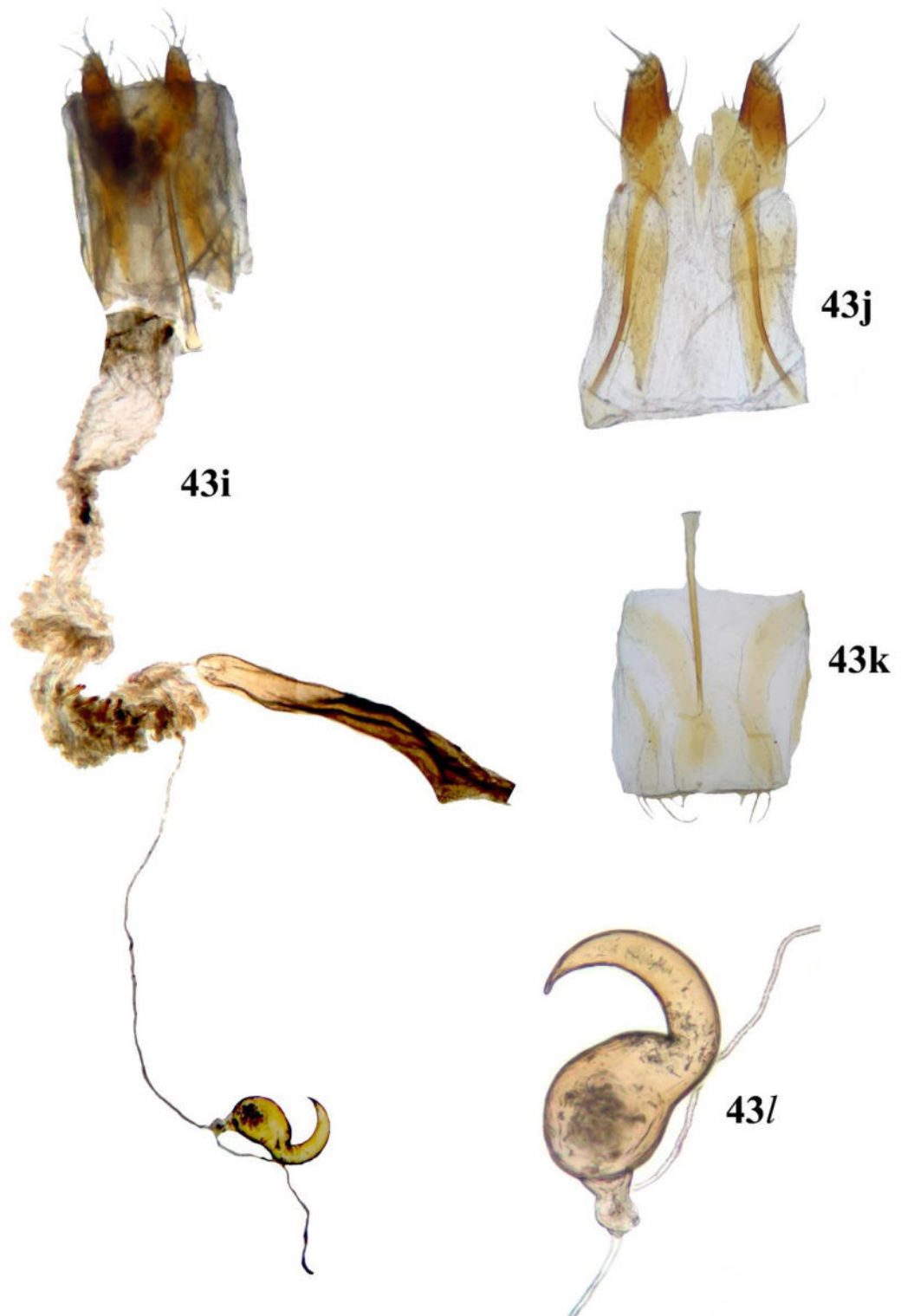


43g



43h

Figures 43e–h. Male genitalia of *Bathseba picea*. **43e.** Aedeagus, ventral view, **43f.** Aedeagus, Lateral view. **43g.** Aedeagus ventrolateral view. **43h.** Spiculam gastrale, spiculam relictum & 8th tergite.



Figures 43i–l: Female genitalia of *Bathseba picea*: **43i.** Female genitalia. **43j.** Ovipositor, **43k.** Eighth sternite & tignum, **43l.** Spermatheca.

Female genitalia. Spermathecal capsule with proximal region short, almost dumbbell shaped where spermathecal duct and spermathecal gland attached; distal area with basal half almost spherical or oval shaped, apical area much narrowed, apex acute. Vagina long with characteristic spicules near base. Ovipositor longer than tignum.

Remarks. *B. picea* is closely related to *B. melaneura* Lefevre and *B. puncticeps* Duvivier. *B. picea* differs from *B. melaneura* in its entirely red brown colour and the nearly impunctate head, also in the absence of the aeneous gloss of the elytra. *Bathseba puncticeps* Duvivier is narrower, the head is rugosely punctured and the thorax of different shape and sculpture (head minutely punctate and not rugose in *B. picea*)

Material examined (30 specimens).

2 ♂, 2 ♀ & 16 unsexed “India: Kerala/Thenmala/28.ix.2017/Amritha Kumari S Coll./Ex. *Terminalia paniculata*”. 2 unsexed with same data Ex. Light. 1 unsexed “India: Kerala/Kattilappara/29.xi.2017/Amritha Kumari S Coll.”. 1 unsexed “India: Kerala/COA, Vellayani/15.vii.2017/Amritha Kumari S Coll./Ex. Light”. 1 unsexed “India: Karnataka/COH, Mudigere/13.1152⁰ 75.6328⁰ E/03.x.2017/Amritha Kumari S Coll.”. 4 unsexed “India: Kerala/Kattilappara/10.xi.2017/Amritha Kumari S Coll.”. 1 unsexed with same data collected from light”.

Host plants. *Terminalia paniculata* Roth. (Combretaceae)

Distribution. India (Kerala, Maharashtra).

4.2.2.4. *Bathseba puncticeps* (Duvivier, 1891) New combination (Figs. 44a–m)

Tricliona puncticeps Duvivier, 1891; 1908: 470; Clavaraeu, 1914: 152; Medvedev, 2000: 8; Kimoto, 2005: 38; Medvedev & Sprecher-Uebersax, 2009a: 294; Moseyko & Sprecher-Uebersax, 2010: 643.

Tricliona apicata Jacoby, 1895: 285; 1908: 474; Clavaraeu, 1914: 151; Medvedev & Sprecher-Uebersax, 2009b: 364 (synonymy).

Description

Body length 3.7–3.8 mm; width 2.3–2.4 mm; oblong, elongate, colour dark red brown to aeneous, head darker, elytral apex yellow, antennae with first four antennomeres yellow, rest brown to aeneous; legs yellow to yellow brown.

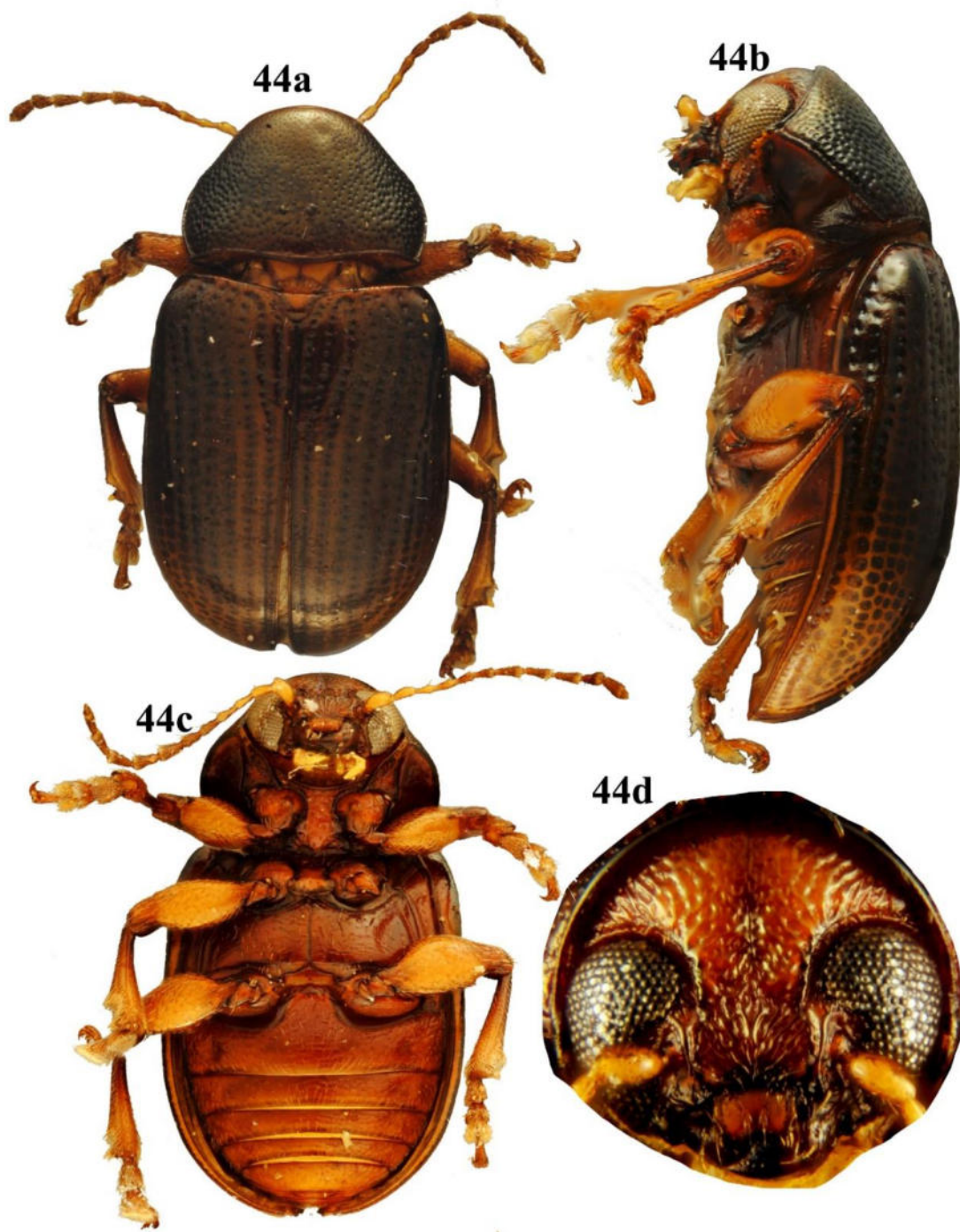
Head inserted, strongly punctate with fine setae, interstices raised appearing rugose, coronal suture distinct, supra frontal sulcus weak, frons and vertex hardly differentiated,

frons rectangular with distinct longitudinal and oblique rugosities, vertex with distinct longitudinal rugosities posterolaterally; orbital sulcus distinct; supraorbital pore well developed, raised, round, placed near dorsal margin of eye, bearing a long seta. Antenna subfiliform, reaching basal quarter of elytra, first antennomere thick, longer than second; second antennomere subequal to or longer than antennomeres 3–5 separately which are thinner, rest progressively broadened; first five antennomeres smooth with a few long setae, rest clothed with dense short setae; proportionate length of antennomeres I to XI equals 1 : 0.7 : 0.5 : 0.75 : 0.7 : 0.6 : 0.7 : 0.8 : 0.8 : 0.75 : 1.1. Compound eyes cordiform, inner angle distinctly notched near antennal socket, vertical diameter 1.2 times horizontal. Distance between compound eyes, transverse diameter of eye, and distance between antennal sockets subequal, maximum width of head 2.5 times distance between antennal sockets. Clypeus distinct but reduced; labrum broad with a pair of widely separated setose punctures preapically, anterolateral corners with a pair of setae each, apex deflexed, distinctly sinuate. Mandibles bidentate apically with a black spot, a few setae laterally. Maxillary and labial palpi with last palpomere longest; maxillary palpi with last palpomere almost twice as long as penultimate which is subequal to preceding one, labial palpi with penultimate palpomere almost $\frac{2}{3}$ rd of last palpomere.

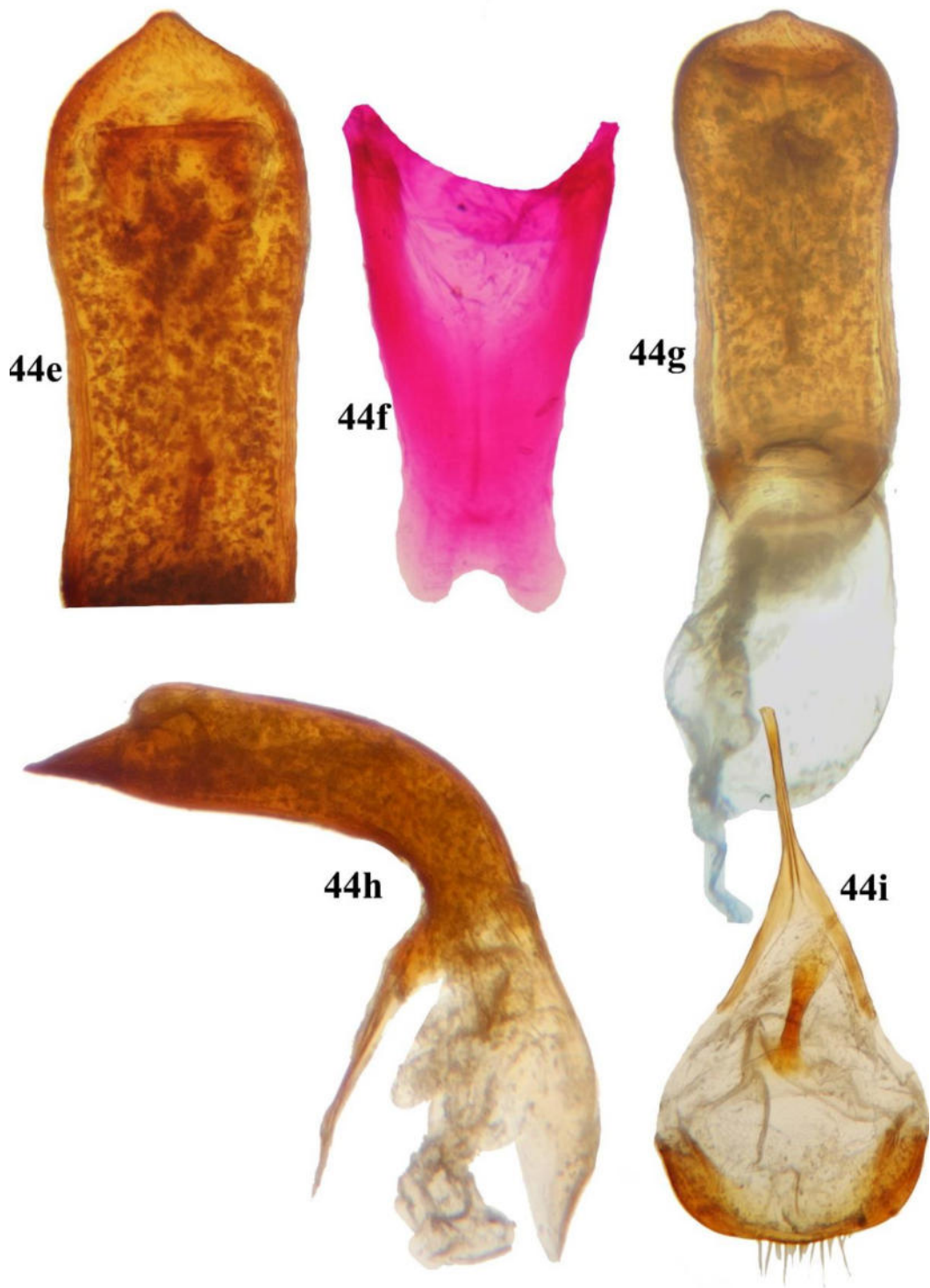
Pronotum transverse, 2.2 times broader than long, posteriorly 1.4 times broader than anteriorly, densely punctured with minute setae, punctures denser laterally; anterior margin straight, anterolateral angles deflexed, lateral margins entire, rounded, posterior margin lobed, posteriolateral margin piceous, posterolateral callosity extends beyond lateral margins.

Scutellum as broad as long, with triangular sclerotized impression in middle, narrowly rounded posteriorly, without setae or punctures.

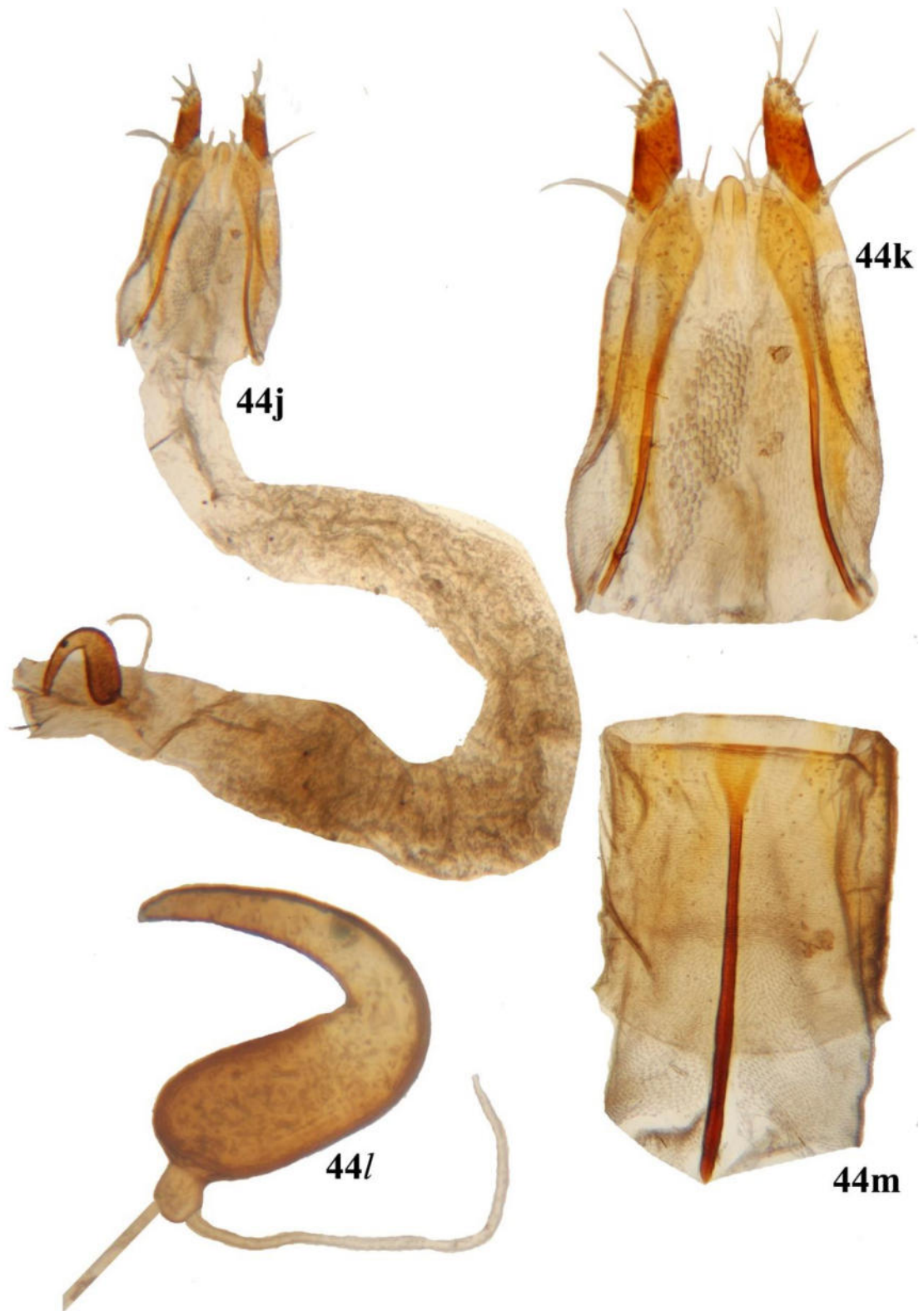
Elytra long and oblong, 1.2–1.3 times longer than broad, elytral base slightly broader than pronotal base, regularly punctured; scutellar striae incomplete, short, reaching up to first quarter of elytra, punctures bold, surrounded by hollow-like area giving extra large appearance; consists of 11 longitudinal rows post basally, including scutellar striae; scutellar striae almost four times as long as scutellum; one striae each from either side merge near apical third, striae adjacent to both sutural and lateral margins complete



Figures 44a–d: *Bathseba punctipes*, habitus: **44a.** Dorsal view, **44b.** Lateral view **44c.** Ventral view, **44d.** Head, frontal view



Figures 44e–i: Male genitalia of *Bathseba punctipes*: **44e.** Aedeagus, ventral view, **44f.** Tegmen **44g.** Aedeagus, dorsal view, **44h.** Aedeagus, lateral view. **44i.** Spiculam gastrale, spiculam relictum & 8th tergite.



Figures 44j–m: Female genitalia of *Bathseba punctipes*: **44j.** Female genitalia. **44k.** Ovipositor, **44l.** Spermatheca, **44m.** Eighth sternite & tignum.

reaching elytral apex; distance between punctures in a row less than distance between rows, elytral apex subacute; humeral calli prominent with minute punctures, basal calli weak, post basal depression weak; epipleura outwardly oblique, widest basally, narrowing post basally, hardly reaching apex with minute punctures.

Ventral and pleural areas red brown, anterior margin of proepisternum convex with bold punctures, hypomeron depressed posteriorly.

Prosternum nearly two times longer than broad, with bold punctures and fine long setae, distinctly concave laterally; mesosternum as long as broad, with bold punctures and setae.

Ventrites finely pubescent with long thin setae; first ventrite longer than following two combined or subequal; ventrites 1 to 4 each longer than preceding one; apex of last ventrite emarginated.

Male genitalia. In lateral view, aedeagus bent almost at right angle near aedeagus proper, dorsal and ventral margins subparallel upto basal 3/4th, apical quarter strongly converging with acute apex. In dorsal view, proximal half almost parallel sided, then widened, converging again strongly into a subacute denticle, ventral surface convex. Tegmen distinctly lobed apically, lateral margins straight, narrowed basally, encircles aedeagus. Spiculum gastrale Y-shaped, spiculum relictum dilated basally and apically; 8th tergite apically setose.

Female genitalia. Spermathecal capsule with short subglobular knob like proximal area where spermathecal duct and spermathecal gland duct attached; distal area strongly curved medially, inner margin almost V-shaped, outer margin almost U-shaped with first half almost of uniform thickness, narrowing post medially with a subacute apex. 8th sternite and ventrite fused to form membranous tube, with lateral sclerotizations. Ovipositor long.

Remarks. One of the species related to *B. puncticeps* is *B. picea*. Head sparsely and minutely punctate and prothorax irregularly punctate with small punctures in *B. picea* while in *B. puncticeps* head is rugosely punctate and prothorax closely and strongly punctate. *Bathseba puncticeps* can be distinguished from other species of *Bathseba* by the rugose head and closely and strongly punctured prothorax.

Material examined. (2 specimens)

1 ♀ and 1 ♂ “ India : Kerala : Kannur / DAF, Karimbam / 12^o02’35.12” N, 75^o23’16.88”E / 04.i.2018 / Amritha Kumari S Coll.”

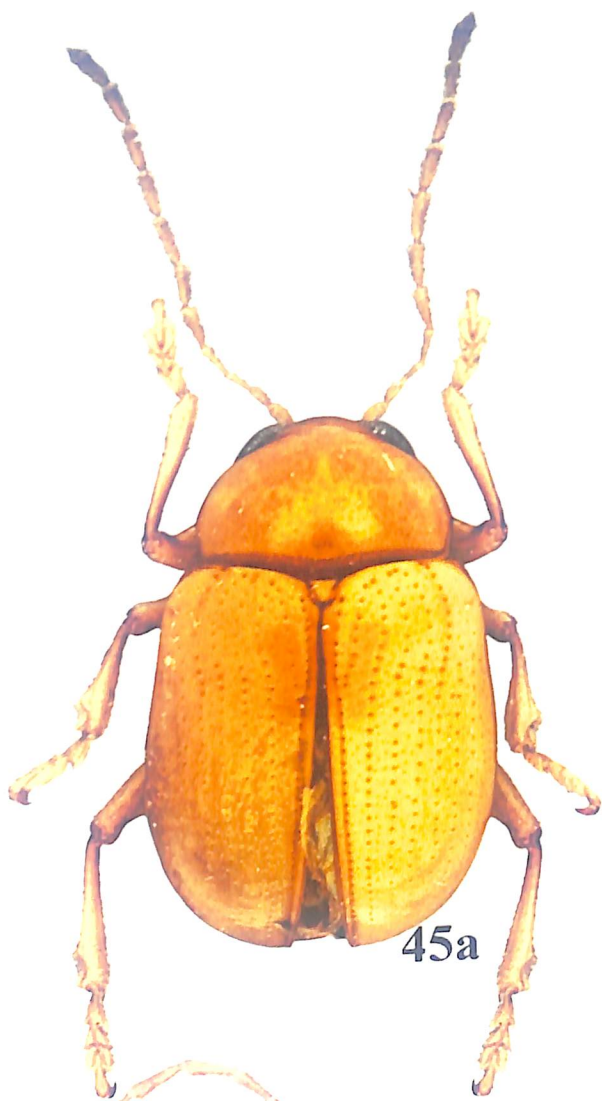
Distribution. India (Bengal, Bombay, Karnataka, Kerala), Nepal.

4.2.2.5. *Bathseba syzygium*, new species (Figs. 45a–o)

Description.

Body length 2.8 to 3.9 mm; width 1.6 to 2.4 mm; body oblong-ovate, shiny. Color variable: entirely yellow or brown without maculation to elytra black or black with yellow wavy transverse band medially, apex yellow, humerus yellow in one specimen with black elytra and transverse yellow band, head and pronotum yellow to orange brown; yellow specimens rarely with small black round spot on or behind humerus; head, pronotum, ventral and pleural areas and legs always yellow to orange brown, antennae and palpi yellow with last two or three antennomeres dorsally dark, mandibles red brown, incisor area and a spot on mesal side black, maxillae and labium light yellow.

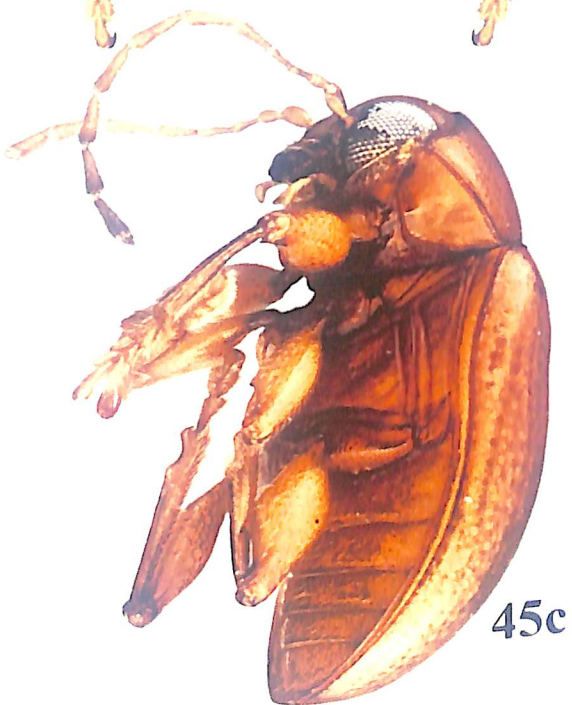
Head inserted, minutely setose with small and minute punctures; coronal sulcus weak but distinct; suprafrontal sulcus weak dorsally; frons and vertex hardly differentiated; supraorbital pore with a long seta, poorly developed, placed inside orbital sulcus adjacent to dorsal margin of eye; orbital sulcus distinct, deep, wide with dorsal margin obtusely angulate above supraorbital pore; antennal calli weak but distinct, nearly squadrate; frons almost semicircular, concave medially, sloping anteriorly; clypeus much reduced; frontoclypeal suture with a row of small setae; labrum broader than long, apical margin concave with a row of setae discontinuous in middle, a pair of widely placed setae medially, anterolateral corners with a pair of setae each; mandibles deeply bidentate apically; maxillary and labial palpi with three and two palpomeres, each with apical palpomere being the longest, maxillary palpi with proximal two palpomeres subequal. **Compound eyes** deeply emarginate near antennal socket, nearly cordiform, vertical diameter of eye 1.2 times transverse diameter, transverse diameter of eye 1.1 to 1.3 times distance between compound eyes, 1.2 to 1.6 times distance between antennal sockets; maximum width of head 2.3 to 2.4 times transverse diameter of eye, 2.7 to 3 times interocular space, 3.0–3.4 times interantennal space. **Antennae** filiform, extend



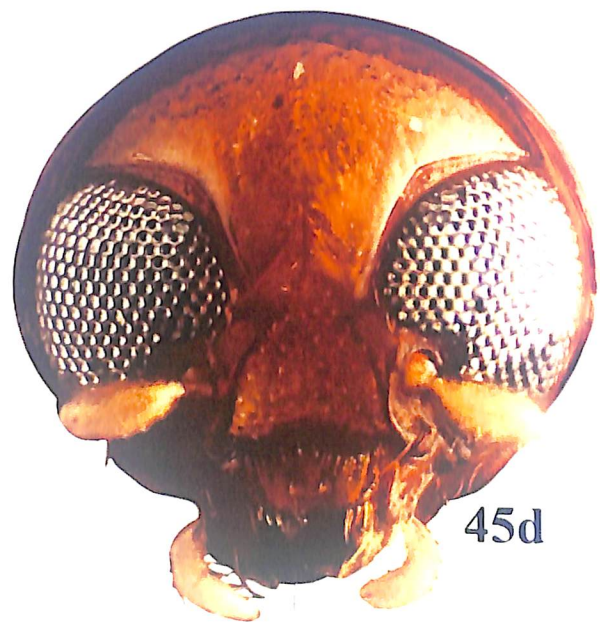
45a



45b

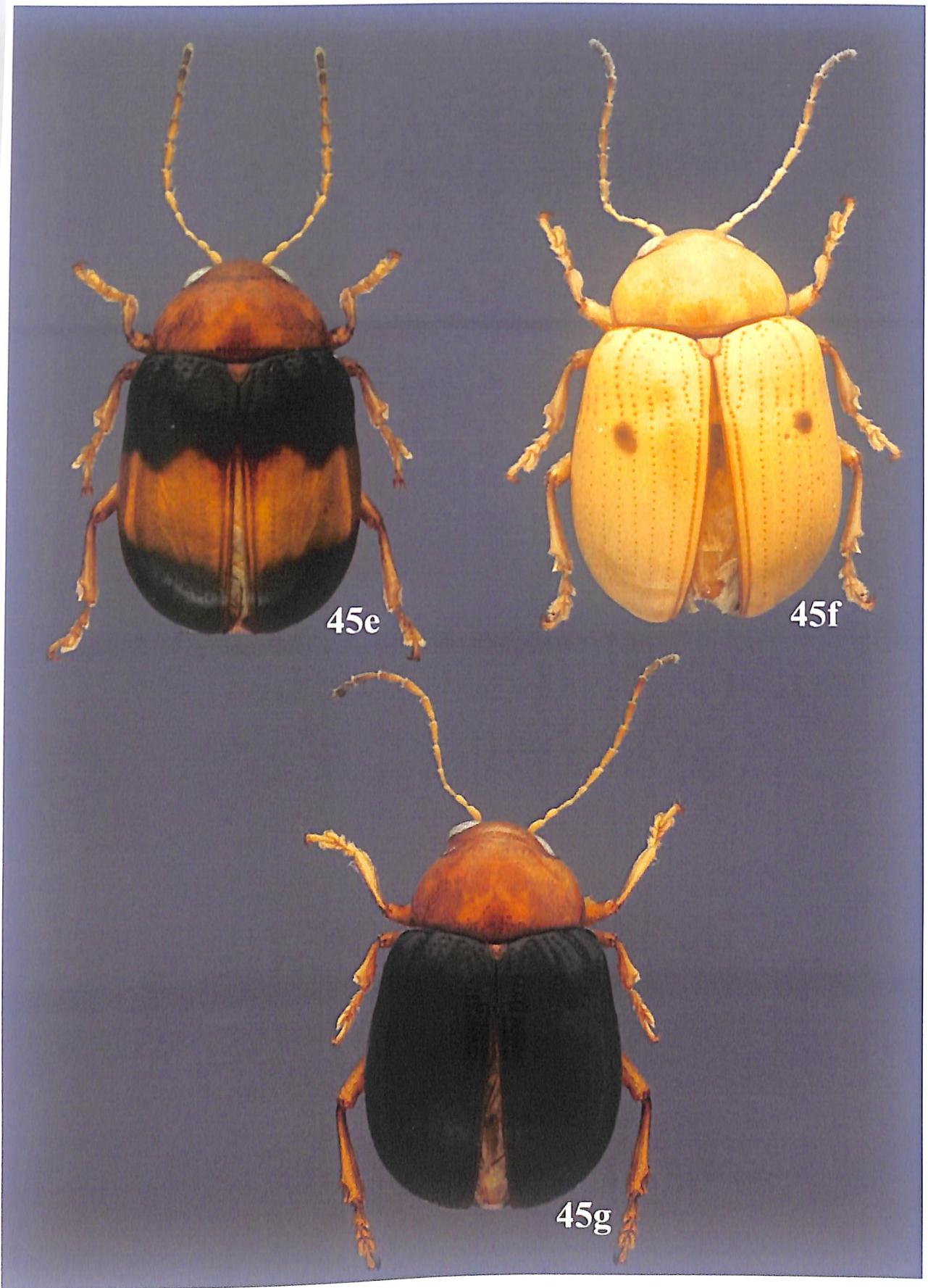


45c



45d

Figures 45a–d: *Bathseba syzygium* n.sp. habitus: 45a. Dorsal view, 45b. Ventral view, 45c. Lateral view 45d. Head, frontal view



Figures 45e–g: *Bathseba syzygium* n. sp. colourmorphs



Figure 45h–k. Male genitalia of *Bathseba syzygium* n. sp: **45h.** Aedeagus, dorsal view, **45i.** Aedeagus, lateral view. **45j.** Spiculum gastrale, spiculum relictum and 8th tergite, **45k.** Tegmen



Figures 45l–o. Female genitalia of *Bathseba syzygium* n. sp. **45l.** Ventral view, **45m.** Ovipositor, **45n.** Spermatheca, **45o.** Fused 8th sternite and 8th tergite with tignum.

beyond half of elytra; first antennomere thick, longer than second, second antennomere thicker than 3 and 4 separately, which are thinner; remaining antennomeres progressively broadened; ratio of length of antennomeres 1 to 11 equals 1 : 0.7 : 0.5 : 0.8 : 1 : 1 : 1.2 : 1.1 : 1.2 : 1.1 : 1.3.

Pronotum 1.7 times broader than long, posteriorly 1.4 times broader than anteriorly, glabrous with small and minute punctures; posterior margin absolutely lobed; anterior margin gently convex medially, weakly concave on either side of middle; lateral margins evenly curved; anterolateral callosity broader than long, slightly protruding laterally, posterolateral callosity not laterally protruding. **Scutellum** longer than broad with narrowly rounded apex.

Elytra 1.2 to 1.3 times longer than broad, punctate striate, punctures small, distance between adjacent punctures 3 to 6 times diameter of a puncture in middle of elytra, distance between rows of punctures longer than distance between punctures in a row; about ten countable rows evident in post basal area, punctures turn indistinct towards apical 2/3rd, scutellar striae almost thrice as long as scutellum. Humeral calli well developed with depression posteriorly and mesally, basal calli weak, post basal depression weak or obsolete, apical angle subacute.

Epipleura broadest anteriorly, greatest width being subequal to half of that of forefemur.

Proepisternum with a few minute punctures. Hypomeron without setae or punctures.

Prosternum medially longer than broad, sparsely setose with large shallow punctures; mesosternum longer than broad, sparsely punctate, sparsely setose; metasternum minutely punctate without bold punctures, sparsely setose.

Ventrites finely setose, first ventrite subequal to following two combined, ventrites 1 to 4 each shorter than preceding one, last ventrite subequal to penultimate. **Pygidium** with preapical line near to apical edge.

Legs long, femur dilated medially with anterior femora strongly dentate, mid- and hindfemora weakly dentate, tibia longitudinally carinate on all sides with row of setae on either side of carina; tarsomeres ventrally fringed with diverse forms of setae. Probasitarsomere and mesobasitarsomere in males with closely arranged capitate setae bordered by long pointed setae. All basitarsomeres in females and metabasitarsomere

in males fringed with only pointed setae, second tarsomere with pointed setae, and bilobed third tarsomere with variously shaped setae like triangular, inverted arrowhead-shaped, pointed or truncate.

Male genitalia. **Aedeagus** in lateral view bent almost at right angle near base of aedeagus proper, ventral surface feebly concave. In dorsal view, lateral margins subparallel; dorsal surface with arrowhead-shaped depression preapically; apex narrowed, nipple shaped, apical opening or ostium partially covered with a single lamina. **Tegmen** with a pair of short anterior arms, parallel sided in middle, posteriorly widened and distinctly lobed. **Spiculum gastrale** Y-shaped, median arm subequal to lateral arms, spiculum relictum poorly sclerotized, distal margin of 8th tergite with spindle shaped sclerotization on either side.

Female genitalia. Spermathecal capsule (SpC) distinctly differentiated into two parts: rod like proximal region with extreme base capitate, flask shaped distal region with concave outer side and convex inner side; pump sickle shaped, longer than receptacle. Bursa copulatrix not distinctly differentiated from vagina. Vaginal wall long, slightly curved proximally. Ovipositor (OP) long, stylus absent. 8th sternite and 8th tergite fused laterally to form a membranous tube with sclerotizations laterally. 8th sternite with a long tignum which is longer than ovipositor.

Remarks. *Bathseba syzygium* **n. sp.** is closely related to *Bathseba bifasciata* (Jacoby, 1895). The new species can be differentiated from the latter by the orbital sulcus with subacutely angulate dorsal margin above supraorbital pore (in *B. bifasciata*, orbital sulcus with evenly rounded dorsal margin; Compound eyes are comparatively larger and legs are comparatively longer in the new species, compared to those in *B. bifasciata*. Anterior half of vertex is narrower in the new species than in *B. bifasciata*. Aedeagus is shorter with lateral margins subparallel in the new species where as in *B. bifasciata*, aedeagus is longer and gently narrowed in the middle. Spermatheca of the new species has pump longer than the receptacle (in *B. bifasciata*, pump is shorter than the receptacle).

Another species closely related to *B. syzygium* **n. sp.** is *B. inconspicua* where the anterior portion of vertex is narrower than that in *B. syzygium* **n. sp.** Pronotum is more

weakly punctured in *B. syzygium* **n. sp.** while the same is almost impunctate in *B. inconspicua*.

Preapical line of pygidium is placed far from the apical edge in *B. bifasciata* where as in *B. syzygium* **n. sp.**, preapical line is near to apical edge. Prepical line is weakly wavy in *B. syzygium* **n. sp.**, however, it is convex in *B. bifasciata*.

Etymology. The species name “*syzygium*” refers to the generic name of its host plant, *Syzygium cumini* (L.) Skeels.

Distribution. India (Kerala)

Types. Holotype. ♂ (1) “India: Kerala/ CRS, Pampadumpara/ 9^o48’ 23.7” N 077^o 10’ 4.9”E/ AKS & SRH Coll./ Ex. Jamun”.(2) HOLOTYPE/ *Bathseba syzygium* **sp. nov.**/ des. Amritha, Moseyko & Prathapan, 2020 (red label) (BMNH).

Paratypes (19 specimens). 8♀ & 9♂. The same labels as holotype. 1♀ & 1♂. The same labels as holotype except date 23.iv.2018 and without host record (10 NBAIR, 2 KAU, 5 UASB, 2 ZIN).

Host plant. *Syzygium cumini* (L.) Skeels (Myrtaceae).

4.2.2.6. *Bathseba variabilis* (Jacoby, 1895) new comb. (Figs. 46a–m)

Tricliona variabilis Jacoby, 1895: 286; 1908: 473; Clavaraeu, 1914: 152; Takizawa, 1984: 24.

Description

Body length 2.0 to 2.5 mm, width 1.5 to 1.9 mm, oval or almost rounded, dark red brown, rarely with aeneous shades on anterior and lateral sides of elytra and ventral side or entirely aeneous except antennomeres, maxillary and labial palpi yellow or yellow brown.

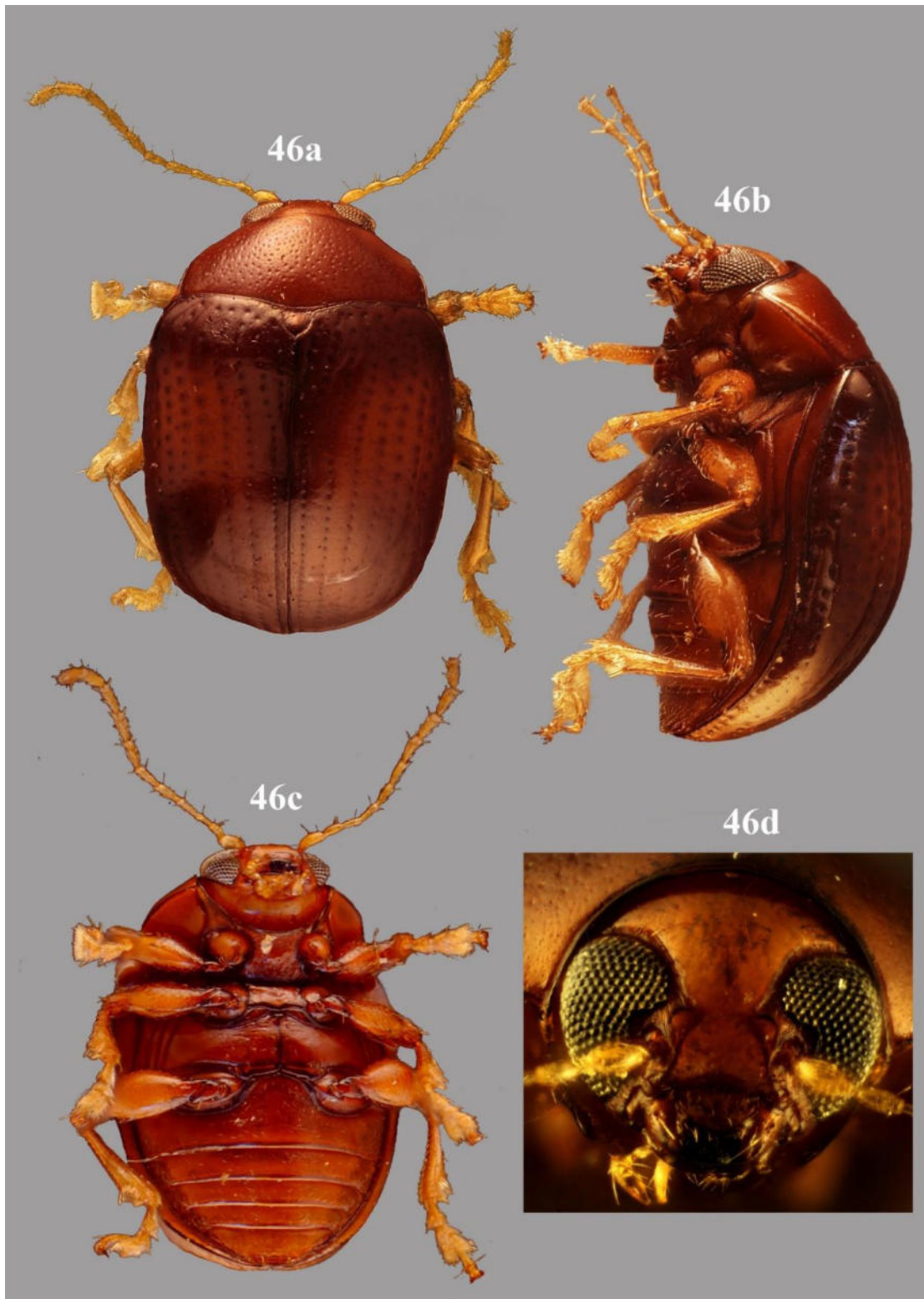
Head with sparse small and minute punctures and fine setae; coronal sulcus weak but distinct, in some examples vertex depressed medially on anterior half; suprafrontal sulcus weak but distinct, variable in prominence; frons and vertex clearly differentiated, frons depressed or sloping anteriorly; clypeus narrow, reduced. **Labrum** broader than long with a pair of widely spaced setose punctures medially and a pair of setae anterolaterally, anterior margin with thick short setae absent medially, apical margin emarginate. **Mandibles** with one long seta laterally and a black spot anteriorly. **Maxilla and labium** with last palpomere longest; maxillary palpi with penultimate palpomere

almost half or slightly less than half length of last palpomere, shorter than preceding one, **labial palpi** with last palpomere slightly longer than penultimate; antennal calli trapezoidal with supracallinal sulcus merging with orbital sulcus; orbital sulcus broad, deep, bordered by a row of fine setae with orbital pore in middle of dorsal margin of eye, round and raised with a long erect seta. **Compound eyes** large, anterolateral, distinctly sinuate at its inner angle, transverse diameter of eye 1.13 to 1.16 times interocular space and slightly longer than interantennal space; vertical diameter of eye 1.3 to 1.4 times horizontal; maximum width of head more than three times interocular space, almost three times interantennal space, 2.7 to 2.9 times transverse diameter of eye. **Antenna** long, subfiliform, extends up to half of elytra; first antennomere thick, longer than second, second longer than third and fourth separately, remaining antennomeres progressively broadened; first five antennomeres smooth, sparsely setose with long setae and rest densely setose. Proportionate length of antennomeres 1 to 11 equals 1 : 0.7–0.76 : 0.65–0.71 : 0.8–0.9 : 0.9–0.95 : 0.9–0.95 : 0.95–1.0 : 1–1.05 : 1.05–1.15 : 0.95–1.0 : 1.2–1.35.

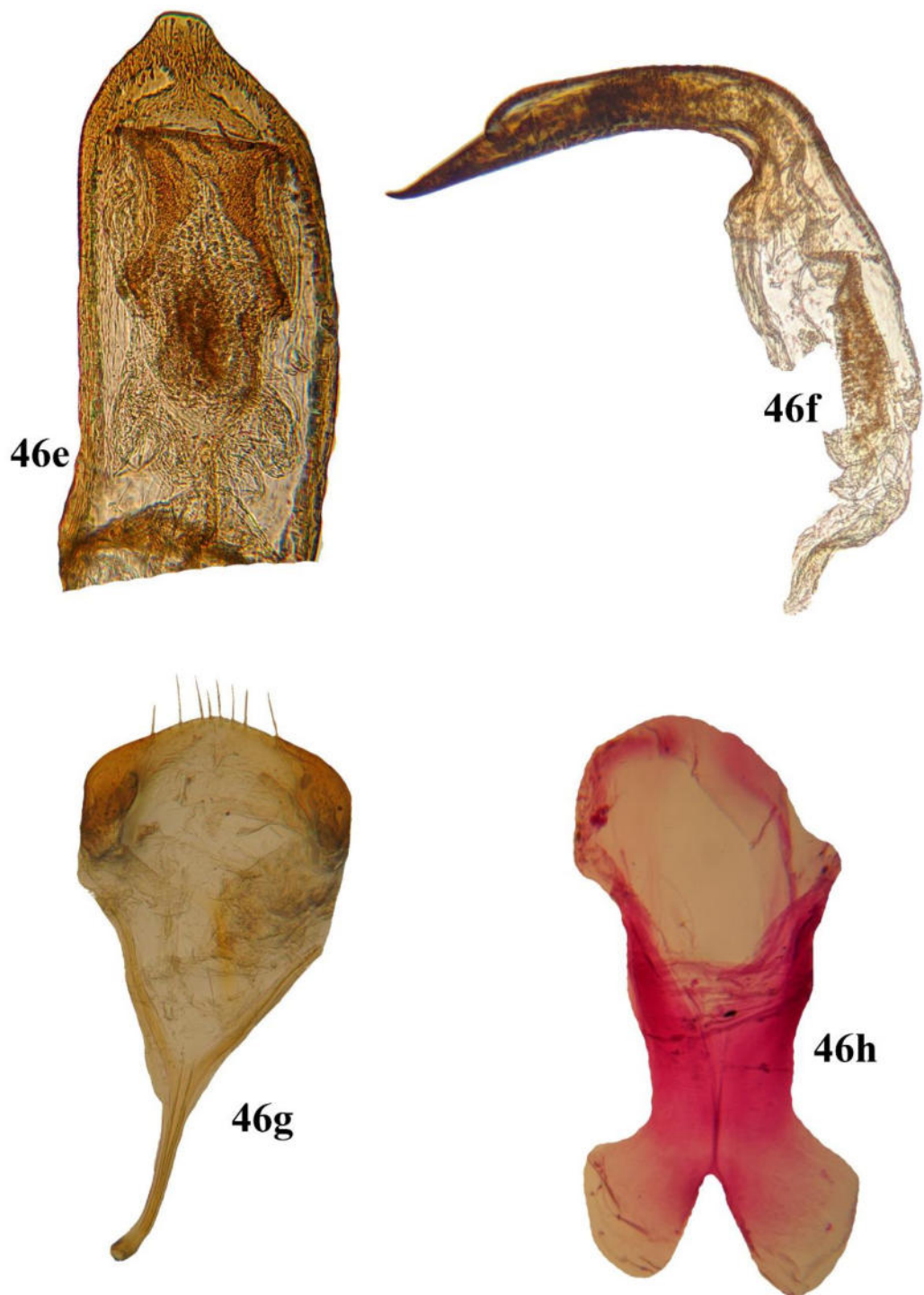
Pronotum 2.1 to 2.2 times broader than long, posteriorly 1.5 to 1.7 times wider than anteriorly, disc profusely punctured with small and minute punctures, lateral margins evenly curved, posterior margin gently lobed in middle, posterolateral callosity gently extend beyond lateral margin. **Scutellum** broader than long or as long as broad, narrowly rounded posteriorly with an acute apex, sparsely, minutely punctate.

Elytra 1.13 to 1.15 times longer than wide, regularly punctate striate, punctures larger than those on head and pronotum, sparsely setose, interstices bear numerous minute punctures. Scutellar striae incomplete, hardly reaching middle of elytra, four times as long as scutellum. Elytra with about 11 striae post basally, 10 striae post medially; distance between rows 1.5 to 1.6 times distance between punctures in a row. Humeral calli distinct with a few punctures or irregular marks; basal calli less distinct, post basal depression weak; elytral apex feebly concave; epipleura outwardly oblique with a few minute punctures, widest at base, narrowing towards apex.

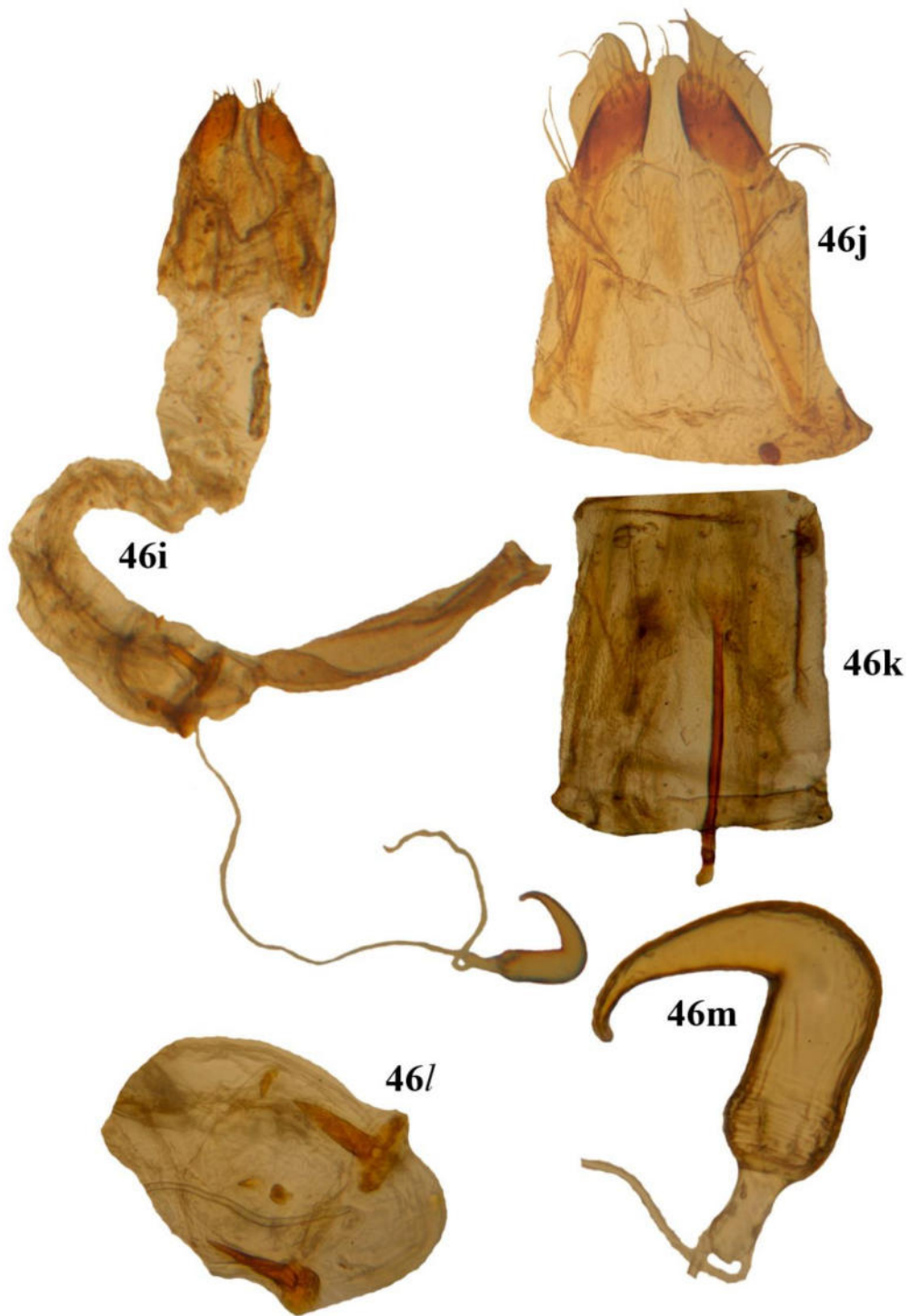
Prosternum broader than long with its lateral margin curved inwards and gently angulate with a few bold setose punctures, broader posteriorly than anteriorly.



Figures 46a–d: *Bathseba variabilis*, habitus: **46a.** Dorsal view, **46b.** Lateral view, **46c.** Ventral view, **46d.** Head, frontal view.



Figures 46e–h. Male genitalia of *Bathseba variabilis*: **46e.** Aedeagus, dorsal view, **46f.** Aedeagus, lateral view. **46g.** Spiculam gastrale, spiculam relictum and 8th tergite, **46h.** Tegmen.



Figures 46i–m. Female genitalia of *Bathseba variabilis*. **46i.** Ventral view, **46j.** Ovipositor, **46k.** Fused 8th sternite and 8th tergite with tignum, **46l.** Bursa copulatrix, **46m.** Spermatheca.

Mesosternum almost 1.8 – 2 times broader than long, sparsely pubescent with minute punctures.

Proepisternum convex, hypomeron depressed without setae or punctures.

Legs moderately long; all femora slightly dilated, dentate after middle; tibia longitudinally carinate with more than 5 carinae variable in prominence, without apical tibial spurs; tarsomeres ventrally fringed with diverse forms of setae, probasitarsomere and mesobasitarsomere in males with closely arranged capitate setae bordered by long pointed setae; all basitarsomeres in female and metabasitarsomere in male fringed with only pointed setae, second tarsomere with pointed setae, bilobed third tarsomere with diverse forms of setae such as triangular, inverted arrowhead-shaped, pointed or truncate.

Ventrites sparsely and finely pubescent, remotely punctate, first ventrite longer than following two combined medially, ventrites 3 and 4 subequal, shorter than 2 and 5 separately which are subequal, last ventrite hardly dimorphic sexually, last tergite without longitudinal groove medially.

Male genitalia. **Aedeagus** in lateral view, sharply bent almost at right angle near base of aedeagus proper; apical quarter acutely narrowed, feebly recurved, slightly depressed ventrally; in dorsal view, lateral margins almost parallel upto 3/4th, then narrowed, apex slightly projected. Paired central sclerites of endophallus visible dorsally, single apical sclerite present. **Tegmen** membranous or mildly sclerotized, distal area bilobed, proximally with a pair of arms those turn narrow and encircle at base of aedeagus proper by membranous connection. **Spiculum gastrale** (second spiculum of Jolivet & Verma 2008) Y-shaped, sclerotized with median arms slightly bent distally. Tergite VIII with middle and marginal angles arcuate with short setae apically; spiculum relictum less sclerotized and indistinct.

Female genitalia.

Spermatheca with short, thick translucent tube at base; capsule with inner margin V-shaped, outer margin curved at middle; pre-medial portion distinctly thick, gradually narrowing towards subacutely pointed apex, pre-apical portion slightly curved, length of spermathecal capsule 5.6 times its maximum width; bursa copulatrix sac like, longer than wide, with a long sclerite on either side, spermathecal duct joins bursa copulatrix

in between these sclerites; median oviduct attached at base of bursa copulatrix; ovipositor elongate, sclerotized distally, stylus absent. 8th sternite and 8th tergite fused laterally forming a membranous tube with mild sclerotizations laterally. 8th sternite bears a long tignum almost subequal in length to ovipositor.

Remarks.

B. variabilis is smaller in size and more rounded or ovoid than *B. bifasciata*. Both the species exhibit good deal of variations. Degree of color variation shown by *B. bifasciata* is more than that of *B. variabilis*. About ten colormorphs are reported in *B. bifasciata* while in the other, three or four colormorphs are seen.

Material examined (36 specimens)

7 ♂ and 2 ♀ “India : Karnataka / COH, Mudigere / 13.1152⁰N, 75.6328⁰ / 3.x.2017 / Amritha Kumari S Coll. / Ex. *Lagestroemia microcarpa*”. 1 ♂ “India: Karnataka / Ettina Bhuja / 12⁰58’51.83”N 75⁰34’11.83” / 1.x.2017 1013 m / Amritha Kumari S Coll.”. 10 ♂ and 11 ♀ “India: Kerala / Kattilappara / 20.ix.2017 / Amritha Kumari S Coll.”. 1 ♂ and 1 ♀ “India: Kerala / Thenmala / 28.ix.2017 / Amritha Kumari S Coll.”. 1 ♀ “India: Kerala: Kannur / Sreekandapuram BDP / 4.i.2018 / Amritha Kumari S Coll.” 1 ♂ “India: Kerala / JNTBGRI, Palode / 8⁰45’10.1”N; 77⁰1’30.8” E / 17.iv.2018 / Amritha Kumari S Coll.”. 1 ♀ “India: Kerala / Kallar / 8⁰41’48.9”N; 77⁰07’53.6” E / 31.iii.2018 / Viswajyothi Coll.”.

Host. *Terminalia paniculata* Roth. (Combretaceae).

Distribution. India (Karnataka, Kerala).

4.2.3. *Chrysonopa* Jacoby, 1908

(Type species: *Chrysonopa viridis* Jacoby, 1908 from south India)

Chrysonopa Jacoby, 1908: 353; Gressitt & Kimoto, 1961: 214; Seeno & Wilcox, 1982: 53; Clavaraeu, 1914: 61

Generic diagnosis.

Body oblong, metallic; antenna long, subfiliform. Pronotum with lateral margins rounded. Elytra basally wider than pronotum, punctate striate. Anterior margin of proepisternum concave. Legs long, slender, femur dilated with a small tooth beneath, intermediate and posterior femora emarginated preapically, claws appendiculate. Prosternum distinct, subquadrate, anterior margin of thoracic episternum concave.

Remarks. *Chrysonopa* closely resembles *Nodostella*. Both the genera share many characters however, they can be separated by metallic color in *Chrysonopa* (*Nodostella* non metallic) as well as the pronotum without depressions and the lateral margins rounded medially in *Chrysonopa* (lateral margins of pronotum in *Nodostella* is subangulately rounded behind the middle and surface bears a few irregular depressions).

Four species of the genus were treated by Jacoby (1908), of which two occur in south India.

4.2.3.1. *Chrysonopa viridis* Jacoby, 1908 (Figs. 47a–m)

Jacoby, 1908: 354; Clavaraeu, 1914: 61; ZSI, 1996: 627.

Description

Body length 5.5.–6.3 mm; width 2.6–3.2 mm oblong, shiny, metallic green or blue except legs, antennae, mouth parts. Legs orange brown to piceous, antennae piceous, yellow brown or proximal four antennomeres yellow brown, rest piceous; mouth parts with mandibles, labrum piceous, maxillary and labial palpi yellow brown.

Head profusely punctured with impunctate areas, punctures bold and stronger than those on pronotum; coronal sulcus weak but distinct, supraorbital pore adjacent to dorsal margin of eye with a long seta, orbital sulcus with a row of deep bold punctures; antennal calli almost trapezoidal, raised; supracallinal sulcus well developed with a row of bold punctures, suprafrontal sulcus indistinct and frons and vertex undifferentiated; frons gently sloping anteriorly, more densely punctate than vertex, clypeus distinct, emarginate anteriorly; labrum broader than long, with a pair of setose punctures medially and a pair of setae anterolaterally, anterior margin with thick short setae on either side except middle, apical margin gently sinuate; **mandibles** with two denticles; **maxillary** and **labial palpi** with last palpomere longest; maxillary palpi with last palpomere more than twice as long as penultimate, penultimate palpomere shorter than preceding one; labial palpi with last palpomere longest, penultimate longer than preceding. **Antenna** hardly extends up to middle of elytra, first antennomere thickest, longer than second, shorter than 3rd and 4th separately, 3 and 4 thin, rest progressively broadened, basal four antennomeres smooth and shiny with a few long setae, distal seven thickly covered with short pointed setae; proportionate length of antennomeres I

to XI equals 1 : 0.8–0.9 : 0.9–1.1 : 1.1–1.2 : 1 : 1–1.1 : 1.1–1.2 : 1.1–1.2 : 1.1–1.2 : 1.1–1.2 : 1.1–1.2 : 1.1–1.5. **Compound eyes** lateral, pyriform, transverse diameter of eye almost 3/4th of vertical, almost half of distance between compound eyes, 1/3rd of maximum width of head. Distance between compound eyes 1.4–1.7 times distance between antennal sockets, maximum width of head 1.8–2.0 times distance between eyes and 2.8 times distance between antennal sockets.

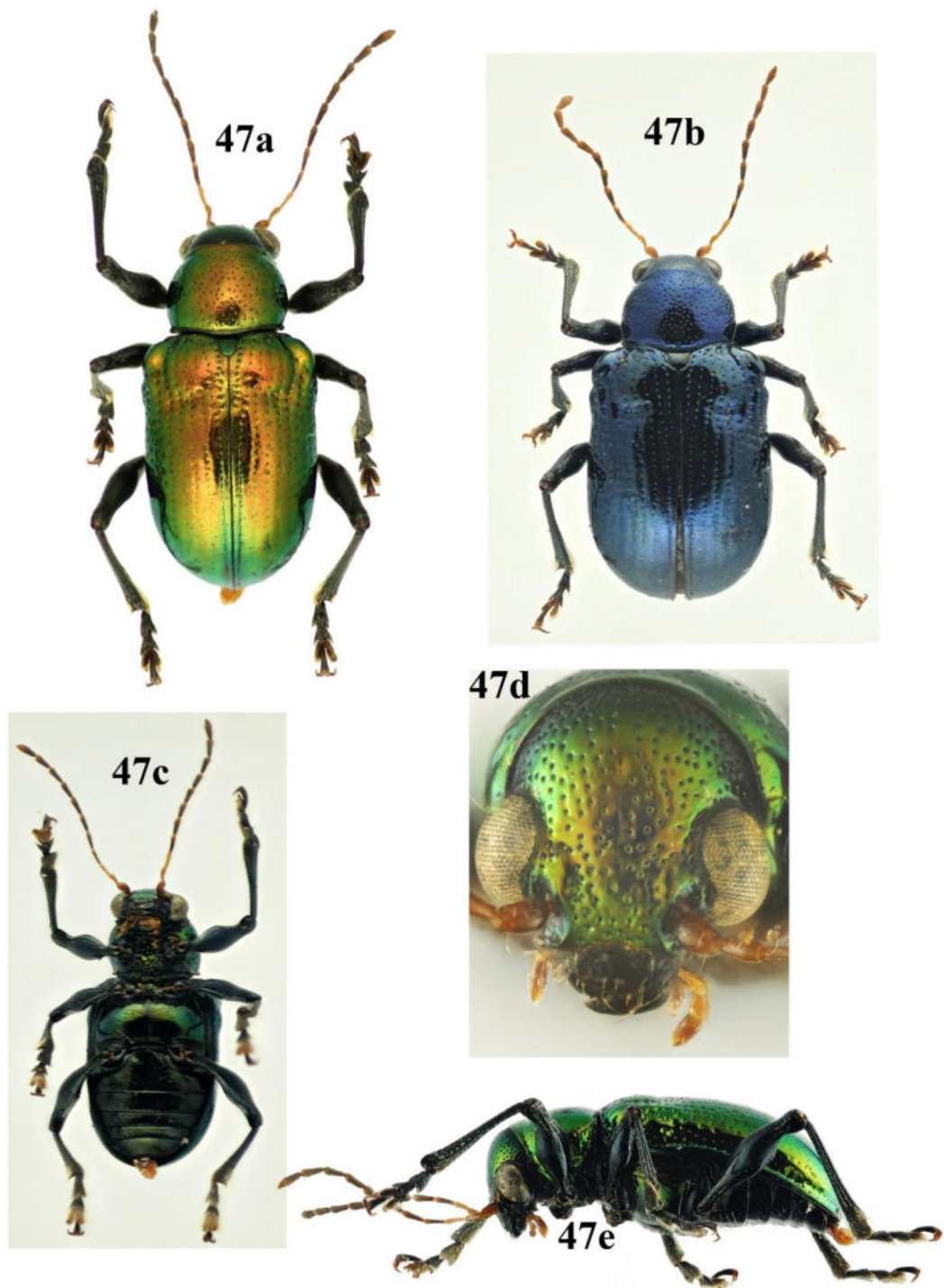
Pronotum 1.4 times broader than long, posteriorly 1.2 times wider than anteriorly, lateral margins entire, curved anteriorly and straight posteriorly, punctation less denser than those on head, more denser than those on elytra; punctures stronger laterally, posterior sulcus stronger than anterior sulcus, anterior sulcus weak medially; posterior margin gently lobed medially. **Scutellum** slightly broader than long, without setae or punctures, narrowly rounded posteriorly.

Elytra 1.4–1.5 times longer than broad, punctate striate, punctures stronger, coarse, semiregular or partially confused due to incomplete or broken striae on lateral areas, reduced in apical third, interstices in lateral areas raised, slightly rugose, reticulate in appearance; anterior half of elytra with countable rows, starts fading post medially; punctures stronger than those on head and pronotum; humeral calli prominent with minute punctures, a distinct costa arising anterolaterally from humeral calli extends up to post basal depression; basal calli prominent, lateral margin deflexed, sutural angle subacute. **Epipleura** weakly oblique with minute punctures, narrowing post medially, hardly reaching apex.

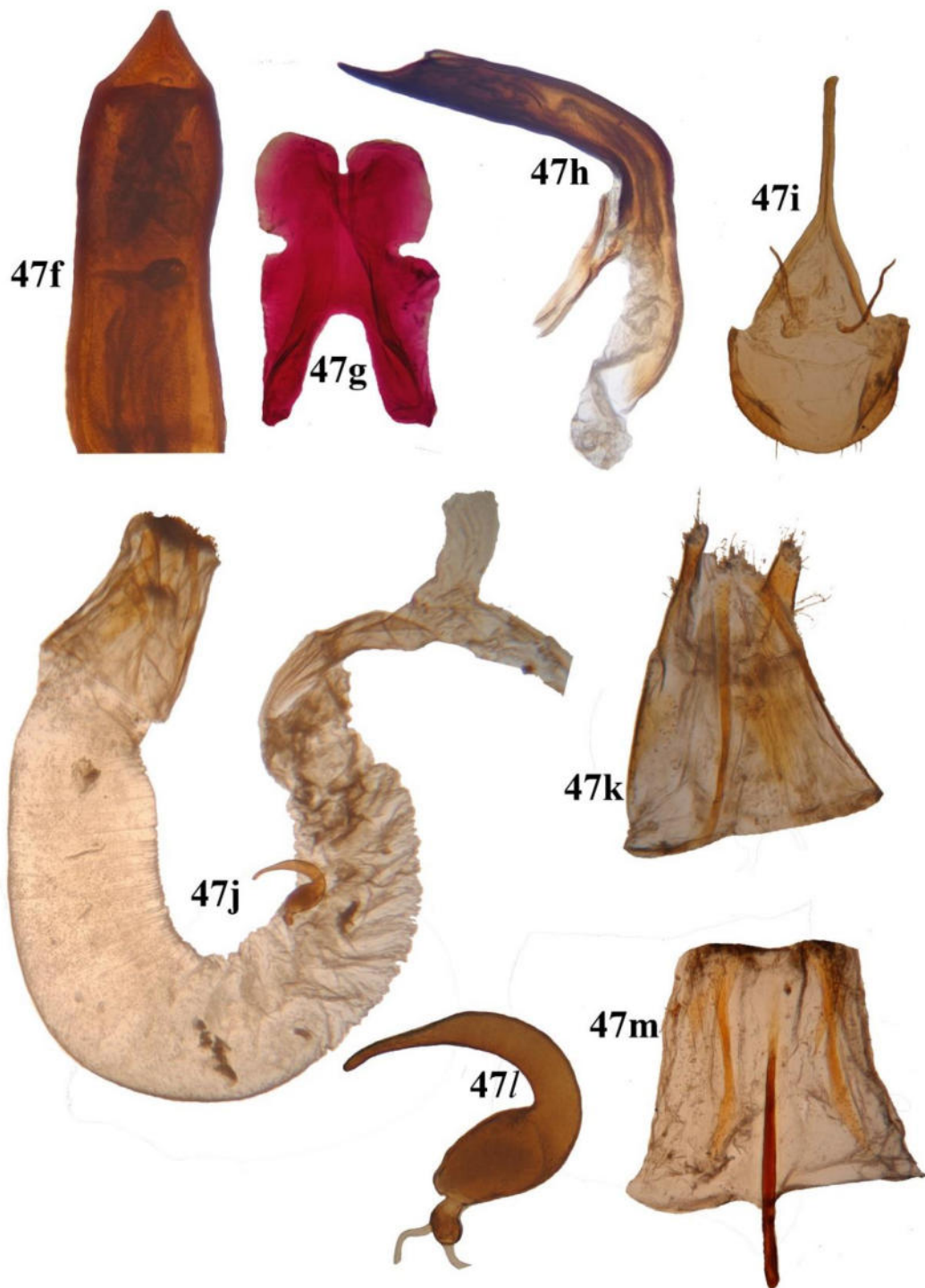
Prosternum longer than broad, broader posteriorly than anteriorly with bold punctures and fine setae; mesosternum broader than long with a few punctures and setae.

Proepisternum concave with a few punctures and setae, hypomeron posteriorly depressed with a few bold punctures.

Legs long, forefemora dilated medially without ventral tooth, meso- and metafemora dilated behind middle with a minute tooth, tibia longitudinally carinate. **Tarsomeres** ventrally fringed with diverse forms of setae, probasitarsomere and mesobasitarsomere with closely arranged capitate setae bordered by long pointed setae and metabasitarsomere with pointed setae in males; all basitarsomeres fringed with only



Figures 47a–e: *Chrysonopa viridiis*, habitus: **47a.** Dorsal view (male), **47b.** Dorsal view (female), **47c.** Ventral view, **47d.** Head, frontal view, **47e.** Lateral view.



Figures 47f–m. Genitalia of *Chrysonopa viridis*: **47f–i:** Male genitalia. **47f.** Aedeagus, ventral view, **47g.** Tegmen, **47h.** Aedeagus, lateral view, **47i.** Spiculum gastrale, spiculum relictum and 8th tergite. **47j–m.** Female genitalia: **47j.** Female genitalia. **47k.** Ovipositor, **47l.** Spermatheca, **47m.** Fused 8th sternite and 8th tergite with tignum.

pointed setae in females; second tarsomere ventrally with pointed setae, bilobed third tarsomere with triangular or inverted arrow-head shaped setae ventrally.

Venter almost aeneous or aeneous with metallic blue or green tint, ventrites finely pubescent, first ventrite longer than following two combined medially, apical margin of last ventrite concave with a row of stout setae.

Male genitalia with **aedeagus** in lateral view sharply bent near base of aedeagus proper, apical one fourth abruptly narrowed forming an acute denticle; in ventral view, apex narrowed, subacute, lateral margins gently concave medially. **Tegmen** flat, membranous or mildly sclerotized, distal area bilobed, lateral margins sinuate. **Spiculum gastrale** Y-shaped, with apex of median arm slightly bent, median arm longer than lateral arms; tergite VIII semicircular with spindle shaped sclerotization on either side with a few very short setae apically; spiculum relictum less distinct.

Female genitalia with spermathecal capsule with proximal region constricted medially, extreme base distinctly rounded; spermathecal duct and spermathecal gland duct attached proximally, distal region strongly curved before middle, distal third strongly narrowed with subacute apex, spermathecal gland tubular, vagina long, median oviduct attached at base of vagina.

Distribution. India (Kerala, Pondicherry, Tamil Nadu)

Remarks. *Chrysonopa viridis* is closely allied to *C. metallica* Bryant, 1950, which is the largest species so far described with an approximate body length of 9 mm. Elytral punctation in *C. metallica* is weak, however, *C. viridis* is smaller (5.5 to 6.5 mm) with stronger elytral punctures.

Material examined (5 specimens)

3♀ & 2♂ “India: Kerala/Idukki, Vattavada/Pampadumchola NP/10⁰7’28.3”N, 77⁰15’14.3”E/ 22.iv.2018 6280 ft AMSL/Amritha Kumari S Coll.” 1♀ “India: Kerala/Pampadumchola NP/ 17.vi.2019/K D Prathapan Coll.”

4.2.4. *Cleoporus* Lefevre, 1884

(Type species. *Cleoporus cruciatus* Lefèvre, 1884: lxxvi from Philippines).

Cleoporus Lefevre, 1884, 76; 1885: 137; Jacoby, 1908: 479; Chen, 1935: 283; 1940: 489; Chujo, 1956: 152; Chujo, 1965: 142; Gressitt & Kimoto, 1961: 199; Kimoto,

Seeno & Wilcox, 1982: 53; 1964: 239; Kimoto & Gressitt, 1982: 96. Tan, 1985: 112; Tan, 1992: 762; Xing-peng, & Cheng-de, 2007:65; Moseyko, 2011: 318.

Generic diagnosis.

Body oblong ovate, head inserted, eyes partially covered by pronotum; eyes lateral, feebly emarginate; ocular sulcus very deep and broad; suprafrontal sulcus distinct, frons and vertex distinctly separated; clypeus reduced, antenna subfiliform reaching middle of elytra; pronotum transverse, narrower than elytra, lateral margins nearly straight; propleura with anterior margin concave; prosternum broad, subquadrate; legs long; femora dilated, minutely dentate; intermediate and posterior tibiae emarginated preapically; claws bifid.

Remarks. *Cleoporus* is closely related to the recently described *Medvedemolpus* Moseyko, 2010. It differs from *Cleoporus* in having entirely bifid claws with narrow inner lobes, the length of which distinctly exceeds half the length of the outer lobes, and the weakly widened 3rd tarsomere. Another genus related to *Cleoporus* is *Bathseba* (= *Tricliona*). *Cleoporus* has a minute or no tooth on forefemora, while in *Bathseba*, forefemora has a well developed tooth ventrally. In *Cleoporus*, the lateral margins of pronotum and elytra are deflexed or not visible from above and the ocular sulci are very broad, while in *Bathseba*, the lateral margins of pronotum and elytra are visible from above and the ocular sulci are narrow. However, these characters are variable with in the genera.

Of the six species of *Cleoporus* treated by Jacoby (1908), three occur in south India.

Key to select species of south Indian *Cleoporus*

1. Vertex long, extends up to middle of compound eyes; clypeus short and almost semicircular; coronal sulcus distinct; compound eyes are distinctly emarginated; color entirely yellow, rarely with small black spots on pronotum and/ or elytra.....*C. inornatus*

- Vertex short, not reaching middle of compound eyes; clypeus large and subquadrate; coronal sulcus weak or indistinct; compound eyes are weakly emarginated; color entirely bluish black except head, propleura and legs yellow or red brown, pronotum rarely red brown.....*Cleoporus* sp.1

4.2.4.1. *Cleoporus inornatus* Jacoby, 1908 (Figs. 48a–m)

Jacoby, 1908: 480; Kimoto, 1982: 97

Description

Body length 2.5–3.04 mm, width 1.5–1.9 mm, oblong ovate, shiny; entirely yellow except labrum, margins, leg joints and parts of venter red brown, some variants with black spots on pronotum and elytra.

Head inserted, almost impunctate, major portion of compound eyes concealed by propleura; **vertex** raised, broad, almost U-shaped, lateral margins gently angulate, anterolateral margins slightly wavy or dentate; coronal suture weak, distinct; a weak longitudinal carina in line with coronal suture in dorsal half; **supraorbital pore** adjacent to dorsal margin of eye, raised, round, with a long seta; **orbital sulcus** deep, wide; suprafrontal sulcus distinct, clearly differentiating frons and vertex; **frons** with a few minute punctures; **antennal calli** distinct; **clypeus** reduced; **labrum** broader than long with a pair of broadly spaced setose punctures medially, a pair of setae each on anterolateral angles, anterior margin with a row of short setae discontinuous in middle; **maxillary and labial palpi** with apical palpomere longest, maxillary palpi with penultimate palpomere almost half as long as last palpomere, labial palpi with last palpomere 1.2 times as long as penultimate; **compound eyes** with inner margin slightly emarginate; **antenna** extends almost up to half of body, first antennomere thick, second thick, shorter than first, antennomeres 3–6 thin and subequal, 7–11 progressively broadened. Proportionate length of antennomeres I to XI equals 1 : 0.7–0.89 : 0.74–0.89 : 0.74–0.86 : 0.78–0.86 : 0.69–0.79 : 0.95–1.05 : 1.05–1.19 : 1.04–1.24 : 1.09–1.26 : 1.26–1.58. Ratio of interocular space, inter antennal space, distance between antennae and eye and maximum width of head equals 1: 0.63–0.68 : 0.1–0.13 : 1.8–2.13.

Pronotum almost 1.2–1.3 times wider than long, anteriorly 1.4 times narrower than posteriorly, convex with a mixture of small and minute punctures, lateral margins almost straight; anterolateral margins of proepisternum and hypomeron confluent, with a setose puncture at junction, posterior margin gently lobed; lateral and anterolateral margins deflexed; **scutellum** broadly rounded posteriorly, as long as wide.

Elytra 1.25–1.32 times longer than wide; punctate striate, punctures partially confused, semiregular, punctuation turning weaker in posterior half, distance between punctures

in a row less than distance between adjacent rows; scutellar striae incomplete, more than three times as long as scutellum, hardly reaching middle of elytra; elytra medially with approximately nine countable striae; humeral calli distinct with oblique markings or punctures; basal calli weak but distinct; **epipleura** outwardly oblique, narrowing beyond proximal one third, hardly reaching elytral apex; sutural angle acute.

Propleura with a few bold punctures; **hypomeron** impunctate; **legs** long; femora thick, weakly dentate ventrally beneath middle, tooth on forefemora more prominent than rest; tibiae with longitudinal carinae; tarsomeres ventrally fringed with diverse forms of setae, pro- and mesobasitarsomeres ventrally with very short capitate setae bordered by long pointed setae in males; metabasitarsomere in males and all basitarsomeres in females ventrally with only pointed setae; second tarsomeres with long pointed setae, third bilobed tarsomeres with a mixture of triangular, inverted arrow-head-shaped, pointed or blunt setae.

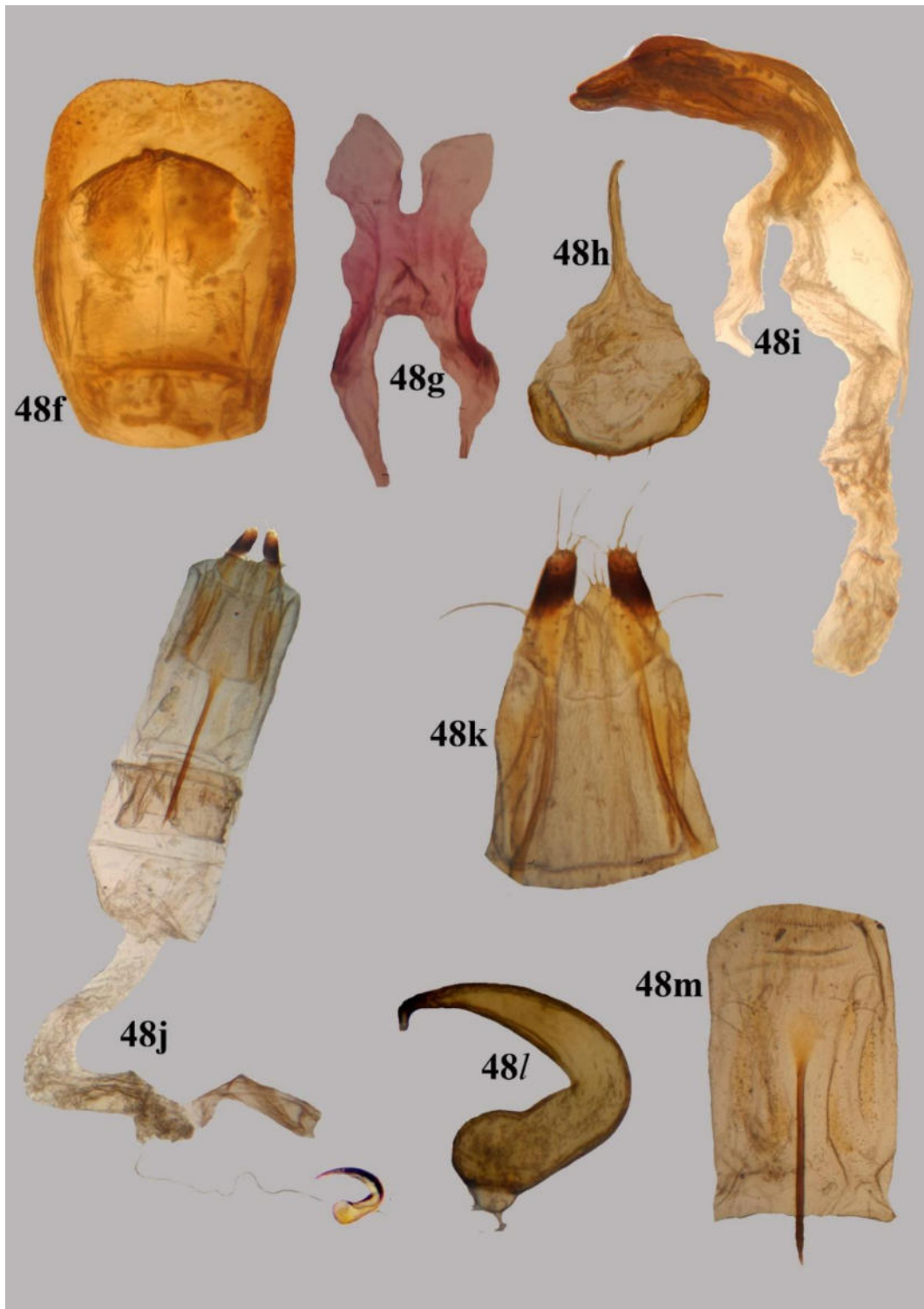
Prosternum broader than long; broader posteriorly than anteriorly with bold punctures and setae; lateral margins angulate, mesosternum broader than long with fewer and weaker punctures than on prosternum; **ventrites** pubescent, first ventrite medially longer than following two combined; 3rd, 4th subequal, shorter than 2nd and 5th separately; apex of last ventrite almost straight or gently concave with setae and small triangular teeth; last ventrite hardly dimorphic sexually; last tergite without longitudinal groove medially.

Male genitalia with **aedeagus** in lateral view, sharply bent near base of aedeagus proper, distally narrowed with blunt apex; in ventral view, lateral margins gently convex, apex distinctly bilobed. **Tegmen** flat, membranous or mildly sclerotized, distally bilobed, lateral arms bisinuate, proximally with a pair of arms narrowed and encircle base of aedeagus proper by means of membranous connection; **spiculum gastrale** Y-shaped, sclerotized, median arms longer than lateral; tergite VIII semicircular with spindle shaped sclerotization on either side with short setae apically; spiculum relictum less distinct.

Female genitalia with spermathecal capsule distinctly curved, proximal area very short, semicircular where spermathecal duct and spermathecal gland joins side by side; distal portion with base rounded, medially narrowed, strongly narrowed towards apex;



Figures 48a–e: *Cleoporus inornatus*, habitus: **48a–b.** Dorsal view. **48c.** Ventral view, **48d.** Head, frontal view, **48e.** Lateral view.



Figures 48f–m. Genitalia of *Cleoporus inornatus*: **48f–i**: Male genitalia. **48f**. Aedeagus, ventral view, **48g**. Tegmen, **48h**. Spiculam gastrale, spiculam relictum and 8th tergoite. **48i**. Aedeagus, lateral view, **48j–m**. Female genitalia: **48j**. Female genitalia, ventral view. **48k**. Ovipositor, **48l**. Spermatheca, **48m**. Fused 8th sternite and 8th tergite with tignum.

bursa copulatrix indistinct; ovipositor elongate; stylus absent; 8th sternite and 8th tergite fused laterally to form a membraneous tube with mild sclerotizations laterally; 8th sternite bears a long tignum, longer than ovipositor.

Remarks. *Cleoporus plagiatus* Jacoby closely resembles *C. inornatus*. Pronotum of the former is two times wider than long (in *C. inornatus*, almost 1.2 times wider than long). Antenna in *C. inornatus* does not reach middle of the elytra while in *C. plagiatus*, antenna extends up to the middle of elytra. Venter is black in *C. plagiatus* while the same is yellow in *C. inornatus*.

Distribution. India (Assam, Karnataka, Kerala, Maharashtra), Myanmar, Thailand, Laos.

Material examined (15 specimens).

10 ♂ and 5 ♀ “India: Kerala/Tirurangadi/N 11^o 02’ 21.80”/ E 75^o 55’ 18,91” 14 m/2.ix.2016/Shameem KM Coll./Ex. *Mallotus atrovirens*”.

Host plant. *Mallotus atrovirens* Müll.Arg. (Euphorbiaceae).

4.2.4.2. *Cleoporus* sp. 1 (Figs. 49a–p)

Description

Body length 2.8–3.04 mm, width 2.3–2.5 mm; oblong ovate, metallic, blue black to brown black without spots, stripes or macula; one variant with orange pronotum and blue black elytra.

Head inserted, glabrous, **vertex** broad with a mixture of small and minute punctures; coronal suture indicated by a depression in middle of vertex, rarely weak; suprafrontal sulcus deep, separates frons and vertex; **frons** subquadrate, sparsely setose, sides depressed; **clypeus** narrow, with numerous setae, anteriorly emarginate; **labrum** gently deflexed anteriorly, apex slightly sinuate with a row of setae discontinuous medially, a pair of widely spaced setose punctures in middle, a pair each of very closely approximated setae on either side anterolaterally; **mandibles** red brown to brown black with a few setae laterally; **maxillary and labial palpi** light yellow with apical palpomere longest; maxillary palpi with apical palpomere more than two times as long as preceding, labial palpi with apical palpomere about two times as long as preceding; **compound eyes** pyriform, inner margin emarginate, vertical diameter 1.4–1.6 times horizontal; ocular sulcus broad, deep with a row of setae bordering lateral margin of

vertex; **antennae** generally yellow brown, first five antennomeres yellow, rest light brown to brown black; first antennomere thick, oval or elliptical, second thinner than first, almost elliptical, 3–6 thinner than second, 7–11 progressively widened, antenna extends beyond half of elytra. Proportionate length of antennomeres I to XI equals 1 : 0.7–1 : 0.67–1 : 0.7–1 : 0.7–1 : 0.7–0.9 : 0.6–1.3 : 0.6–1.3 : 0.6–1.3 : 0.6–1.5 : 0.6–1.3 : 0.8–1.7. Ratio of transverse diameter of eye, vertical diameter of eye, interantennal space, interocular space, distance between antennae and eye and maximum width of head respectively equals 1 : 1.4–1.6 : 1.2–1.45 : 1.7–2.3 : 0.21–0.28 : 3.3–3.75; maximum width of head almost twice as large as interocular space.

Pronotum almost 1.5 times wider than long, anteriorly 1.5–1.6 times narrower than posteriorly, convex with small punctures; lateral margins straight, slightly oblique, converging towards front; anterolateral margins of preepisternum and pronotum confluent with its junction bearing one or two setose punctures; anterior margin convex medially and concave laterally, posterior margin slightly lobed medially; **scutellum** as broad as long with a few setae, yellow brown to dark brown, apex acute.

Elytra 1.2–1.3 times longer than wide, regularly punctate in middle, confused laterally and apically, seven distinct striae excluding scutellar, scutellar striae more than three times as long as scutellum; humeral calli prominent, followed by depression posteriorly and mesally, basal calli weak, post basal depression obsolete; distance between adjacent striae 1.5 to 2 times distance between punctures, distance between adjacent punctures 1.5 to 3 times diameter of punctures in middle of elytra; **epipleura** outwardly oblique, narrowed beyond middle, narrowly reaching apex; lateral elytral margin distinct, humeral angle rounded, sutural angle subacute.

Prosternum broad, subquadrate, yellow brown to brown black, punctate and slightly pubescent, lateral margins straight; venter finely pubescent, red brown to brown black.

Proepisternum distinctly convex with a few punctures near forecoxa; hypomeron brown to black, concave posteriorly. **Legs** yellow to yellow brown, joints red brown; femora thick, weakly dentate, tibiae dorsally sulcate; tarsomeres ventrally fringed with diverse forms of setae, basitarsomere with closely arranged capitate setae bordered by long pointed setae in males; only pointed setae instead of capitate setae in females;



49a



49b

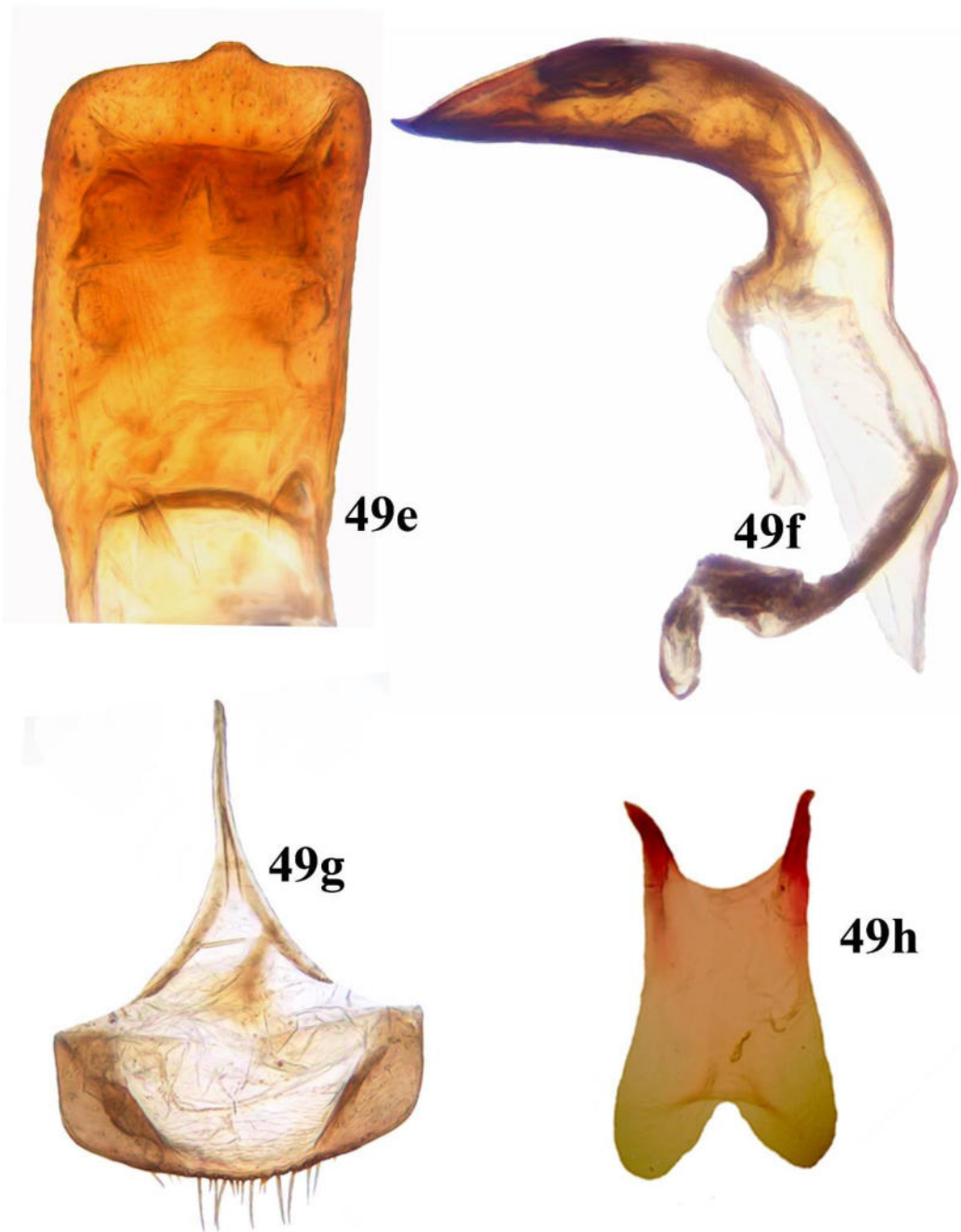


49c

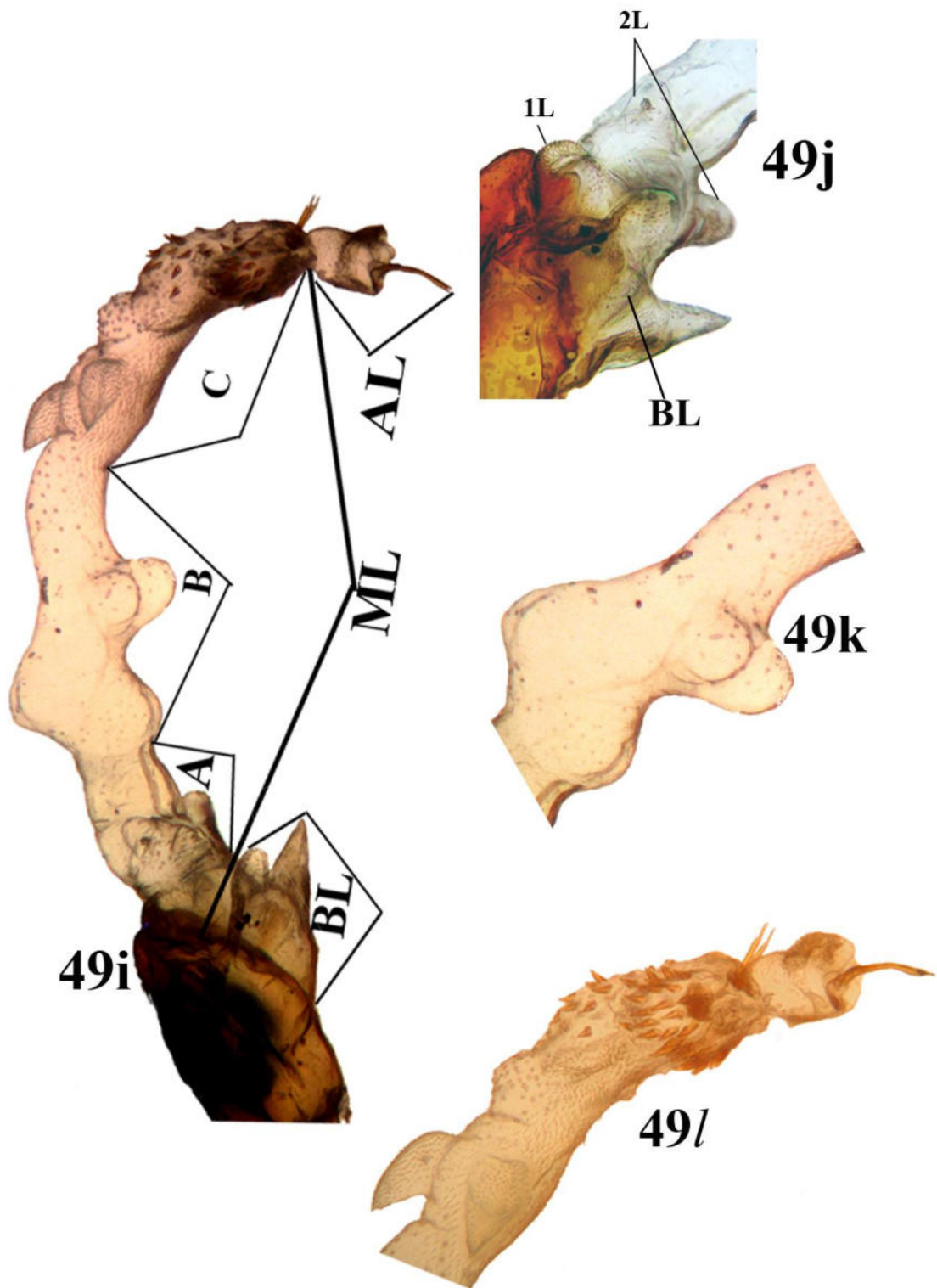


49d

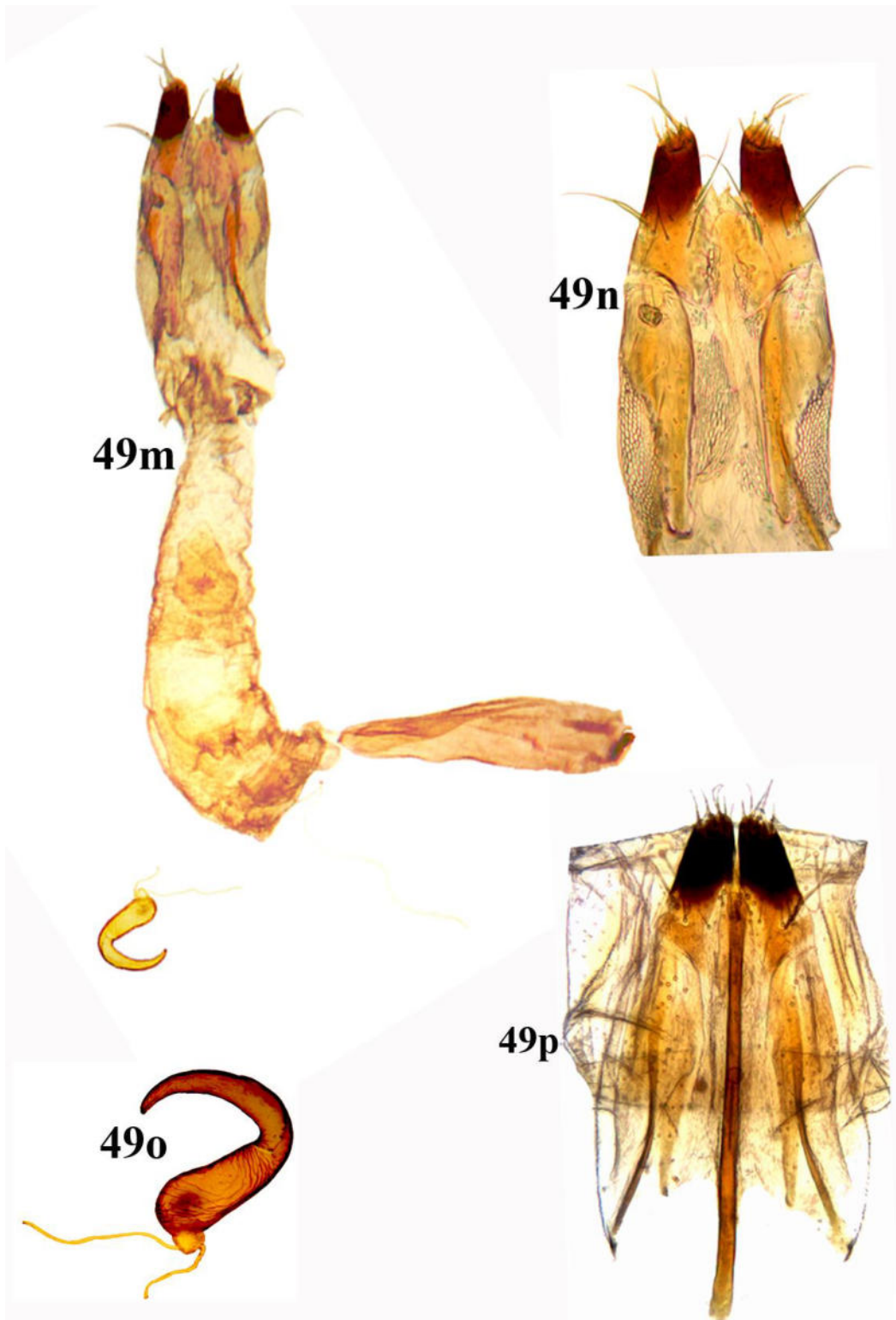
Figures 49a–d: *Cleoporus* sp.1, habitus: **49a–b.** Dorsal view, **49c.** Ventral view, **49d.** Head, frontal view.



Figures 49e–h. Male genitalia of *Cleoporus* sp. 1: **49e.** Aedeagus, ventral view, **49f.** Aedeagus, lateral view. **49g.** Spiculum gastrale, spiculum relictum and 8th tergite, **49h.** Tegmen.



Figures 49i–l.Endophallus of *Cleoporus* sp. 1: **49i.** Endophallus completely everted, lateral view, **49j.** Basal phallomere; **49k.** Median phallomere, **49l.** Apical phallomere.



Figures 49m–p. Female genitalia of *Cleoporus* sp.1: **49m.** Ventral view **49n.** Ovipositor, **49o.** Spermatheca, **49p.** Fused 8th sternite and 8th tergite with tignum along with ovipositor.

second tarsomere with pointed setae, bilobed third tarsomere with variously shaped setae such as triangular, inverted arrow-head shaped, truncate or clavate apices.

Ventrites pubescent; first ventrite medially longer than following two combined; last ventrite with dentate apex, apical margin of last ventrite convex in female, almost straight in male.

Male genitalia with **tegmen** flat, membranous, distal area bilobed, proximally with a pair of narrow sclerotized arms attached at base of aedeagus by membranous connections; **aedeagus** in lateral view, sharply bent almost at right angle near base of aedeagus proper, acutely narrowed apically; ventral surface flat or slightly concave, parallel sided, with widely spaced minute setose punctures, apex transverse, obtusely projected in middle, anterolateral angle obtuse; median orifice wide open medially.

Spiculum gastrale Y-shaped with slightly curved lateral arms and almost straight stem. Tergite VIII spindle shaped on either side, apex setose; spiculum relictum weakly sclerotized, less distinct.

Endophallus long, tubular, more than two times as long as aedeagus proper, very complex in structure with distinct regions and sclerites; three distinct regions: basal phallomere (BP), median phallomere (MP) and apical phallomere (AP). BP and AP small, simple compared to lengthy median lobe, basal lobe paired, flap-like, triangular, recurved dorsally, ornamented with small angular spicules; AP bell-shaped with long apical sclerite, basally curved, distally bifurcated, BP and AP including apical sclerite of almost comparable length, MP long and complex with a number of side lobes; for convenience, MP divided into three regions: A, B and C; region A composed of two paired, strongly convex lobes arranged side by side, first pair bearing closely arranged diamond shaped spicules on its apex and hair like setae laterally, second pair (2L) with minute spicules followed by a tubular portion; region B composed of three paired lobes followed by a tubular area, first two weakly convex, arranged on dorsal and ventral sides respectively with widely spaced circular spicules, third lobe strongly convex facing dorsally with a few circular spicules, cylindrical area with widely spaced circular spicules ventrally and hair like setae dorsally; region C highly modified, starting with a paired widely spaced leaf shaped lobe lateroventrally with angulate pointed spicules with circular base arranged regularly, corresponding dorsal area with hair like setae or

spicules followed by a weakly convex single lobe dorsally with circular spicules and corresponding dorsum same as that of previous lobe; two more weakly convex lobes thereafter containing very large angular spicules, first one with a few angular pointed sclerites ventrally, lateral side with a small ear like lobe bearing small angular spicules, second lobe cylindrical bearing numerous angular spicules much bigger than those on previous lobe arranged as a band on base of lobe; a paired preapical sclerite present ventrally near AP, shorter than apical sclerite.

Female genitalia with spermathecal capsule sickle shaped, constricted proximally, short and spherical, spermathecal duct and spermathecal gland joins side by side, distal area sickle-shaped with sharply curved outer margin and almost V-shaped inner margin, subacutely narrowed towards apex; length of spermathecal capsule almost subequal to maximum width (1.12 times); bursa copulatrix indistinct or absent, spermathecal duct directly attached near base of vaginal wall, common oviduct connected near base of vaginal wall; vagina long, curved proximally; ovipositor long, stylus absent. 8th sternite and 8th tergite fused laterally to form a membranous tube with mild sclerotizations laterally; 8th sternite bears a long tignum, longer than ovipositor.

Distribution. India (Karnataka)

Remarks. This species is closely related to *Cleoporus lefevrei* Duvivier, from Bengal. *Cleoporus lefevrei* is colored greenish aeneous while *Cleoporus* sp. 1 is colored blue black to brown black or with orange pronotum and blue black elytra. In *Cleoporus Lefevrei*, head is impunctate and the scutellum is smooth, while in *Cleoporus* sp. 1, the head has small and minute punctures and setose scutellum.

Material examined (40 specimens).

18 males 9 females and 1 unsexed “India:Karnataka/Bangaluru/18.xii.2017/ Kamala Jayanthi Coll. /Ex. *Punica granatum*. 1 male and 11 unsexed “India: Karnataka/Bangaluru/07.vi.2019/Shylesha Coll./ Ex. *Terminalia catappa*”.

Host plants. *Punica granatum* L. (Lythraceae) (Jayanthi & Verghese, 2014) and *Terminalia catappa* L. (Combretaceae).

4.2.5. *Colasposoma* Laporte, 1833

(Type species: *Colasposoma senegalense* Laporte, 1833 from Senegal)

Colasposoma Laporte, 1833: 22 – Chapuis, 1874: 301 -Lefevre, 1885: 103 -Jacoby, 1908, 439 -Chen, 1935, 329; 1940, 489 - Chujo, 1956: 122 -Gressitt & Kimoto, 1961: 233 -Kimoto, 1964: 249 - Selman, 1972: 51

Acis Chevrolat, 1837 (in Dejean, Catalogue) 411 -Monros & Bechyne, 1956: 1127

Ballastro Gistel, 1837: 404 -Monros & Bechyne, 1956: 1127.

Tlzysbe Thompson, 1858: 370.

Palesida Harold, 1874: 23.

Pseudomacetes Linell, 1896: 695.

Dasychlorus Fairmaire, 1898: 19.

Chiviphyle Jacoby, 1901: 241.

Generic diagnosis. Body convex, oblong ovate, metallic, rarely pubescent above; head inserted; antenna subfiliform; thorax broader than long, lateral margins rounded; elytra rugose laterally in most cases, punctures confused; legs robust, femora dilated, sometimes dentate; tibiae sulcate, dilated and curved at apex; claws bifid; prosternum quadrate, pubescent; anterior margin of proepisternum concave.

Remarks. Species of *Colasposoma* are very variable and separation of closely allied species may be difficult. External morphology is unreliable and hence delimitation of species should be based on the characters of genitalia. However, in a few cases, even the shape of aedeagus vary, creating uncertainties in circumscribing species. Fourteen species of the genus are known from south India.

Key to select species of *Colasposoma* of south India

1. Larger species, body length more than 7mm, foretibia long, curved and widened distally.....**2**
 - Smaller species, length less than 7mm, foretibia long and normal.....**3**
- 2(1). Head, pronotum and scutellum violet; elytra red or cupreous green.....***C. pretiosum***
 - Head, pronotum and elytra unicolorous, metallic green.....***C. robustum***
- 3(2). Elytra with bands and/ or spots.....**4**
 - Elytra unicolorous, without bands or spots.....**5**
- 4(3). Spermatheca differentiated into receptacle and pump, receptacle globular, pump narrowed posteriorly, apex acute***C. versicolor***

- Spermatheca weakly differentiated into receptacle and pump, apex subacute
.....*C. ornatum*
- 5(3). Aedeagus with apex acute or subacute.....6
- Aedeagus with apex obtuse.....7
- 6(5). Apex of aedeagus subacute.....8
- Apex of aedeagus acute..... 9
- 7(5) Aedeagus with lateral margins subparallel.....*C. splendidum*
- Aedeagus with lateral margins converging towards apex.....*C. coromandelina*
- 8(6). Aedeagus with lateral margins subparallel upto 3/4th, apical fourth strongly
narrowed towards apex, ventral plate flat.....*C. downesi*
- Aedeagus with lateral margins feebly concave and gradually converging towards
apex, ventral plate concave basally*C. auripenne*
- 9(6). Ventral surface of aedeagus distinctly concave medially.....*C. asperatum*
- Ventral surface of aedeagus distinctly convex*Colasposoma* sp. 1

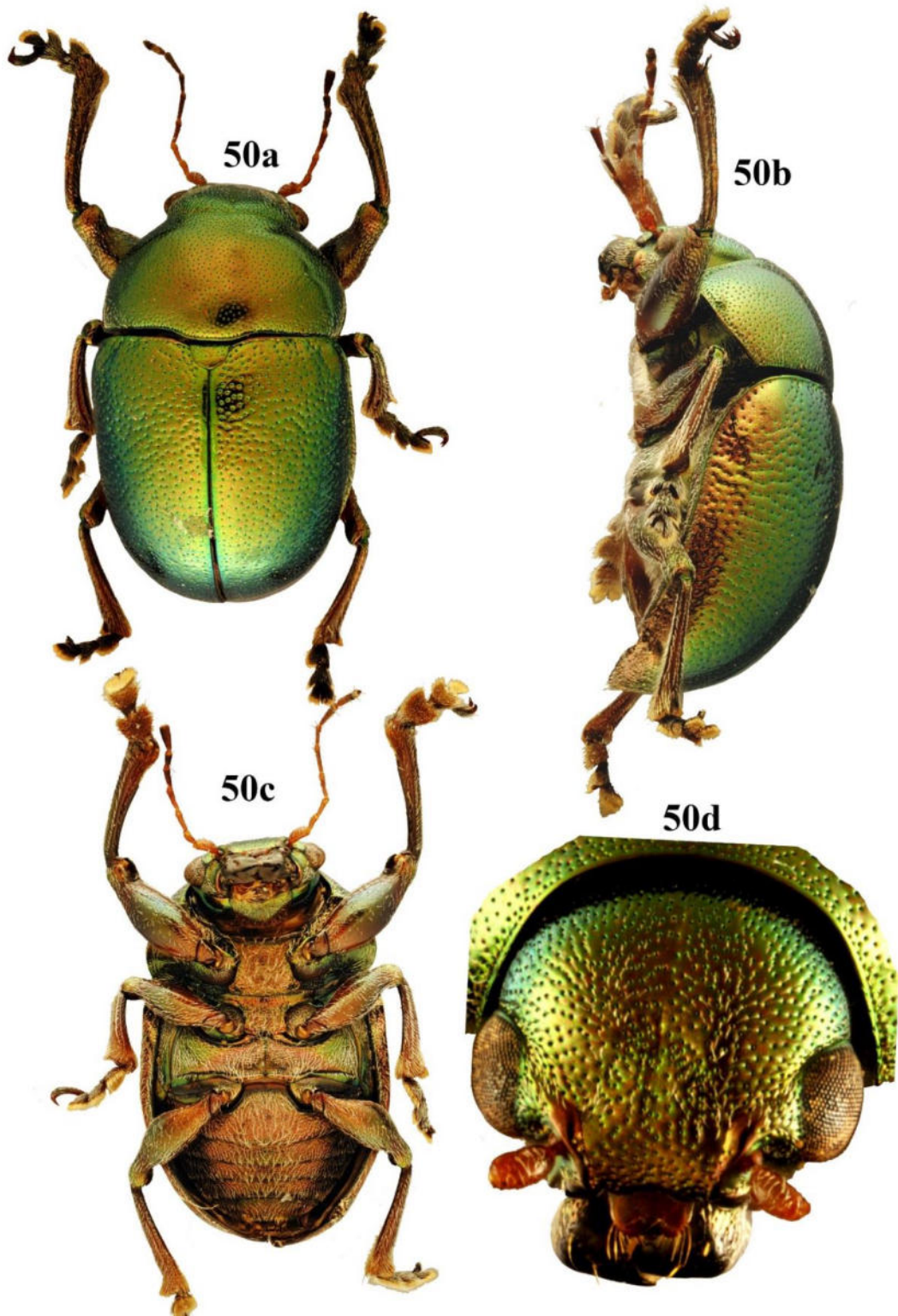
4.2.5.1. *Colasposoma asperatum* Lefevre, 1885: 104 (Figs. 50a–i)

Colasposoma asperatum Lefevre, 1885: 104; Jacoby, 1908: 452; Chen, 1935: 334; Gressitt & Kimoto, 1961: 237.

Description

Body length 6.0–6.2 mm, width 3.1–3.2 mm, oblong ovate, strongly convex, metallic dark green or aeneous; venter aeneous to dark brown; legs, mandibles, distal antennomeres, last palpomere piceous; proximal antennomeres, palpomeres orange brown; dorsum glabrous, or sparingly setose; venter densely setose.

Head densely and irregularly punctured, sparsely setose, interstices microsculptured; coronal suture distinct, rarely weak; suprafronatal sulcus weak, frons and vertex hardly differentiated; punctures on vertex stronger, elongate posterolaterally presenting rugose appearance; frons anteriorly sloping; clypeus narrow, strip-like; labrum broader than long, with widely spaced paired setose punctures preapically, anterolateral corners with a group of three setae each on either side; apex gently deflexed with a row of setae discontinuous in middle; maxilla with three palpomeres; labial palpi with two palpomeres, last palpomere longer than penultimate in both cases; **compound** eyes emarginate at inner angle, vertical diameter 1.4 times transverse; distance between



Figures 50a–d: *Colasposoma asperatum*, habitus: **50a.** Dorsal view, **50b.** Lateral view, **50c.** Ventral view, **50d.** Head, frontal view.



Figures 50e–i. Male genitalia of *Colasposoma asperatum*: **50e.** Aedeagus, dorsal view, **50f.** Aedeagus, ventral view **50g.** Aedeagus, lateral view. **50h.** Spiculum gastrale, spiculum relictum and 8th tergite, **50i.** Tegmen.

compound eyes three times transverse diameter of one eye, 1.5 times distance between antennal sockets; maximum width of head almost 4.5 times transverse diameter of eye, 1.4 times distance between compound eyes, 2.2 times distance between antennal sockets; **antenna** subfiliform, reaching upto middle of elytra, first antennomere thick, longer than second; second thicker than following 3–6 antennomeres separately, remaining antennomeres distally widened, clothed with thick short setae.

Pronotum two times as broad as long; posterior width subequal to anterior; distinctly convex, densely punctate, punctures weaker than those on elytra; anterior margin straight, posterior margin lobed medially and straight on either side; lateral margins uniformly curved, sparsely setose near margins; **scutellum** broader than long, sparingly punctate, apex rounded.

Elytra 1.2 times longer than broad, strongly convex, densely and irregularly punctate with minute setae between punctures, laterally punctures stronger, weakly transversely rugose, elytral base as broad as pronotal base, apex convex, preapical area setose, lateral margins sparsely setose, humeral calli weak but distinct, basal calli less prominent, post basal depression weak.

Venter densely pubescent.

Proepisternum with anterior margin convex, sparingly punctate, setose, weakly rugose; hypomeron distinctly rugose, posteriorly depressed.

Legs long, anterior pair longer than others; femur dilated medially without tooth; tibia gently curved basally, longitudinally carinate; tarsomeres ventrally fringed with setae of varying shape; first two tarsomeres ventrally with capitate setae bordered with bordering pointed setae in males, females bear pointed setae instead of capitate setae, third bilobed tarsomeres with setae of varying shape.

Prosternum slightly longer than broad medially, pubescent with long setae; mesosternum longer than broad, setose, posteriorly narrowed; metasternum and pleural triangle densely setose.

Ventrites finely setose, first ventrite medially longer than following two combined; ventrites 2–4 each shorter than preceding one, last ventrite longer than penultimate, apex of last ventrite emarginate with a gentle convexity medially.

Male genitalia with aedeagus in dorsal view widest at base, sharply converging distally with acutely pointed apex, ventral surface deeply grooved upto apical quarter, groove triangular in cross section; aedeagus crescent shaped in lateral view including basal hood, widest basally, dorsal and ventral margins converging distally into an acute apex, apical area sharply narrowed and extended like a beak; spiculum gastrale Y-shaped with median arm thicker basally and narrowing towards apex, lateral arms longer than median arm; Spiculum relictum spoon-like with dilated base and apex long and thin; 8th tergite semicircular with a few short setae; tegmen distally rounded, gently emarginated laterally.

Remarks. *Colasposoma asperatum* closely resembles *Colasposoma downesi*. It is difficult to segregate these species based on external morphological features, however, shape of the aedeagus is entirely different and they can be easily separated based on this character. Medvedev (2003) wrongly treated *C. asperatum* as a subspecies of *C. downesi*.

Distribution. India (Bengal, Kerala, Tamil Nadu), Myanmar, South China, Thailand. This is the first report of *C. asperatum* in south India.

Material examined (8 specimens).

5 ♂ “India: Tamilnadu/KMTR/David Rock Vistarmalai/5.v.2012/Ex. *Janakia aryalpathra*”. 3 ♂ “India: Kerala/ Peppara WLS/ 2.iv.2015/ K D Prathapan Coll. /Ex. Asclepiadaceae”

Host plants. *Decalepis aryalpathra* (J. Joseph & V. Chandras) (= *Janakia aryalpathra*) and an unknown host plant (both Asclepiadaceae).

4.2.5.2. *Colasposoma auripenne* Motschulsky, 1860 (Figs. 51a–l)

Colasposoma auripenne Motschulsky, 1860: 179; Jacoby, 1908: 454; Gressitt & Kimoto, 1961: 235; Kimoto & Gressitt, 1966: 506; Kimoto, 1972: 145.

Colasposoma pulcherrimum Baly, 1864: 15; Jacoby, 1889: 175; Lefevre, 1889: 292; 1890: 195; 1904: 454.

Colasposoma metallicurn Clark, 1865: 142; Baly, 1867: 276; Jacoby, 1908: 446; Gressitt & Kimoto, 1961: 236; Kimoto, 1964: 250; Kimoto & Gressitt, 1966: 506.

Colasposoma mutabile Baly, 1867: 273; Lefevre, 1887: 261; Jacoby, 1908: 454.

Colasposoma annamita Lefevre, 1885: 104; 1889: 292; 1893: 126.

Colasposoma capitatus Jacoby, 1889: 178; 1908: 446.

Colasposoma affine Lefevre, 1890: 195; 1904: 151.

Colasposoma oberthuri Jacoby, 1896: 6; Chujo, 1956: 124; Kimoto, 1964: 250.

Colasposoma auripenne ab. *sumatrense* Weise, 1926: 243.

Colasposoma jeanvoinei Pit, 1937: 21.

Colasposoma brevinotatum Pit, 1937: 22.

Colasposoma perroudi Pic, 1937: 22.

Colasposoma oberthuri abb. *aurita*, *azurea*, *azureolineata*, *bryanti*, *chzljoi*, *sauteri*, *violacea* Papp, 1946: 7.

Description.

Body length 4.8–6.5 mm, width 2.9–4.3 mm; oblong ovate, dorsum glabrous, metallic blue, green or cupreous, antenna with first five or six antennomeres yellow brown to red brown, rest piceous; legs and venter concolorous with dorsum or piceous with tinges of red brown; mouth parts red brown to piceous.

Head strongly and densely punctured, distinctly rugose except middle; coronal sulcus indistinct; suprafrontal sulcus weak; frons feebly rugose, punctures bold, deflexed anteriorly; antennal calli distinct, raised and almost triangular; clypeus reduced; supraorbital pore near dorsal margin of eye with a long seta; labrum broader than long, with a pair of widely spaced setose punctures preapically, anterolateral corners with a group of three setae, apex gently deflexed, gently sinuate with a row of setae discontinuous in middle; mandibles bidentate apically, finely setose laterally; maxillary palpi with three palpomeres, last palpomere longest, middle shorter than first; labial palpi with two palpomeres, subequal; **compound eyes** with mesal margin distinctly sinuate, vertical diameter 1.2 times horizontal, distance between compound eyes 2.6 times transverse diameter of eye, 1.6 times distance between antennal sockets, maximum width of head almost 4.2 times transverse diameter of eye, 1.6 times distance between eyes and 2.6 times distance between antennal sockets; **antenna** subfiliform, first antennomere thick, longer than second, second thicker than following 3–6 antennomeres which are thin, subequal, rest gradually broadened posteriorly, thickly covered with short setae.

Pronotum transverse, 1.7–1.9 times broader than long, posteriorly 1.3–1.4 times wider than anteriorly, convex, densely punctured with minute setae, interstices with minute punctures, punctures stronger laterally, interstices raised giving feeble rugose appearance laterally, anterolateral corners project forward with a long seta, anterior margin straight; posterior margin weakly lobed in middle, straight laterally; lateral margins entire, and uniformly curved. **Scutellum** U-shaped, as long as broad, sparsely punctate with minute setae.

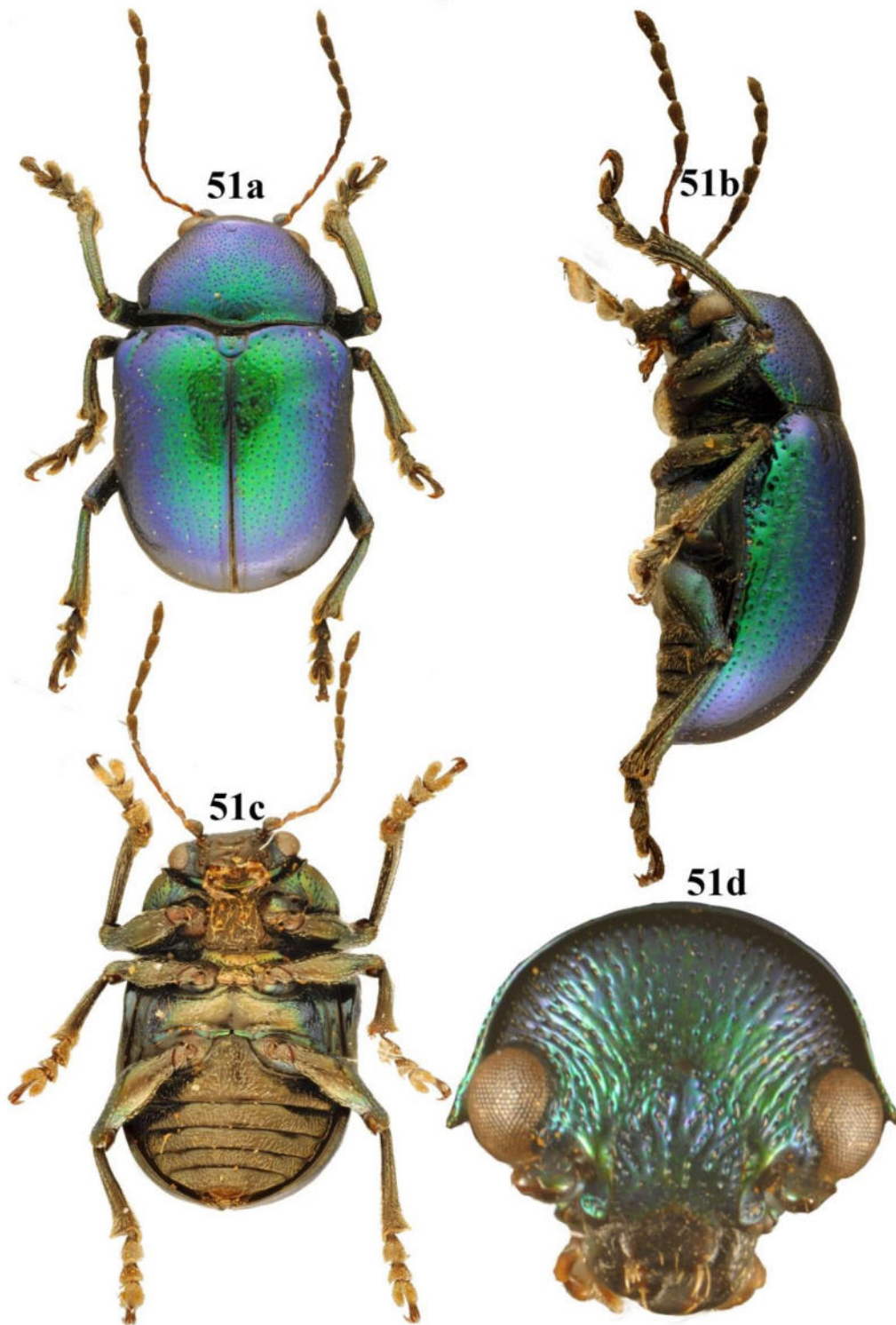
Elytra 1.2–1.3 times longer than broad, densely and irregularly punctate, interstices aciculate with minute setae; humeral calli prominent, punctate; basal calli and post basal depression distinct; feebly rugose laterally, apex rounded, **epipleura** outwardly oblique, punctate with minute setae, widest basally, narrowing posteriorly, hardly reaching apex.

Ventrites finely pubescent, first ventrite medially longer than following two combined, ventrites 2 to 4 each shorter than preceding one, last ventrite longer than penultimate, apex of last ventrite gently emarginate.

Prosternum slightly longer than wide; punctures bold, rugose, densely punctate, **mesosternum** as long as broad, sparsely setose, metasternum sparsely setose, pleural triangle minutely punctate, pleural stripe and pleural triangle distinctly separated.

Male genitalia with aedeagus in lateral view, distinctly curved beyond base of aedeagus proper, length of aedeagus proper and basal hood subequal; ventral surface concave basally; dorsal plate widest basally; gradually narrowed distally with subacute apex; **spiculum gastrale** Y-shaped with lateral arms longer than median arm, lateral arms gently curved inwards. **Spiculum relictum** distinct, Y-shaped, median arm longer than lateral arms, 8th tergite semicircular, sclerotized apically with short setae; **tegmen** internally with X-shaped sclerotization; proximal arms linear, paired, encircles aedeagus, distal area distinctly lobed at apex.

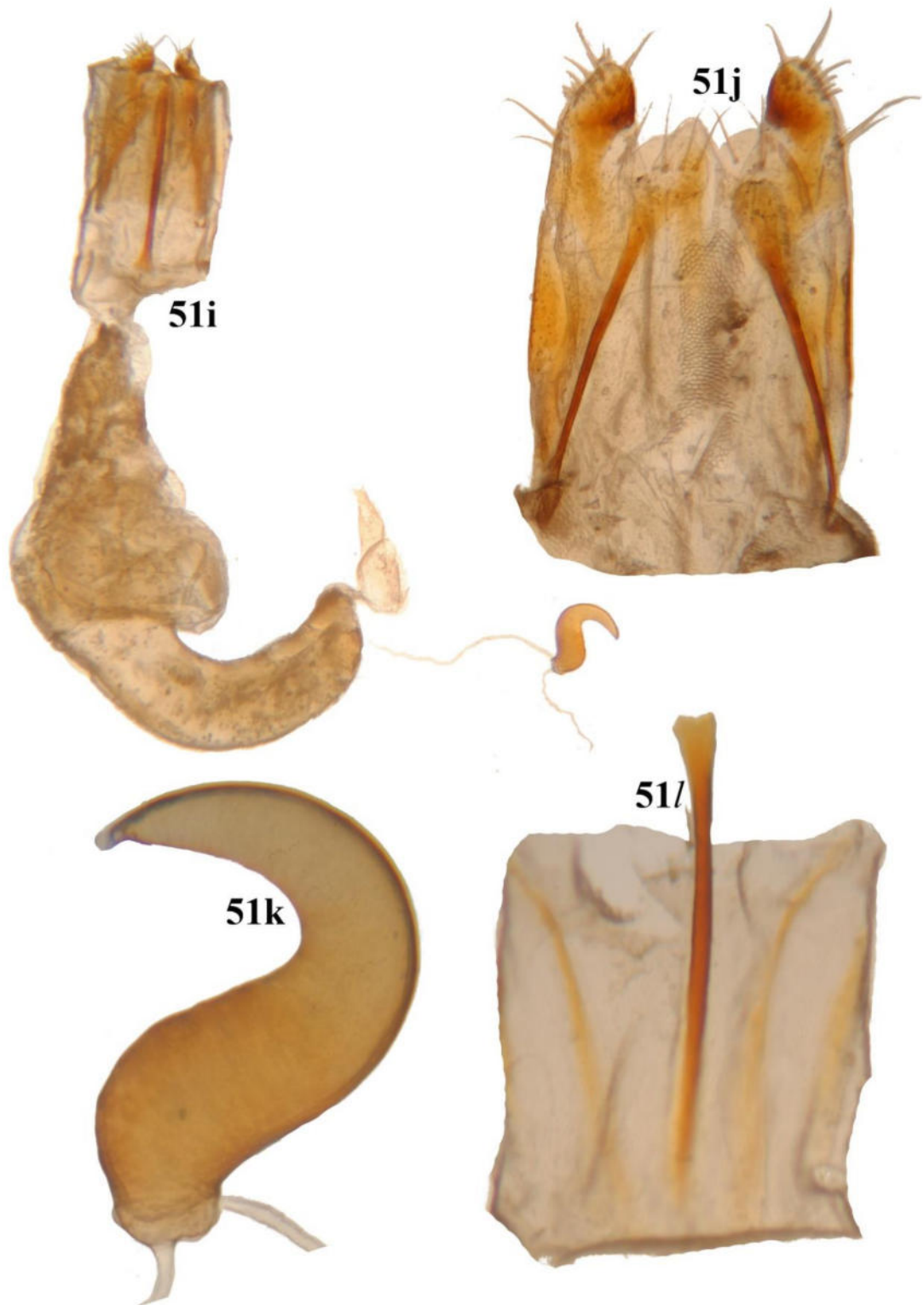
Female genitalia with spermathecal capsule almost ‘Question mark’ shaped; spermathecal gland tubular; vagina long; bursa copulatrix indistinct; ovipositor long; tignum longer than ovipositor, apex of tignum gently bifurcated.



Figures 51a–d: *Colasposoma auripenne*, habitus: **51a.** Dorsal view, **51b.** Lateral view, **51c.** Ventral view, **51d.** Head, frontal view.



Figures 51e–h. Male genitalia of *Colasposoma auripenne*: **51e.** Aedeagus, dorsal view, **51f.** Aedeagus, lateral view. **51g.** Tegmen, **51h.** Spiculam gastrale, spiculam relictum and 8th tergite.



Figures 51i–l. Female genitalia of *Colasposoma auripenne*. **51i.** Ventral view, **51j.** Ovipositor, **51k.** Spermatheca **46l.** Fused 8th sternite and 8th tergite with tignum,

Distribution. India (Andaman Islands, Kerala), Myanmar, Thailand, Laos, Cambodia, Vietnam, Hainan, S. China, Ryukyus, Taiwan, Malaya, Sumatra, Java, Borneo, Molluccas, Timor.

Remarks. Some specimens from Pampadumpara were larger and stouter than others. Minor variation in the shape of male genitalia also observed, however, the overall structure suggest that these specimens are conspecific. *Colasposoma auripenne* is closely related to *C. ornatum* Jacoby and *C. aureovittatum* Baly. Externally they are almost similar to *C. auripenne*, however, the elytral sculptures are quite different.

Material examined (48 specimens).

2 ♂, 1 ♀ & 5 unsexed "India: Kerala/ CRS, Pampadumpara/ 23.iv.2018 /9⁰48' 23.7" N 077⁰ 10' 4.9"E/ AKS & SRH Coll.". 10 ♂, 8 ♀ & 22 unsexed "India: Kerala/COA Vellayani/29.i.2016/Amritha Kumari S Coll./Ex. Sweet potato"

Host plants. *Ipomoea batatas* (L.), *Argyreia* Lour. (Convolvulaceae).

4.2.5.3. *Colasposoma coromandeliana* Jacoby, 1908 (Figs. 52a–g)

Colasposoma coromandeliana Jacoby, 1908: 444; Clavaraeu, 1914: 101; Medvedev, 2003: 295.

Description

Body length 5.6 mm, width 3.7 mm; oblong, dorsally convex, dorsum metallic green except antennae and mouth parts piceous, first antennomere, sternal and pleural region metallic green, ventrites aeneous.

Head densely punctured, minute setae with some impunctate areas in between, interstices aciculate; coronal sulcus weak; suprafrontal sulcus indistinct, frons and vertex hardly differentiated; vertex distinctly rugose, with a tubercle between eyes; antennal calli distinct, raised, oblique, ventrally acute; supraorbital pore near dorsal margin of eye; orbital sulcus weak; clypeus reduced; labrum broader than long, with a pair of widely spaced setose punctures preapically, anterolateral corners with a group of three setae each, apex gently deflexed, gently sinuate with a row of setae discontinuous in middle; mandibles with bold punctures laterally; maxillary palpi with three palpomeres, middle palpomere shorter, other two subequal; labial palpi with apical palpomere longest; **compound** eyes hemispherical, mesal margin obsoletely sinuate, vertical diameter 1.6 times transverse; distance between eyes 3.8 times

transverse diameter of one eye, 1.7 times distance between antennal sockets; maximum width of head almost 6 times transverse diameter of eye, 1.5 times distance between compound eyes, 2.5 times distance between antennal sockets, **antenna** subfiliform, reaching up to middle of elytra, first antennomere thick, longer than second, antennomeres 2–6 thin, rest distally broadened, clothed with thick short setae. Proportionate length of antennomeres I to XI equals 1 : 0.75 : 0.9 : 0.9 : 1 : 0.9 : 1.1 : 1.1 : 1.1 : 1.1 : 1.4.

Pronotum 1.6 times broader than long, posteriorly 1.2 times wider than anteriorly, convex, densely punctate; anterior margin straight medially, concave laterally; posterior margin lobed medially, straight laterally, lateral margins uniformly curved, posterolateral callosity extends beyond lateral margin; **scutellum** as broad as long, sparingly punctate, setose, apex rounded.

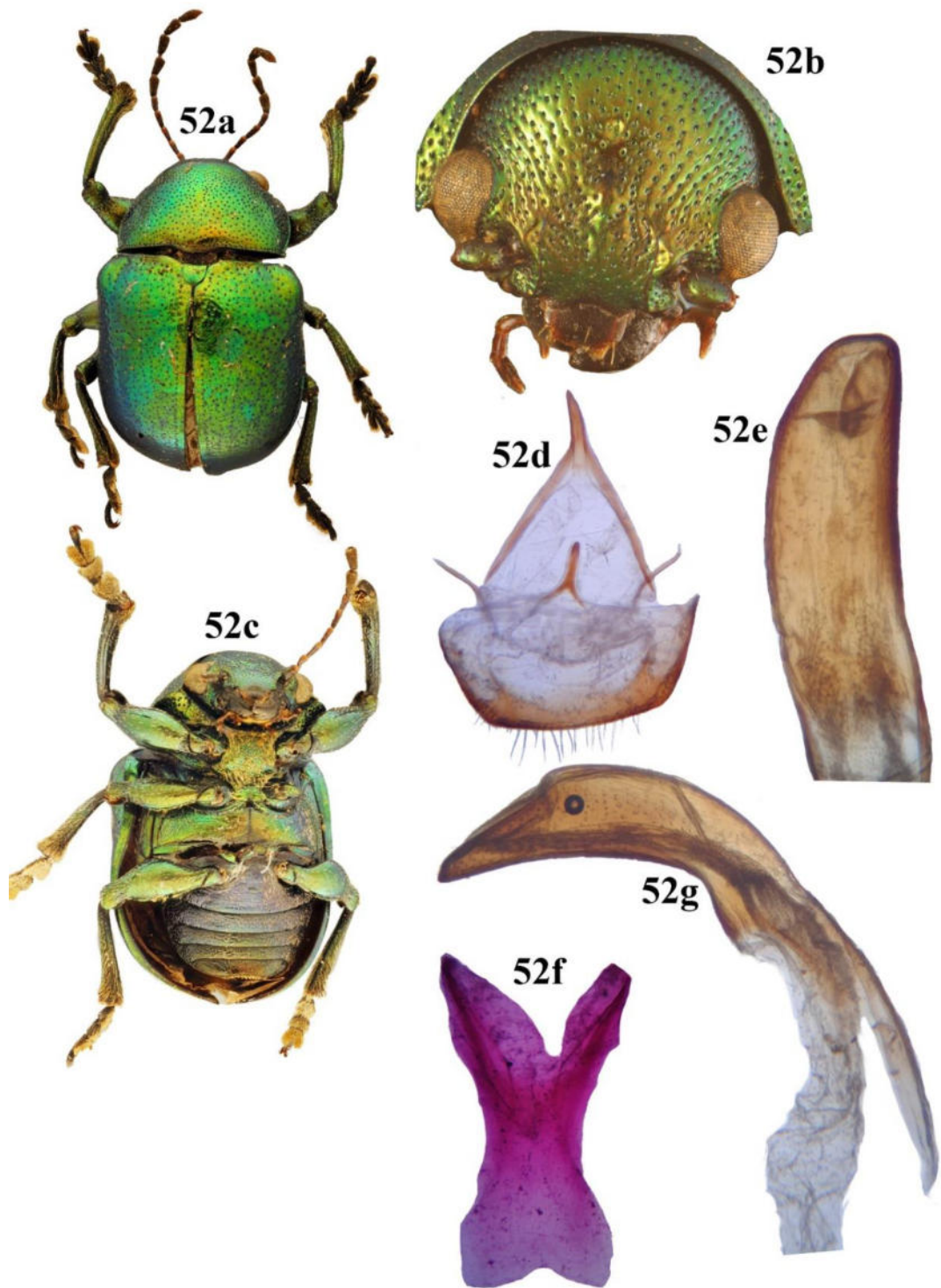
Elytra 1.1 times longer than broad, convex, densely punctate, interstices aciculate, laterally feebly transversely rugose, apex rounded, sutural angle with a distinct round tubercle; humeral calli prominent, punctate; basal calli and post basal depression weak; epipleura outwardly oblique, widest basally, narrowing posteriorly, hardly reaching apex, minutely punctate.

Proepisternum with anterior margin convex with a few large punctures; hypomeron with much larger punctures, rugose, posteriorly depressed.

Legs long, forelegs longer than mid- and hindlegs; femur dilated medially without tooth ventrally; tibia gently curved basally, longitudinally carinate; tarsomeres ventrally fringed with setae variable in shape, first two tarsomeres ventrally with capitate setae bordered by pointed setae in males; only pointed setae instead of capitate setae in females; third bilobed tarsomere with setae of varying shape.

Prosternum as long as broad, densely pubescent with long setae; metasternum sparsely setose; pleural triangle with a few bold punctures and short fine setae, pleural stripe distinctly separated from pleural triangle.

Ventrites finely setose, first ventrite medially longer than following two combined, ventrite 2 longer than 3; 4th subequal to 3rd, last ventrite longer than penultimate, apex of last ventrite gently emarginate.



Figures 52a–g. *Colasposoma coromandeliana*: **52a–c.** Habitus. **52a.** Dorsal view, **52b.** Ventral view, **52c.** Head, frontal view. **52d–g.** Male genitalia: **52d** Spiculam gastrale, spiculam relictum and 8th tergite. **52e.** Aedeagus, dorsal view, **52f.** Tegmen, **52g.** Aedeagus, lateral view.

Male genitalia with aedeagus in lateral view almost crescent shaped, extreme base concave, dorsal and ventral margins subparallel, gradually converging distally with subacute apex; in dorsal view lateral margins subparallel before apical quarter, apex obtuse; 8th tergite semicircular with a few fine short setae at apex; **spiculum gastrale** Y-shaped, median arms extremely short, lateral arms very long; **spiculum relictum** Y-shaped, sclerotized, median arms longer than lateral; **tegmen** distinctly bilobed apically, lateral margins emarginate, proximal area with membranous connectives which encircle aedeagus at base of aedeagus proper.

Distribution. India (Kerala, Pondichery, Tamil Nadu).

Remarks. Medvedev (2003) synonymised *Colasposoma coromandeliana* with *Colasposoma robustum* Jacoby. The former differs from the latter by its smaller size, stronger and closer punctation of the head, short, thick, terminal joints of the antennae, and the larger non-aciculate punctures of the elytra and thorax. In every probability they are distinct species.

Material examined. 1 ♂ “Nilgiri hills/A. K. Weld Downing/a 993” [KAU].

4.2.5.4. *Colasposoma downesi* Baly, 1862 (Figs. 53a–h)

Colasposoma downesi Baly, 1862: 19; Jacoby, 1908: 442; Kimoto, 1970: 165; Gressitt & Kimoto, 1982: 59.

Colasposoma aureovittatum Baly, 1864: 14; Lefevre, 1893: 126; Jacoby, 1908: 455.

Colasposoma igneicolle Baly, 1865: 428.

Colasposoma viridiaeneum Baly, 1865: 429.

Colasposoma ornaticolle Jacoby, 1881: 444; Lefevre, 1890: 195; 1904: 151.

Colasposoma asperatum Lefevre, 1885: 104; 1889: 292; 1890: 195; Jacoby, 1895: 274; Lefevre, 1904: 151; Jacoby, 1908: 452; Gressitt & Kimoto, 1961; Chujo, 1964: 270.

Colasposoma transversicolle Jacoby, 1889: 176; Lefevre, 1893: 126; Jacoby, 1908: 448.

Colasposoma multipunctata Jacoby, 1889: 177; 1895: 274; 1908: 448.

Colasposoma angulicolle Lefevre, 1893: 127.

Colasposoma insuturatum Pic, 1937: 21.

Colasposoma saigonense Pic, 1937: 22.

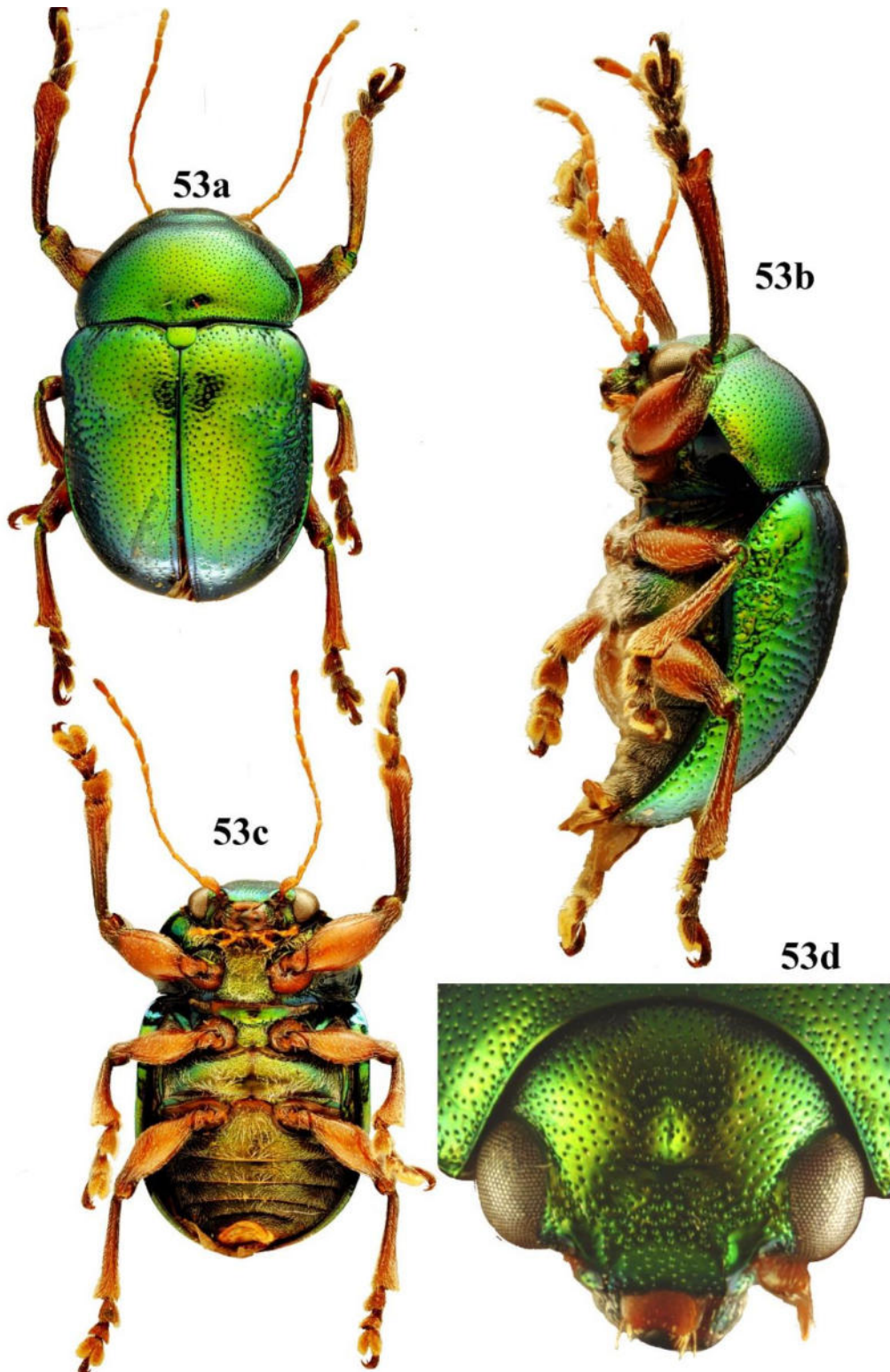
Colasposoma downesi var. *purpureicolle* Pic, 1937: 22.

Description

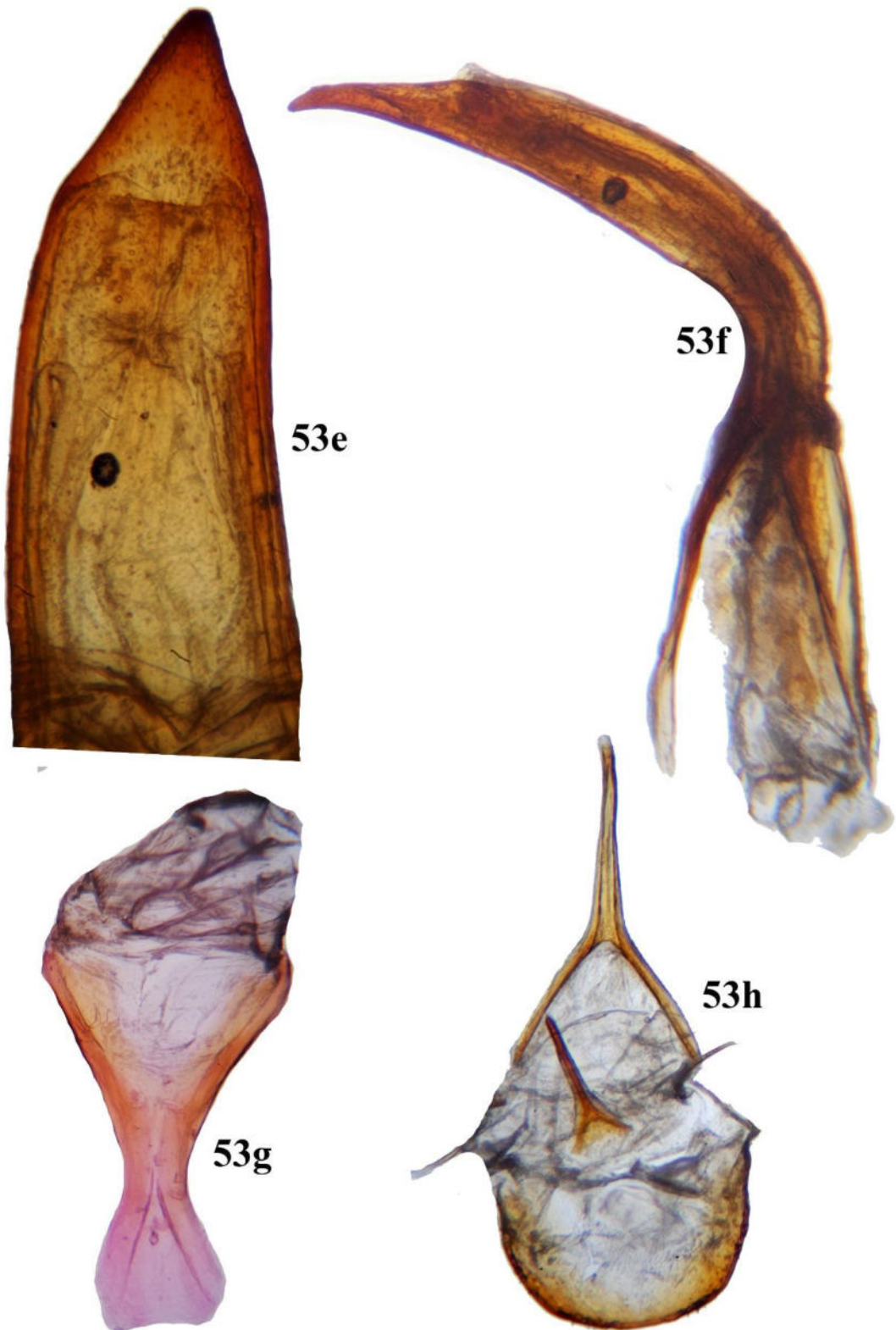
Body length 5.3–6.1 mm, width 3.3–3.9 mm; metallic green, blue or chocolate brown except labrum, mandibles, palpi and legs yellow brown to orange brown, venter aeneous.

Head densely and irregularly punctate, interstices microsculptured, finely setose; coronal suture indicated by a weak depression between compound eyes, less prominent rarely; suprafrontal sulcus weak, frons and vertex hardly differentiated; vertex obsoletely rugose posteriorly; frons depressed anteriorly with weaker punctures; orbital sulcus weak, marked by a row of punctures; supracallinal sulcus distinct, bordered by a row of setose punctures; antennal calli distinct, raised, trapezoidal; supraorbital pore near dorsal margin of eye, raised, round with a long seta; clypeus reduced, narrow, strip-like; labrum broader than long with a pair of widely spaced setae preapically, anterolateral corners with a group of three setae each, apex deflexed and gently emarginate with a row of setae; mandibles robust, lateral area with setose punctures and rugosities; maxillary palpi with three palpomeres, first and last subequal, middle shorter; **compound eyes** lateral, obsoletely sinuate at inner angle, vertical diameter 1.4 times horizontal, interocular space 2.4 times transverse diameter of eye, 1.6 times distance between antennal sockets, maximum width of head 3.7 times transverse diameter of eye, 1.5 times distance between compound eyes, 2.5 times distance between antennal sockets; **antenna** long, subfiliform, hardly reaching middle of elytra, first antennomere thick, longer than 2nd, 2nd shorter and thicker than following 3–6 which are thin, rest widened distally.

Pronotum transverse, 1.8–2.1 times broader than long, posteriorly 1.3–1.4 times wider than anteriorly, punctate with minute setae in between; lateral margins distinct, entire, evenly curved; anterior margin straight, posterior margin weakly lobed medially, densely and irregularly punctate with minute setae, punctures weaker than those on elytra; posterolateral callosity protrude beyond lateral margin. **Scutellum** broader than long, sparingly punctate, surface microsculptured.



Figures 53a–d: *Colasposoma downesi*, habitus: **53a.** Dorsal view, **53b.** Lateral view, **53c.** Ventral view, **53d.** Head, frontal view.



Figures 53e–h. Male genitalia of *Colasposoma downesi*: **53e.** Aedeagus, dorsal view, **53f.** Aedeagus, lateral view. **53g.** Tegmen, **53h.** Spiculam gastrale, spiculam relictum and 8th tergite

Elytra 1.2 times longer than wide, densely and irregularly punctate; humeral calli distinct, posteriorly rugose; basal calli and post basal depression distinct; distinctly rugose laterally behind humeral calli up to middle third; apex rounded.

Prosternum slightly longer than broad, densely setose with long erect and suberect setae; mesosternum punctate and setose, gently narrowing posteriorly, posterior margin emarginated; metasternum, pleural triangle densely setose.

Proepisternum setose; anterior margin concave, gently rugose posteriorly; hypomeron sparingly setose and rugose.

Ventrites finely setose, first ventrite medially longer than following two combined; ventrites 3–5 subequal medially, 2nd slightly longer; apex of last ventrite concave.

Male genitalia with aedeagus in dorsal view widest basally, gently converging upto apical third, apex sharply narrowed, subacute; ventral plate flat; aedeagus in lateral view crescent shaped, including basal hood, aedeagus proper gently constricted basally, broadened medially and again converging anteriorly, apex strongly narrowed, bent like beak; **spiculum gastrale** Y-shaped with median arm thicker basally, narrowing towards apex, longer than lateral arms, **Spiculum relictum** Y-shaped, median arm more than two times longer than lateral arms; 8th tergite semicircular with a few alternating long and short setae; tegmen broad basally, lateral margins concave, distal area distinctly lobed with membranous covering, proximal area with membranous connections which encircle aedeagus proper.

Remarks. Elytra of males with sides closely transversely rugose, without tubercles while the same is strongly rugose and tuberculate in females. *Colasposoma downesi* is closely allied to *C. asperatum* and is difficult to segregate from the former based on morphological features. However, shape of aedeagus is unique and different in both of the species. Medvedev (2003) treated *C. asperatus* as a subspecies of *C. downesi*.

Distribution. India (Kerala, Sikkim, Tamil Nadu), Nepal, Burma, Thailand, Laos, Cambodia, Vietnam.

Material examined (10 specimens). 5♂ & 5♀ “India: Kerala/ EKM, Thripunithura/ 20.v.2017/ Amritha Kumari Coll. / Ex. *Aegle marmelos*”.

Host plant. *Aegle marmelos* L. (Rutaceae).

Nature of damage. Adults feed on leaves making irregular holes.

4.2.5.5. *Colasposoma ornatum* Jacoby, 1881 (Figs. 54a–m)

Colasposoma ornatum Jacoby, 1881: 445

Colasposoma ornatum var. *obscurofasciatum* Jacoby, 1895: 273

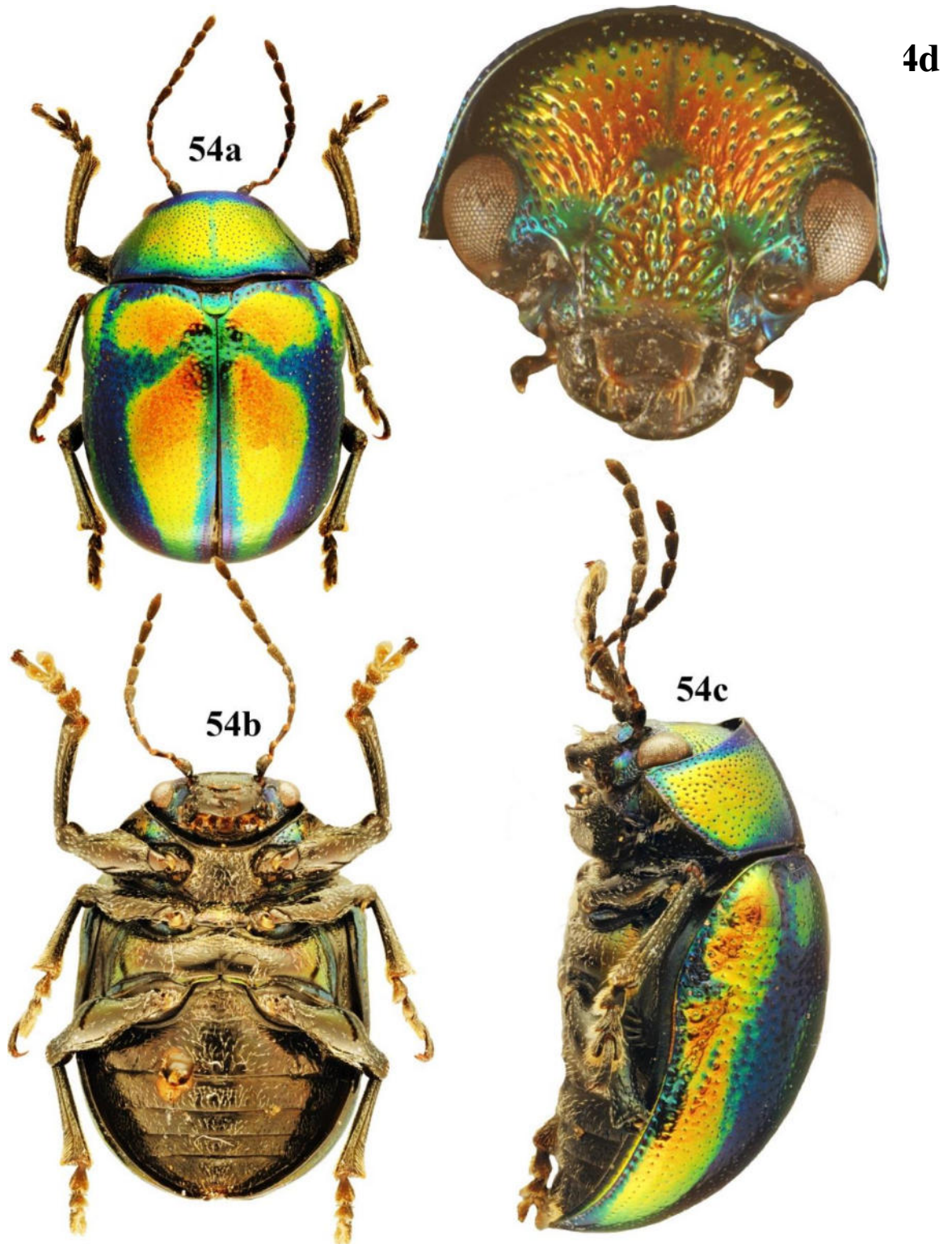
Colasposoma cyaneovittatum Pic, 1943; Medvedev, 2003: 294 (synonymy)

Description

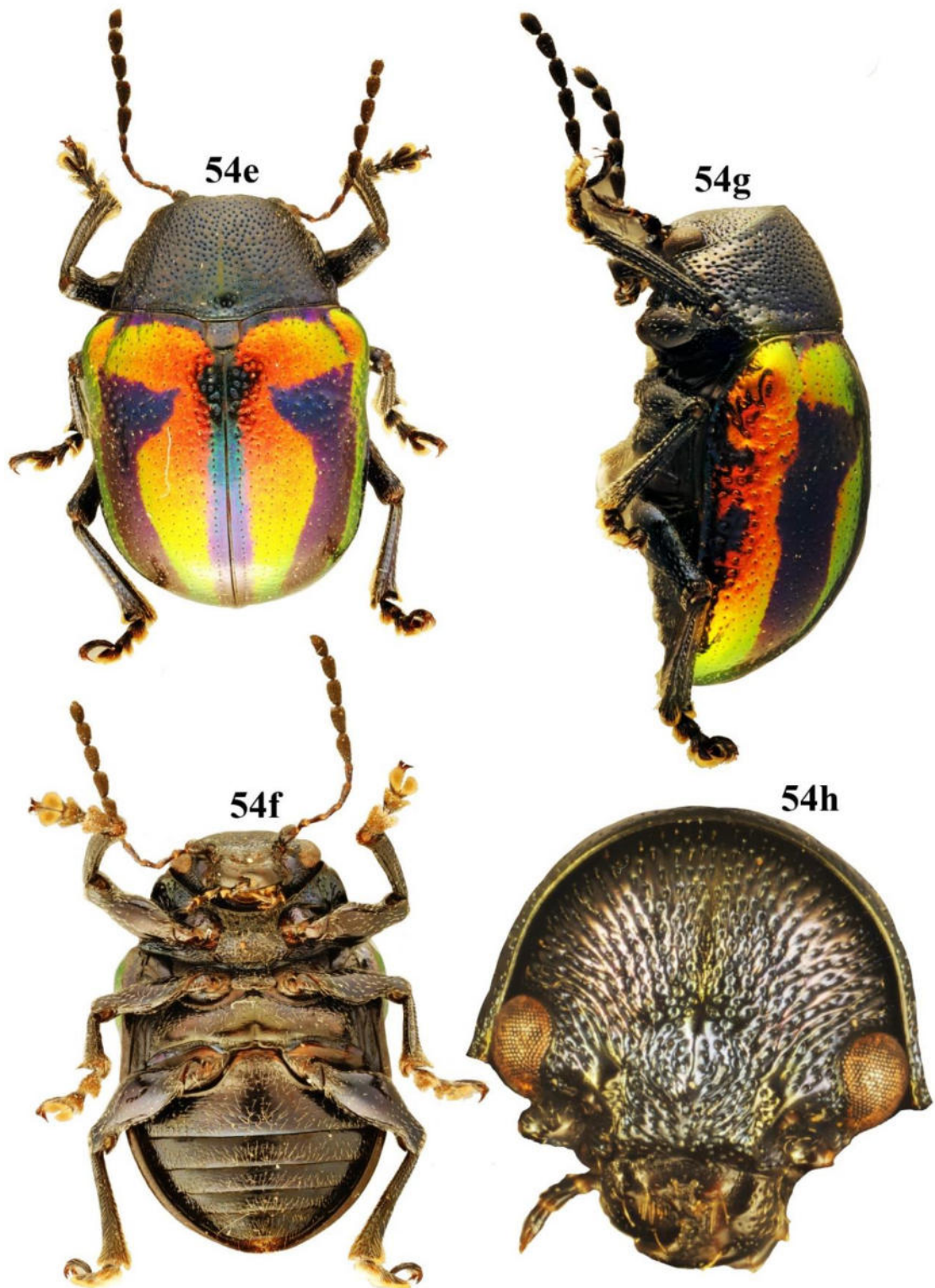
Body length 5.8–6.4 mm, breadth 3.8–4.4 mm; oblong ovate, metallic; head and pronotum golden green or dark violet in some cases; elytra golden green with blue green longitudinal band or golden purple with violet longitudinal band medially; venter, legs, antennae, mouth parts piceous to black.

Head densely punctate with elongate bold punctures, distinctly rugose with short and minute setae, a distinct raised tubercle in middle of vertex; coronal sulcus weak; supraorbital pore near dorsal margin of eye; orbital sulcus weak; antennal calli distinct, oblique, ventrally pointed, suprafrontal sulcus weak; clypeus reduced, narrow strip like; labrum broader than long, a pair of widely spaced setae preapically, anterolateral corners with a group of three setae each, apex gently deflexed with a row of setae, apical margin gently sinuate; maxillary and labial palpi with apical palpomere longest; mandibles bidentate apically, laterally punctate and finely setose; eyes with obsoletely sinuate mesal margin, vertical diameter 1.3 times transverse, distance between compound eyes 2.9 times transverse diameter of eye and 1.7 times distance between antennal sockets; maximum width of head almost 4.6 times transverse diameter of eye, 1.6 times distance between compound eyes and 2.6 times distance between antennal sockets; **antenna** moderately long, hardly reaching middle of elytra, first antennomere thick, longer than second, antennomeres 2–6 thin, sparsely punctate, rest of antennomeres progressively broadened, thickly covered with long setae. Proportionate length of antennomeres I to XI equals 1 : 0.9 : 0.9 : 0.7 : 0.9 : 0.7 : 1.2 : 1 : 0.9 : 1 : 1.4.

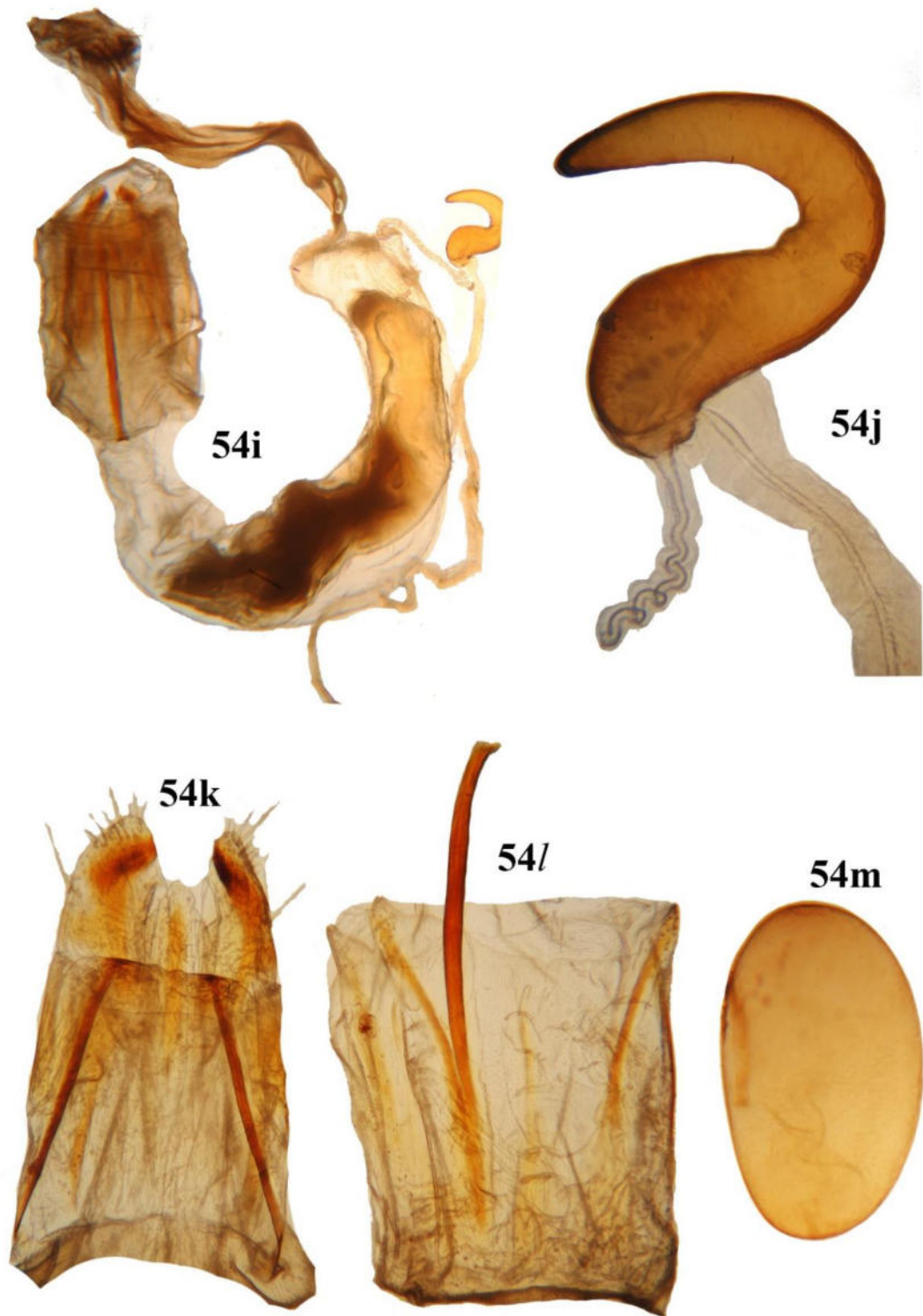
Pronotum transverse, more than two times wider than long, posteriorly 1.8 times wider than anteriorly, distinctly and uniformly convex, densely punctured with minute setae, lateral margins distinct, entire, evenly curved; posterolateral callosity project beyond lateral margin, anterolateral callosity project forward; anterior margin straight, posterior margin weakly lobed; **scutellum** as long as broad, almost U-shaped, sparingly punctate with minute setae, broadly rounded posteriorly.



Figures 54a–d: *Colasposoma ornatum* variant 1, habitus: **54a**. Dorsal view, **54b**. Ventral view, **54c**. Lateral view, **54d**. Head, frontal view.



Figures 54e–h: *Colasposoma ornatum* variant 2, habitus: **54e**. Dorsal view, **54f**. Ventral view, **54g**. Lateral view, **54h**. Head, frontal view.



Figures 54i–m. Female genitalia of *Colasposoma ornatum*. **54i.** Ventral view, **54j.** Spermatheca, **54k.** Ovipositor, **54l.** Fused 8th sternite and 8th tergite with tignum, **54m.** Egg.

Elytra 1.1–1.2 times longer than broad, strongly convex, oblong ovate, irregularly and densely punctate with minute setae, interstices aciculate, humeral calli prominent with minute punctures, basal calli distinct, postbasal depression weak, sublateral area with short transverse rugosities, apex rounded; **epilpeura** outwardly oblique with minute punctures, broadest basally, narrowing post basally, hardly reaching apex.

Prosternum subquadrate, as long as broad with setose punctures; **mesosternum** broader than long, setose; metasternum sparsely pubescent; pleural triangle sparingly setose.

Proepisternum concave, sparsely setose; **hypomeron** with bold punctures, posteriorly depressed and rugose.

Legs short, femur dilated medially, forefemora with small obtuse tooth beneath, tarsomeres ventrally fringed with setae of varying shapes, first and second tarsomeres ventrally with capitate setae bordered by pointed setae in males; third bilobed tarsomere with capitate setae basally and setae having pointed, triangular and arrow head ones posteriorly. Females with pointed setae instead of capitate setae ventrally on all basitarsomeres.

Ventrites pubescent, first ventrite longer than following two combined medially; ventrites 3 and 4 subequal, shorter than ventrite 2; 5th ventrite slightly longer than 4th, shorter than 2nd, apex of last ventrite gently emarginate.

Female genitalia with spermathecal capsule almost sickle shaped, receptacle weakly differentiated, with distinctly convex inner side and weakly concave outer side, pump curved and narrowed towards subacute apex; spermathecal duct short, coiled; spermathecal gland much longer than spermathecal duct; ovipositor long, coxite broader than long; tignum longer than ovipositor; 8th tergite and sternite fused laterally with longitudinal sclerotizations.

Distribution. India (Maharashtra, Odisha, Gujrat, Bombay, Sangir)

Remarks. *Colasposoma ornatum* is closely allied to *C. auripenne* Motschulsky. *Colasposoma auripenne* has different sculptures compared to *C. ornatum*. *C. aureovittatum* Baly is closely allied in coloration to *C. ornatum*, but the elytra are more strongly punctured and rugose, and the longitudinal bands are cupreous instead of purplish.

Material examined (2 specimens).

1 ♀ “India: Odisha/ Bhubaneswar/OUAT Campus/ 22.vi.2018/ Prathapan K D Coll./ Ex. *Ixora*”. 1 ♀ “Gujrat:Navsari/2019/Ex. Sweet potato”

Host plants. *Ixora* sp., (Rubiaceae) and *Ipomaea batatas* Poir. (Convolvulaceae) (label data).

4.2.5.6. *Colasposoma pretiosum* Baly, 1860 (Figs. 55a–h)

Colasposoma pretiosum Baly, 1860: 36; Jacoby, 1908: 449; Gressitt & Kimoto, 1961; Gressitt & Kimoto, 1982: 60.

Colasposoma coeruleatum Baly, 1879: 440; Gressitt & Kimoto, 1961: 234.

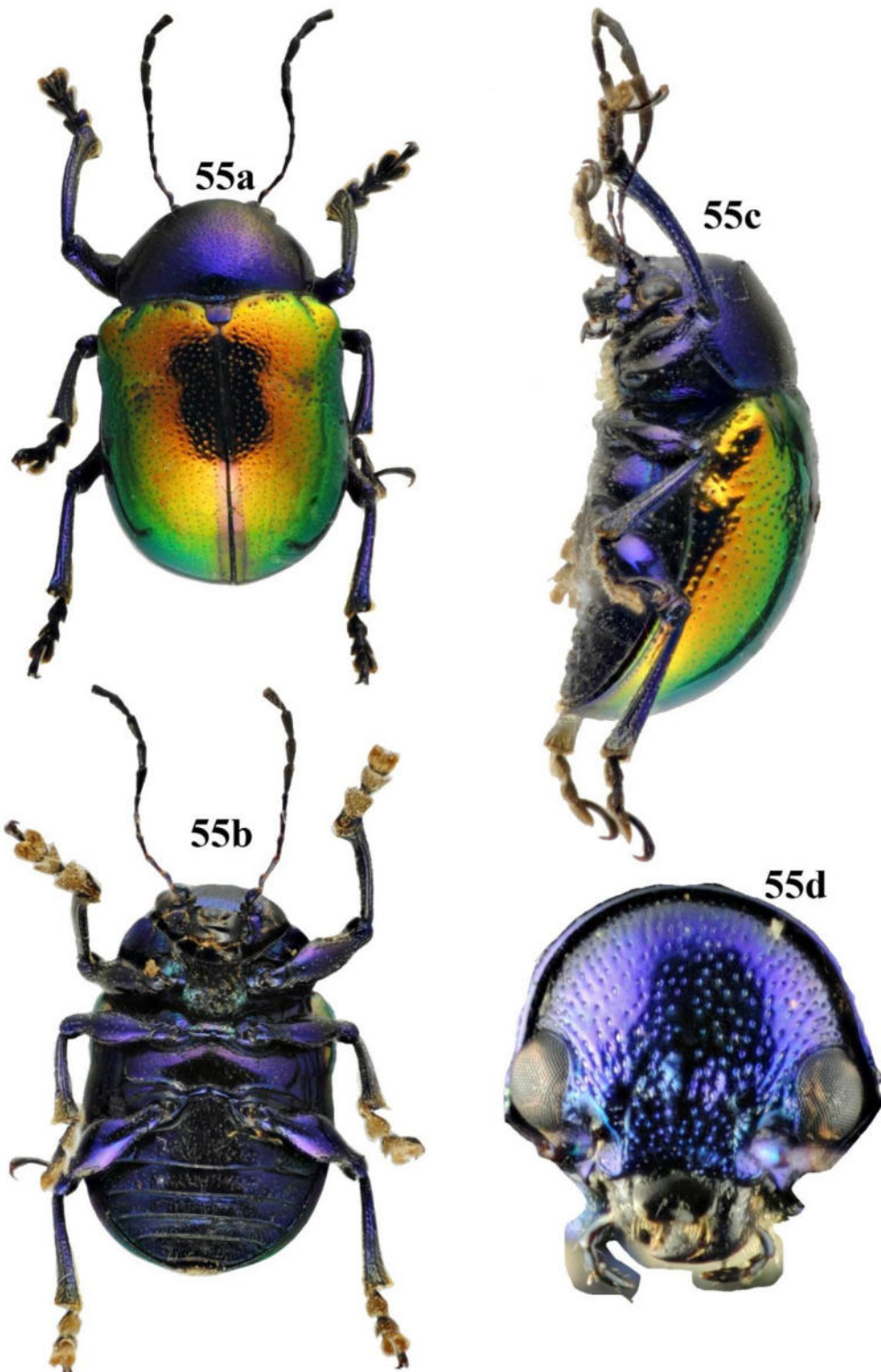
Colasposoma thibetanum Jacoby, 1891: 35; 1908: 449.

Colasposoma purpureum Pic, 1937: 21; Gressitt & Kimoto, 1961: 234.

Description

Body length 7.2–4 mm, width 4.8–5.0 mm, oblong ovate, brilliant metallic, elytra cupreous green, or purple green, head, pronotum, pleurites, venter violaceous or rarely green; prosternum, mesosternum and scutellum blue green, posterior part of tibia, tarsomeres and mouth parts aeneous, proximal five or six antennomeres violet, brown, or mixture of both, rest aeneous.

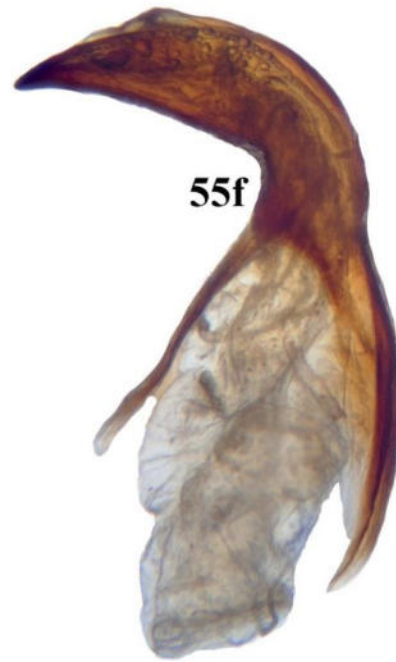
Head inserted, densely and irregularly punctate with thin minute setae; with a broad depression between eyes convex in middle; coronal sulcus indistinct; suprafrontal sulcus weak, frons and vertex undifferentiated; vertex with posterolateral areas feebly rugose with elongate punctures; frons anteriorly depressed; clypeus reduced; labrum broader than long, anteriorly deflexed, a pair of widely spaced setose punctures preapically, anterolateral margins with three setae each, apical margin feebly emarginate with a row of short setae absent in middle, mandibles robust, bidentate apically; maxillary palpi with last palpomere slightly longer than second, first palpomere longest; labial palpi with last palpomere subequal to penultimate; gena depressed, sculptured; **compound eyes** gently emarginate mesally, vertical diameter of eye 1.2 times horizontal, distance between compound eyes 2.8–2.9 times transverse diameter of eye, 1.7–1.8 times distance between antennal sockets; maximum width of head almost 4.3 times transverse diameter of eye, 1.5 times distance between compound eyes and 2.4 times distance between antennal sockets; supraorbital pore near dorsal



Figures 55a–d: *Colasposoma pretiosum*, habitus: **55a.** Dorsal view, **55b.** Ventral view, **55c.** Lateral view, **55d.** Head, frontal view.



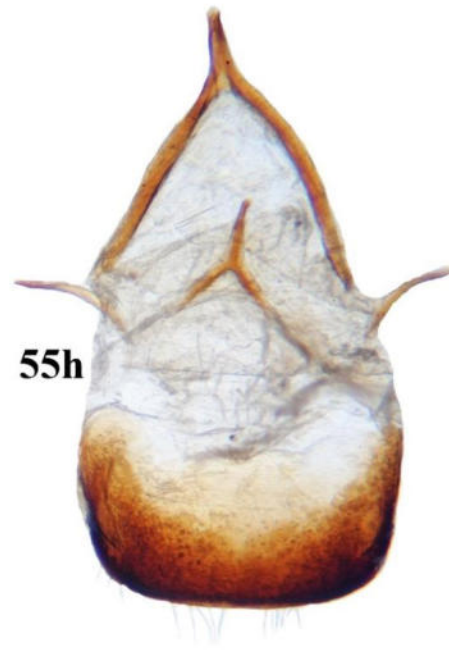
55e



55f



55g



55h

Figures 55e–h. Male genitalia of *Colasposoma pretiosum*: **55e.** Aedeagus, dorsal view, **55f.** Aedeagus, lateral view. **55g.** Tegmen, **55h.** Spiculam gastrale, spiculam relictum and 8th tergite.

margin of eye; antennal calli distinct, raised, ventrally narrowed; **antenna** moderately long, hardly reaching middle of elytra, first antennomere thick, oval, gently curved, longer than second, second antennomere shorter than antennomeres 2–6 separately, antennomeres 2–6 thin, distal five antennomeres broad, aeneous; proximal six antennomeres smooth with sparse long setae, rest densely clothed with short setae. Proportionate length of antennomeres I to XI equals 1 : 0.8 : 1.2 : 1 : 1.2 : 1 : 1.4 : 1.3 : 1.3 : 1.8 : 1.5.

Pronotum transverse, almost two times as wide as long, posteriorly 1.4 times wider than anteriorly, densely and finely punctate with minute setae, posterior margin distinctly lobed; lateral margins distinct, entire, regularly curved; anterior margin almost straight; anterolateral and posterolateral callosities gently projecting beyond lateral margin; **scutellum** as long as broad, U-shaped, with a few setose punctures anteriorly.

Elytra 1.1–1.2 times longer than broad, strongly convex, oblong ovate, densely, finely and irregularly punctate, aciculate; humeral calli prominent with minute punctures; basal calli distinct; post basal depression distinct, feebly rugose, with bold punctures; lateral margins distinct; apex rounded; **epilpeura** outwardly oblique with minute punctures, broadest basally, narrowing post basally, narrowly reaching apex.

Prosternum subquadrate, broader than long, densely pubescent; **mesosternum** broader than long; sparsely pubescent.

Proepisternum triangular, anterior margin concave, with a few fine setose punctures; **hypomeron** rugose, punctures bold, posteriorly depressed.

Legs long, anterior pair of legs longer than rest; tibia curved basally; femur dilated medially with a subacute denticle or tubercle ventrally beneath middle; tibiae longitudinally carinate; tarsomeres ventrally fringed with setae of varying shapes; probasitarsomeres ventrally with capitate setae bordered by pointed setae in males; only pointed setae in females.

Ventrites finely pubescent, first ventrite longer than following two combined medially, ventrites 2–4 each shorter than preceding one, apex of last ventrite gently emarginate.

Male genitalia with aedeagus in lateral view strongly bent near base of aedeagus proper, gradually narrowing posteriorly, with a subacute apex; ventral plate concave

near base and remaining area convex, dorsal plate subparallel basally, progressively narrowed post basally with obtuse apex, apical opening or ostium broad; **spiculum gastrale** Y-shaped, median arm thick, shorter than lateral arms, lateral arms almost three times as long as median arm; **Spiculum relictum** Y-shaped, sclerotized; 8th tergite almost rectangular with fine setae posteriorly; **tegmen** distinctly bilobed apically, with gently emarginated lateral margins, proximal area with membranous connectives which encircle aedeagus at base of aedeagus proper.

Remarks. Lefevre treated *C. auripenne* Motschulsky as a synonym of *C. pretiosum* (Jacoby, 1908). However, they differ by size and colour only. Hence more studies are required to ascertain their status, with respect to each other.

Distribution. India (Assam, Darjeeling, Karnataka, Meghalaya, Tamil Nadu), Tibet, Myanmar, Thailand, Laos, Vietnam, China.

Material examined (3 specimens).

1♂ “India: Karnataka/Kottigehara/ N 13° 7’ 18.4” E 75° 29’ 38.2”/6.v.2010 920 m/K D Prathapan and Shameem Coll.”. 1♂ “A.K.Weld Downing/ Coimbatore”. 1♂ “Nilgiri hills/ A.K.Weld Downing”.

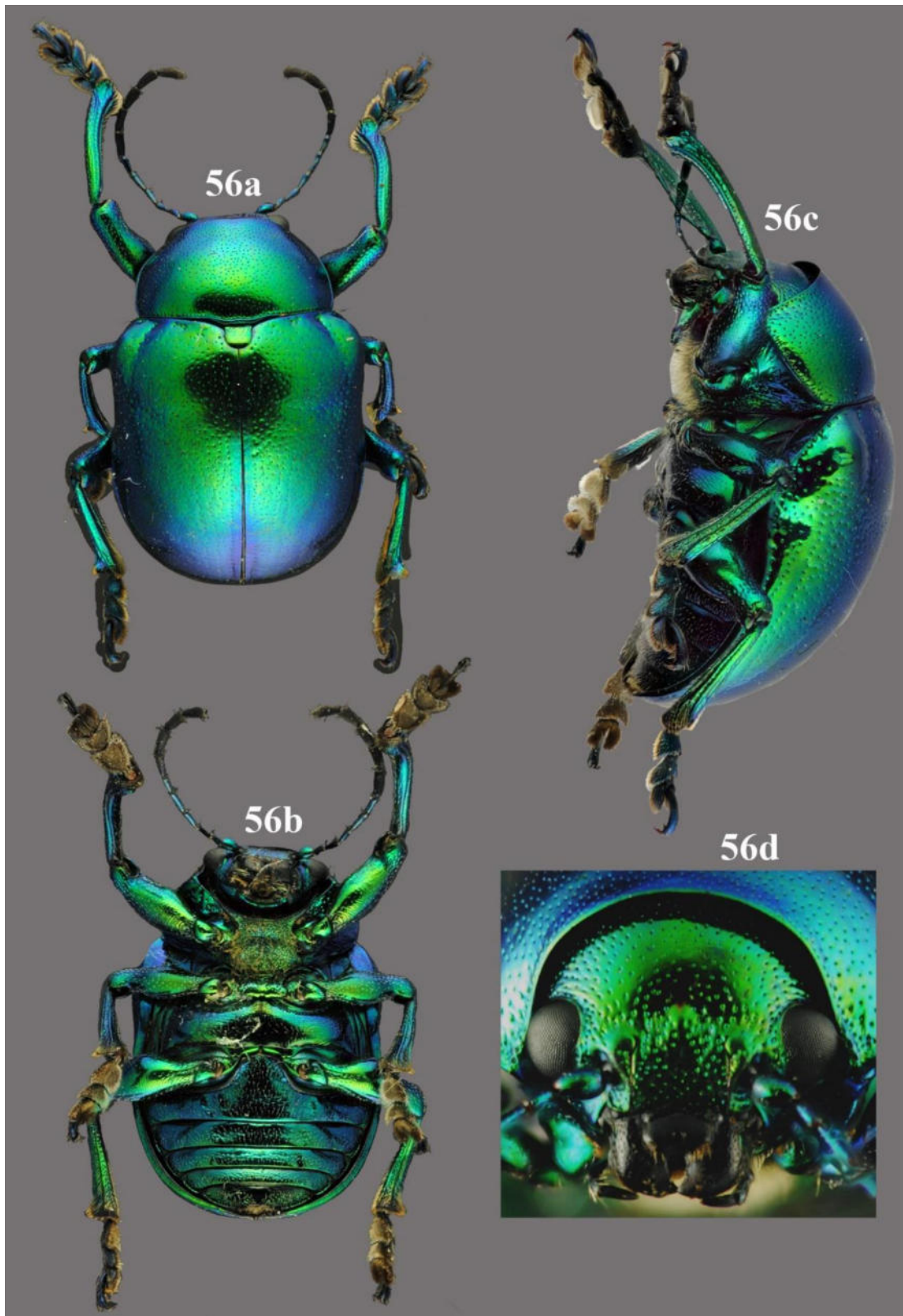
4.2.5.7. *Colasposoma robustum* Jacoby, 1881 (Figs. 56a–l)

Colasposoma robustum Jacoby, 1881: 446; 1908: 450; Medvedev, 2003: 295.

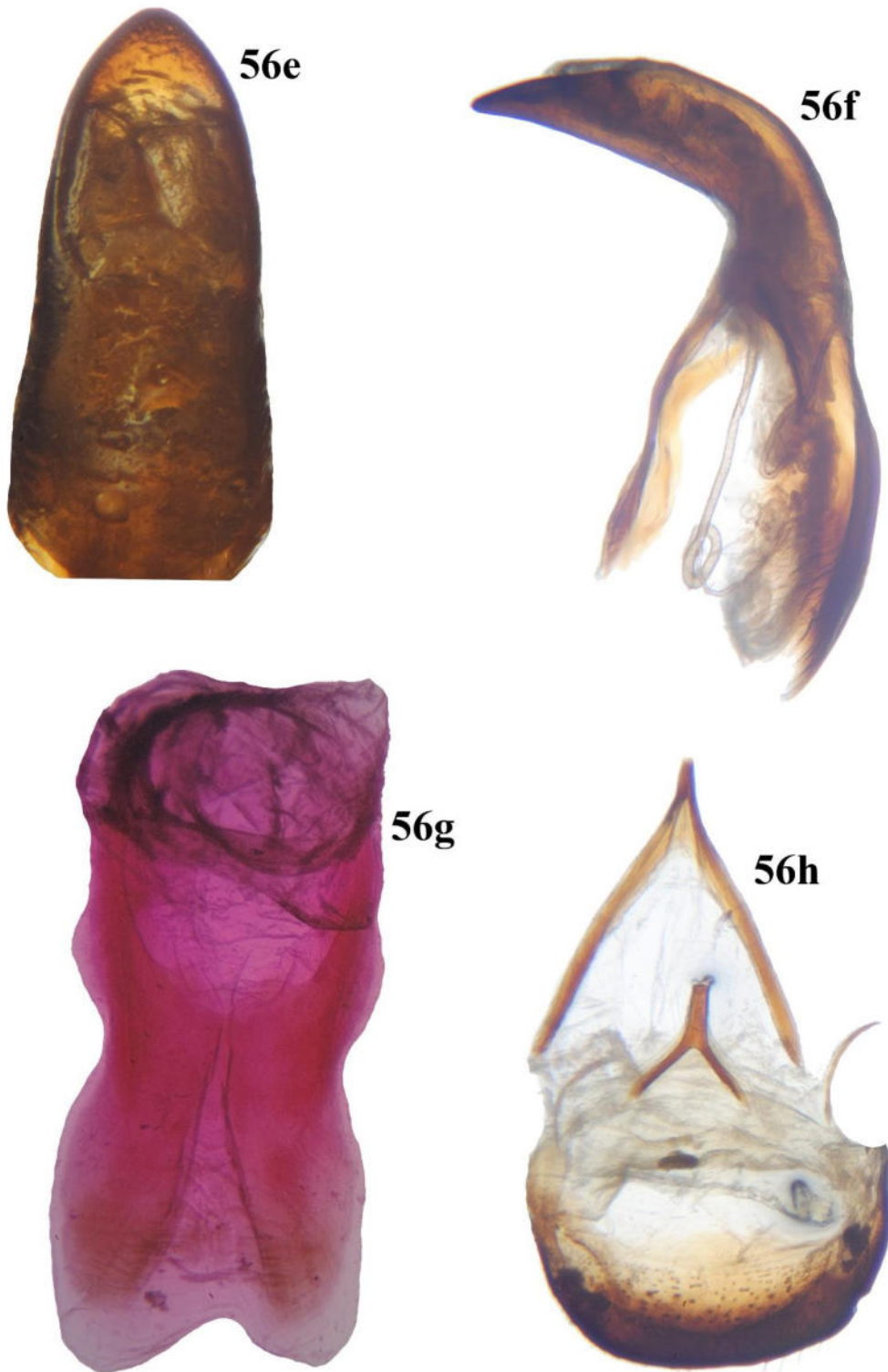
Description

Body length 9.3–11 mm, width 6.4–7.4 mm; oblong ovate, shiny, metallic green except clypeus, antennae and mouth parts aeneous; antenna with proximal six antennomeres metallic green, rest aeneous.

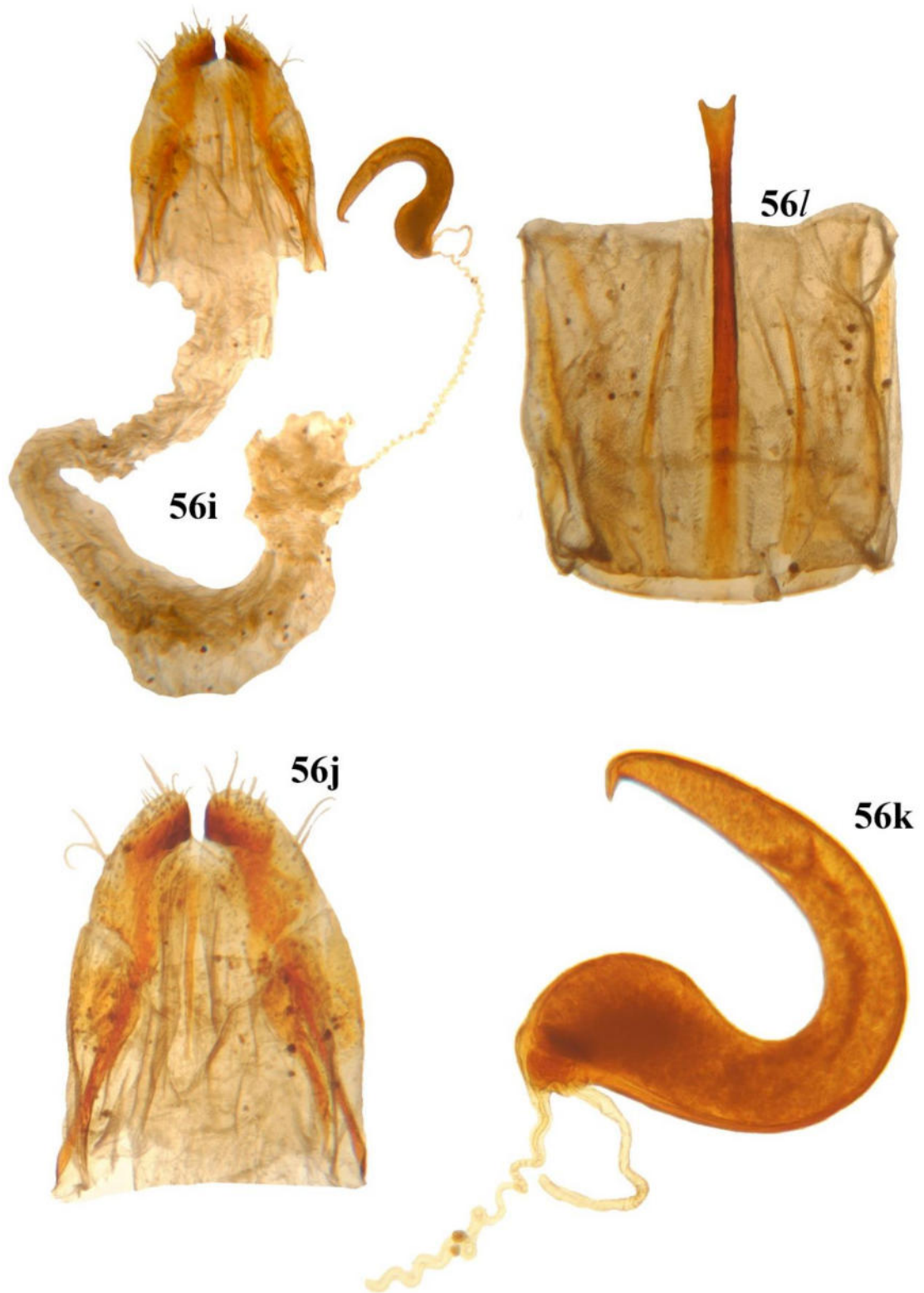
Head inserted, densely punctate, minutely setose, frons with distinct subtriangular depression between eyes, vertex feebly rugose posterolaterally; coronal sulcus indistinct; suprafrontal sulcus weak, frons and vertex hardly differentiated; clypeus distinct, reduced; labrum broader than long, anteriorly deflexed with paired setose punctures preapically; anterolateral margins with three setae each, apex feebly emarginate with a row of short setae absent in middle; mandibles robust with punctures, bidentate apically; gena with bold setose punctures; maxillary palpi with last palpomere slightly longer than second, first palpomere longest; labial palpi with last palpomere subequal to penultimate; **compound eyes** emarginate mesally, vertical diameter 1.4



Figures 56a–d: *Colasposoma robustum*, habitus: **56a.** Dorsal view, **56b.** Ventral view, **56c.** Lateral view, **56d.** Head, frontal view.



Figures 56e–h. Male genitalia of *Colasposoma robustum*: **56e.** Aedeagus, dorsal view, **56f.** Aedeagus, lateral view. **56g.** Tegmen, **56h.** Spiculam gastrale, spiculam relictum and 8th tergite.



Figures 56i–l. Female genitalia of *Colasposoma robustum*. **56i.** Ventral view, **56j.** Ovipositor **56k.** Spermatheca, **56l.** Fused 8th sternite and 8th tergite with tignum.

times horizontal, distance between eyes three times transverse diameter and 1.7 times distance between antennal sockets; maximum width of head almost 4.7 times transverse diameter of eye, 1.6 times distance between compound eyes, 2.6 times distance between antennal sockets; supraorbital pore near dorsal margin of eye; antennal calli distinct, raised, ventrally narrowed; **antenna** subfiliform, hardly reaching middle of elytra; first antennomere thick, gently curved, longer than second, antennomeres 2–6 thin, distal five broad, aeneous; first six antennomeres smooth with sparse long setae, rest densely clothed with short setae.

Pronotum transverse, 1.7–2 times broader than long, posteriorly 1.3 to 1.4 times wider than anteriorly, uniformly convex; lateral margins distinct, entire and evenly curved; anterolateral and posterolateral callosity slightly projecting beyond lateral margin; anterior margin concave, posterior margin gently lobed in middle; densely punctate, punctures stronger than those on elytra; **scutellum** as long as broad, sparingly punctate with minute setae, broadly rounded posteriorly.

Elytra 1.2–1.5 times wider than broad, strongly convex, oblong ovate, irregularly and densely punctate without setae, aciculate; punctures turn finer towards apex, stronger laterally; interstices raised, forming gentle transverse rugosities laterally; in females, rugosities distinct and stronger from post basal to post medial area of elytra; a strong costa arise behind humeral calli reaching middle of elytra in females; humeral calli prominent with minute punctures; basal calli, post basal depression distinct; lateral margins distinct; apex rounded; **epilpeura** outwardly oblique with small and minute punctures, broadest basally, narrowing post basally, hardly reaching apex.

Prosternum subquadrate, broader than long, densely pubescent, densely and strongly punctate; **mesosternum** much broader than long with bold punctures; sparsely pubescent.

Proepisternum concave with bold punctures and setae; **hypomeron** with bold punctures.

Legs long, pubescent, anterior pair of legs exceptionally long with tibia curved basally with a broader apex, femur dilated medially, minutely dentate beyond middle, tarsomeres ventrally with setae of varying shapes; first and second tarsomeres ventrally with capitate setae bordered by pointed setae in males, third bilobed tarsomere with

capitate setae basally and pointed, triangular and arrow-head shaped setae posteriorly.

In females, basitarsomere with pointed seate instead of capitate setae in males.

Ventrites pubescent, first ventrite longer than following two combined medially; ventrites 1–4 each longer than preceding one; 5th ventrite slightly longer than 4th; apex of last ventrite gently emarginate.

Male genitalia with aedeagus in lateral view strongly bent near base of aedeagus proper, dorsal and ventral margins subparallel basally, gradually converging towards apex with a subacute apex; ventral surface distinctly convex; in dorsal view, lateral margins gradually converging towards apex, apex gently deflexed; 8th tergite semicircular with a few fine short setae at apex; spiculum gastrale Y-shaped, median arms extremely short, lateral arms very long; spiculum relictum Y-shaped, sclerotized, median arms and lateral arms subequal, median arm thicker; **tegmen** distinctly bilobed apically, with gently emarginated lateral margins, proximally with membranous connectives which encircle aedeagus at base of aedeagus proper.

Female genitalia with spermathecal capsule U-shaped, basally narrowed, curved, widest post basally, strongly curved medially, gradually narrowing towards apex, apex acutely pointed with deflexed denticle; spermathecal duct long, coiled, spring like; spermathecal gland tubular, short; ovipositor long, coxite long and apex broad with setae of varying shape; 8th sternite with tignum slightly longer than ovipositor; apex gently bifurcated; half of tignum sclerotized on either side; 8th tergite with two pairs of sclerotizations of varying length on either side of middle, 8th tergite and 8th sternite fused laterally.

Distribution. India (Karnataka, Kerala, Pondicherry, Tamil Nadu); Sri Lanka.

Remarks. Medvedev (2003) extended range of distribution of *Colasposoma robustum* to ‘Bombay’ and Pondicherry. He synonymised *Colasposoma coromandeliana* Jacoby with *Colasposoma robustum* Jacoby. *Colasposoma coromandeliana* differs from the latter by its smaller size, stronger and more close punctation of the head, the short, thick, terminal joints of the antennae, and the larger non-aciculate punctures of the elytra and thorax. Clearly these are distinct species. *Colasposoma bicoloratum* Jacoby, *C. arcuateimpressum* Pic, *C. coimbatorensis* Pic, *C. cyaneicollis* Pic, *C. sparsepunctatum* Pic, *C. nathani* Pic were also synonymised with *C. robustum* in the same work.

Materials examined (2 specimens).

1 ♂ “India: Kerala/ Wayanad/ Elston tea factory/11°36’31”N 76°5’38” E/9.iv.2018 782 m/Viswajyothi K Coll.”. 1 ♀ “India: Karnataka/COH, Mudigere/2017/Students collection”.

4.2.5.8. *Colasposoma splendidum* Fabricius, 1792 (Figs. 57a–h)

Colasposoma splendidum Fabricius, 1792: 324; Baly, 1867: 275; Jacoby, 1908: 451; Medvedev, 2003: 303.

Description

Body length 5.4–6.3 mm, width 3.5–4.0 mm; metallic green or cupreous except antennae, mouth parts, apex of tibia and tarsomeres piceous.

Head densely punctured; vertex distinctly rugose; coronal sulcus indistinct; suprafrontal sulcus weak, frons and vertex hardly differentiated; frons with a tubercle between eyes, less prominent in some specimens; antennal calli raised, oblique; clypeus reduced; supraorbital pore near dorsal margin of eye with a long seta; labrum broader than long, with a pair of widely spaced setose punctures preapically, anterolateral corners with a group of three setae, apex gently deflexed, sinuate, apical margin with a row of setae discontinuous in middle; mandibles bidentate, hardly setose laterally; labial palpi with last palpomere longest; maxillary palpi with three palpomeres, middle palpomere shorter than basal and apical palpomeres separately, basal palpomere longest; compound eyes distinctly sinuate, vertical diameter 1.3 times horizontal, distance between compound eyes 2.8 times transverse diameter and 2.4 times distance between antennal sockets; maximum width of head almost 4.5 times transverse diameter of eye, 1.6 times distance between compound eyes, 3.9 times distance between antennal sockets; antenna extends beyond base of elytra, first antennomere thick, longer than second, second thicker than following 3 to 6 which are thin, rest progressively broadened, clothed with short setae, proportionate length of antennomeres I to XI equals 1 : 0.75 : 1.1 : 0.9 : 1 : 0.9 : 1.25 : 1.25 : 1.25 : 1.25 : 1.5.

Prosternum subquadrate, sparsely pubescent, densely pubescent rarely, gently rugose, apparently longer than broad medially; mesosternum sparsely pubescent; metasternum sparsely setose; pleural triangle glabrous, pleural triangle and pleural stripe distinctly separated.

Proepisternum concave anteriorly, setose, hypomeron with bold punctures, posteriorly depressed.

Legs with foretibia longer than mid- and hindtibiae, femora dilated medially without tooth ventrally, tibiae ventrally carinate, tarsomeres ventrally fringed with setae of varying shape, first two tarsomeres with capitate setae bordered by pointed setae in males, only pointed setae in females, third tarsomere with different kinds of setae; claws bifid.

Pronotum transverse, 1.7–1.8 times broader than long, posteriorly 1.3 times wider than anteriorly, convex, densely and randomly punctured, interstices aciculate, anterior margin straight, posterior margin distinctly lobed in middle, sides weakly concave, lateral margins entire and evenly curved; **scutellum** U-shaped, as long as broad, sparsely setose.

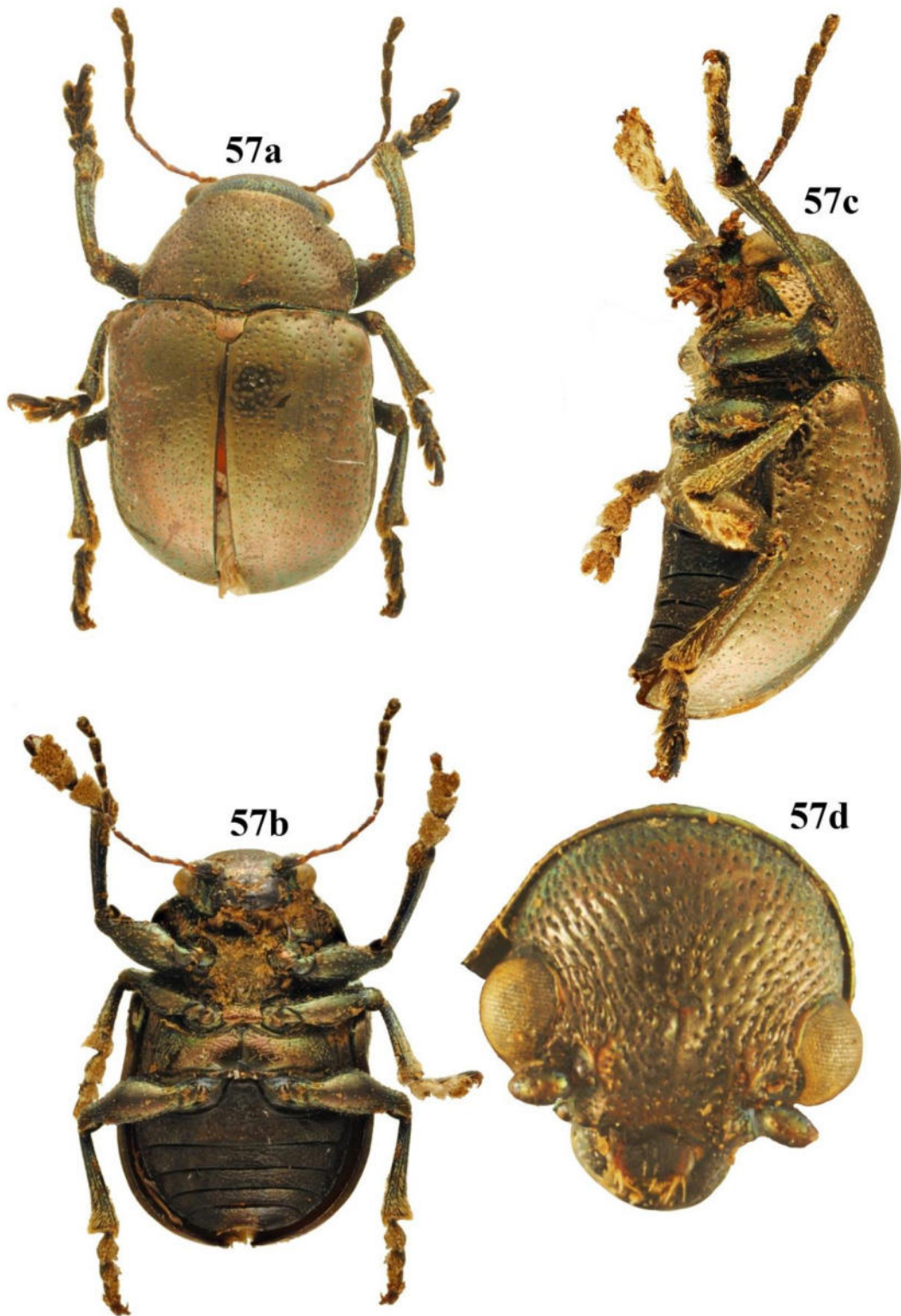
Elytra 1.2–1.3 times longer than broad, densely and irregularly punctate, feebly rugose laterally, humeral calli prominent without punctures, basal calli distinct, post basal depression weak, apex rounded; **epipleura** outwardly oblique, punctate, widest basally, narrowing posteriorly, hardly reaching apex.

Ventrites pubescent, first ventrite longer than following two combined medially, ventrites 3 to 5 almost subequal in length, ventrite 2 slightly longer, apex of last ventrite narrowed and gently emarginated.

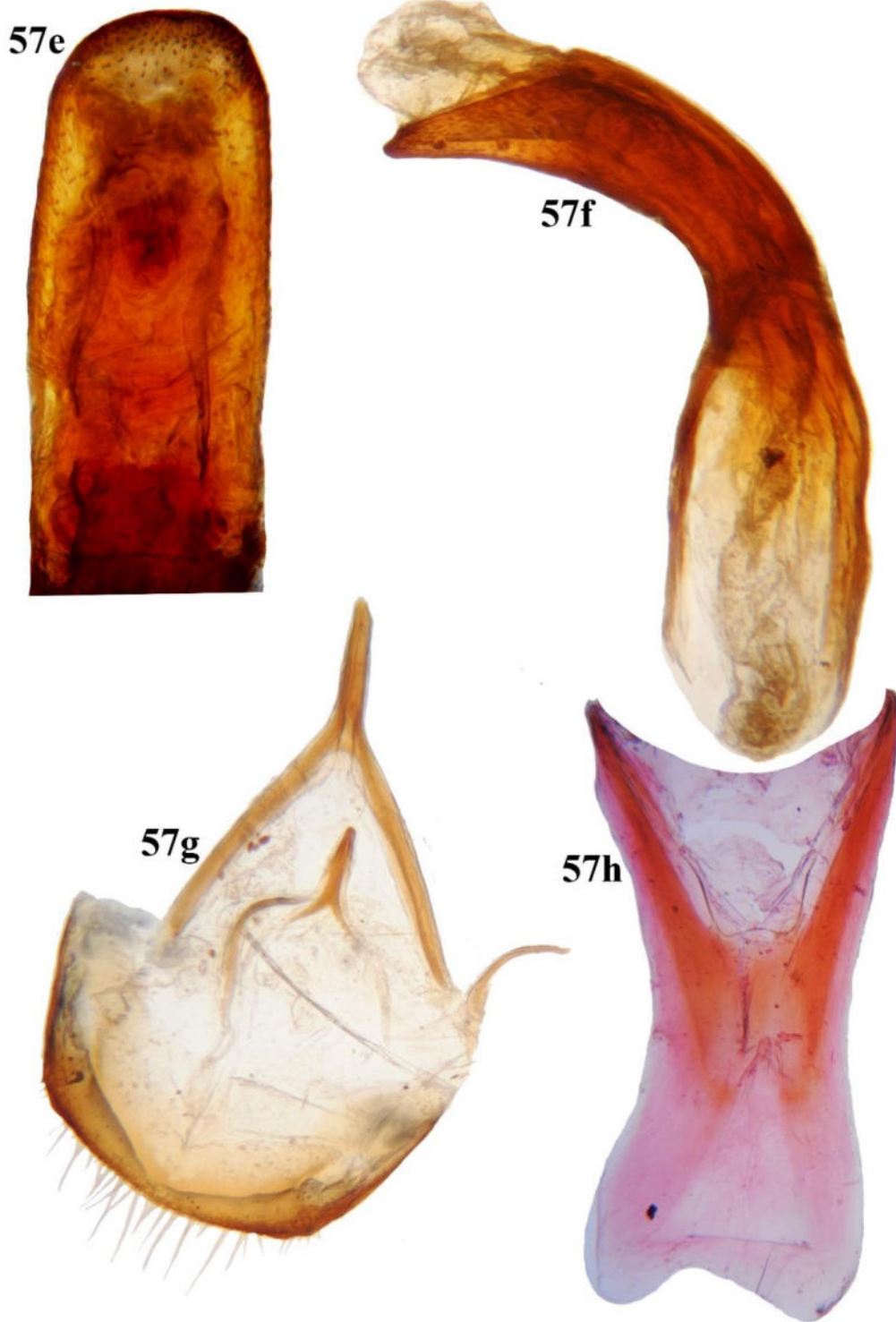
Male genitalia with aedeagus in lateral view curved near base of aedeagus proper, dorsal and ventral margins subparallel basally, slightly converging and tapering at distal third, apex subacute, ventral plate convex; dorsal surface gradually converging, apex obtuse; 8th tergite semicircular, apex with a row of short and long setae; spiculum gastrale Y-shaped, lateral arms twice as long as median arm; tegmen distinctly bilobed apically, lateral margins gently emarginated, basal membranous connectives encircle aedeagus.

Distribution. Celebes, India (Kerala, Tamil Nadu), Java, Malayan Islands, Tringani

Remarks. *Colasposoma nigriventre* Baly and *C. viridicoeruleum* Motschulsky closely resembles *C. splendidum*. Jacoby (1908) remarked that he did not find sufficient difference to separate *C. nigriventre* and *C. splendidum*. Medvedev (2003) stated that *C. splendidum* is possibly identical with *C. viridicoeruleum*. In the same work,



Figures 57a–d: *Colasposoma splendidum*, habitus: **57a.** Dorsal view, **57b.** Ventral view, **57c.** Lateral view, **57d.** Head, frontal view.



Figures 57e–h. Male genitalia of *Colasposoma splendidum*: **57e.** Aedeagus, dorsal view, **57f.** Aedeagus, lateral view. **57g.** Spiculam gastrale, spiculam relictum and 8th tergite, **57h.** Tegmen.

Medvedev commented on the similarity between *C. viridicoeruleum*, *C. splendidum*, *C. propinquum* Baly, *C. purpuratum* Motschulsky etc. These species should be studied in detail by comparing the genitalia and endophallus of the type specimens to ascertain their species status.

Material examined. 3♂ & 1♀

1♂ “Nilgiri hills/A.K. Weld Downing/ a/ 993”. 1♂ “Nilgiri hills/A.K. Weld Downing/ 847/D”. 1♂ “A.K. Weld Downing ‘Poolanoor’ (Punalur?)/ 521”.

4.2.5.9. *Colasposoma versicolor* Lefevre, 1887 (Figs. 58a–h)

Colasposoma versicolor Lefevre, 1887: 174.

Colasposoma bifasciatum Jacoby, 1900: 116.

Colasposoma viridicinctum Pic, 1943: 10; Medvedev, 2003: 297.

Description

Body length 4.6–6.3 mm, width 3.2–4.0 mm; oblong, shiny, dorsum metallic green; elytra with a post basal round purplish spot and a longitudinal median band and longitudinal purple band on lateral margin, venter aeneous, legs, mouth parts and antennae piceous.

Head profusely punctured, punctures bold, interstices microsculptured; coronal sulcus weak, indistinct rarely; suprafrontal sulcus indistinct, frons and vertex hardly differentiated; coronal sulcus near dorsal margin of eye without setae; antennal calli distinct, oblique, ventrally acute; frons anteriorly deflexed; clypeus reduced; labrum broader than long, with a pair of widely spaced setae preapically, anterolateral corners with a group of three setae, apex gently deflexed with a row of setae, apical margin gently sinuate; maxillary palpi with three palpomeres, middle shorter, 1st and 3rd subequal; labial palpi with apical palpomere longest; mandibles bidentate, laterally punctate and finely setose; compound eyes obsoletely sinuate at inner angle, vertical diameter 1.4 times transverse diameter, distance between compound eyes 2.9 times transverse diameter of eye and 1.5 times distance between antennal sockets, maximum width of head almost 4.3 times transverse diameter of eye, 1.5 times distance between compound eyes and 2.3 times distance between antennal sockets; **antenna** moderately long, subfiliform, extends beyond base of elytra, first antennomere thick, longer than second, antennomeres 2–6 thin and sparsely punctate, rest progressively broadened and

thickly covered with long setae, proportionate length of antennomeres I to XI equals 1 : 0.6 : 0.75 : 0.75 : 0.75 : 0.6 : 1.1 : 0.9 : 1 : 1 : 1.25.

Pronotum transverse, almost twice as broad as long, posteriorly 1.4 times wider than anteriorly, densely punctured, punctures bold, interstices microsculptured, anterolateral callosity project forward; lateral margins distinct, entire and evenly curved; anterior margin straight; posterior margin weakly lobed medially, gently concave laterally; **scutellum** broader than long, almost U-shaped, sparingly punctate, broadly rounded posteriorly.

Elytra 1.2 times longer than broad, convex, oblong, irregularly and densely punctate, distinctly rugose laterally; humeral calli prominent with minute punctures; basal calli distinct; post basal depression weak; apical third weakly costate; apex rounded; **epilpeura** outwardly oblique with minute punctures, broadest basally, narrowing post basally, hardly reaching apex.

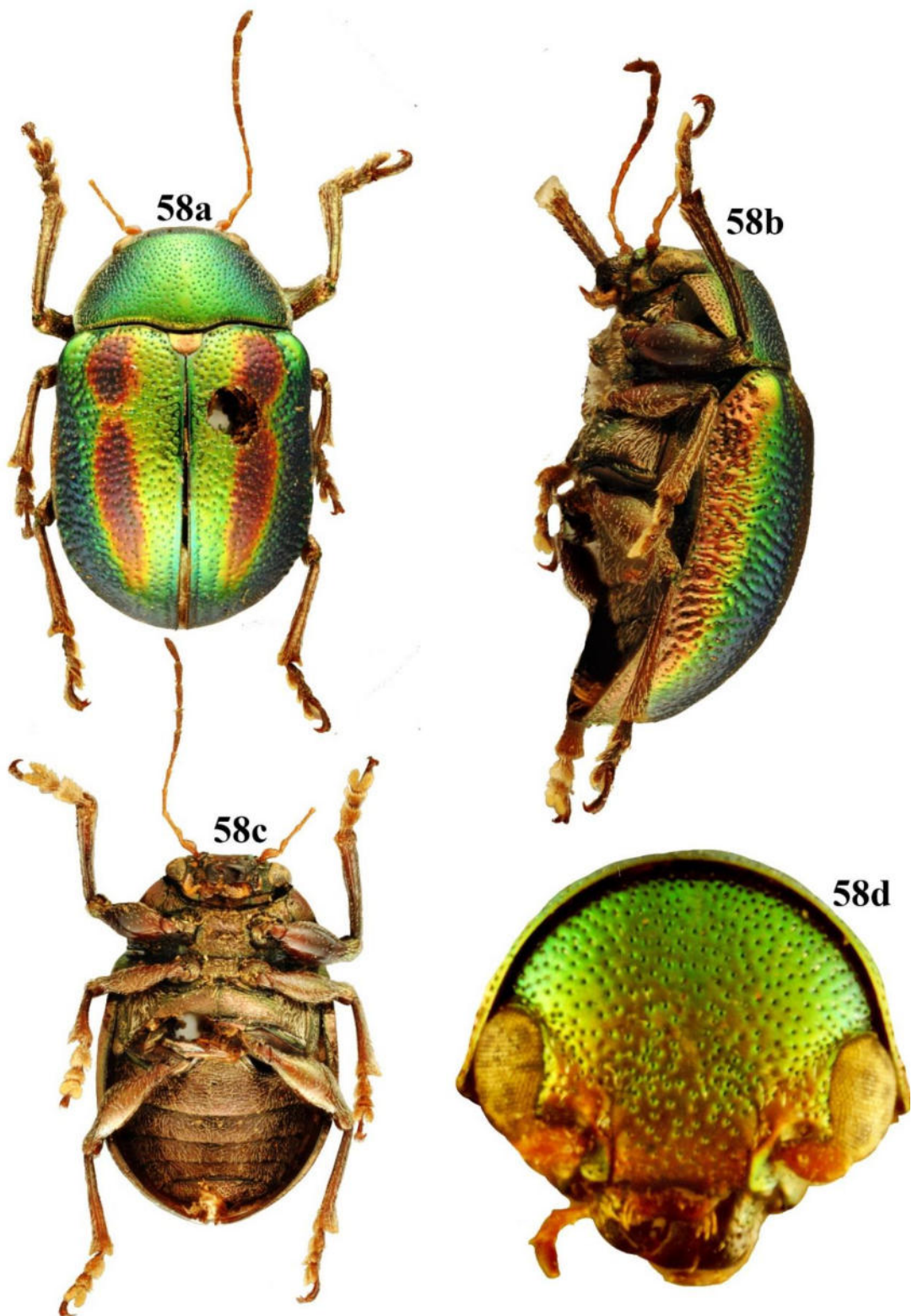
Prosternum subquadrate, broader than long, punctures bold and setose; **mesosternum** broader than long, punctures bold and setose; metasternum sparsely pubescent, densely setose laterally, pleural triangle densely setose, pleural stripe and pleural triangle indistinctly separated.

Proepisternum concave, sparsely setose; **hypomeron** posteriorly depressed and gently rugose.

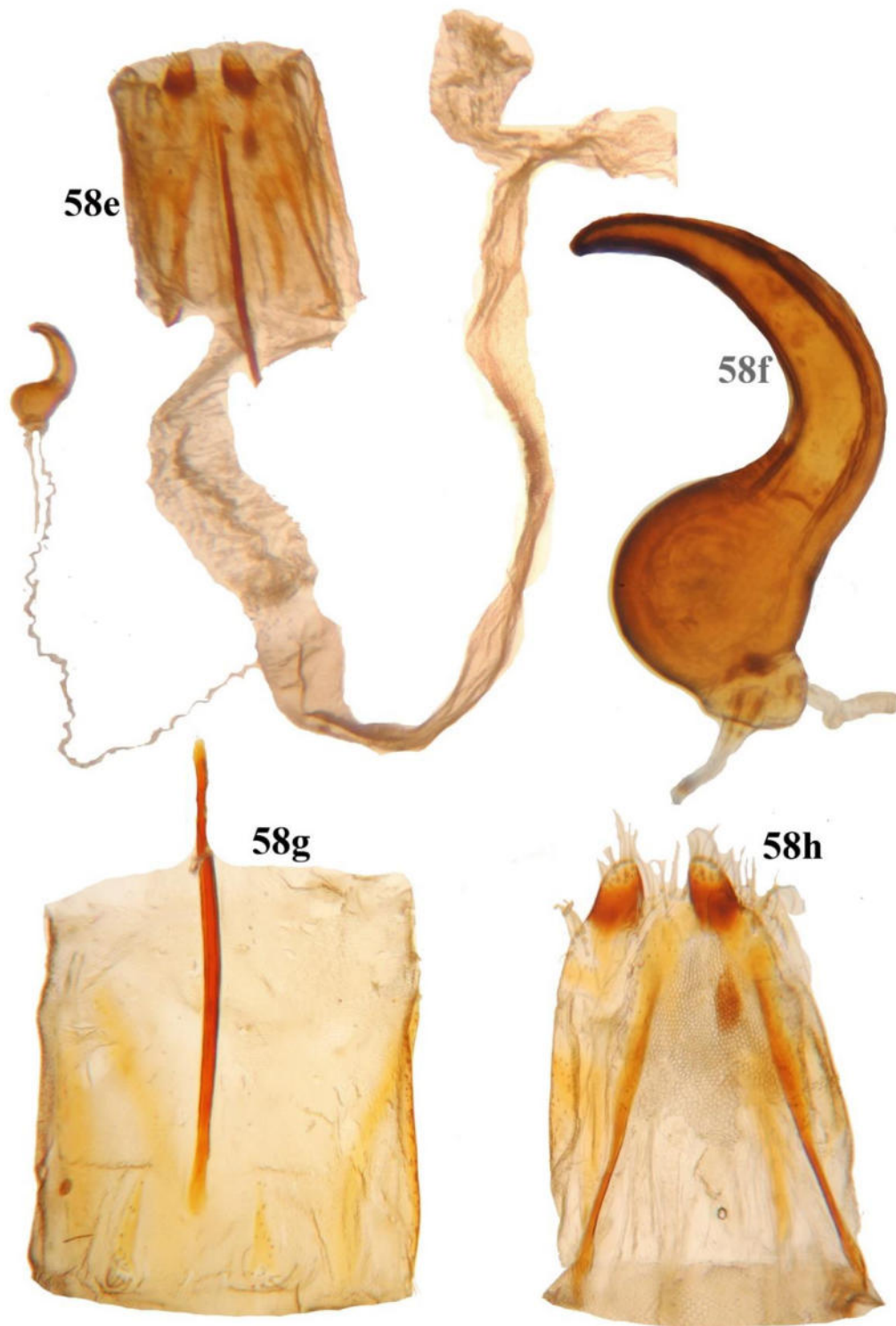
Legs short, femur dilated medially, forefemora with small obtuse tooth beneath, tarsomeres ventrally fringed with setae of varying shapes, first and second tarsomeres ventrally with capitate setae bordered by pointed setae in males; third bilobed tarsomere with capitate setae basally and pointed, triangular and arrow-head-shaped setae apically. Females without capitate setae, only pointed setae ventrally.

Ventrites pubescent, first ventrite longer than following two combined medially, ventrites 2–4 each shorter than preceding one, 5th ventrite slightly longer than 4th; apex of last ventrite gently emarginate.

Female genitalia with spermathecal capsule almost sickle shaped, receptacle and pump differentiated, receptacle globular, pump narrowed apically, apex acute; spermathecal duct long and gently coiled; spermathecal gland tubular and short; median oviduct longer than vagina; ovipositor long; coxite slightly longer than wide; 8th tergite and 8th



Figures 58a–d: *Colasposoma versicolor*, habitus: **58a.** Dorsal view, **58b.** Lateral view, **58c.** Ventral view, **58d.** Head, frontal view.



Figures 58e–h. Female genitalia of *Colasposoma versicolor*. **58e.** Ventral view, **58f.** Spermatheca, **58g.** Fused 8th sternite and 8th tergite with tignum, **58h.** Ovipositor.

sternite fused laterally forming a membranous tube with longitudinal sclerotizations; tignum as long as ovipositor,

Distribution. India (Tamil Nadu), Sri Lanka

Remarks. *Colasposoma versicolor* is similar to *C. villosulum* Lefevre and *C. downesi* Baly. It is also similar in colour to banded forms of *C. villosulum*, however, the former is glabrous and the latter is pubescent. Thorax of the former is more strongly punctate and the punctures are widely separated. Punctures are finer and arranged closer in *C. villosulum*. *Colasposoma downesi* differs from *C. versicolor* in having punctation finer and closer and the elytra without narrow cupreous bands.

Material examined (4 specimens).

4 ♀ “Nilgiri hills/A K Downing”

4.2.5.10. *Colasposoma* sp. 1 (Figs. 59a–i)

Description

Body length 5.9 mm, width 3.5 mm; oblong ovate, distinctly convex, dorsum metallic green; legs, antennae and mouth parts dark orange brown; sternites dull metallic green; ventrites aeneous.

Head densely punctured with fine short setae, medially impunctate, interstices microsculptured; coronal sulcus indistinct; suprafrontal sulcus weak, frons and vertex hardly differentiated; vertex feebly rugose posterolaterally; frons anteriorly depressed; antennal calli distinct, raised, oblique, ventrally acute; supracallinal sulcus marked by a row of punctures; supraorbital pore near dorsal margin of eye; orbital sulcus weak; clypeus reduced; labrum broader than long, a pair of widely spaced setose punctures preapically, anterolateral corners with a group of three setae each, apex gently deflexed, sinuate with a row of setae discontinuous in middle; mandibles with bold setose punctures laterally; maxillary palpi with three palpomeres, middle palpomere shorter, other two subequal; labial palpi with two subequal palpomeres; **compound eyes** gently emarginate mesally, vertical diameter 1.4 times transverse diameter, distance between compound eyes 2.3 times transverse diameter of one eye and 1.5 times distance between antennal sockets; maximum width of head almost 3.9 times transverse diameter of eye, 1.7 times distance between compound eyes and 2.6 times distance between antennal sockets, **antenna** subfiliform, reaching upto middle of elytra, first

antennomere thick, longer than second, second antennomere thicker than following 3–6 separately, rest broadened moderately and clothed with thick short setae.

Pronotum 1.7 times broader than long, posteriorly 1.3 times wider than anteriorly, convex, densely punctate, anterior margin straight, posterior margin lobed medially, lateral margins uniformly rounded, posterolateral callosity extends beyond lateral margin; **scutellum** broader than long, sparingly punctate and setose, apex rounded.

Elytra 1.2 times longer than broad, strongly convex, densely and irregularly punctate with minute setae in between punctures, feebly transversely rugose laterally, apex convex, setose preapically, lateral margins sparsely setose; humeral calli prominent with minute punctures; basal calli prominent; post basal depression weak; epipleura widest basally, gradually narrowing, hardly reaching apex, minutely punctate, feebly rugose.

Venter densely pubescent.

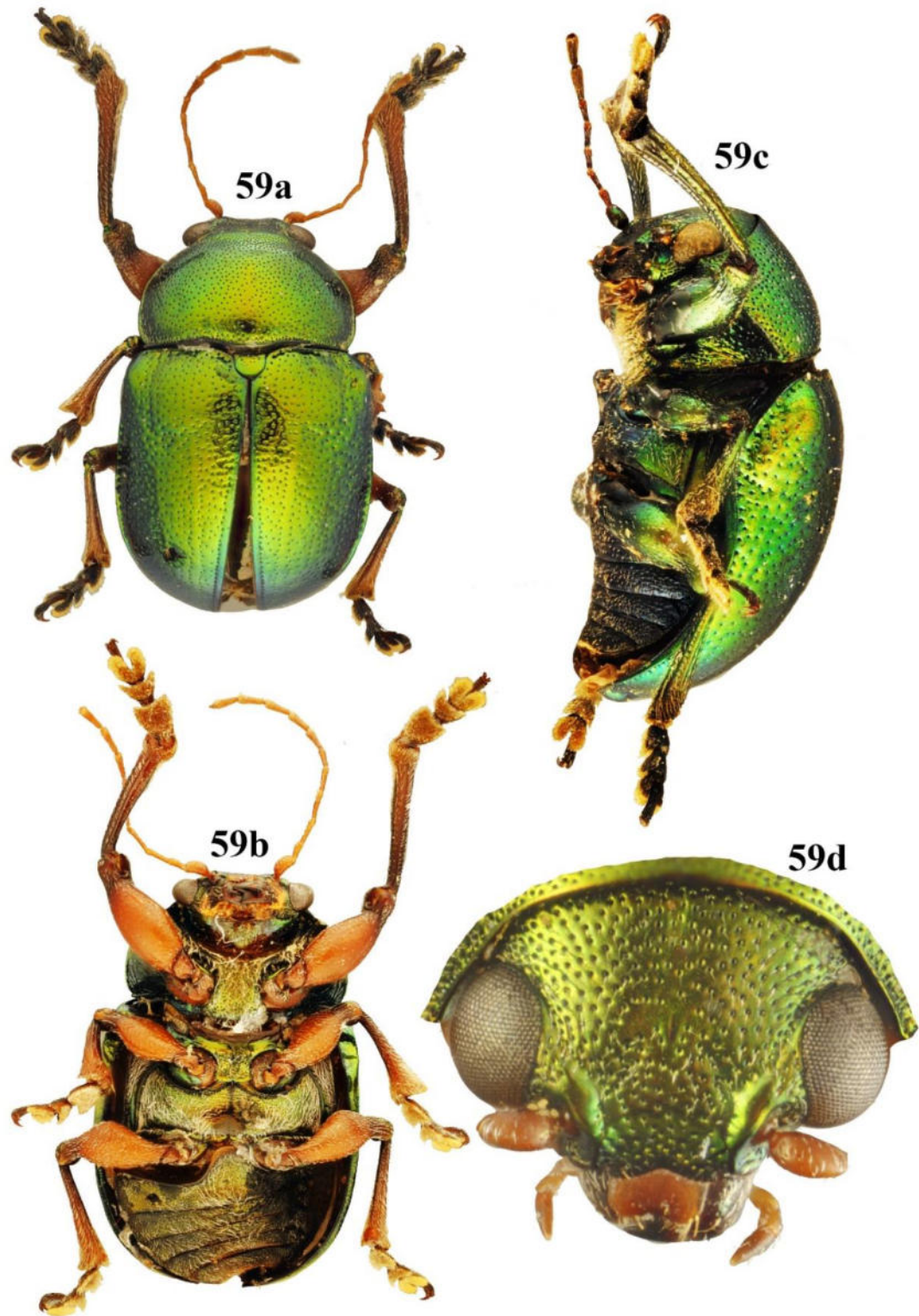
Proepisternum with anterior margin convex, setose; **hypomeron** rugose, posteriorly depressed.

Legs long, anterior pair longer than rest; tibiae gently curved basally, femora dilated medially without tooth, tibiae longitudinally carinate, tarsomeres ventrally fringed with setae of varying shapes, first two tarsomeres ventrally with capitate setae bordered with pointed setae in males, females with pointed setae instead of capitate setae, third bilobed tarsomeres with setae of varying shape.

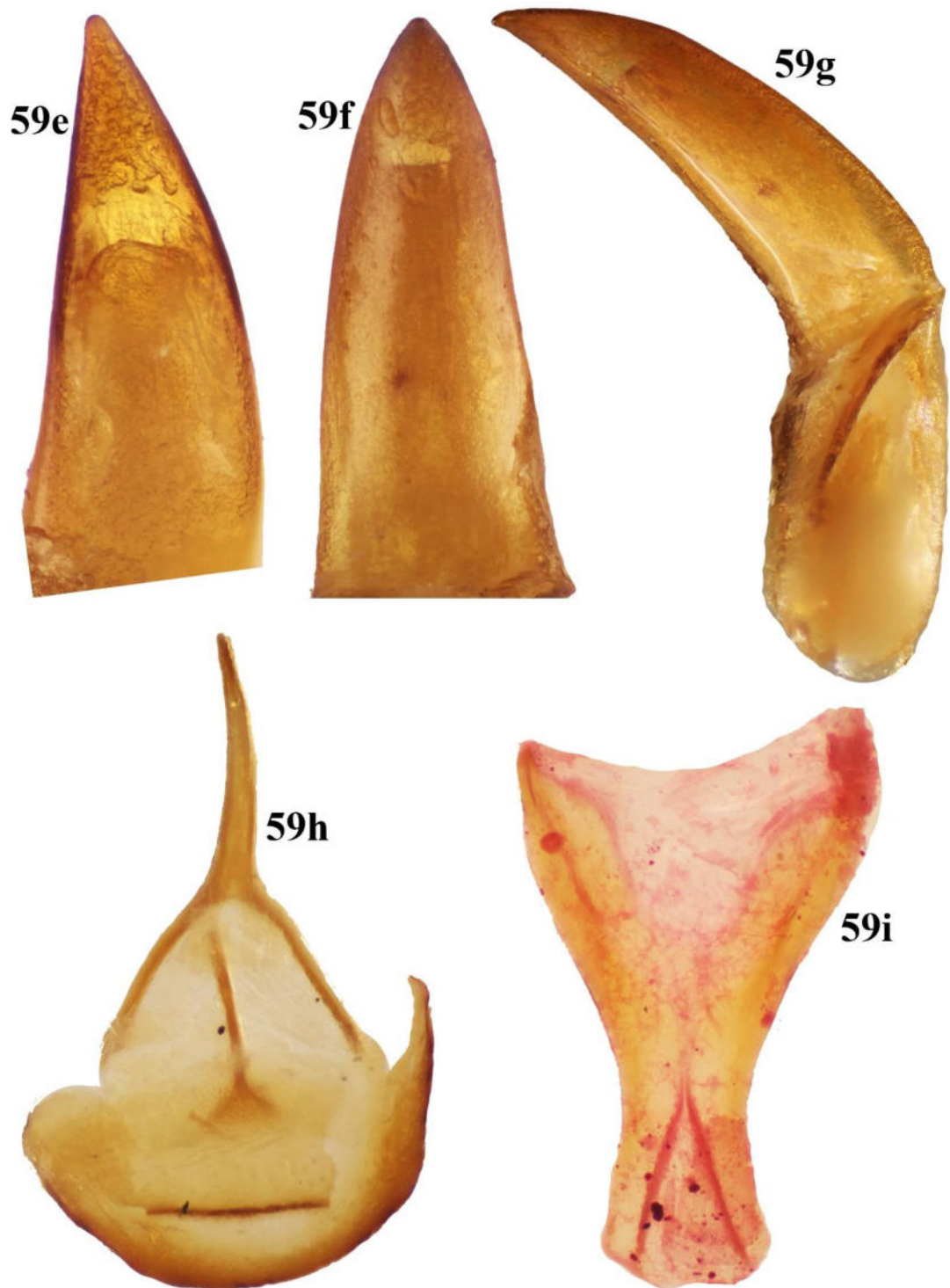
Prosternum longer than broad, densely pubescent with long setae; mesosternum posteriorly narrowed, setose; metasternum and pleural triangle densely setose.

Ventrites finely setose, first ventrite medially longer than following two combined; ventrites 1–4 each longer than preceding one, last ventrite longer than penultimate, apex of last ventrite weakly emarginate.

Male genitalia with **aedeagus** in lateral view bent at base of aedeagus proper; ventral plate convex, ventral margin straight, dorsal margin curved, distinctly curved distally like beak with acute denticle; dorsal surface widest basally, gradually converging anteriorly, apex acute; ventral surface distinctly convex; **spiculum gastrale** Y-shaped with gently curved median arm longer than lateral arms; spiculum relictum distinctly



Figures 59a–d: *Colasposoma* sp.1, habitus: **59a.** Dorsal view, **59b.** Ventral view, **59c.** Lateral view, **59d.** Head, frontal view.



Figures 59e–i. Male genitalia of *Colasposoma* sp.1: **59e.** Aedeagus, dorsal view, **59f.** Aedeagus, ventral view, **59g.** Aedeagus, lateral view, **59h.** Spiculam gastrale, spiculam relictum and 8th tergite, **59i.** Tegmen.

sclerotized; 8th tergite semicircular; tegmen distinctly constricted medially, distally narrower than proximally.

Distribution. India (Kerala).

Remarks. *Colasposoma* sp. 1 closely resembles *Colasposoma asperatum* Lefevre, even by the shape of aedeagus. However, the ventral surface of aedeagus in *C. asperatum* is distinctly concave with a longitudinal furrow medially (ventral surface of aedeagus in *Colasposoma* sp. 1 is distinctly convex).

Material examined (1 specimen).

1 ♂ “India: Kerala/ KFRI, Peechi/ 10^o31’53.7”N 76^o20’44.9”E/ 9.IV.2018/SR Hiremath Coll.”.

4.2.6. *Dermorhytis* Baly, 1861

(Type species. *Dermorhytis igneo-fasciata* Baly, 1861 from Srilanka)

Dermorhytis Baly, 1861: 282; 1867: 262; Chapuis, 1874: 252; 1885: 48; Jacoby, 1908: 367; Clavaraeu, 1914: 40.

Generic diagnosis. Body oblong, shiny, colour metallic; irregularly, densely, strongly punctate; antenna subfiliform; compound eyes feebly emarginate; thorax transverse, lateral margins more or less angulate. Scutellum U-shaped; elytra parallel-sided, transversely rugose laterally; legs stout and long, femora unarmed, tibia longitudinally carinate with apex broad, intermediate and posterior tibiae not emarginate preapically; claws appendiculate; prosternum subquadrate, lateral margins distinctly concave; anterior margin of proepisternum concave.

Remarks. *Dermorhytis* closely resembles *Abirus* in shape and appearance. These genera can be separated by lateral margins of thorax not angulate (angulate in *Demorhytis*) and anterior margin of proepisternum not concave in *Abirus* (concave in *Demorhytis*). Some species of *Acrothinium* also exhibit close similarity to *Dermorhytis*. However, *Acrothinium* with sparse erect setae on elytra (elytra glabrous in *Demorhytis*) and wide terminal antennomeres (terminal antennomeres not widened in *Demorhytis*) can be readily separated.

The genus comprises more than 20 species distributed mainly in the Oriental region, including seven from south India.

Key to select species of *Dermorhytis* of south India

1. Spermatheca U-shaped with proximal portion straight.....**2**
 - Spermatheca Question mark shaped with proximal portion distinctly curved.....**3**
- 2(1). Head, pronotum and elytra remotely punctured, prosternum with strong punctures, antenna extending beyond middle of body; suprafrontal sulcus well developed; elytra with strong rugosities laterally.....***Dermorhytis* sp. 1**
 - Head, pronotum and elytra densely and closely punctured with bold punctures, prosternum shallowly punctate; suprafrontal sulcus poorly developed; antennae not extending beyond middle of the body; elytra with feeble rugosities laterally***D. fulvipes***
- 3(1). Pronotum and elytra strongly, densely and uniformly punctate, lateral margins of elytra feebly rugose, proximal antennomeres fulvous and rest black; apex of spermathecal capsule not distinctly bulged***D. speciosa***
 - Pronotum and elytra sparsely punctate, pronotum with punctures bolder than those on elytra; lateral margins of elytra distinctly rugose; antenna entirely fulvous; apex of spermathecal capsule distinctly bulged***D. viridinitens***

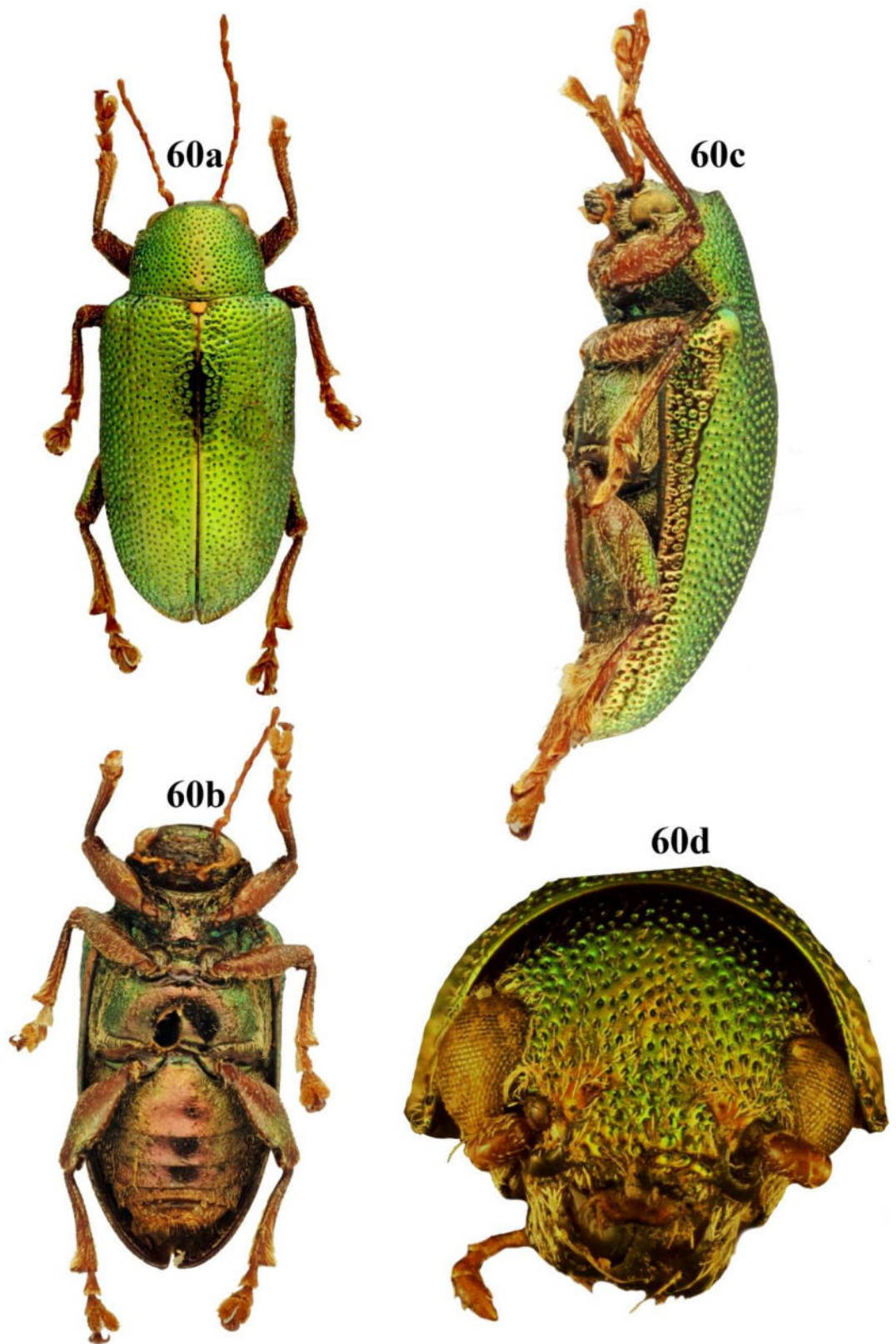
4.2.6.1. *Dermorhytis fulvipes* Jacoby, 1903 (Figs. 60a–j)

Dermorhytis fulvipes Jacoby, 1903: 102; 1908: 375.

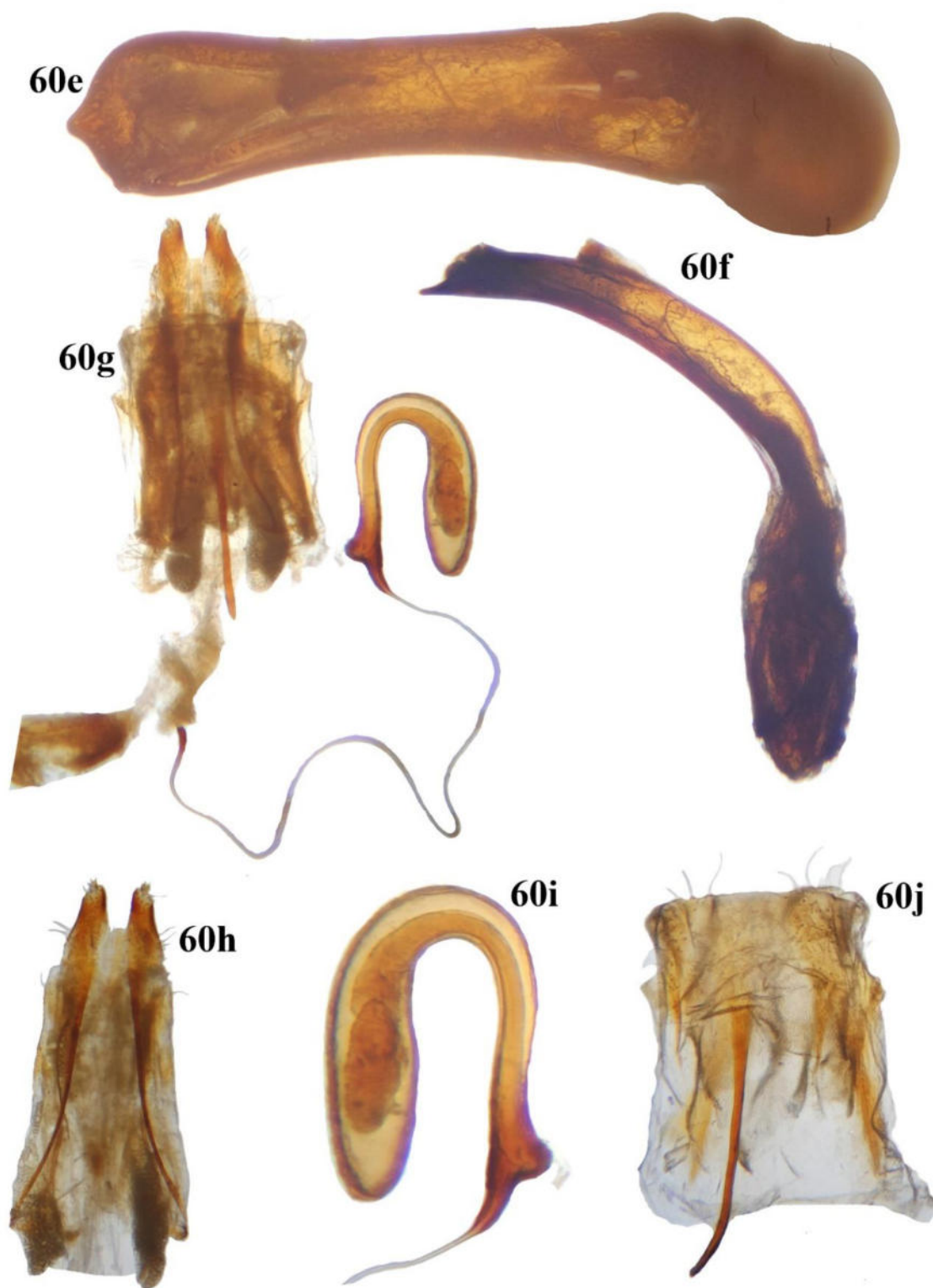
Description

Body length 7.1–8.2 mm, width 3.5–3.9 mm; oblong, dorsum metallic olive green, venter aeneous, antennae, palpi, legs and posterior ventrites brown, mandibles piceous.

Head densely punctate, punctures bold, finely setose, interstices raised with rugose reticulate appearance; coronal sulcus indistinct; suprafrontal sulcus weak, frons and vertex hardly differentiated; orbital sulcus weak; supraorbital pore near dorsal margin of eye; antennal calli weak, rarely purple and easily differentiated; clypeus narrow, strip-like; labrum broader than long, gently deflexed anteriorly, with a pair of widely spaced setae preapically, anterolateral corners with three setae, apical margin sinuate with a row of setae absent in middle; mandibles bidentate apically, lateral area setose; maxillary and labial palpi with apical palpomere longest, maxillary palpi with first two



Figures 60a–d: *Dermorhytis fulvipes*, habitus: **60a.** Dorsal view, **60b.** Ventral view, **60c.** Lateral view, **60d.** Head, frontal view.



Figures 60e–j. Genitalia of *Dermorhytis fulvipes*: **60e–f.** Male genitalia: **60e.** Aedeagus, dorsal view, **60f.** Aedeagus, lateral view; **60g–j.** Female genitalia: **60g.** Ventral view, **60h.** Ovipositor, **60i.** Spermatheca, **60j.** Fused 8th sternite and 8th tergite with tignum.

palpomeres subequal; compound eyes gently emarginated at mesal margin, transverse diameter 1.3–1.4 times vertical diameter, distance between compound eyes 2.6 times transverse diameter of eye, 1.4 times distance between antennal sockets; maximum width of head more than four times transverse diameter of eye, 1.6 times distance between compound eyes, 2.3 times distance between antennal sockets. **Antenna** long, subfiliform, hardly reaching middle of elytra, first antennomere thick, longer than second, second thinner than first, antennomeres 3–6 thin, rest progressively widened. Proportionate length of antennomeres I to XI equals 1 : 0.4 : 0.9 : 0.9 : 1 : 0.8 : 1.2 : 1.1 : 1.1 : 1.1 : 1.3.

Pronotum 1.3–1.4 times broader than long, posteriorly 1.1–1.2 times wider than anteriorly, subquadrate, densely and boldly punctate with minute setae, interstices aciculate, anterolateral corners project forward, anterior margin straight, posterior margin obsolete lobed in middle, lateral margins almost straight.

Scutellum gently broader than long, U-shaped, with minute punctures, narrowly rounded posteriorly.

Elytra 1.5–1.6 times longer than broad, lateral margins subparallel, densely punctured, with minute setae, humeral calli prominent with minute punctures, basal calli and post basal depression indistinct, transversely rugose except near sutural margin, purple tinted near lateral margin, apex rounded.

Epipleura tinted brown, narrow, minutely punctate, widest basally, posteriorly narrowing.

Proepisternum with anterior margin concave, densely setose; hypomeron densely punctate with bold punctures, finely setose, interstices gently raised, gently depressed posteriorly.

Legs with femora dilated, tibiae weakly carinate with rows of setae in between, tarsomeres ventrally fringed with variously shaped setae, basitarsomere of fore- and middle legs with short capitate setae bordered by pointed setae and on hindlegs entirely fringed with pointed setae in males, all basitarsomeres ventrally with pointed setae alone in females, second tarsomere with pointed setae and third bilobed palpomere with diverse forms of setae.

Prosternum narrow, less than two times longer than broad medially, finely setose, lateral margins gently concave; **mesosternum** longer than broad, finely setose, widened posteriorly, **metasternum** finely setose, pleural triangle setose.

Ventrites finely pubescent, first ventrite longer than following two combined medially, ventrite 2–4 shorter than preceding one except last slightly longer than 4th, apex of last ventrite distinctly emarginate. **Pygidium** distinctly grooved medially.

Male genitalia with aedeagus bent in lateral view, aedeagus proper more than two times longer than basal hood; in dorsal view narrowed medially and widening towards both ends, dorsal surface convex, apex with acute denticle, ostium wide open; ventral surface widest and distinctly concave basally, middle region narrowed and feebly convex, anterior portion widened and flat; anterolateral angle round and apex with acute denticle.

Female genitalia with long coxite with a few short setae; stylus setose; base of ovipositor with paired collateral glands (or organs for symbiont transmission); vagina short; bursa copulatrix indistinct; spermathecal duct very long; spermatheca U-shaped, sclerotized; apex pointed, distinctly curved medially, widened towards apex; spermathecal gland short and tubular, attached laterally near base of spermatheca; 8th sternite and tergite fused laterally, with longitudinal sclerotizations; tignum with pointed apex.

Remarks. *Demorhytis fulvipes* is similar to *D. speciosa* Jacoby. *Demorhytis speciosa* is smaller than *D. fulvipes*. Punctures are bolder in *D. speciosa* than in *D. fulvipes*, however, they are closer in *D. fulvipes*. Suprafrontal sulcus is more prominent in *D. speciosa* than in *D. fulvipes*. Antenna is longer, proximal antennomeres fulvous, distal six antennomeres black and extending beyond middle of elytra in *D. speciosa*, while antenna in *D. fulvipes* is shorter, hardly reaching the middle of elytra and is entirely fulvous black in *D. fulvipes*.

Distribution. India (Pondicherry, Tamil Nadu)

Material examined. (6 specimens)

2♀ & 4♂ “Nilgiri Hills/A K Weld Downing”

4.2.6.2. *Dermorhytis speciosa* Jacoby, 1895 (Figs. 61a–k)

Dermorhytis speciosa Jacoby, 1895: 275; 1908: 376.

Description

Body length 5.2–5.7 mm, width 2.8–3.1 mm; oblong; metallic blue-green, green, greenish purple or purple except compound eyes, antennae, mouthparts and venter red brown to aeneous; distal ventrites and legs yellow brown to red brown; distal 5 or 6 antennomeres, tarsomeres and last palpomeres piceous.

Head closely punctate, punctures bold, of varying diameter, finely setose; coronal sulcus weak; suprafrontal sulcus weakly indicated, frons and vertex hardly differentiated; orbital sulcus distinct; supraorbital pore near dorsal margin of eye; antennal calli weak; frons sloping anteriorly, punctures finer anteriorly; clypeus reduced; labrum broader than long, gently deflexed anteriorly, with two pair of setose punctures preapically, each arranged in separate rows, apical margin sinuate with a row of setae discontinuous in middle; maxillary and labial palpi with last palpomere longest; maxillary palpi 3 segmented, basal palpomere longer than middle; mandibles bidentate, with numerous setae laterally. Compound eyes lateral, oval, mesal margin distinctly sinuate, transverse diameter 1.2 times vertical diameter, distance between compound eyes 1.8 times transverse diameter of eye, 1.4 times distance between antennal sockets; maximum width of head more than three times transverse diameter of eye, 1.9 times distance between compound eyes, 2.7 times distance between antennal sockets. Antenna long, subfiliform, reaching beyond middle of elytra, first antennomere thicker and longer than second, antennomere 3–6 thin, rest progressively broadened and clothed with short thin setae. Proportionate length of antennomeres I to XI 1 : 0.3 : 0.9 : 0.8 : 1.2 : 1 : 1.4 : 1.2 : 1.2 : 1.2 : 1.5.

Pronotum 1.4–1.5 times broader than long, posteriorly 1.2 times broader than anteriorly, densely and boldly punctate with minute setae, interstices with minute punctures, posterior margin weakly punctate, anterior margin straight, lateral margins weakly angulate in anterior half, anterolateral callosity project forward.

Scutellum as broad as long, U-shaped, with minute punctures.

Elytra convex, 1.4–1.5 times longer than broad, densely, boldly and irregularly punctate with minute setae; humeral calli prominent with minute punctures; basal calli weak; post basal depression indistinct; transversely rugose laterally, lateral margins

distinctly visible in dorsal view, apex subacute; **epipleura** narrow with minute punctures, posteriorly narrowed.

Proepisternum densely pubescent; hypomeron with bold punctures, finely and transversely rugose laterally, gently depressed posteriorly.

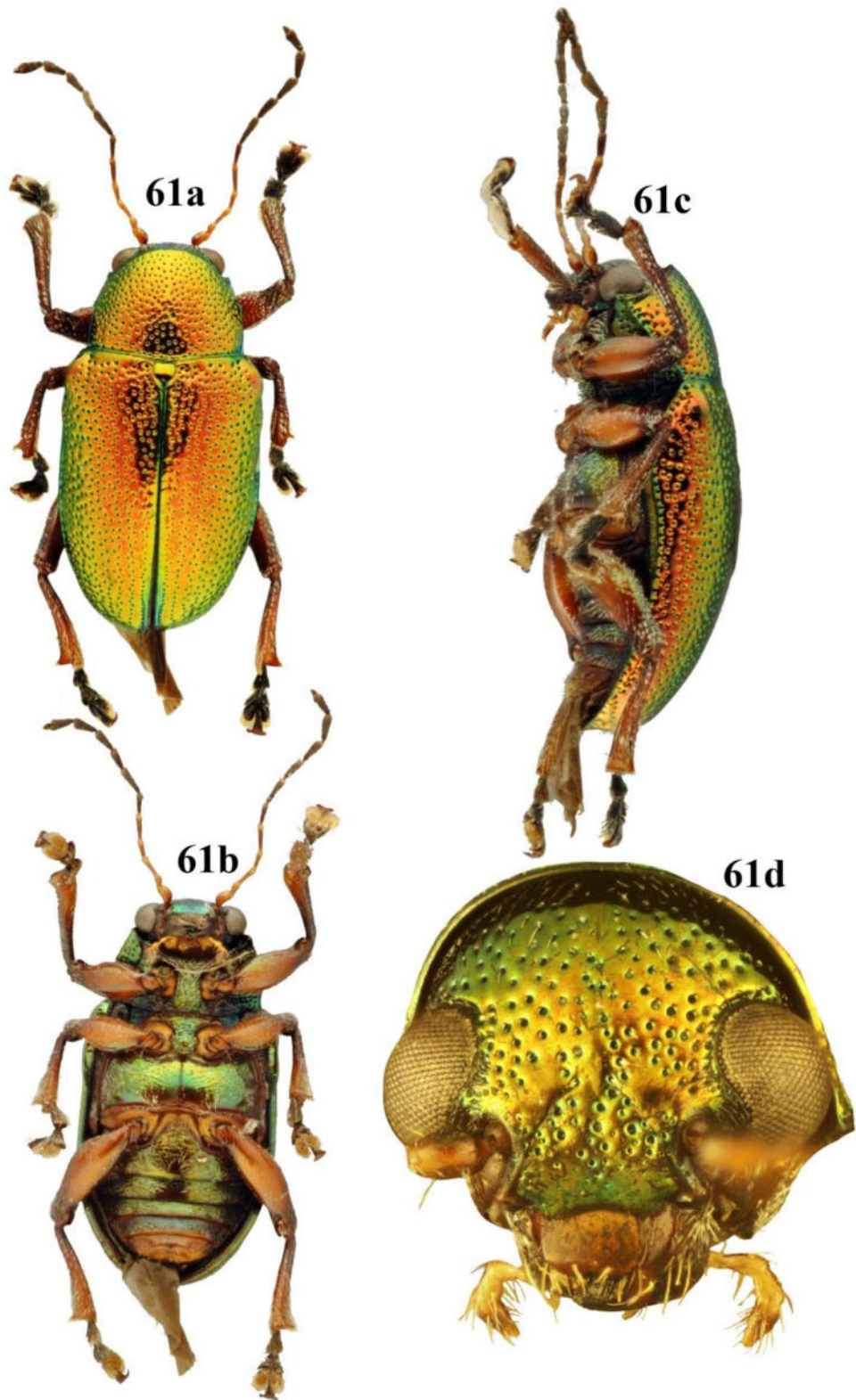
Legs with femur dilated, tibia longitudinally carinate with rows of setae between carinae, tarsomeres ventrally fringed with variously shaped setae, basitarsomere of fore- and middle legs ventrally with short capitate setae bordered by pointed setae, first tarsomere of hindlegs with pointed setae alone in males; all basitarsomeres ventrally with pointed setae in females, second tarsomere with pointed setae and third bilobed tarsomere with diverse forms of setae.

Prosternum narrow, almost two times longer than broad medially, setose with bold punctures, lateral margins distinctly concave, **mesosternum** longer than broad, finely setose, posteriorly narrowing; **metasternum** finely setose, pleural triangle sparsely setose.

Ventrites finely pubescent, first ventrite medially longer than following two combined; ventrites 2–4 each shorter than preceding one, 5th slightly longer than 4th; apex of last ventrite distinctly emarginate. **Pygidium** distinctly grooved medially with minute sensillae, apex densely setose.

Female genitalia. Spermatheca Question mark shaped with proximal portion distinctly curved, apex rounded; spermathecal duct very long, attached at base, spermathecal gland opens near base of capsule; bursa copulatrix indistinct; vagina and oviduct short; ovipositor long; coxite with short and long setae, stylus bearing a few short setae; 8th sternite and tergite fused laterally forming a membranous tube with lateral sclerotizations; tignum shorter than ovipositor.

Male genitalia with paired ejaculatory duct, followed by an ejaculatory sac and median ejaculatory duct connected to a sclerotized spirally wound rod inside endophallic membrane; aedeagus proper very long; aedeagus curved, crescent shaped in lateral view, both dorsal and ventral plates convex; dorsal surface concave medially, gently broadened towards both ends, apex narrowed with a subacute denticle; spiculum gastrale, spiculum relictum and 8th tergite absent.



Figures 61a–d: *Dermorhytis speciosa*, habitus: **61a.** Dorsal view, **61b.** Ventral view, **61c.** Lateral view, **61d.** Head, frontal view.



Figures 61e–k. Genitalia of *Dermorhytis speciosa*: **61e.** Aedeagus, dorsal view, **61f.** Male genitalia, lateral view. **61g.** Tegmen. **61h.** Female genitalia: **61i.** Ovipositor, **61j.** Spermatheca, **61k.** Fused 8th tergite and sternite with tignum

Remarks. *Dermorhytis speciosa* is similar to *D. fulvipes* Jacoby. *Dermorhytis speciosa* is smaller than *D. fulvipes*. Punctures in *D. speciosa* are stronger than those in *D. fulvipes* and are more closely spaced in *D. fulvipes*. Suprafrontal sulcus is more prominent in *D. speciosa* than in *D. fulvipes*. Antenna is longer, extending beyond the middle of elytra in *D. speciosa* (antenna shorter, hardly reaching the middle of elytra in *D. fulvipes*). Proximal antennomeres fulvous and the distal six black in *D. speciosa* (antenna entirely fulvous black in *D. fulvipes*). *Dermorhytis speciosa* superficially resembles *D. andrewesi* Jacoby. Elytra longer and pointed, and lateral margins of thorax distinctly angulate in *D. speciosa* while elytra shorter and thorax weakly angulate in *D. andrewesi*. According to Jacoby (1908), *D. biangulata* may possibly be a local variety of *D. speciosa*, the thorax has two small teeth at the middle of the lateral margins in *D. biangulata*, while in *D. speciosa*, pronotum is not biangulate and the general size is larger.

Distribution. India (Kerala, Karnataka, “southern Bombay “).

Material examined. (9 specimens)

2♀ & 2♂ “India: Kerala/Kallar/ N 08° 42’ 43.0” E 077° 07’ 47.3”/25.iii.2018/Amritha Kumari S Coll./Ex. *Olea dioica*”. 2♀ & 2♂ same data except S R Hiremath Coll. and no host data“. 1♀ “India: Kerala/JNTBGRI, Palode/ N 08° 45’ 10.1” E 077° 01’ 30.8”/17.iv.2018/Amritha Kumari S Coll.

4.2.6.3. *Dermorhytis viridinitens* Jacoby, 1908 (Figs. 62a–h)

Dermorhytis viridinitens Jacoby, 1908: 371

Description

Body length 6.1–6.9 mm, width 3.4–3.9 mm; oblong elongate, color metallic green except compound eyes, antennae, mouthparts, tarsomeres, palpi, labrum yellow brown to piceous; mandibles piceous except base metallic green; tarsomeres piceous.

Head sparsely and strongly punctured with some impunctate areas between punctures, finely setose, interstices with minute punctures; coronal suture indistinct; suprafrontal sulcus weak, frons and vertex hardly differentiated, vertex with a mixture of small, bold and elongate punctures, posterolateral areas form rugosities, frons gently depressed; clypeus reduced; labrum broader than long, gently deflexed anteriorly, with a pair of widely separated setae preapically, anterolateral corners with a pair of setae each, apex

sinuate with a row of setae discontinuous in middle; mandibles bidentate, setose laterally; maxillary and labial palpi with three and two palpomeres respectively, last palpomere longest, maxillary palpi with middle palpomere shortest; ocular sulcus weak, indicated by a row of setae; supraorbital pore adjacent to dorsal margin of eye; antennal calli weak; mesal margin of compound eyes distinctly sinuate; transverse diameter of eye 1.1 times vertical diameter, distance between compound eyes 2.3 times transverse diameter of eye, 1.5 times distance between antennal sockets; maximum width of head more than three times transverse diameter of eye, 1.6 times distance between compound eyes, 2.4 times distance between antennal sockets. Antenna subfiliform, hardly reaching middle of elytra, first antennomere thick, longer than second, antennomeres 3 – 6 thin, rest progressively broadened and clothed with thick short setae. Proportionate length of antennomeres I to XI 1 : 0.7 : 1 : 1 : 1.3 : 1.1 : 1.6 : 1.4 : 1.4 : 1.4 : 1.9.

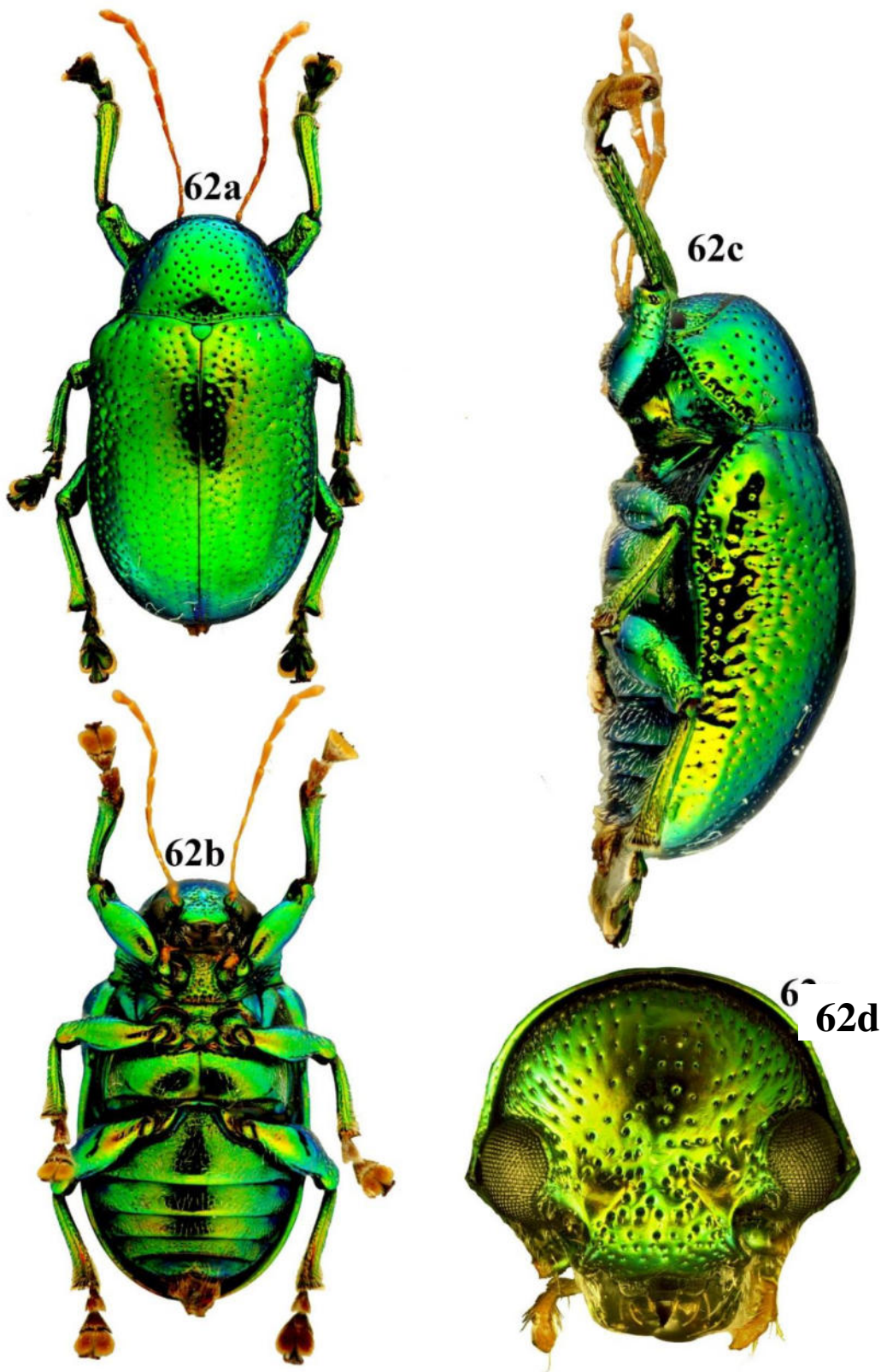
Pronotum 1.3–1.4 times broader than long, posteriorly 1.4 times broader than anteriorly, strongly and remotely punctate, interstices with small and minute punctures, anterolateral callosity project forward, lateral margins weakly angulate, anterior margin straight, posterior margin lobed medially and straight laterally; **scutellum** broader than long, U- shaped, with minute punctures.

Elytra convex, 1.3–1.4 times longer than broad, densely and irregularly punctured, setae minute, punctures smaller than those on pronotum; humeral calli prominent with minute punctures; basal calli weak, post basal depression indistinct; with transverse rugosities laterally, mildly tuberculate; sutural angle subacute, apex round; **epipleura** finely punctate, widest basally, posteriorly narrowed, hardly reaching apex.

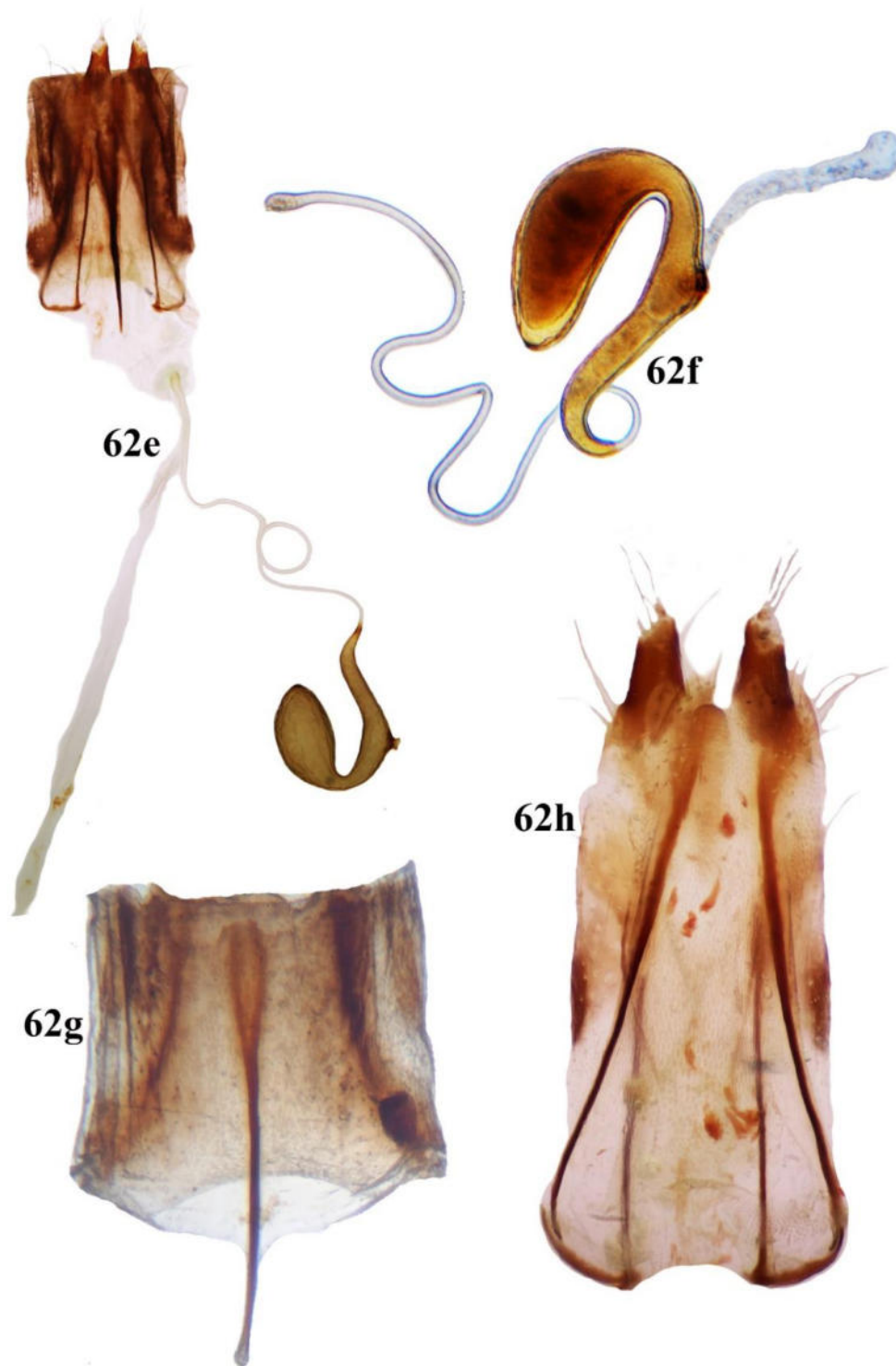
Proepisternum with concave anterior margin; hypomeron with bold punctures, finely transversely rugose laterally, gently depressed posteriorly, pleural triangle densely setose.

Legs with femora dilated, tibiae longitudinally carinate with rows of setae between carinae, tarsomeres ventrally fringed with variously shaped setae.

Prosternum narrow, more than two times longer than broad medially, densely setose with bold punctures, lateral margins distinctly concave; **mesosternum** longer than broad, finely setose; **metasternum** finely setose, densely setose laterally.



Figures 62a–d: *Dermorhytis viridinitens*, habitus: **62a.** Dorsal view, **62b.** Ventral view, **62c.** Lateral view, **62d.** Head, frontal view.



Figures 62e–h. Female genitalia of *Dermorhytis viridinitens*. **62e.** Ventral view, **62f.** Spermatheca, **62g.** Fused 8th sternite and 8th tergite with tignum, **62h.** Ovipositor.

Ventrites finely pubescent, first ventrite medially longer than following two combined, ventrites 1–4 shorter than preceding one, last one slightly longer than penultimate, apex of last ventrite distinctly emarginated; pygidium deeply grooved medially, punctate with short setae representing sensillae, interstices microsculptured.

Genitalia.

Female genitalia with spermathecal capsule ‘question mark’ shaped with an acute base, gradually widened towards middle, sharply bent after middle, apex round or obtuse; spermathecal duct attached at base of capsule, spermathecal gland attached before middle, bursa copulatrix indistinct; vagina and oviduct short; ovipositor long, coxite with short and long setae; stylus bearing a few setae; 8th sternite and tergite fused laterally forming a membranous tube with lateral sclerotizations; tignum shorter than ovipositor.

Remarks. The thorax is sparsely punctured in *D. viridinitens* than in any other species of the genus, and the antennae are fulvous. *Demorhytis imitans* Jacoby is similar to *D. viridinitens*, however, the former is larger than the latter. Antenna is longer and dark in *D. imitans* while the same is shorter and entirely fulvous in *D. viridinitens*. Thorax is less transverse and remotely punctured in *D. viridinitens*. In *D. imitans*, thorax is wider and the punctures are comparatively closer than in *D. viridinitens*. The lateral elytral rugosities are fewer and feeble in *D. imitans* compared to those in *D. viridinitens*.

Distribution. India (Kerala)

Material examined. (4 specimens)

3♀ “India: Kerala/Kallar/ N 08^o 42’ 43.0” E 077^o 07’ 47.3”/31.iii.2018/Amritha Kumari S Coll./Ex. *Pavetta*”. 1 ♀ same data except date 25.iii.2018 & Ex. *Olea dioica*”.

Host plants. *Pavetta* sp. (Rubiaceae) and *Olea dioica* Roxb. (Oleaceae).

4.2.6.4. *Dermorhytis* sp. 1 (Figs. 63a–h)

Description

Body length 7.5–8.0 mm, breadth 3.9–4.2 mm; oblong, metallic; head metallic green with purple lustre; pronotum metallic green with two large spots laterally, rarely obscure; elytra metallic green with two longitudinal purple bands extending from base to apex, a thin band near lateral margin, a thin obscure golden band near sutural margin followed by a thick purple band occupying major part; prosternum, mesosternum and

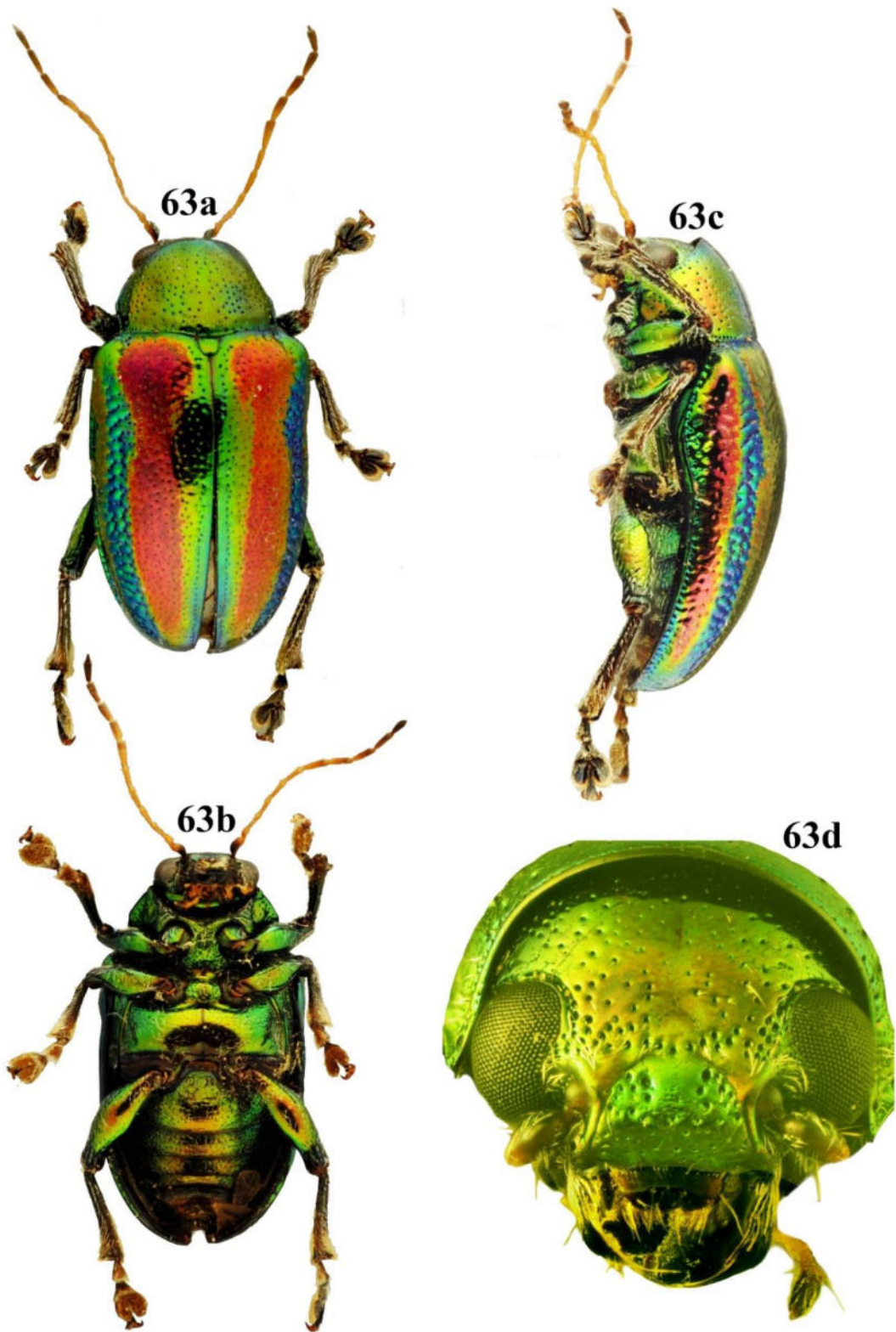
pleuron metallic green; femora, metasetrum and ventrites brown with metallic lustre; tibia, tarsomeres and first antennomere piceous, antennomeres 2–6 yellow brown, rest yellow brown basally and piceous apically.

Head sparsely punctured, with mixture of small and bold punctures, with impunctate areas, sparingly setose, anterolateral corners weakly rugose; coronal suture indistinct; orbital sulcus distinct with a row of elongate punctures; supraorbital pore round near dorsal margin of eye; antennal calli weak, gently raised and triangular; suprafrontal sulcus distinct, frons and vertex differentiated, frons with bold punctures laterally and small fine punctures anteriorly; clypeus much reduced; labrum broader than long, apex gently deflexed and sinuate, with a row of setae on apical margin and a pair of widely separated setose punctures preapically, anterolateral corners with four suberect setae; mandibles robust, bidentate, laterally with bold punctures and fine setae; maxillary and labial palpi with three and two palpomeres respectively, last palpomere being longest, maxillary palpi with first palpomere longer than second. Antenna subfiliform, first antennomere thick and longer than second, second thicker than 3 to 6 thin, rest progressively broadened and clothed with thick short setae. Proportionate length of antennomeres I to XI 1 : 0.5 : 1 : 0.9 : 1.2 : 1.1 : 1.5 : 1.2 : 1.2 : 1.2 : 1.4. Compound eyes lateral, oval, mesal distinctly sinuate, vertical diameter 1.2 times horizontal diameter, distance between compound eyes 1.9 times transverse diameter of eye and 1.4 times distance between antennal sockets; maximum width of head more than three times transverse diameter of eye, 1.8 times distance between compound eyes and 2.5 times distance between antennal sockets.

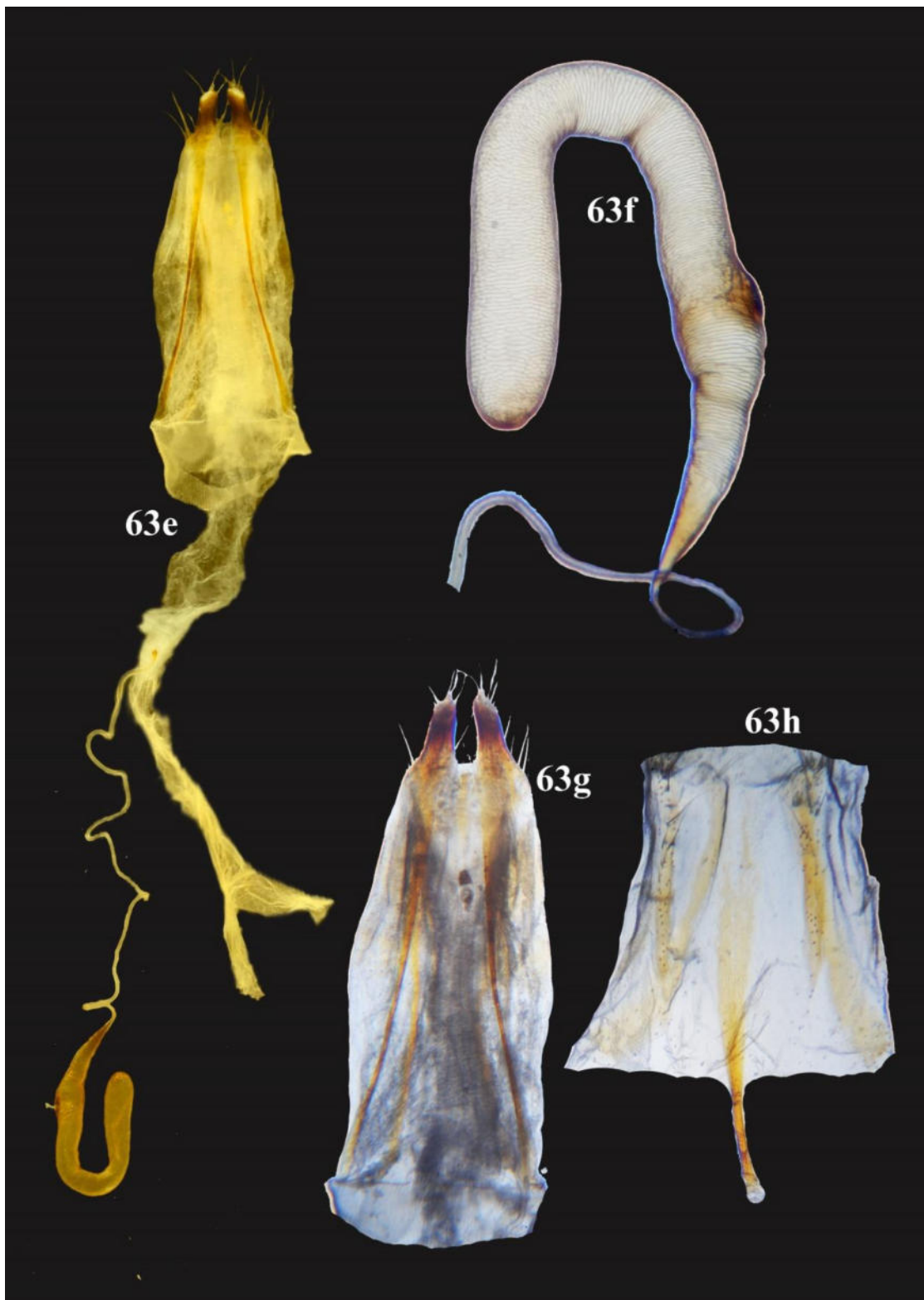
Pronotum 1.5 times broader than long, posteriorly 1.3–1.4 times broader than anteriorly, profusely punctate, interstices aciculate with minute punctures, anterolateral callosity project forward, posterolateral callosity extend beyond lateral margin, anterior margin straight, posterior margin weakly lobed in middle, lateral margins weakly angulate.

Scutellum broader than long, U-shaped, minutely punctate, finely setose.

Elytra convex, 1.5–1.6 times longer than broad, densely punctured, punctures confused; humeral calli distinct, impunctate; basal calli weak, post basal depression



Figures 63a–d: *Dermorhytis* sp.1, habitus: **63a.** Dorsal view, **63b.** Ventral view, **63c.** Lateral view, **63d.** Head, frontal view.



Figures 63e–h. Female genitalia of *Dermorhytis* sp.1. **63e.** Ventral view, **63f.** Spermatheca, **63g.** Ovipositor, **63h.** Fused 8th sternite and 8th tergite with tignum.

obsolete; laterally with distinct transverse rugosities, sutural angle subacute; **epipleura** finely punctate with minute punctures, posteriorly narrowed, hardly reaching apex.

Proepisternum densely setose; hypomeron with bold punctures, gently depressed posteriorly.

Legs with femur dilated medially, tibia distinctly carinate with rows of setae in between, tarsomeres ventrally fringed with variously shaped setae.

Prosternum medially two times longer than wide, lateral margins distinctly concave, punctures dense and bold, with silvery setae; **mesosternum** rugose, finely setose; **metasternum** sparingly setose.

Ventrites finely pubescent, first ventrite medially longer than following two combined, ventrites 1–5 each shorter than preceding one, apex of last ventrite distinctly emarginate.

Female Genitalia having coxite with stylus, vagina short, bursa copulatrix indistinct, spermatheca U-shaped; base acutely pointed where spermathecal duct attached; spermathecal gland short, tubular, attached near base on its side, gradually broadened towards apex with a sharp U-shaped bent medially; 8th sternite and tergite fused laterally with longitudinal sclerotizations; tignum shorter than ovipositor, apex blunt.

Remarks. This species is closely similar to *D. atkinsoni* Jacoby in having metallic green colour, purple-violaceous bands on elytra and fulvous labrum, antennae, apices of tibiae and tarsi. The species can be differentiated from *D. atkinsoni* by the following characters: *D. atkinsoni* with anterior margin of frons angularly emarginated (anterior margin of frons wavy in *Demorhytis* sp.1) and scutellum with a deep fovea (fovea on scutellum absent in *Demorhytis* sp. 1). Moreover, size of *D. atkinsoni* is about 6.5 mm, while that of *Demorhytis* sp. 1 is 7.5–8.0 mm.

Distribution. India (Kerala)

Material examined. (5 specimens)

1 ♀ “India: Kerala/Shendurney WLS/Kattalappara/22.iii.2012/Prathapan & Shameem Coll.”. 4 ♀ “India: Kerala/ ICRI, Myladumpara/N 09^o 53’ 26.6” E 077^o 09’ 43.5”/27.iii.2017/Amritha K S & S R Hiremath Coll.”.

4.2.7. *Edistus* Lefevre, 1884

(Type species. *Edistus fulgidus*, Lefevre, 1884 from Bintang Islands)

Edistus Lefevre, 1884: 202; Jacoby, 1908: 365; Clavaraeu, 1914: 63.

Generic diagnosis. Body ovate, shiny, dorsum glabrous; compound eyes lateral, sub globular, obsoletely emarginated mesally; antenna subfiliform, terminal antennomeres thickened, hardly longer than half of body; thorax transverse, convex, lateral margins entire; legs long, femur unarmed, intermediate and posterior tibiae emarginated preapically, claws appendiculate; prosternum subquadrate, truncate; anterior margin of proepisternum concave.

Remarks. Genera closely related to *Edistus* are *Callisina* Baly and *Nodina* Motschulsky. *Callisina* has terminal antennomeres broadly dilated and femora toothed beneath. *Nodina* has lateral margins of thorax distinctly angulate, however, lateral margins of thorax are entire and not angulate in *Edistus*.

Of the four known species, three occur in south India.

Key to select species of *Edistus*

1. Body oval, length around 2 mm, coronal sulcus rarely indicated or weak, head closely punctate, pronotum densely punctate.....*E. indicus*
- Body oblong ovate, length around 3 mm, coronal sulcus distinct, head remotely punctate, pronotum weakly punctate.....*Edistus* sp.1

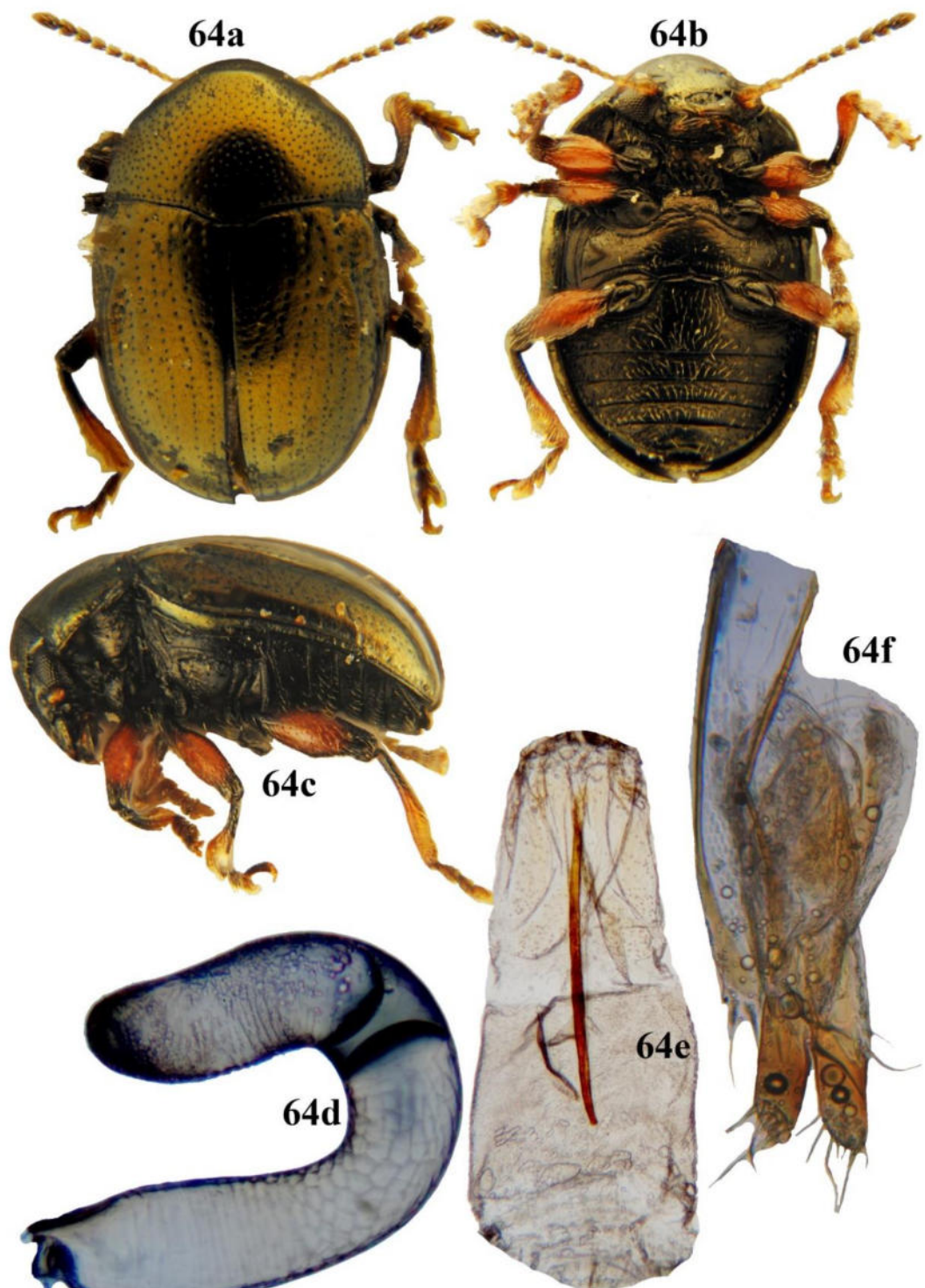
4.2.7.1. *Edistus indicus* Jacoby, 1903 (Figs. 64a–j)

Edistus indicus Jacoby, 1903: 99; 1908: 366; Clavaraeu, 1914: 63.

Description

Body length 1.7–2.2 mm, width 1.2–1.5 mm; round, distinctly convex, shiny black except first four antennomeres and palpomeres yellow to brown; mandibles, labrum and legs yellow brown to aeneous; ventral and pleural regions dark aeneous.

Head inserted, finely and closely punctured with setae; coronal sulcus rarely indicated, weak; suprafrontal sulcus indistinct, frons and vertex undifferentiated, frons semicircularly emarginate anteriorly; clypeus reduced; labrum broader than long, setose; antennal calli distinct, acutely pointed posteriorly; supraorbital pore distinct, rounded, adjacent to dorsal margin of eye; orbital sulcus well developed, broad and deep; maxillary and labial palpi with last palpomere longest, maxillary palpi with last palpomere almost two times longer than penultimate, labial palpi with last palpomere more than twice longer than penultimate. **Antenna** moniliform, extends beyond base



Figures 64a–f: *Edistus indicus*, habitus: **64a.** Dorsal view, **64b.** Ventral view, **64c.** Lateral view, **64d–f:** Female genitalia: **64d.** Spermatheca, **64e.** Fused eighth sternite and ventrite with tignum , **64f.** Ovipositor



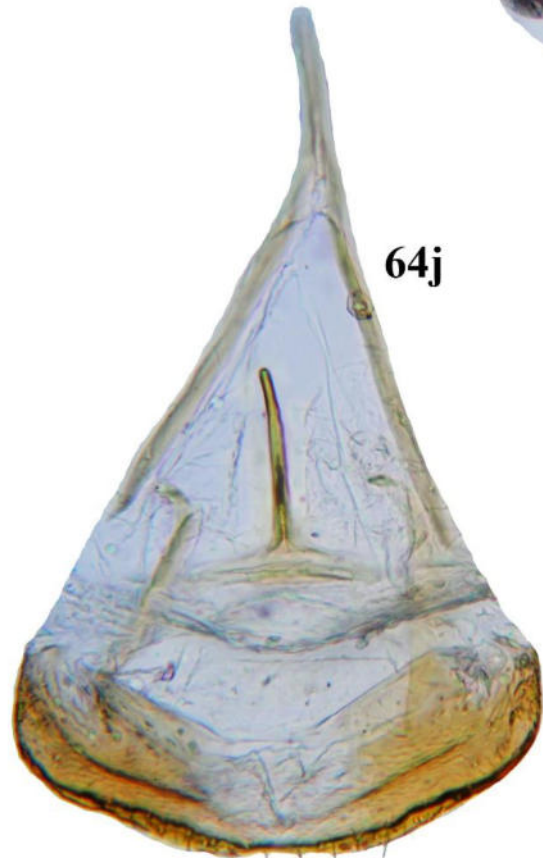
64g



64h



64i



64j

Figures 64g–j. Male genitalia of *Edistus indicus*: **64g.** Aedeagus, dorsal view, **64h.** Aedeagus, lateral view, **64i.** Tegmen, **64j.** Spicula gastrale, spiculum relictum and 8th tergite.

of elytra, not reaching middle, first antennomere thick, length subequal to second, second thicker and longer than 3 and 4 separately, thin, rest distinctly wider distally, antennomeres 7–10 subequal. **Compound eyes** lateral, gently emarginated at inner angle, vertical diameter 1.4 times transverse diameter; distance between compound eyes 3 times transverse diameter of eye, 1.4 times distance between antennal sockets; maximum width of head 4.6 times transverse diameter of eye, 2.2 times distance between antennal sockets and 1.5 times distance between compound eyes.

Pronotum transverse, 1.6–1.8 times broader than long, posteriorly 1.4 times broader than anteriorly, densely punctate, lateral margins entire; subparallel in basal 2/3rd, round and narrowed on anterior 1/3rd; **scutellum** as long as broad, narrowly rounded posteriorly with a few setose punctures.

Elytra 1.1 times longer than broad, punctures partially confused with a few countable rows in middle, distance between punctures in a row less than distance between rows of punctures; humeral calli prominent with minute punctures; basal calli less prominent; postbasal depression weak; a distinct costa arising from humeral calli reach up to middle of elytra; one more costa, parallel to former, arise post basally near basal calli, hardly reaching middle of elytra, apex rounded.

Proepisternum without setae or punctures, surface granulose; hypomeron posteriorly depressed with bold punctures.

Prosternum transverse with bold punctures and fine setae, mesosternum much broader than long with fine setae.

Legs long, tibiae long and longitudinally carinate, tarsomeres ventrally fringed with setae of varying shape, probasitarsomere with capitate setae in males and long pointed setae in females, 2nd tarsomere with pointed setae and third bilobed tarsomere with variously shaped setae such as triangular, arrow head, truncate and pointed.

Ventrites finely setose, first ventrite medially longer than following two combined, 3rd and 4th subequal, 2nd and 5th variable in length, apex of last ventrite emarginated.

Male genitalia with aedeagus in lateral view sharply bent near base of aedeagus proper; crescent shaped, apex sharply narrowed ends in acutely pointed denticle, slightly recurved dorsally; in dorsal view aedeagus broadest proximally, converging distally, strongly narrowed post medially, apex obtuse; tegmen distinctly lobed at apex, lateral

margins straight, basal region encircles base of aedeagus proper; spiculum gastrale Y-shaped with a short median arm, lateral arms two times as long as median arm; spiculum relictum long, sclerotized; 8th tergite with very short or minute setae at apex.

Female genitalia with spermathecal capsule large, almost U-shaped, uniformly broad, apex rounded; eighth sternite and ventrite fused laterally forming a membranous tube with lateral sclerotizations; ovipositor long.

Remarks. Closely related to *E. caeruleus* Jacoby. *Edystus caeruleus* has head closely and finely punctured, thorax crowded evenly with large, deep punctures. Head of *E. indicus* is distinctly and remotely punctured, while thorax is finely and remotely punctured. Anterior margin of thoracic episternum nearly straight in *E. caeruleus* while the same is concave in *E. indicus*.

Distribution. India (Kerala)

Material examined (5 specimens).

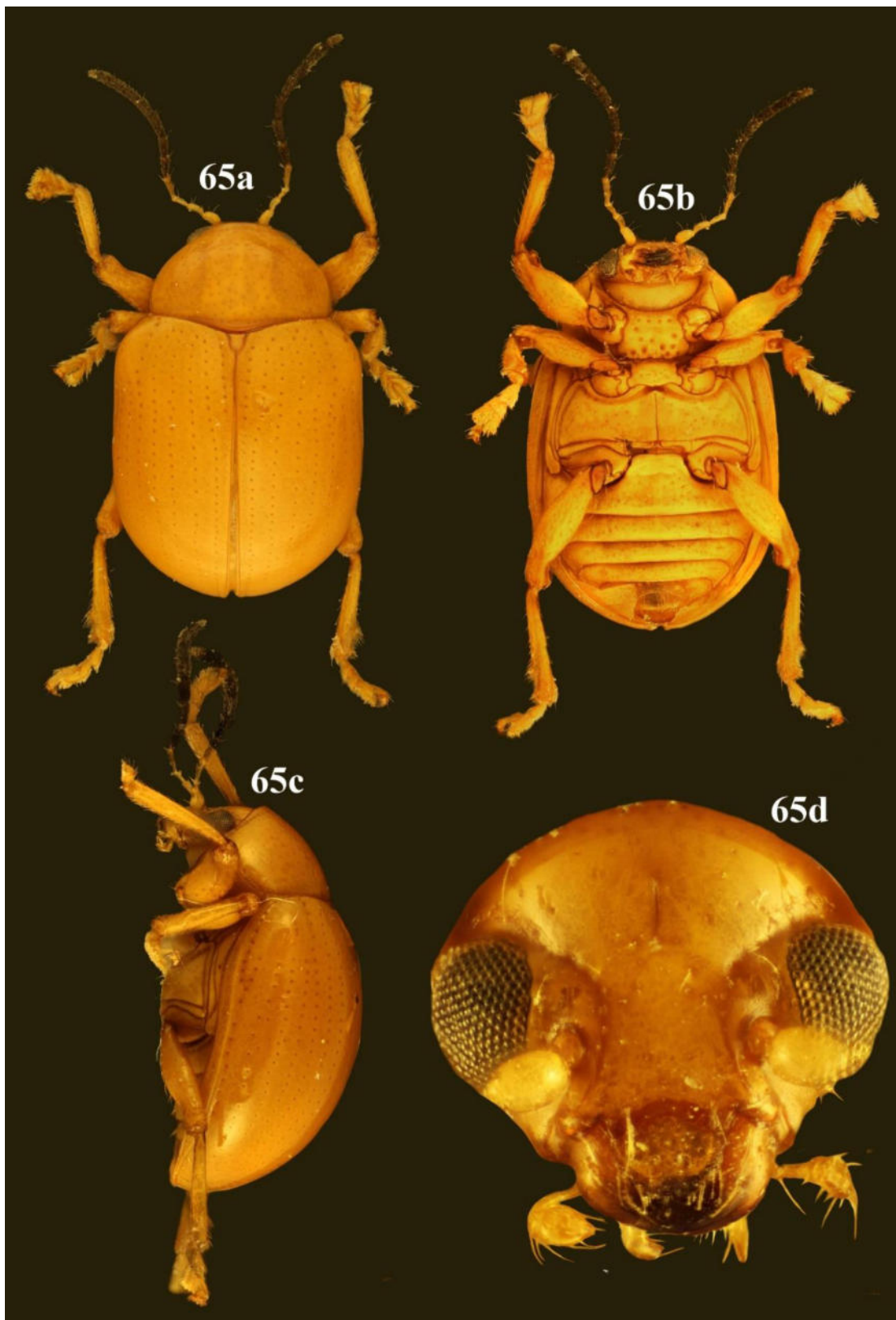
3 ♀ & 2 ♂ “India: Kerala/ Idukki WLS 1100 MSL/ 9^o43’42” N 076^o 57’ 10.2”E/ 27.8.ix.2019/ K D Prathapan Coll.”.

4.2.7.2. *Edistus* sp.1 (Figs. 65a–l)

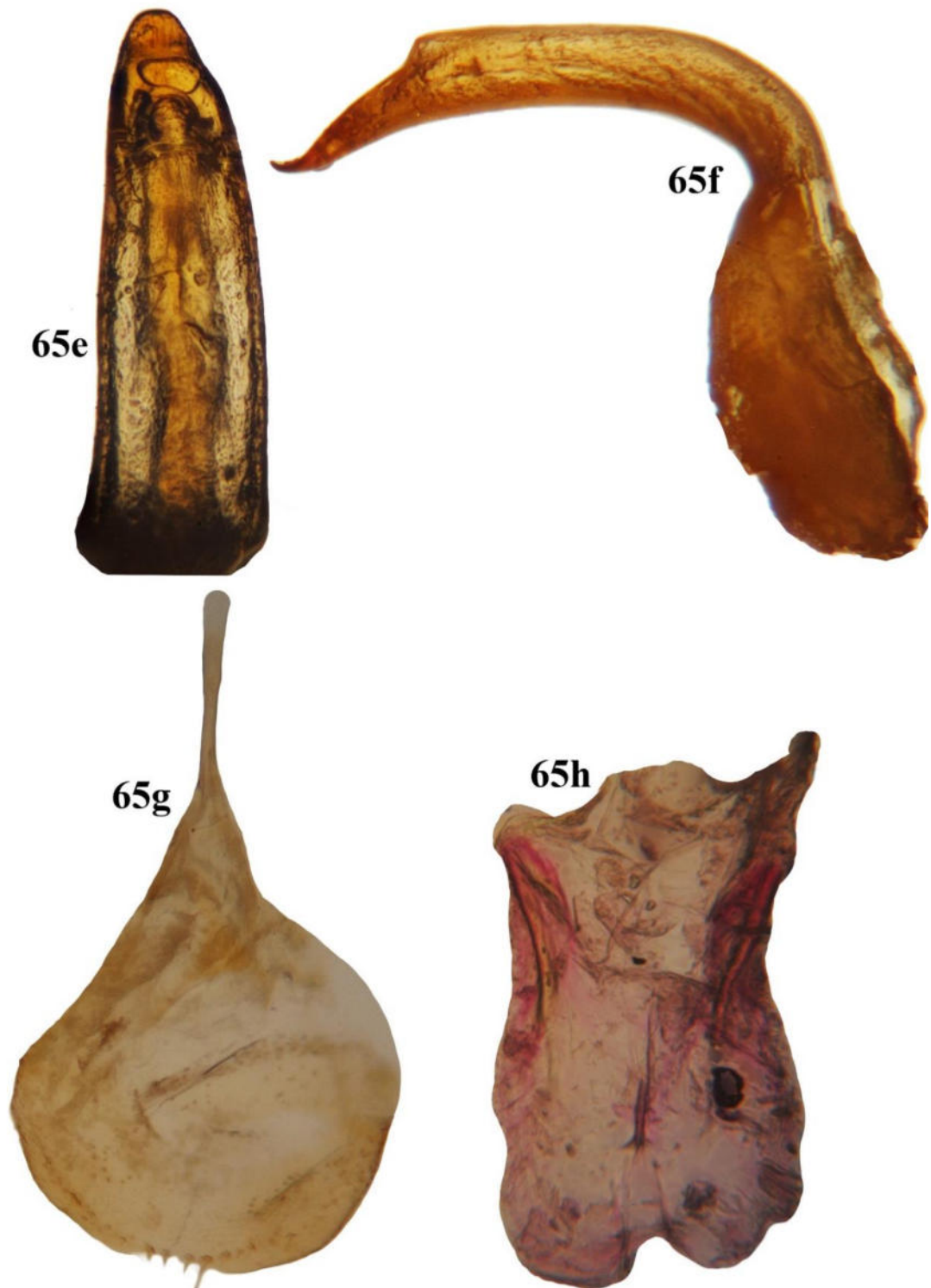
Description

Body length 2.6–3.7 mm, width 1.7–2.2 mm; ovate, general colour bright yellow to light brown except distal six antennomeres and apex of mandibles piceous.

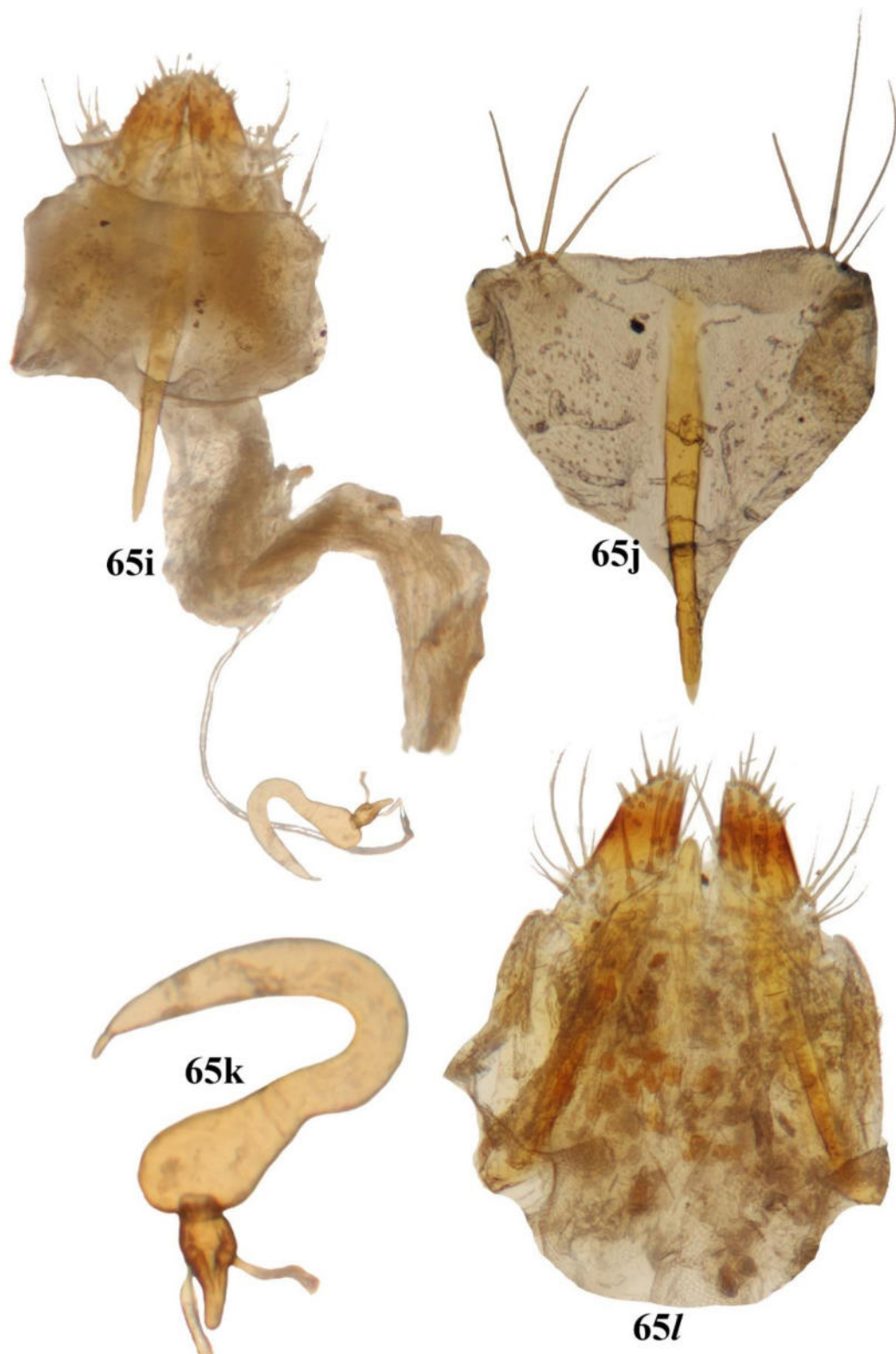
Head remotely punctate; coronal suture distinct; suprafrontal sulcus indistinct; frons and vertex hardly differentiated; supraorbital pore adjacent to dorsal margin of eye with a long seta; antennal calli distinct, curved, widest posteriorly, acutely narrowing anteriorly; clypeus distinct, reduced to narrow curved strip; labrum broader than long, gently deflexed anteriorly with a pair of widely spaced setose punctures preapically, anterolateral corners with three setae each, apex sinuate, apical margin with a row of short setae; mandibles with a few setose punctures laterally, apex bidentate; labial palpi with subequal palpomeres, maxillary palpi with last palpomere longest, middle shorter than basal. Compound eyes lateral, oval, vertical diameter subequal to horizontal; distance between compound eyes 1.9 times transverse diameter of eye, 1.7 times distance between antennal sockets; maximum width of head almost 3.5 times transverse diameter of eye, 1.8 times distance between compound eyes, 3.1 times distance between



Figures 65a–d: *Edistus* sp.1, habitus: **65a.** Dorsal view, **65b.** Ventral view, **65c.** Lateral view, **65d.** Head, frontal view.



Figures 65e–h. Male genitalia of *Edistus* sp.1: **65e.** Aedeagus, dorsal view, **65f.** Aedeagus, lateral view. **65g.** Spiculum gastrale, spiculum relictum and 8th tergite, **65h.** Tegmen.



Figures 65i–l. Female genitalia of *Edistus* sp.1. **65i.** Ventral view, **65j.** 8th sternite with tignum, **65k.** Spermatheca, **65l.** Ovipositor.

antennal sockets; antenna subfiliform, moderately long, first antennomere thick, slightly longer than second, 3 and 4 thinner than second, rest widened. Proportionate length of antennomeres I to XI 1 : 0.85 : 0.75 : 1.5 : 1.25 : 1.15 : 1.15 : 1 : 1 : 1 : 1.45.

Pronotum 1.5 times broader than long, posteriorly 1.5 times broader than anteriorly; moderately punctate with small and minute punctures, minutely setose; lateral margins evenly curved; anterior margin straight, posterior margin lobed, posterior margin extends beyond lateral margins; anterior sulcus and antibasal sulcus distinct, weaker medially; **scutellum** longer than broad with a sclerotized triangular impression within, narrowly rounded posteriorly, without setae or punctures.

Elytra 1.1–1.4 times longer than broad, regularly punctate, finely setose, punctuation in apical quarter confused, alternate rows with minute setose punctures; scutellar striae hardly reaching middle of elytra, more than three times longer than scutellum; post basally with 10 striae including scutellar row and one short and broken row near lateral margin, eight rows of punctures near middle; humeral calli prominent with a few minute punctures; basal calli, post basal depression weak; apex rounded; **epipleura** outwardly oblique with a few minute punctures, widest basally, converging posteriorly, hardly reaching apex.

Proepisternum concave anteriorly, without setae or punctures; hypomeron with a few minute punctures, depressed, weakly punctured, microsculptured posteriorly.

Prosternum with bold punctures, as broad as long medially, posteriorly with longer punctures with fine setae; mesosternum broader than long, posterior margin trilobed, metasternum sparingly punctate with fine setae.

Ventrites finely setose, variable in length, first ventrite longer than following two combined, last ventrite longer than second, apex of last ventrite gently convex or straight.

Legs long, femora gently dilated, tibiae with rows of setae, weakly carinate, tarsomeres ventrally fringed with variously shaped setae, basitarsomere of fore- and middle legs of males ventrally with capitate setae bordered by pointed setae, metabasitarsomere ventrally with pointed setae only; all basitarsomeres in females with pointed setae, second tarsomere with pointed setae and third bilobed tarsomere with diverse forms of setae such as capitate, clavate, pointed, triangular, arrow-head-shaped etc.

Male Genitalia with aedeagus curved almost at right angle, aedeagus proper longer than basal hood, dorsal and ventral margins almost subparallel, apical fourth narrowed and converge into an acute denticle, gently recurved dorsad, ventral surface almost flat except at base concave, dorsal plate gently convex, feebly converging anteriorly, distinctly narrowed preapically with rounded apex; tegmen distinctly bilobed apically, base encircles aedeagus; spiculum gastrale Y-shaped, median arms longer than lateral; spiculum relictum weakly sclerotized; 8th tergite semicircular with a row of setae apically.

Female genitalia having spermathecal capsule with nib-like proximal part where spermathecal duct and spermathecal gland attached; distal part almost U-shaped with basal area bulged, then narrowed towards apex, apex with an acute denticle; spermathecal gland long, tubular; tignum as long as ovipositor.

Remarks. This new species of *Edistus* can be differentiated easily from the other two described species from the Indian subcontinent. *Edistus indicus* Jacoby and *E. caeruleus* Jacoby are black, head and pronotum are distinctly punctured and both are almost 2 mm long. The new species is longer than the other two (2.6 –3.7 mm long), and head and pronotum are light yellow and weakly punctate.

Distribution. India (Kerala).

Material examined (27 specimens).

11 ♀, 11 ♂ & 4 unsexed "India: Kerala/ Bonacaud: Pandipath/ 8^o41' 1.6" N 077^o 11' 24.0"E/ 9.iv.2017 Amritha Kumari S Coll. / Ex. *Antidesma acidum*". 1 ♂ with same data except host *Mesa arnotiana* and collectors Amritha K S & S R Hiremath.

Host plant. *Antidesma acidum* (Euphorbiaceae).

4.2.8. *Eurypelta* Lefevre, 1885

(Type species. *Eurypelta* (= *Chrysomela*) *modesta* Fabricius, 1792: 323

Eurypelta vittata, (= *Euraspis*) Chapuis, 1874: 318)

Eurypelta Lefevre, 1885: 118 -Jacoby, 1908: 464

Euraspis Chapuis, 1874: 317 (*Euryaspis* misspelled as *Euraspis* as per Lefevre, 1885) (nec. *Euryaspis* Blanchard, 1851)

Generic diagnosis. Body subquadrate-ovate; antenna subfiliform, nearly half as long as body, terminal five antennomeres gently dilated and longer than broad; thorax

transverse, laterally feebly angulate, lateral margins subparallel basally with acute angles; scutellum broader than long; elytra irregularly, strongly and densely punctate with minute setae, elytral base broader than pronotal base; legs unarmed, intermediate and posterior tibiae not emarginated preapically, claws appendiculate; anterior margin of proepisternum convex.

Remarks. *Eurypelta* is closely related to *Heterotrichus* Chapuis. Prosternum grooved at sides for reception of part of antennae in *Heterotrichus*, while no such antennal groove is present in *Eurypelta* and it is concave and gently angulate at sides in *Eurypelta*. Scutellum is subovate in *Heterotrichus* while it is semicircular or subquadrate in *Eurypelta*.

Two species are so far known from India, and both occur in south India.

4.2.8.1. *Eurypelta modesta* (Fabricius, 1792) (Figs. 66a–n)

Chrysomela modesta, Fabricius, 1792: 323.

Eurypelta vittata Chapuis, 1874: 318; Duvivier, 1892: 414.

Eurypelta modesta (Fabricius, 1792); Daccordi, 1976: 594; Duvivier, 1891: xli; Medvedev, 2018: 251.

Description

Body length 6.1–7.3 mm, breadth 3.5–4.2 mm; robust and oblong, metallic green with purple and golden longitudinal bands or spots; **head** with central greenish or cupreous band, purplish band on either side and margin greenish cupreous; mouth parts dark brown except palpi yellow brown; **elytra** metallic green with alternate bands of purple, golden and green colours; like coloured bands merges on the apical third; **pronotum** with four longitudinal purplish bands and three golden or green bands. Entire margins and angles green. **Venter** metallic blue or green; pleurites brown to black; **antenna** with first joint dark brown or black, second and third yellow or yellow brown, rest black brown. Terminal dilated joints sometimes metallic blue. Clypeus black. Legs with femur metallic blue green, rest dark brown.

Head coarsely and shallowly punctate, gently rugose; coronal sulcus indistinct; suprafrontal sulcus weak, frons hardly differentiated from vertex, **frons** almost triangular, bears setose punctures, anteriorly sloping; **clypeus** sinuate anteriorly; labrum wider than long with a pair of widely spaced setose punctures in middle, apex

emarginated with a row of setae; **mandibles** robust, bidentate, with a number of setae laterally; **vertex** strongly and rugosely punctate; **antennal calli** oblique, raised, subquadrate; **compound eyes** lateral, globular, convex, mesal margin distinctly emarginate; interocular space 1.4–1.5 times interantennal space, maximum width of head 1.7–1.8 times distance between compound eyes, 2.6 times distance between antennal sockets. **Antenna** subfiliform, first antennomere large and globular, second thinner than first, 3–6 thin, 4–6 subequal, antennomeres 7–10 distinctly dilated distally, longer than broad, proportionate length of antennomeres I to XI equals 1 : 0.6 : 1.1 : 0.7 : 1.1 : 0.8 : 1.3 : 1.2 : 1.2 : 1.2 : 1.4.

Pronotum 1.4–1.5 times broader than long, anterior margin concave, posterior margin distinctly lobed, lateral margins distinct, anterolateral angle obtusely angulate, entire pronotal disc uniformly and deeply punctured, interspaces between punctures less than diameter of a puncture; punctures with very short setae, difficult to notice, setae near lateral margins comparatively longer; **scutellum** punctate, almost semicircular or subquadrate.

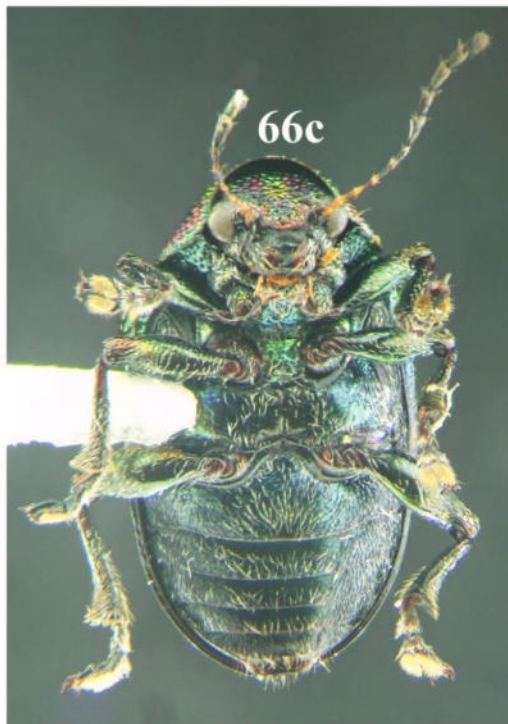
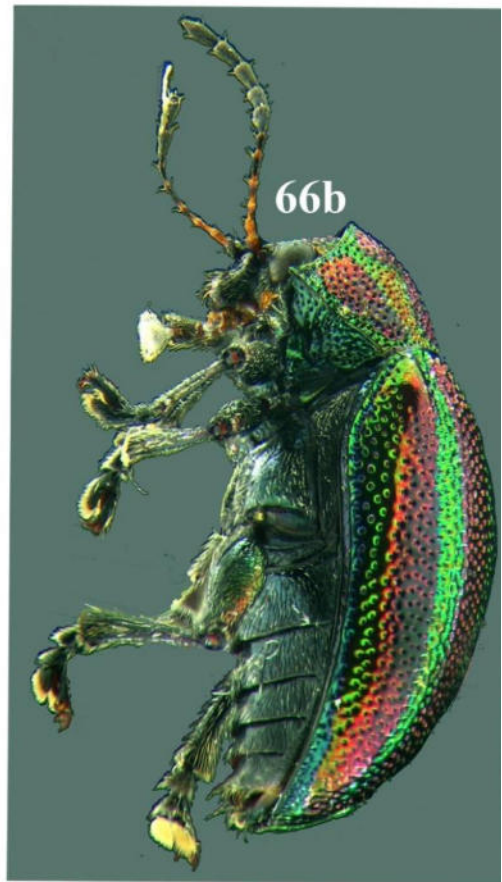
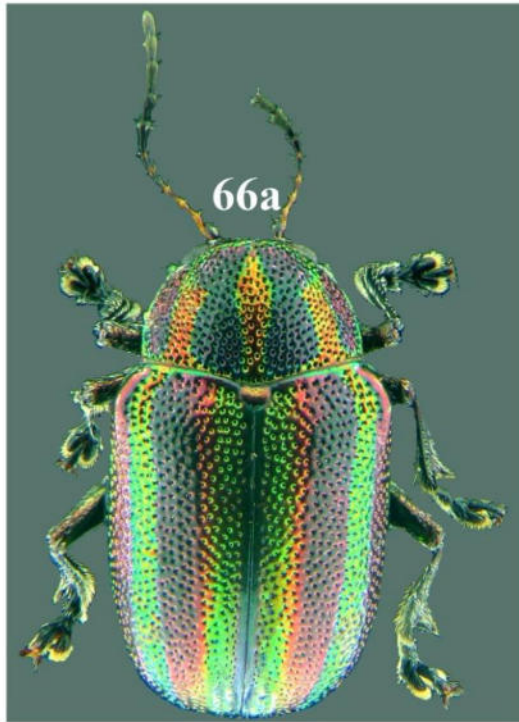
Elytra. 1.3–1.4 times longer than broad, subcylindrical, deeply, uniformly and sharply punctate, with short setae longer towards apex, laterally with obsolete transverse rugosities, elytra distinctly margined, apex rounded, humeral calli prominent and impunctate, epipleura sparsely punctate.

Venter lustrous, pubescent; prosternum distinct with setose punctures, slightly constricted in middle and medially angulate, posteriorly wider than anteriorly. Proepisternum pubescent; hypomeron punctate, setose.

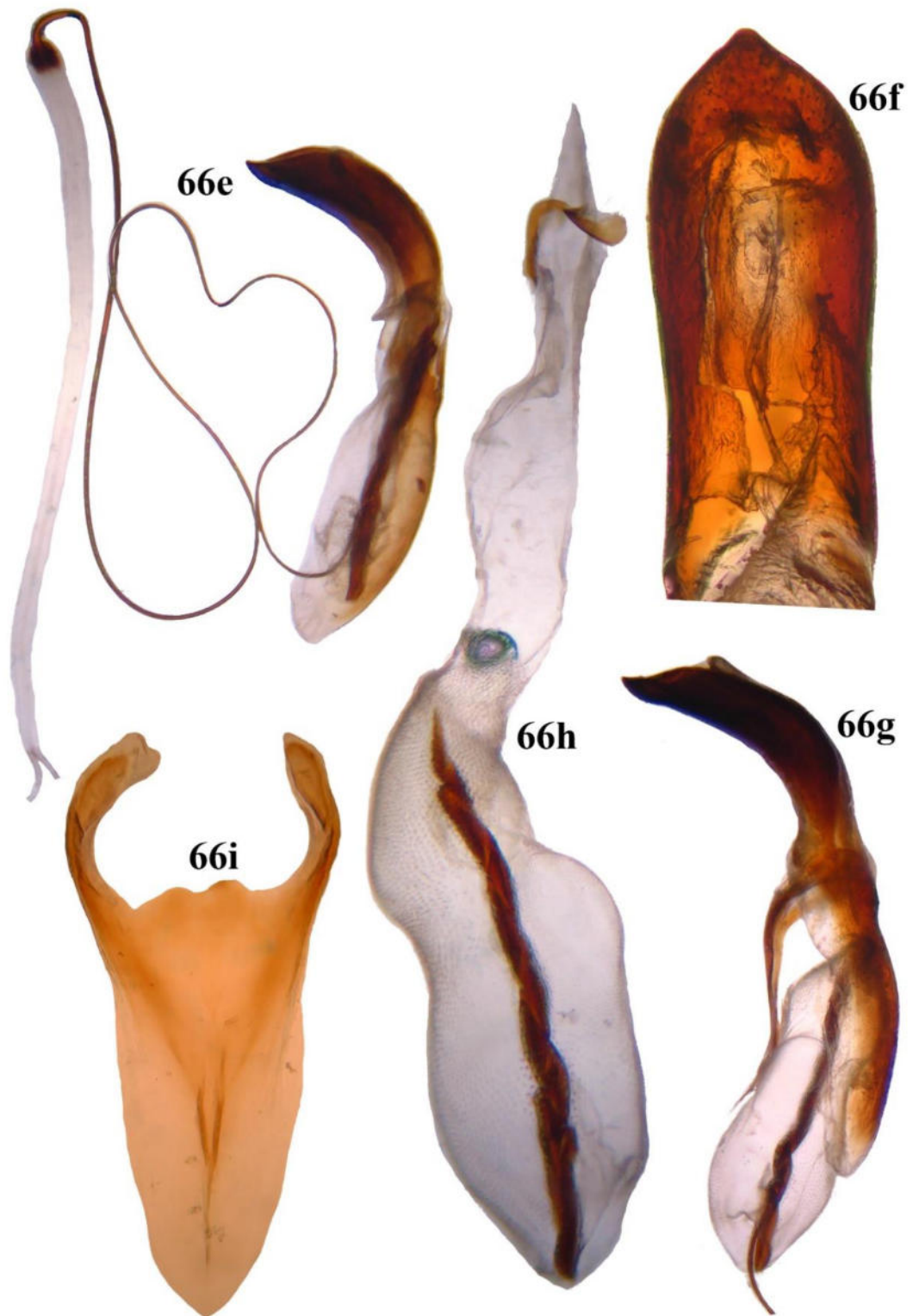
Legs long, pubescent; **femur** stout, long; **tibiae** longitudinally sulcate, with rows of setae, intermediate and posterior tibiae not emarginated at apex, **tarsomeres** strongly pubescent ventrally.

First ventrite longer than following two combined medially, last ventrite distally emarginated or almost chordate. Pygidium with a distinct, broad, longitudinal groove and numerous sensillae within it.

Male genitalia with aedeagus in dorsal view with lateral margins concave in basal half and convex in distal half, converging anteriorly, apex subacute. In lateral view, basal hood longer than aedeagus proper, distinctly curved; ventral surface with a distinct



Figures 66a–d: *Eurypelta modesta*, habitus: **66a.** Dorsal view, **66b.** Lateral view, **66c.** Ventral view, **66d.** Head, frontal view.



Figures 66e–i. Male genitalia of *Eurypelta modesta*: **66e.** Male genitalia, **66f.** Aedeagus, dorsal view, **66g.** Aedeagus, lateral view, **66h.** Endophallus, **66i.** Tegmen.



Figures 66j–n. Female genitalia of *Eurypelta modesta*. **66j.** Ventral view, **66k.** Fused 8th sternite and 8th tergite with tignum., **66l.** Ovipositor, **66m–n.** Spermatheca

longitudinal depression medially; **tegmen** proximally with two thin curved tines encircling base of aedeagus proper through membranous connections, distal area broad basally, converging posteriorly. Lateral ejaculatory ducts lead to spindle shaped translucent 'ejaculatory sac' from where very long median ejaculatory duct arises, connected to a rod shaped sclerite embedded inside endophallus.

Endophallus with three distinct regions; basal phallomere, medium phallomere and apical phallomere; basal phallomere short, followed by curved paired central sclerite, apical phallomere longer than median phallomere (basal phallomere and median phallomere neither turgid nor shape not properly visible).

Female genitalia having spermathecal capsule with an acutely pointed base where spermathecal duct attached, distinctly curved post medially where spermathecal gland attached, again narrowed, apex widest, distinctly subglobular; spermathecal gland short, tubular; spermathecal duct long, distinctly sclerotized; vagina short; bursa copulatrix indistinct; median oviduct long; 8th sternite and 8th tergite joined laterally into a membraneous tube with longitudinal sclerotizations; ovipositor long; shorter than tignum; coxite long with a few short setae; stylus setose.

Remarks. *Eurypelta modesta* is very closely similar to *E. splendida* Medvedev, 2018. Elytra is with a narrow longitudinal costa in *E. splendida*, also with other colour and form of aedeagus and spermatheca compared to *E. modesta*. In *E. modesta*, dorsum is mostly with alternate golden and purple or green stripes and the longitudinal costa on elytra is lacking. However, on comparing the male and female genitalia of *E. modesta* with the genitalia illustrations of *E. splendida*, it appears that they are only variants and both the species are likely to be synonyms. However, this can be confirmed only after studying the type specimens of both the species.

Distribution. India (Bengal, Karnataka, Odisha)

Material examined.

4 ♀, 5 ♂ & 3 unsexed "India:Odisha/Bhubaneswar/OUAT Campus/22.vi.2018/Prathapan K D Coll./ Ex. *Ixora*".

Host plants. *Ixora* spp. (Rubiaceae).

4.2.9. *Fidia* Motschulsky, 1861 (= *Lypesthes* Baly, 1863)

(Type species: *Fidia atra* Motschulsky, 1861: 22 (not *Fidia atra* Jacoby, 1882)).

Fidia Motschulsky 1861: 22 (Strother *et al.* 2007 referred to International Commission on Zoological Nomenclature (ICZN) for suppression); ICZN (2009) rejected Strother *et al.* 2007 and reaffirmed priority.

Lypestes Baly, 1863: 152 (Type species *Fidia atra* Motschulsky, 1861); Chapuis 1874: 273; Gemminger & Harold 1874: 3376 (catalog); Lefevr, 1885: 74; Jacoby 1908: 395, 412; Clavareau 1914: 76 (catalog); Chen 1935: 370–371; 1940: 491; Chujo 1938: 30; Chujo 1956: 88, 101; Ohno 1958: 178; Gressitt & Kimoto 1961: 198, 269; Chujo & Kimoto 1961: 145; Kimoto 1964: 256; Kimoto & Gressitt 1982: 73; Seeno & Wilcox 1982: 62 (checklist); Kimoto 2005: 34; Moseyko & Sprecher-Uebersax 2010: 624.

Endoxus Baly, 1861: 285 (misspelling).

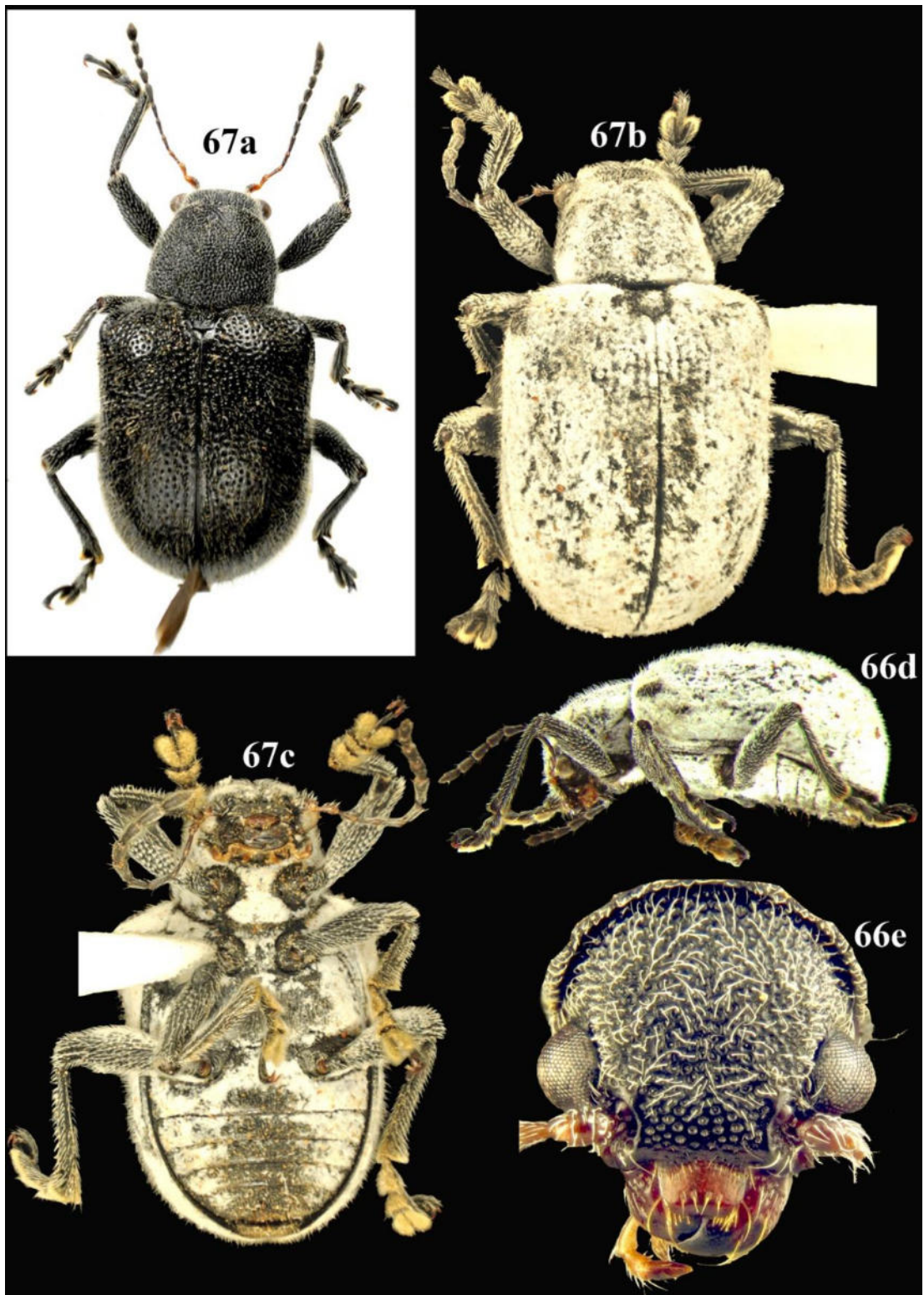
Leptotes Baly, 1863: 158. (Type species *Adoxus gracilicornis* Baly, 1861: 285); 1878: 250; Chapuis 1874: 273; Lefevre 1885: 80; Jacoby 1885: 203; 1908: 396, 425–426; Chen 1935: 370–371 (Synonymized with *Lypestes* Baly, 1863).

Talmonus Fairmaire, 1889: 71 (Type species *Talmonus farinosus* Fairmaire, 1889) (*Fidia atra* Motschulsky, 1861; Jacoby 1890: 115 (Synonymised with *Lypestes* Baly, 1863).

Lypesthinia Pic, 1939: 32 (valid subgenus) [Type species: *Lypesthinia multidentata* Pic, 1939: 32]; Seeno & Wilcox 1982: 62 (checklist).

Generic diagnosis. Body oblong, adorned with setae and or scales. Frons merges with vertex, hardly differentiated. Antenna filiform, longer than half of body, longer than body in some cases. Second antennomere usually shorter than first, longer than half of it, shorter than next three or four. Compound eyes lateral, hemispherical, feebly or not emarginate near antennal sockets. Antennal calli absent. Pronotum longer than wide or subquadrate, narrower than elytra, lateral margins incomplete, foremargin of lateral arms of pronotum (“propleuron”) straight. Pygidium with or without elytral locking groove. Legs long, slender, all femora slightly thickened and toothed beneath, all tibiae longitudinally sulcate with rows of setae, mid- and hind tibiae not emarginate at apex, with short stout paired spines on apex. Claws bifid.

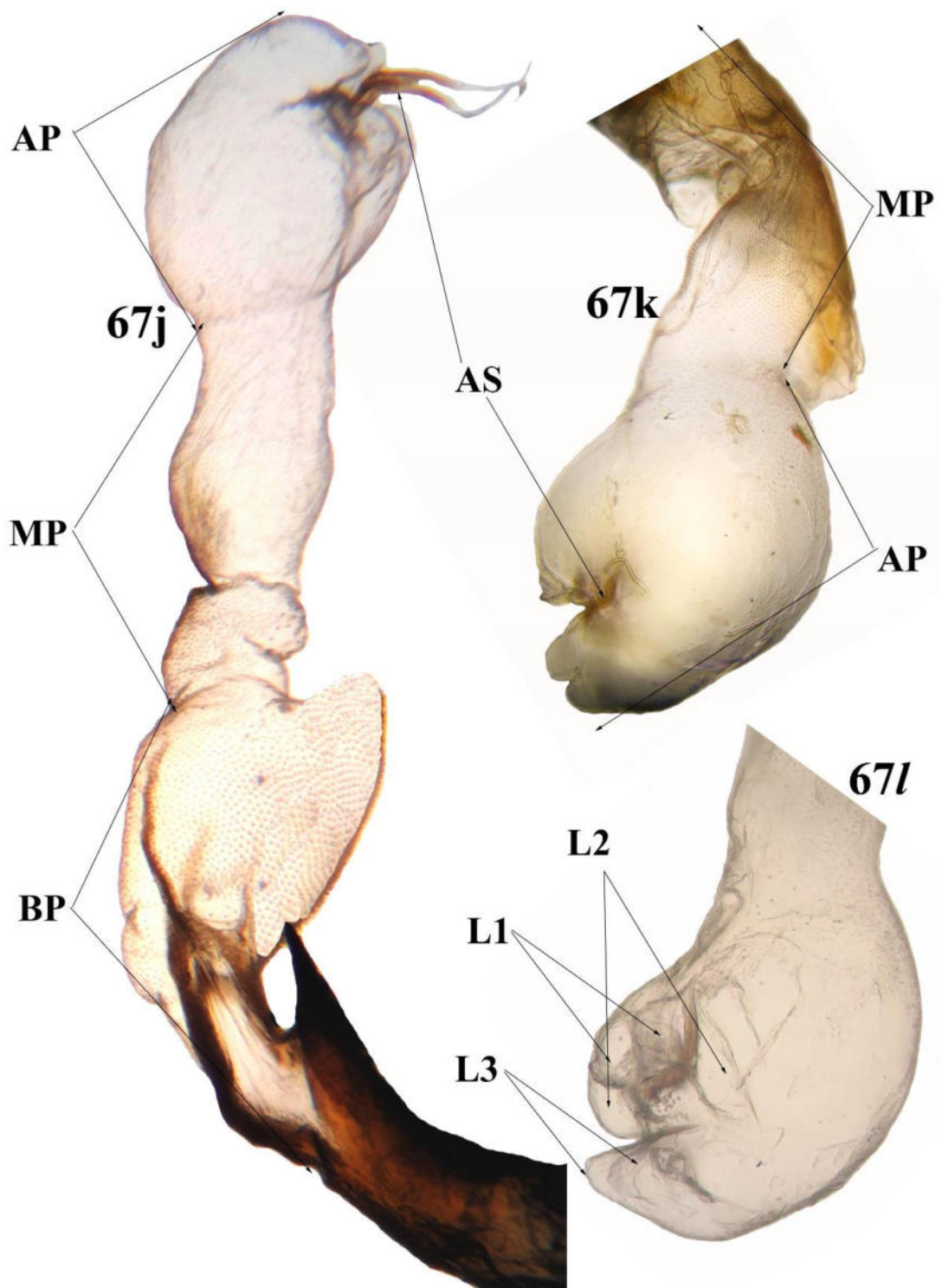
Remarks. The Old World genus *Fidia* can be separated from the closely related New World genus *Neofidia* by the presence of a tooth on the ventral side of all femora (absent in *Neofidia*). Another character mentioned by Strother & Staines (2008), the absence of



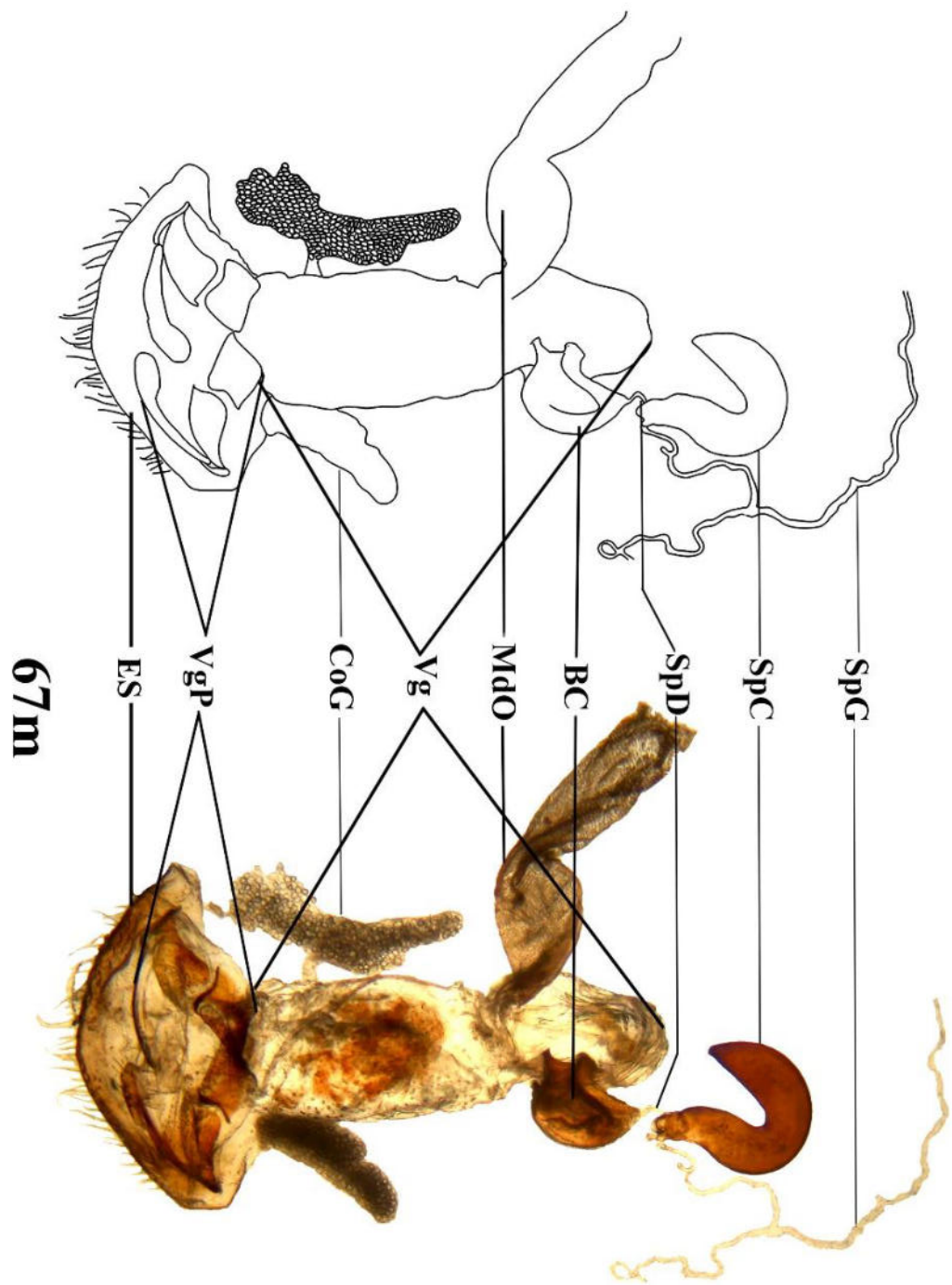
Figures 67a–e: *Fidia kanaraensis*, habitus: **67a–b.** Dorsal view, **67a.** Without encrustation, **67b.** With encrustation, **67c.** Ventral view, **67d.** Lateral view, **67e.** Head, frontal view.



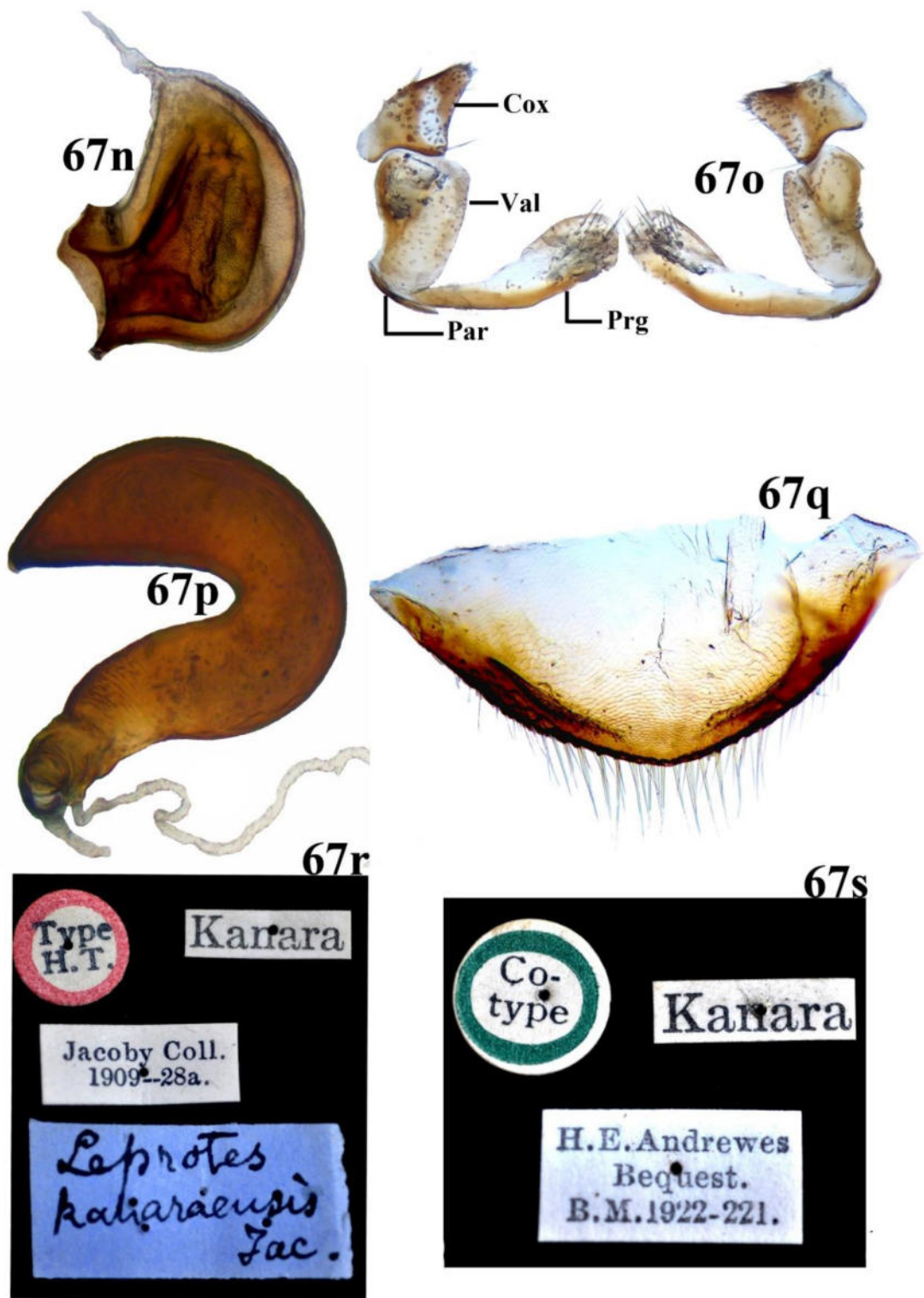
Figs 67f–i. Male genitalia of *Fidia kanaraensis*. **67f.** Aedeagus, dorsal view. **67g.** Aedeagus, lateral view. **67h.** Tergite VIII, sternite VIII & IX. **67i.** Tegmen.



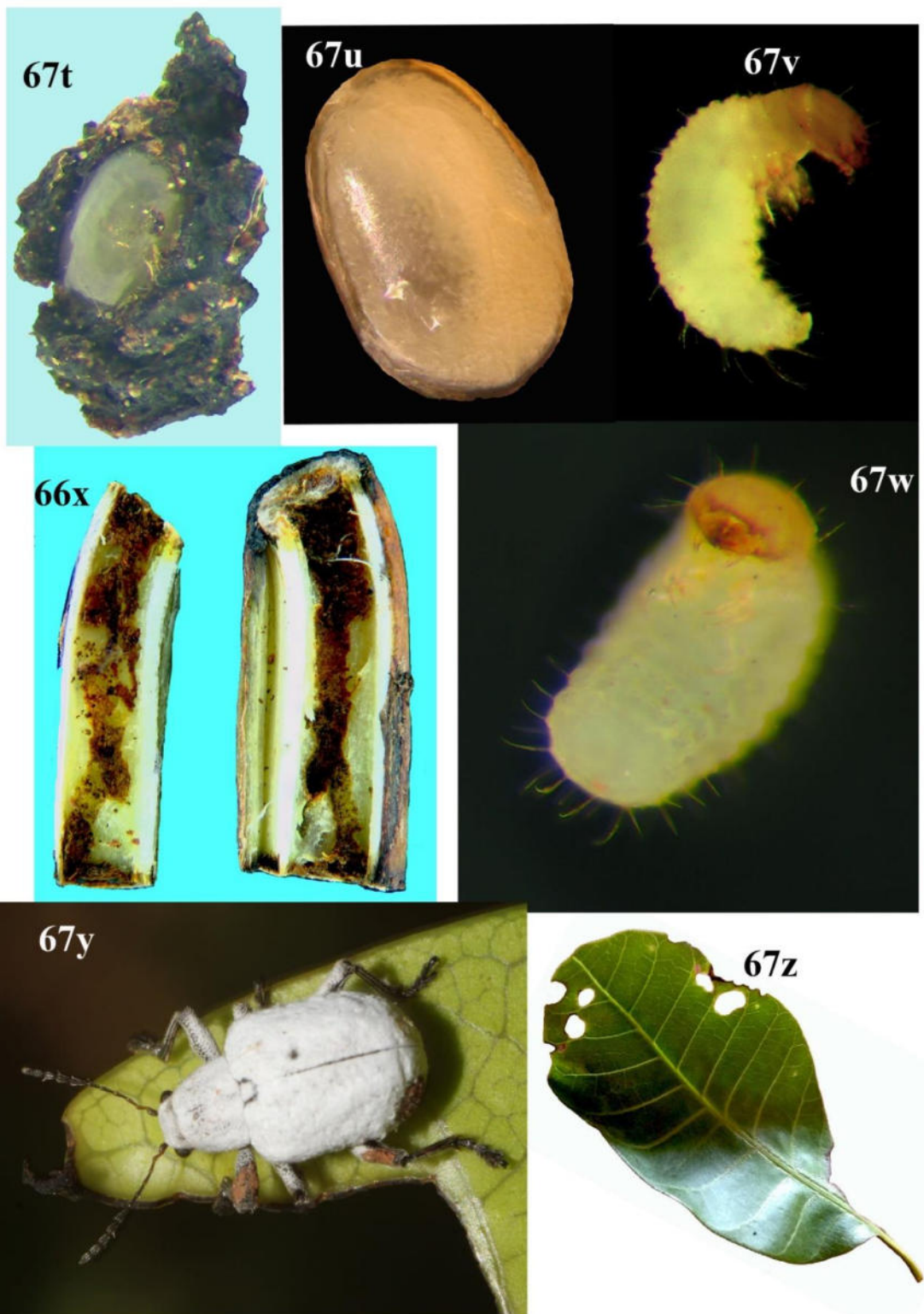
Figures 67j–l. Endophallus of *Fidia kanaraensis*, lateral view. **67j.** Endophallus, everted through apical opening or ostium. **67k.** Endophallus, everted through basal opening. **67l.** Apical phallomere with three pairs of lobes. Abbreviations: L 1 = First pair of lobes, L 2 = Second pair of lobes, L 3 = Third pair of lobes, AS = Apical sclerite.



67m. Female genitalia of *Fidia kanaraensis* along with line diagram. Abbreviations. SpG = Spermathecal gland, SpC = Spermathecal capsule, SpD = Spermathecal duct, MdO = Median oviduct, BC = Bursa copulatrix, Vg = Vagina, CoG = Collateral gland, Ovi = Ovipositor, ET = Eighth tergite



Figures 67n–s. Close up of parts of female genitalia of *Fidia kanaraensis*. **67n.** Bursa copulatrix. **67o.** Ovipositor. **67p.** Spermatheca. **67q.** Eighth tergite. **67r.** Holotype labels. **67s.** Paratype labels. Abbreviations. Cox = Coxite, Val = Valvifer, Par = Paraproct, Prg = Proctiger



Figures 67t–z: Biology and ecology of *Fidia kanaraensis*. **67t.** Eggs covered with excreta. **67u.** Naked eggs. **67v.** First instar grub, lateral view. **67w** First instar grub, ventral view. **67x.** Damage on mango root-bits. **67y.** Adult beetle on mango leaves, **67z.** Damage on cashew leaves

paired apical spurs on the apex of foretibia, cannot be used for separating these genera as spurs are present in some species of *Fidia*, at times being small and poorly visible. The Old World genus *Fidia* belongs to a comparatively large genus-group of the tribe Adoxini, including the genera with bifid claws, straight fore margin of lateral arms of pronotum ("propleura"), simple intercoxal mesothoracic process and tooth on underside of each femur. It is poorly delimited from the genus *Hyperaxis* Gemminger & Harold, 1874, having a difference in longer pronotum, narrower hind femora with smaller tooth and smaller eyes.

Of the 34 species of *Fidia*, only *F. kanaraensis* occurs in south India (Kumari *et al.*, 2020).

4.2.9.1. *Fidia kanaraensis* (Jacoby, 1895) (Figs. 67a–z)

Leptotes kanaraensis Jacoby, 1895: 270; Jacoby 1908: 426; Clavareau 1914: 76 (catalog).

Description. Refer Kumari *et al.*, 2020

Distribution. India (Bengal, "southern Bombay", Karnataka, Kerala).

Host plants & Biology. Refer Kumari *et al.*, 2020

4.2.10. *Heteraspis* Chevrolat, 1836

(Type species: *Scelodonta curculionoides* Westwood, 1837 from Philippines)

Scelodonta Westwood, 1837: 129; Baly, 1867: 155; Chapuis, 1874: 266; Lefevre, 1877: 159; 1885: 67; Jacoby, 1908: 382; Chen, 1935: 327; 1940: 489; Chujo, 1956: 76; Gressitt & Kimoto, 1961: 242; Kimoto, 1964: 251; Selman, 1972: 67; Kimoto & Gressitt, 1982: 5; Warchalowski, 2010: 406.

Heteraspis Chevrolat, 1837 in Dejean's Catalogue: 437 (Type species: *Eumolpus vittatus* Olivier, 1808); Jacoby, 1898: 186; Monros & Bechyne, 1956: 1126. (*nec* Leconte, 1859)

Odontionopa Motschulsky, 1866 (*nec* Erichson, 1842, *nec* Chevrolat, 1837): 408

Scelodontomorpha Pic, 1938: 26

Generic diagnosis. Body oblong ovate, moderately pubescent, anterior margin of proepisternum concave, orbital sulcus distinct and deep but narrow, antennal calli well developed, prosternum broad, epipleura distinct, lateral margins of pronotum obsolete,

legs elongate, femur dilated and toothed beneath, intermediate and posterior tibiae gently emarginate preapically, claws bifid.

Remarks. *Heteraspis* is closely related to *Scelolanka* Medvedev. Lateral margins of pronotum are distinct in *Heteraspis* (obsolete in *Scelolanka*). Body densely pubescent in *Scelolanka* (sparsely pubescent in *Heteraspis*). Prosternum broad and distinct in *Heteraspis* (much narrower in *Scelolanka*). All femora are armed in *Heteraspis* (unarmed in *Scelolanka*). In *Heteraspis*, legs are concolorous with dorsum (often dorsum and legs are differently colored in *Scelolanka*). Epipleura absent in the *Scelolanka* but distinct in *Heteraspis*. *Heteraspis* is very similar in appearance to *Pseudocolaspis* Laporte, 1833, from which it can be readily distinguished by the distinct and deep supraocular grooves.

The genus is represented by more than 75 described species, of which four occur in south India.

Key to select species of *Heteraspis* of south India

- Elytral punctures irregular, with thick and long setae, frons and vertex weakly differentiated, 4.0–4.2 mm long, spermatheca with apex acutely pointed and innerside V-shaped..... *H. dillwyni*
- Elytral punctures semiregular, interstices setose, setae short and thin, frons and vertex distinctly differentiated, 4.5–5.0 mm long, spermatheca with apex blunt and innerside U-shaped.....*H. immaculata*

4.2.10.1. *Heteraspis dillwyni* (Stephens, 1831) (Figs. 68a–l)

Scelodonta dillwyni (Stephens, 1831: 364) (= *Eumolpus*); Kimoto & Takizawa, 1973: 176; Kimoto, 2001: 30; Kimoto, 2005: 36

Scelodonta coomani Pic, 1926: 145

Scelodonta indica Duvivier, 1891: xxxix

Scelodonta nitidula Baly, 1864: 2

Scelodonta strigicollis Motschulsky, 1866: 409; (*Odontionopa strigicollis* Motschulsky, 1866); Medvedev, 2006 (synonymy)

Description

Body length 4.0–4.2 mm, width 2.2–2.3 mm; oblong ovate and lustrous, color greenish cupreous; elytra with four purplish spots, one medially on basal area, second near lateral

margin just below humeral prominence, third almost in middle of elytra, fourth post medially near lateral margin before apical third; entire body covered with white or cream colored adpressed setae more or less flat and pointed at apex except eyes, labrum and mandibles.

Head inserted, strongly punctate; coronal suture distinct, long, indicated by a longitudinal depression in middle of vertex; posterior area of vertex with no or a few setae with elongate punctures giving rugose appearance; suprafrontal sulcus weak but distinct, frons and vertex hardly differentiated; antennal calli distinct, almost square shaped; supraorbital pore located near dorsal margin of eye, distinct, round and raised; orbital sulcus distinct and deep; orbit well developed; frons with a distinct depression anteriorly; clypeus distinct, narrow, curved, black, with a row of long erect setae. Compound eyes gently sinuate, hemispherical, circumocular sulcus with a row of setae, distance between compound eyes 2.4 times distance between antennal sockets, maximum width of head 1.3 times distance between compound eyes, 3.2 times distance between antennal sockets. **Antenna** subfiliform, short, not reaching middle of elytra; first five antennomeres greenish cupreous, remaining aeneous, first antennomere thicker and longer than second, III–VI thin, rest progressively widened, proportionate length of antennomeres I–XI as follows: 1 : 0.57 : 0.87 : 0.6 : 0.7 : 0.6 : 0.77 : 0.73 : 0.73 : 0.67 : 0.9.

Pronotum 1.2–1.3 times broader than long, convex, transversely rugose, anterior margin straight, posterior margin gently lobed medially, lateral margins weak, posterolateral callosity gently projects laterally; **scutellum** broader than long, pentagonal in outline, with bold setose punctures medially.

Elytra 1.3–1.4 times longer than wide, oblong, narrowing towards apex; irregularly, densely and strongly punctate, distance between punctures less than diameter of a puncture; with curved adpressed setae all over; interstice strigose near lateral margin; humeral calli prominent with setae and punctures; basal calli less prominent; post basal depression weak; apex rounded; **epipleura** distinct, widest basally, gradually narrowing post medially, hardly reaching elytral apex.

Prosternum subquadrate, gently longer than broad, with bold punctures and setae. Mesosternum broader than long, punctate, pubescent, all margins straight except posterior distinctly notched.

Proepisternum concave, depressed anteriorly with setae, hypomeron merged with lateral margin of pronotum.

Legs long, femora toothed beneath, pro- and metafemora dilated medially, intermediate femora flask shaped; intermediate and posterior tibiae weakly emarginated preapically, with single short spur apically; tibiae longitudinally carinate with row of setae between carinae.

Ventrites finely pubescent, I ventrite medially longer than following two combined, III and IV subequal, V longer than II, III and IV separately.

Male genitalia.

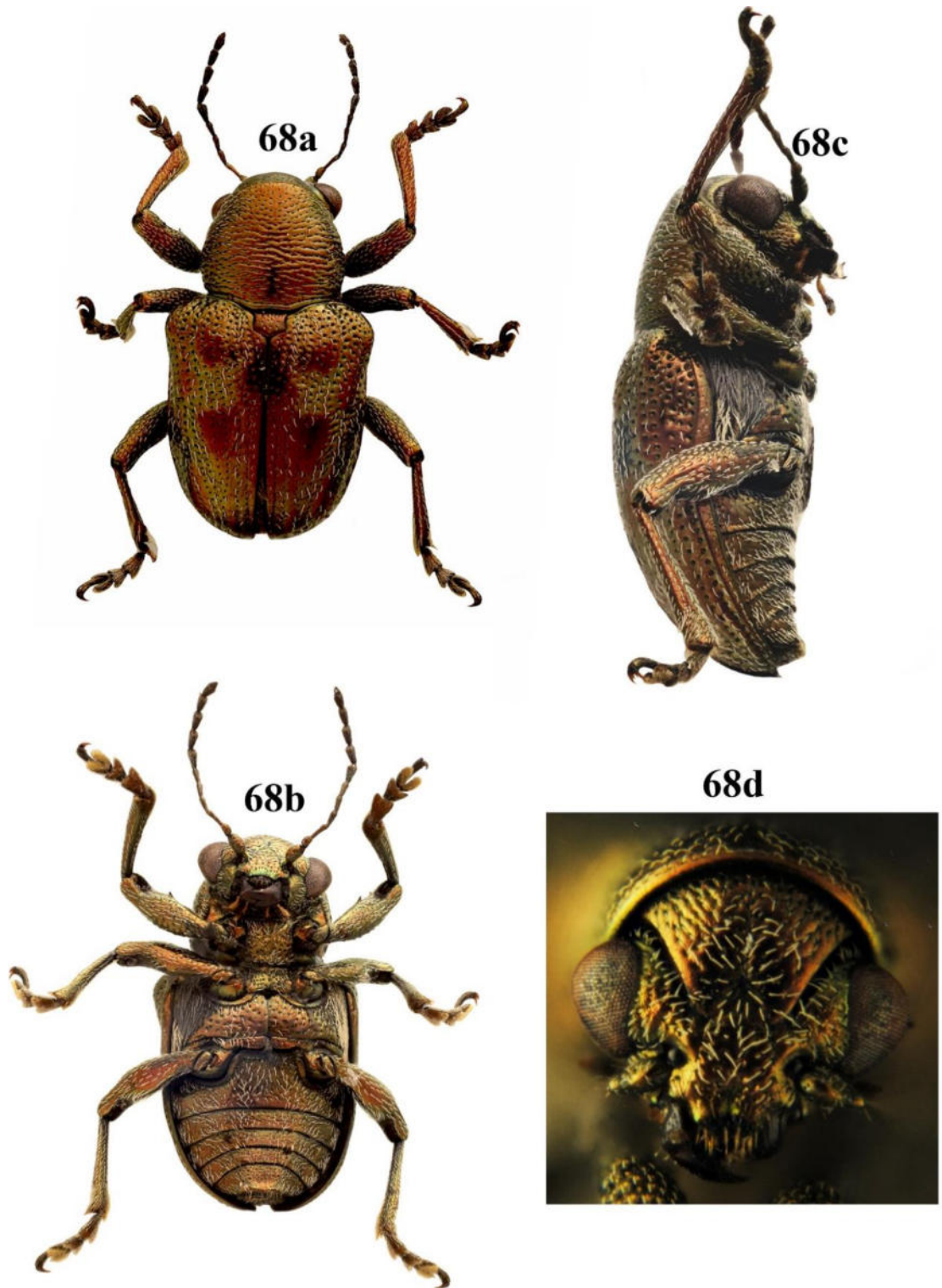
In lateral view, aedeagus proper arc like, apex narrowed into a denticle, recurved dorsally; ventral surface concave; dorsal surface with lateral margins gently converging anteriorly, apical opening wide, apical third strongly narrowed with subacute apex, with a triangular depression preapically; **spiculum gastrale** Y-shaped with short lateral arms, median arm almost thrice longer than lateral arms; **spiculum relictum** distinct, Y-shaped, less sclerotized; **tegmen** distinctly bilobed anteriorly, gently bisinuate laterally.

Female genitalia.

Spermathecal capsule 'question mark'- shaped, divisible into two distinct regions: very short knob like proximal part where spermathecal duct and spermathecal gland duct attached, distal sickle-like area with proximally broad and distally narrowed distal part ending in a subacute denticle; spermathecal duct very long; spermathecal gland short and tubular; ovipositor longer than vagina, 8th tergite and 8th sternite joined laterally forming a membraneous tube gently sclerotized, tignum shorter than ovipositor.

Distribution. Afganistan, Borneo, Cambodia, China, England (accidentally introduced), Hainan, Java, Laos, Myanmar, Nepal, Philippines, Singapore, Sumatra, Thailand, Vietnam.

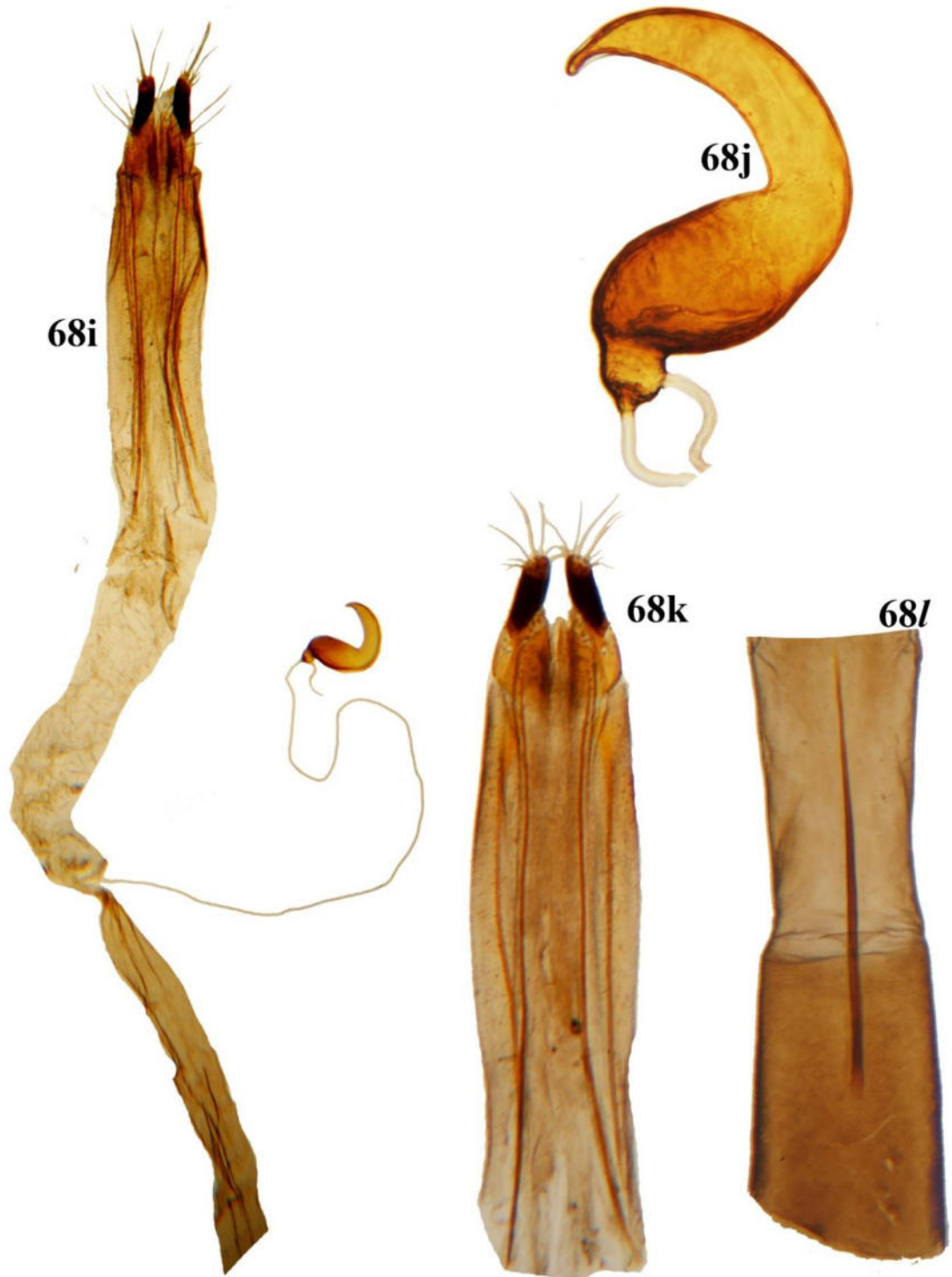
Remarks. *Heteraspis dillwyni* (length 4.0–4.2 mm, width 2.2–2.3 mm) is smaller in size than *H. immaculata* (length 4.5–4.7 mm, width 2.6–2.7). Supra frontal sulcus weak



Figures 68a–d: *Heteraspis dillwyni*, habitus: 68a. Dorsal view, 68b. Ventral view, 68c. Lateral view, 68d. Head, frontal view.



Figures 68e–h. Male genitalia of *Heteraspis dillwyni*. **68e.** Aedeagus, dorsal view. **68f.** Aedeagus, lateral view, **68g.** Spiculum gastrale, spiculum relictum and 8th tergite. **68h.** Tegmen.



Figures 68i–l. Female genitalia of *Heteraspis dillwyni*. **68i.** Ventral view, **68j.** Spermatheca **68k.** Ovipositor, **68l.** Fused 8th sternite and 8th tergite with tignum.

in *H. dillwyni* (very distinct in *H. immaculata*). Elytra longitudinally costate laterally in *H. immaculata* (no costae in *H. dillwyni*) Claws distinctly bifid in *H. dillwyni* (*H. immaculata* with claws nearly appendiculate or intermediate between bifid and appendiculate). Femora weakly dentate in *H. dillwyni* while strongly dentate in *H. immaculata*.

Material examined.

2♂, 2♀ & 29 unsexed “India: Kerala/Sasthamangalam/14.iii.2017/Amritha Kumari S Coll./ Ex. Grape vine”. 10 unsexed “India: Kerala/ Kallar/ 8°42’43”N 77°07’47.3”/Amritha Kumari S Coll./ Ex. *Cissus glauca*” 7 unsexed “India: south Andaman/ Wimberly Gunj/3.v.2019/ Shameem Coll./ Ex. *Leea* sp.”

Host plants: *Vitis vinifera*, *Leea indica*, *Cissus glauca* (All Vitaceae)

4.2.10.2. *Heteraspis immaculata* (Jacoby, 1908) (Figs. 69a–h)

Scelodonta immaculata Jacoby, 1908: 387.

Description

Body length 4.5–4.7 mm, width 2.6–2.7 mm; oblong, elongate, stout; color metallic cupreous or purple except mouth parts, antennae, prosternum, mesosternum, part of metasternum and part of legs aeneous; entire body punctate, interspaces granulose with very short and fine silvery setae.

Head with shallow punctures, bolder anteriorly; coronal sulcus distinct, indicated by a longitudinal depression in middle of vertex; suprafrontal sulcus well developed; frons and vertex distinctly differentiated; orbital pore near dorsal margin of eye, round and bears a short seta; orbital sulcus very deep, broad, forming a well developed groove; orbit well developed with setae and punctures, widest at inner margin of eye near antennal calli, extends around eye; antennal calli distinct, oblique, posteriorly narrowed. Clypeus less distinct; labrum broader than long, with a pair of widely spaced setae preapically, and a few setae on apex, apex sinuate, mandibles bidentate at apex, labial palpi with last palpomere slightly longer than preceding two separately which are subequal, maxillary palpi with last palpomere longest, subequal to I palpomere, II palpomere shorter than other two. **Compound eyes** lateral, hemispherical, gently emarginate at its inner angle, vertical diameter of eye 1.2 times transverse diameter, distance between compound eyes 1.7 times transverse diameter of eye and two times

distance between antennal sockets. **Antenna** short, hardly extending upto 1/4th of elytra, I antennomere slightly curved and thick, longer than II, II thicker than III to VI, III antennomere longer than IV to VI separately, subequal, remaining antennomeres gradually broadened at apex, VII to X subequal, VIII to X transversely dilated.

Pronotum 1.25 times broader than long, posteriorly 1.15 times wider than anteriorly, anterior margins almost straight, posterior margin gently curved medially, lateral margins weak but distinct, anterolateral callosity prominent with short setae, posterolateral callosity weak; pronotal disc convex, strongly punctate, transversely rugose, sides rounded, gently converging anteriorly.

Elytra oblong, 1.25 times longer than broad, strongly punctate, longitudinally costate near lateral areas; punctures stronger, transversely elongate towards lateral areas, interstices raised forming a reticulate sculpture, respective costae or striae from either side joined near apex; humeral calli prominent with strong punctures, basal calli less prominent, post basal depression weak, sutural angle subacute, apex rounded.

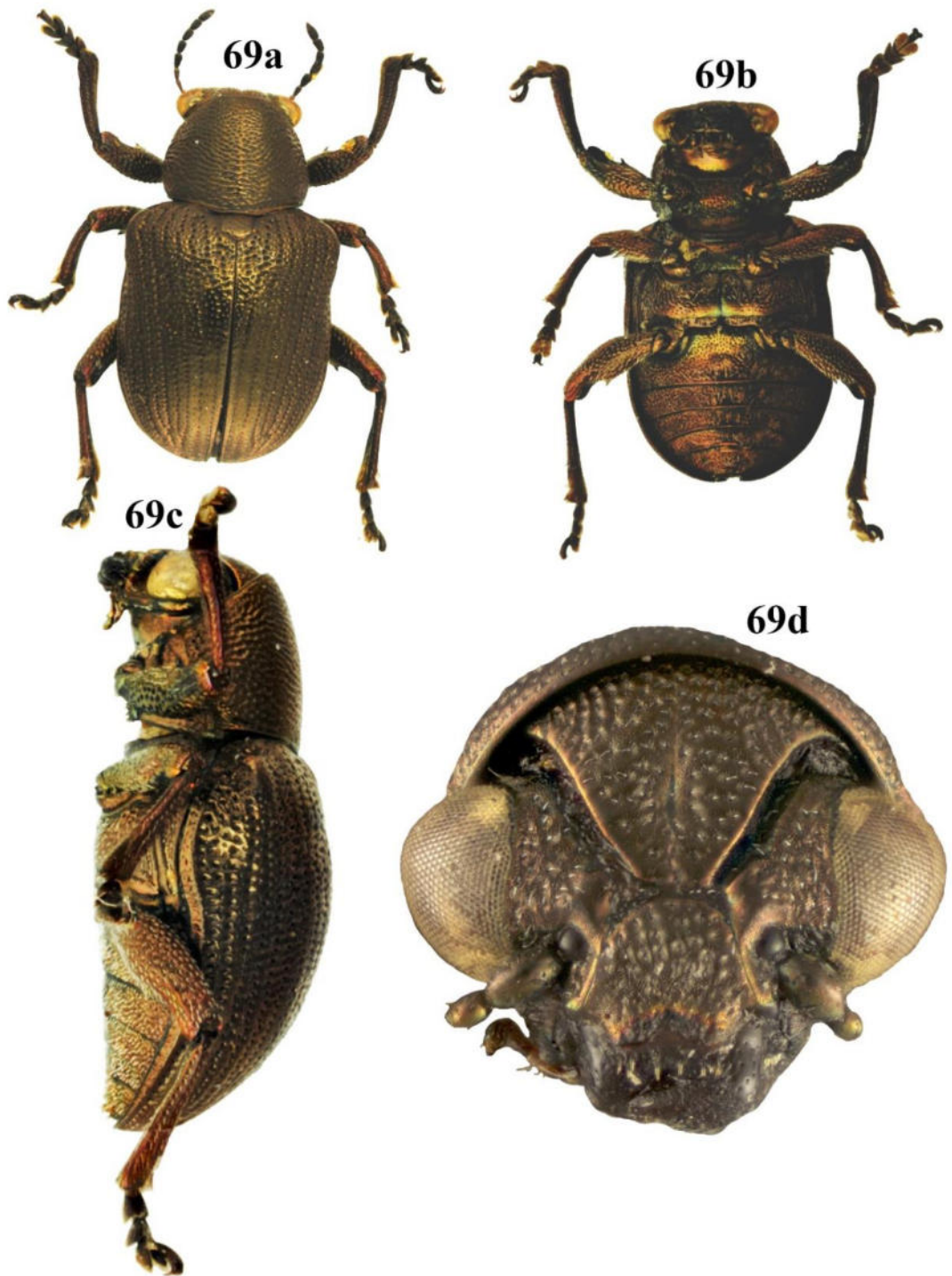
Proepisternum with a few setose punctures anteriorly, **hypomeron** coarsely punctate with setae having a transversely rugose appearance.

Prosternum distinct, as broad as long, closely punctate with shallow setose punctures, mesosternum much broader than long with similar setae and punctures.

Legs long, femora dilated and toothed beneath beyond middle, tibiae longitudinally costate, all legs with paired short spurs at apex, claws appendiculate or intermediate between bifid and appendiculate.

Ventrites strongly punctate, pubescent, I ventrite slightly longer than following ventrites combined, II to IV each shorter than preceding, V subequal to II; apex of last ventrite gently emarginate, dentate with a row of small triangular tooth and long fine setae.

Female genitalia. Spermathecal capsule with a knob like proximal area where spermathecal gland and duct attached; distal area almost U-shaped; proximal area very short, semicircular, distal area widest basally with a sharp bent medially, strongly narrowing towards apex with a subacute tip. Vagina short, bursa copulatrix indistinct, median oviduct much longer than vagina, eighth tergite and eighth sternite fused laterally to form a gently sclerotized membranous tube, ovipositor as long as tignum.



Figures 69a–d: *Heteraspis immaculata*, habitus: **69a.** Dorsal view, **69b.** Ventral view, **69c.** Lateral view, **69d.** Head, frontal view.



Figures 69e–h. Female genitalia of *Heteraspis immaculata*. **69e.** Ventral view, **69f.** Spermatheca. **69g.** Fused 8th sternite and 8th tergite with tignum, **69h.** Ovipositor.

Remarks. *Heteraspis immaculata* is similar to *Heteraspis granulosa* (Baly). However, the former is longer than the latter. *Heteraspis granulosa* with two short ridges basally between humerus and suture, a long and more distinct ridge near lateral margins and another near apex short and feeble; at the middle some of these ridges and also those at the base are marked with dark purplish narrow spots, some ill-defined longitudinal depressions are also visible below base and at the sides. These ridges, depressions and spots are absent in *H. immaculata*.

Distribution. India (Kerala, Karnataka).

Material examined.

2♀ “India : Karnataka / Attigere / Somanakkadu estate / 13°05'46.58”N 75°28'58.49”E / 2.x.2017 641 m / Amritha Kumari S Coll. / Ex. *Leea indica*”. 1♀ India: Kerala/Peruvannamuzhy/ 22.iv.2002/Prathapan K D”.

Host. *Leea indica* (Burm.f.) Merr. (Vitaceae).

4.2.11. *Macrocoma* Chapuis, 1874

(Type species. *Macrocoma eriophora* Chapuis, 1874 from Africa

Macrocoma Chapuis, 1874: 292; 1885: 87; Weise, 1903: 356; Gruev, 1984: 199; Selman, 1963: 638; Jolivet, (vol.51) : 128; Selman, 1972: 78

Adoxinia Reitter, 1889: 128 (Type species *Adoxinia spinipes* Reitter, 1889)

Eubraxis Baly, 1878: 248 (Type species *Eubraxis cylindrica* (Kust.), 1846, (S. Europe))

nec Eubraxis Dejean, 1837

nec Eubraxis Burgeon, 1940

Ischyromus Jakobson, 1893: 241 type species *Pseudocolaspis sarvadensis* Solsky, 1881

Generic diagnosis. Body metallic, densely setose, oblong; proepisternum concave; femora dilated, with a ventral tooth, midtibia shorter than fore and hind tibiae, intermediate and posterior tibiae not emarginated preapically, claws bifid; pronotum subglobular, as long as broad, lateral margins absent, widest near middle, narrowing anteriorly; pygidium covered by elytra; antenna short with transversely dilated terminal joints; orbital sulcus weak, first ventrite exceptionally long, longer than following ventrites combined; elytra with prominent humeral calli, setae arranged in rows.

Remarks. *Macrocoma* Chapuis is closely related to *Pseudocolaspis* Laporte and *Tanybria* Selman. More than half of pygidium is exposed in *Pseudocolaspis*, while in *Tanybria* and *Macrocoma*, pygidium is entirely covered by elytra. *Pseudocolaspis* and *Macrocoma* are densely pubescent, however, *Tanybria* is glabrous. Fore- and midtibiae are almost equal in *Tanybria*, while in *Pseudocolaspis* and *Macrocoma*, midtibia is shorter than foretibia. In *Tanybria*, anterior and posterior margins of pronotum are almost equal, however, pronotum is anteriorly narrowed in the other two genera.

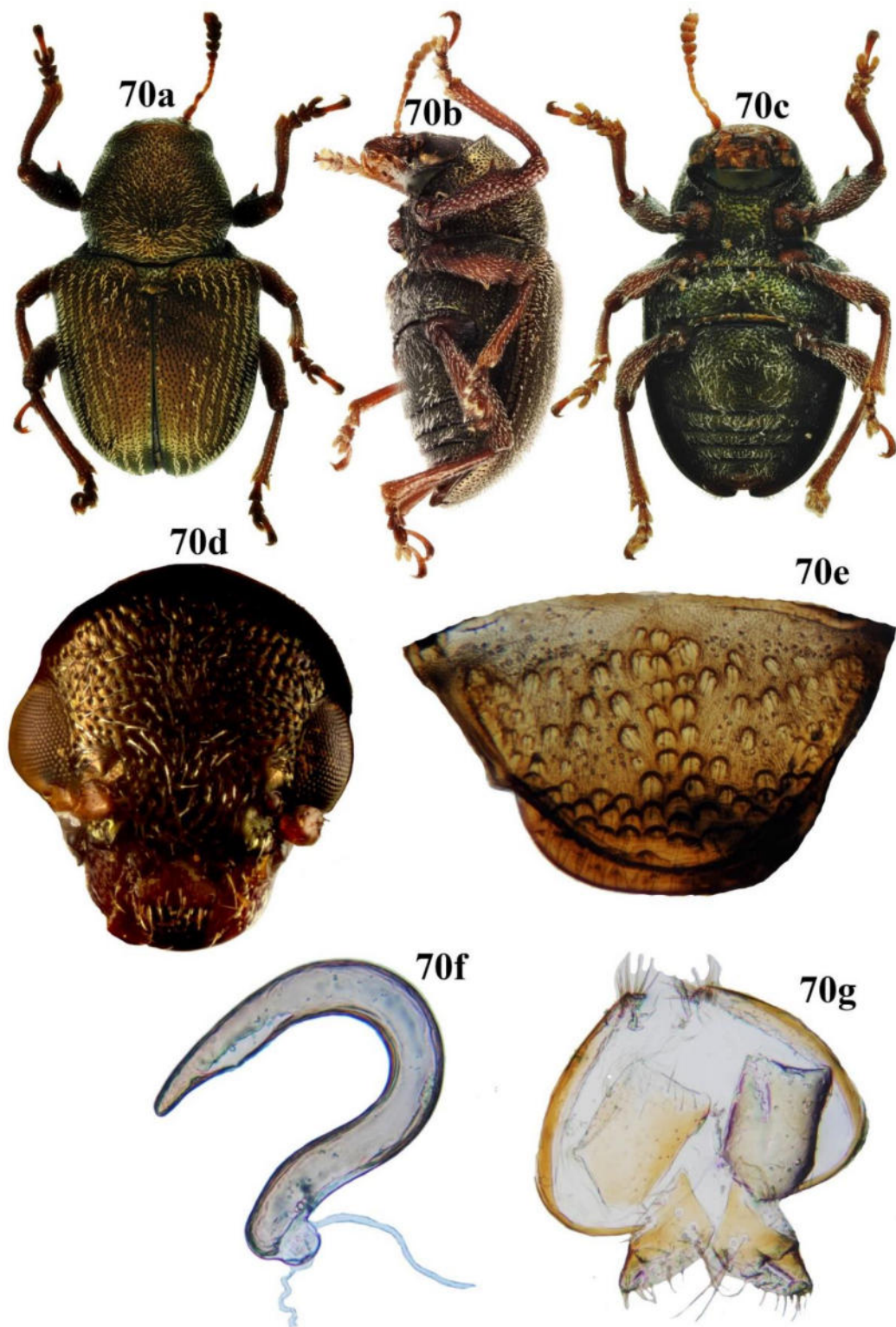
Only two species are known from south India.

4.2.11.1. *Macrocoma* sp. 1 (Figs. 70a–g)

Description

Body length 3.0–3.1 mm, width 2.0–2.1 mm; dark metallic aeneous, except antennae, legs, clypeus, mouth parts, apex of last ventrite and pygidium red brown; body punctate, clothed with silvery setae.

Head closely punctured with fine adpressed setae, interstices appear rugose; coronal suture weak; suprafrontal sulcus indistinct, frons and vertex undifferentiated, frons depressed anteriorly; clypeus reduced, semicircularly emarginate anteriorly; **labrum** broader than long, setose, apical margin with a row of setae discontinuous medially, apex sinuate; **maxillary palpi** with last palpomere longest, preceding two subequal; **labial palpi** with last palpomere almost two times as long as penultimate. **Compound eyes** lateral, oval, vertical diameter of eye 1.25 times transverse diameter, distance between compound eyes two times transverse diameter of eye, 1.5 times distance between antennal sockets; maximum width of head 3.2 times transverse diameter of eye, 1.6 times distance between compound eyes, 2.3 times distance between antennal sockets; orbital sulcus weak; supraorbital pore adjacent to dorsal margin of eye. **Antenna** short with transversely dilated terminal joints, reaching up to base of pronotum, first antennomere thick, longer than second, second antennomere thicker and longer than following 4 antennomeres separately almost subequal and thin, antennomeres 7 to 11 transversely dilated, 7–10 subequal; **antennal calli** distinct, raised, smooth and oblique, ventrally acutely narrowed. Proportionate length of antennomeres I to XI equals 1 : 0.85 : 0.55 : 0.5 : 0.45 : 0.5 : 0.6 : 0.65 : 0.6 : 0.6 : 1.



Figures 70a–g: *Macrocoma* sp.1: a–d. Habitus: 70a. Dorsal view, 70b. Lateral view, 70c. Ventral view, 69d. Head, frontal view. 70e. Last ventrite, 70f. Spermatheca, 70g. Ovipositor

Pronotum 1.1 times broader than long, posteriorly 1.2 – 1.3 times broader than anteriorly, almost subglobular, densely punctate with fine adpressed setae, punctures broader than those on head, interstices slightly raised with a weakly rugose appearance, maximum width at posterior half, narrowing towards anterior, anterior margin straight; posterior margin weakly lobed, straight medially, weakly concave on either side; laterally rounded without margins; **scutellum** broader than long, punctate, with adpressed setae, posterior margin tricuspidate, lateral sides slightly concave.

Elytra 1.15 times longer than broad, maximum width postmedially near humeral calli narrowing towards posterior, base of elytra distinctly wider than pronotal base; elytra closely punctate, punctures confused; setae short, suberect, arranged in distinctly spaced rows; humeral calli with a prominent; basal calli and post basal depression weak, elytral apex weakly rounded, apex almost covers pygidium; **epipleura** arise post basally, outwardly oblique with setae and punctures, postmedially narrowing towards apex.

Prosternum slightly longer than broad with bold punctures, clothed with fine adpressed setae, mesosternum much broader than long, with bold punctures and setae.

Ventrites finely punctate, pubescent with large round and convex sensillae over its surface, second and fifth ventrites subequal and separately longer than third and fourth subequal.

Legs long, femora dilated post medially and toothed ventrally, midfemora shorter with comparatively shorter tooth; tibiae longitudinally carinate, midtibia shorter, hind tibia with short paired apical spurs.

Female genitalia with spermathecal capsule U-shaped, spermathecal duct and spermathecal gland duct attached at proximal semicircular short knob like region, distally deeply curved, almost uniform in width up to apical third, thence narrowed with subacute apex. Spermathecal duct gently coiled, spermathecal gland tubular; ovipositor short, with partially reduced structures.

Remarks. This species is very similar to *Macrocoma orientalis* Jacoby. According to the original description, pronotum is as long as broad and legs fulvous in *Macrocoma orientalis* while pronotum is wider than long and legs piceous in *Macrocoma* sp. 1.

However, it is likely that *Macrocoma* sp. 1 is *M. orientalis*, which can be ascertained only through study of the concerned type

Distribution. India (Karnataka), Myanmar.

Material examined (1 specimen)

1 ♀ “India: Karnataka/Chikkamangalore/Bisileghat/10.v.2011/sweepnet/ Yeshwant H M.”

4.2.12. *Malegia* Lefevre, 1883

(Type species: *Malegia letourneuxi* Lefevre, from Egypt)

Malegia Lefevre, 1883: 65; 1885: 73; Gressitt & Kimoto, 1961: 266.

Generic diagnosis. Body oblong, densely clothed with adpressed scale like setae, anterior margin of proepisternum concave, ocular sulcus weak, antenna short, pronotum almost as broad as long or gently broader than long, lateral margins obsolete, base of elytra broader than pronotum, prosternum much narrower, legs moderately long; femur weakly dilated, without ventral tooth; intermediate and posterior tibiae emarginated preapically with paired spurs at apex; claws bifid.

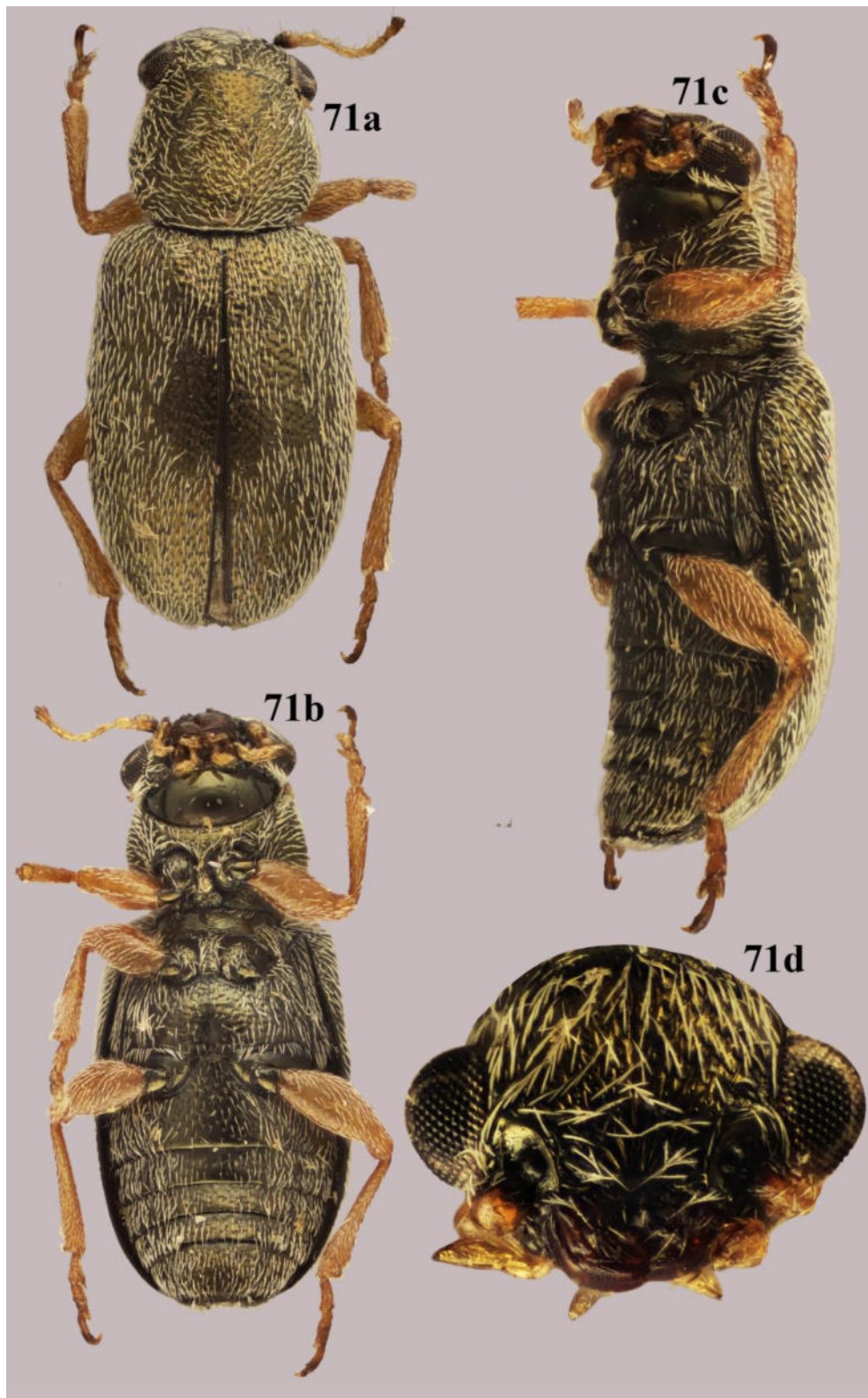
Remarks. *Malegia* is closely related to *Damelia* Clark, however, antenna is shorter than that in *Malegia*. Moreover, elytra and prosternum are tuberculate in *Damelia*, while the same are smooth in *Malegia*. This is the first report of the genus to India.

4.2.12.1. *Malegia* sp.1 (Figs. 71a–h)

Description

Body length 2.3 mm, width 1.0 mm; oblong, entirely piceous except antennae, legs, palpi yellow, labrum, mandibles red brown, entire body covered with cream colored short adpressed scale like setae.

Head closely and boldly punctate, rugose, densely setose; coronal sulcus and suprafrontal sulcus distinct; supraorbital pore adjacent to dorsal margin of eye, distinct, raised and round with a curved thin seta; orbital sulcus weak; vertex almost subquadrate, frons distinctly depressed anteriorly; clypeus reduced; labrum broader than long with a pair of widely spaced setose punctures preapically, anterolateral corners with three setae each, apical margin distinctly sinuate; mandibles bidentate, apex blunt, with a few setae laterally; maxillary and labial palpi with last palpomere



Figures 71a–d: *Malegia* sp.1, habitus: **71a.** Dorsal view, **71b.** Ventral view, **71c.** Lateral view, **71d.** Head, frontal view.



Figures 71e–h. Male genitalia of *Malegia* sp.1. **71e.** Aedeagus, dorsal view. **71f.** Aedeagus, lateral view, **71g.** Spiculum gastrale, spiculum relictum and 8th tergite. **71h.** Tegmen.

longest; maxillary palpi with three palpomeres, first longer than middle. Antenna short, hardly extending beyond base of elytra; first antennomere thick, oval, longer and thicker than second; antennomeres III–VI thin. Compound eyes lateral, almost hemispherical, distance between compound eyes less than two times diameter of a compound eye, 1.5 times distance between antennal sockets; maximum width of head more than thrice diameter of compound eye, 1.7 times distance between compound eyes, 2.6 times distance between antennal sockets.

Pronotum almost rounded, gently broader than long, broadest medially, gently narrowing towards both sides; closely and shallowly punctate, densely setose, lateral margins obsolete and merging with hypomeron, anterior and posterior margins curved; scutellum almost square shaped.

Elytra 1.5 times longer than broad, irregularly punctate with closely placed shallow punctures; setae dense, short, adpressed; humeral calli prominent, basal calli and post basal depression weak, apex rounded, epipleura absent.

Proepisternum entirely setose, punctate.

Prosternum much narrower, longer than broad; **mesosternum** longer than broad, broader than prosternum.

Legs. Femur and tibia concolorous with body, rest yellow brown, femur medially dilated without tooth, tibia weakly carinate, intermediate and posterior tibiae weakly emarginated preapically, hind tibia with paired stout tibial spurs apically, probasitarsomere ventrally with capitate setae.

Ventrites setose, first ventrite medially longer than following two combined, ventrites 2–4 each longer than succeeding one, last ventrite longer than second, apex of last ventrite almost straight and broad; **pygidium** exposed with a preapical fovea, without median groove, punctures bold with short setae throughout, interstices microsculptured, gently depressed preapically, apex with rows of setae.

Male genitalia with aedeagus, in lateral view, strongly bent near base of aedeagus proper, apical third sloping, apex with an acute denticle gently recurved dorsad; ventral plate concave, apex transverse, medially projected into an acute denticle, anterolateral angles round. Spiculum gastrale Y-shaped with median arm curved; spiculum relictum weakly sclerotized; 8th tergite with spindle shaped sclerotization on both sides with a

row of setae at apex. Tegmen distinctly lobed apically, lateral margins sinuate, anterior portion divided into two tines, attached at base of aedeagus proper by means of membranous connections.

Remarks. Morphologically similar to *Malegia atritarsis* Pic (from Angola). *M. atritarsis* is darker in colour than *Malegia* sp. 1. Tarsomeres are black in *M. atritarsis* while yellow brown in *Malegia* sp. 1.

Distribution. India (Karnataka).

Material examined. (1 specimen)

1 ♂ “India: Karnataka/ Shidlagatta: Kothanuru/ N 13^o 23.54’ E 077^o 51.77’/ 892 m, 10.vii.2010/Yeswanth, Sweep net”

4.2.13. *Mesocolaspis* Jacoby, 1908

Mesocolaspis Jacoby, 1908: 437

Generic diagnosis. Oblong, densely setose, setae scale like; suprafrontal sulcus distinct; antenna short, with terminal five antennomeres dilated; pronotum slightly broader than long, with distinct serrate lateral margins; elytra wider at base than thorax, irregularly punctate with rows of setae; femora dilated with an acute tooth beneath, intermediate and posterior tibiae not emarginated preapically, claws bifid; prosternum broad, widened posteriorly than anteriorly; anterior margin of proepisternum concave, ovipositor differentiated into four sclerotized plates: coxite, valvifer, paraproct, proctiger.

Remarks. *Mesocolaspis* resembles *Pseudocolaspis* Laporte. Lateral margins of pronotum is absent in *Pseudocolaspis* however, *Mesocolaspis* has distinct and serrate lateral margins of thorax; suprafrontal sulcus very distinct in *Mesocolaspis*, while it is weak in *Pseudocolaspis*.

Mesocolaspis is similar to the African genus *Cheiridella* Jacoby, however, can be separated by the short and thickened terminal antennomeres. *Mesocolaspis* was proposed by Jacoby for a species that was previously placed in *Apolepis* Baly. However, the anterior margin of proepisternum is convex in *Apolepis*, while it is concave in *Mesocolaspis*. Presence of sclerites on the vaginal wall is scarcely reported (Zoia, 2009) and is apparently very rare in Eumolpinae [for instance in *Apolepis* Baly

and in species belonging to the genera *Mesocolaspis* Jacoby, 1908 and *Fidia* Strother, 2020 (= *Lypesthes* Baly, 1863)].

Of the four species of *Mesocolaspis*, three occur in south India.

Key to select species of *Mesocolaspis* of south India

Dark brown to black in color with 2.2 – 2.6 mm length..... *Mesocolaspis nigrita*

Yellow brown to brown color with around 3 mm length..... *Mesocolaspis* sp. n

4.2.13.1. *Mesocolaspis nigrita* Jacoby, 1908 (Figs. 72a–k)

Mesocolaspis nigrita Jacoby, 1908: 438; Clavaraeu, 1914: 109.

Description

Body length 2.2–2.6 mm, width 1.2–1.4 mm, red brown or dark brown.

Head. vertex dark brown or black, broad, gently rugose, irregularly punctate, setose; setae present between punctures, strongly curved and flat above; coronal suture weak but distinct, indistinct rarely; suprafrontal sulcus well marked, frons semicircular or subtriangular, sparsely punctate, anterolateral angle slightly projects laterally; labrum, mandibles, anterior margin of frons red brown; clypeus narrow strip like, emarginate anteriorly; **labrum** with a pair of widely spaced setose punctures medially and a few long setae on its anterolateral angle, apex sinuate; maxillary and labial palpi with last palpomere longest, last palpomere of maxillary palpi flattened and medially grooved on one side; antennal calli weak, subtriangular, gently raised, posteriorly depressed. Antenna red brown, first antennomere thick, second thinner than first, thicker than 3rd; antennomeres 4-6 subequal in length, subglobose or elliptical, rest distally dilated, proportionate length of antennomeres I to XI 1 : 1 : 0.6 : 0.7 : 0.6 : 0.5 : 0.7 : 0.7 : 0.7 : 0.7 : 1.1. Compound eyes lateral, subglobose, gently emarginated at mesal angle; distance between compound eyes two times distance between antennal sockets, maximum width of head 1.5 times distance between compound eyes and three times distance between antennal sockets.

Pronotum 1.3 times broader than long, punctate, brown or black, mostly black in males, punctures stronger than those on head and elytra, setae present between punctures, lateral margins distinctly dentate, indistinct anteriorly, converging anteriorly, anterior margins gently curved, posterior margin straight.

Elytra 1.3 – 1.4 times broader than long, dark brown, punctate striate, setose, indistinctly costate; setae strongly curved, flat above, deciduous, arranged in rows between striae; elytral base wider than base of pronotum; humeral calli distinct, setose; elytral base broader than base of pronotum. In females, a distinct costa arising from base of humeral calli hardly reaching middle of elytra, less distinct in male, punctures and costae more distinct laterally and posteriorly.

Prosternum longer than broad medially, sparsely pubescent. **Propleura** punctate.

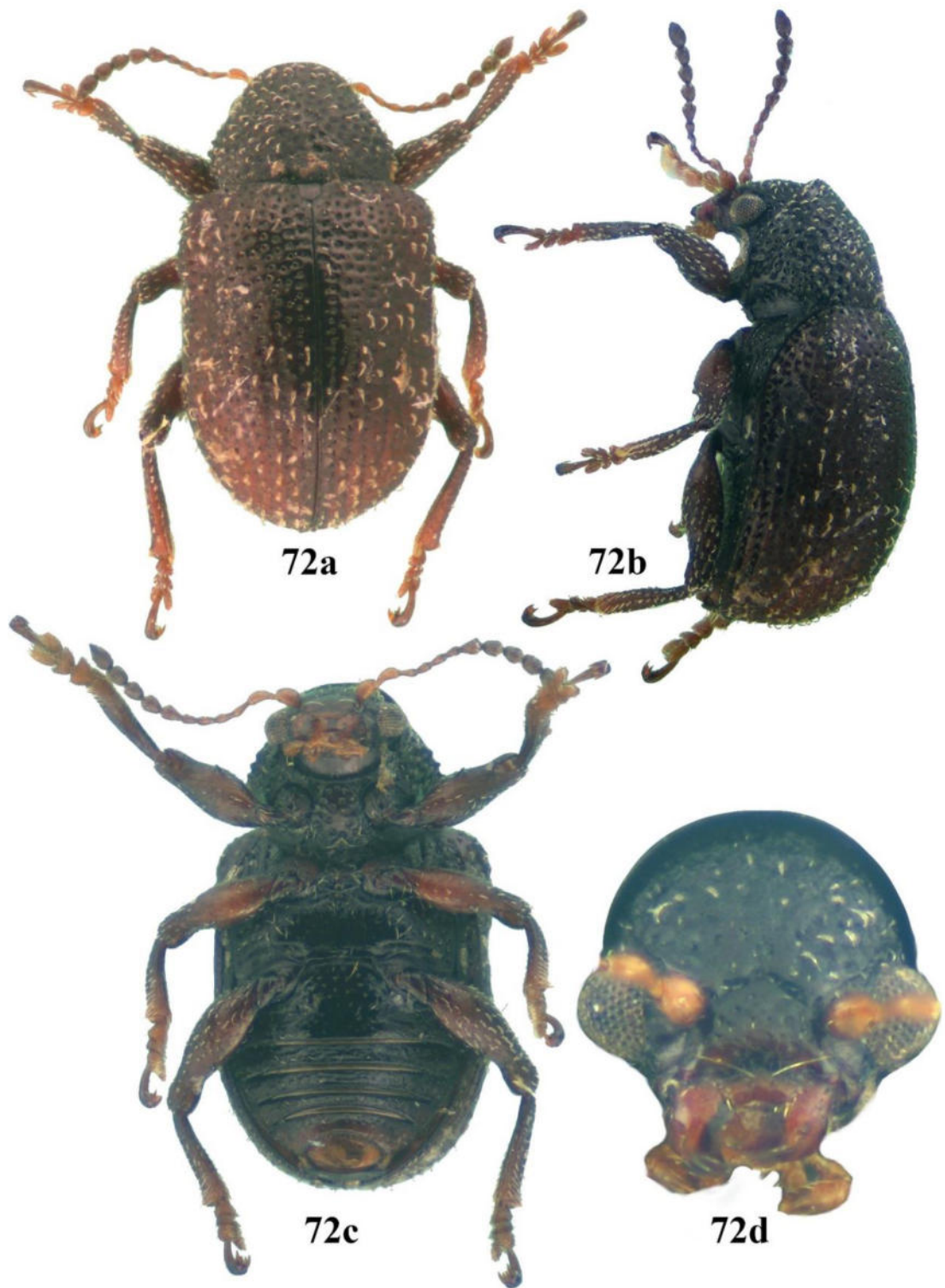
Venter sparsely pubescent, punctate, piceous; first ventrite longer than following three ventrites combined; apex of last ventrite almost straight in females, distinctly emarginate in males. Pygidium sparsely rugose punctate.

Legs red brown or dark brown, distal region of tibiae black rarely, all femora dilated medially with a small tooth ventrally, tibiae with short paired apical spines, claws bifid.

Male genitalia having **aedeagus** with lateral margins strongly deflexed, medially convex, apex obtusely projected; in lateral view, aedeagus proper gently curved, basal hood longer than aedeagus proper; **tegmen** distinctly lobed at apex, gently emarginate laterally, proximal area with two subparallel tines attached to aedeagus at base of aedeagus proper; **spiculum gastrale** Y-shaped, lateral arms shorter than median arm, curved at apex, spiculum relictum less sclerotized, 8th tergite gently curved and almost elliptical.

Female genitalia with **spermathecal capsule** almost sickle shaped, distinctly curved basally and medially, widest post basally, gradually narrowing towards apex, apex subacute, both inner and outer margins U-shaped; **spermathecal gland** translucent, long and tubular; spermathecal duct short; bursa copulatrix less distinct, eighth sternite indistinct or absent, tignum absent, tergite VIII present, ovipositor short with four distinct sclerotized plates: coxite, valvifer, paraproct, proctiger.

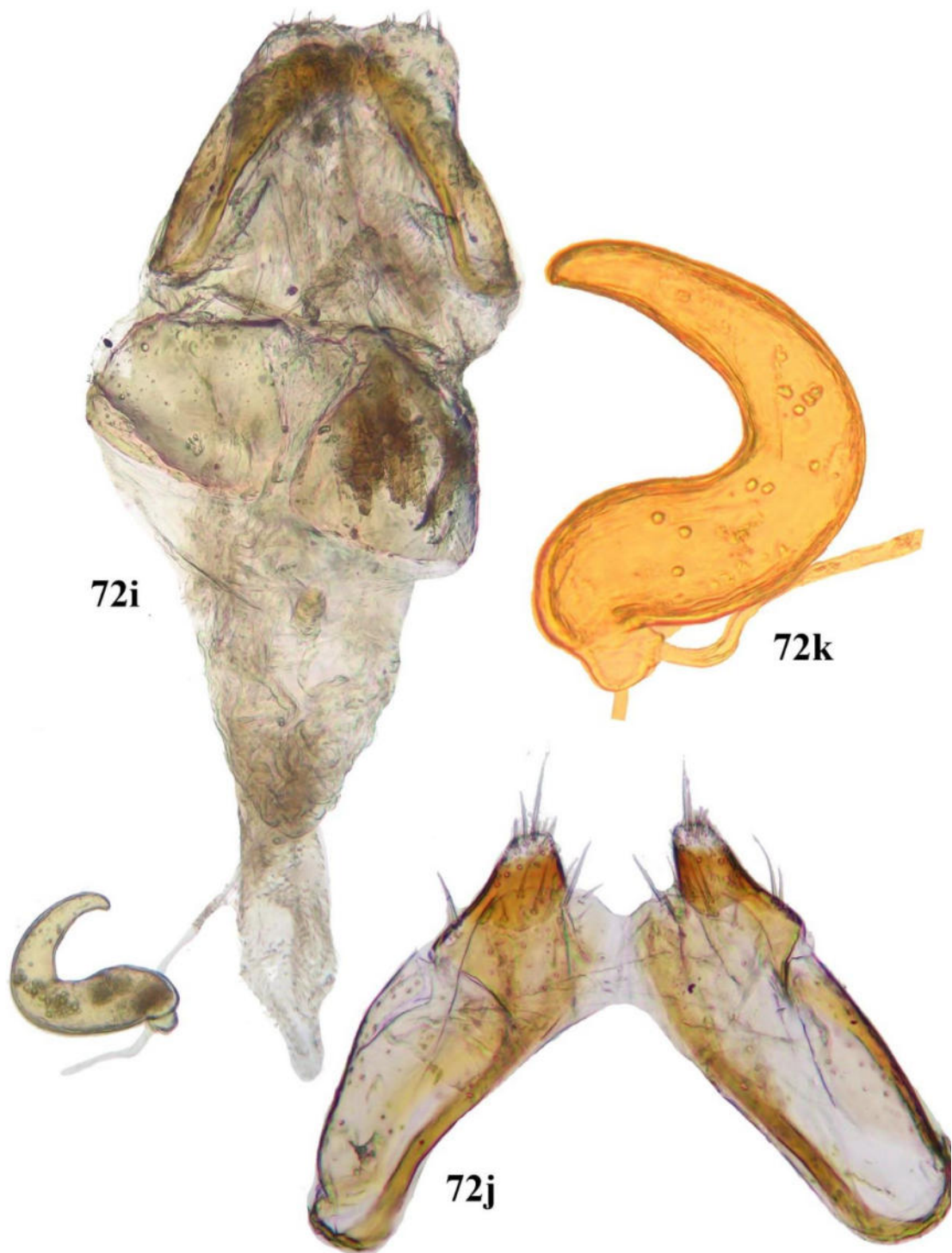
Remarks. *Mesocolaspis nigrata* closely resembles the type species, *M. indica*, however, differs by color and markings. *Mesocolaspis indica* has elytra with sutural triangular patch, a lateral stripe and two obscure fuscous spots; antennae, palpi and elytra are flavus and thorax fulvous while in *M. nigrata*, spots, stripes or maculations are absent, antennae, palpi and legs are fulvous while head, pronotum and elytra are generally black.



Figures 72a–d: *Mesocolaspis nigrita*, habitus: **72a.** Dorsal view, **72b.** Lateral view, **72c.** Ventral view, **72d.** Head, frontal view.



Figures 72e–h. Male genitalia of *Mesocolaspis nigrita*. **72e.** Aedeagus, dorsal view. **72f.** Aedeagus, lateral view, **72g.** Spiculum gastrale, spiculum relictum and 8th tergite. **72h.** Tegmen.



Figures 72i–k. Female genitalia of *Mesocolaspis nigrita*. **72i.** Ventral view, **72j.** Ovipositor, **72k.** Spermatheca.

Distribution. India (Tamil Nadu).

Materials examined (31 specimens).

2 ♀, 3 ♂ & 21 unsexed “India: Kerala/Ponmudi/8°45’58.5”N 77°6’38.9”/01.ix.2017/Amritha Kumari S Coll. /Ex. *Maesa arnottiana*”. 1 ♀, 1 ♂ same data except collected by Viswajyothi K. 1 ♂ 2 unsexed “India: Kerala/CRS Pampadumpara/ 5.x.2017/Viswajyothi K Coll./ Ex. *Maesa arnottiana*”

Host plant. *Maesa* sp. (Primulaceae)

4.2.13.2. *Mesocolaspis* sp. 1. (Figs. 73a–g)

Description

Body length 3.0 mm, width 1.7 mm, generally brown; head and pronotum red brown, elytra yellow brown, venter yellow brown to red brown, ventrites yellow brown, antenna yellow or yellow brown.

Head strongly punctate, vertex broad, coronal sulcus distinct, suprafrontal sulcus well developed differentiating frons and vertex; vertex strongly punctate, setose, setae strongly curved, flat above, gently rugose posteriorly; **frons** semicircular, punctate with short and thin setae, anterolateral callosity with a long bent seta; **clypeus** indistinct, narrow, anteriorly emarginated; **labrum** broad, slightly sloping anteriorly, a pair of widely spaced setose punctures medially, anterolateral angle with a group of three setae each; **mandibles** stout with a few setae laterally. **Antenna** subfiliform, hardly extending beyond base of elytra, first two antennomeres subequal, first antennomere cylindrical and curved, second curved and thin, 3–6 subequal, distal five antennomeres distinctly dilated; proportionate length of antennomeres I to XI 1 : 1 : 0.65 : 0.5 : 0.65 : 0.5 : 0.75 : 0.75 : 0.7 : 1 : 1.2. **Compound eyes** lateral, hemispherical, entire; supraorbital pore (where it is placed) with a long seta; ocular sulcus distinct; maximum width of head 1.6 times distance between compound eyes, 2.2 times distance between antennal sockets; distance between compound eyes 1.35 times distance between antennal sockets.

Pronotum 1.25 times wider than long, convex, closely punctate; interstices punctate, lateral margins distinctly dentate.

Elytra 1.3 times longer than broad, punctate striate, setose, indistinctly costate, dorsum convex, sloping from distal third, apex subacute at sutural angle; humerus with a

distinct callosity, outer margin with a series of dentations; base of elytra wider than base of pronotum; punctate striate, setae arranged in rows between striae, punctures bolder laterally, gently rugose, epipleura with a distinct row of setae.

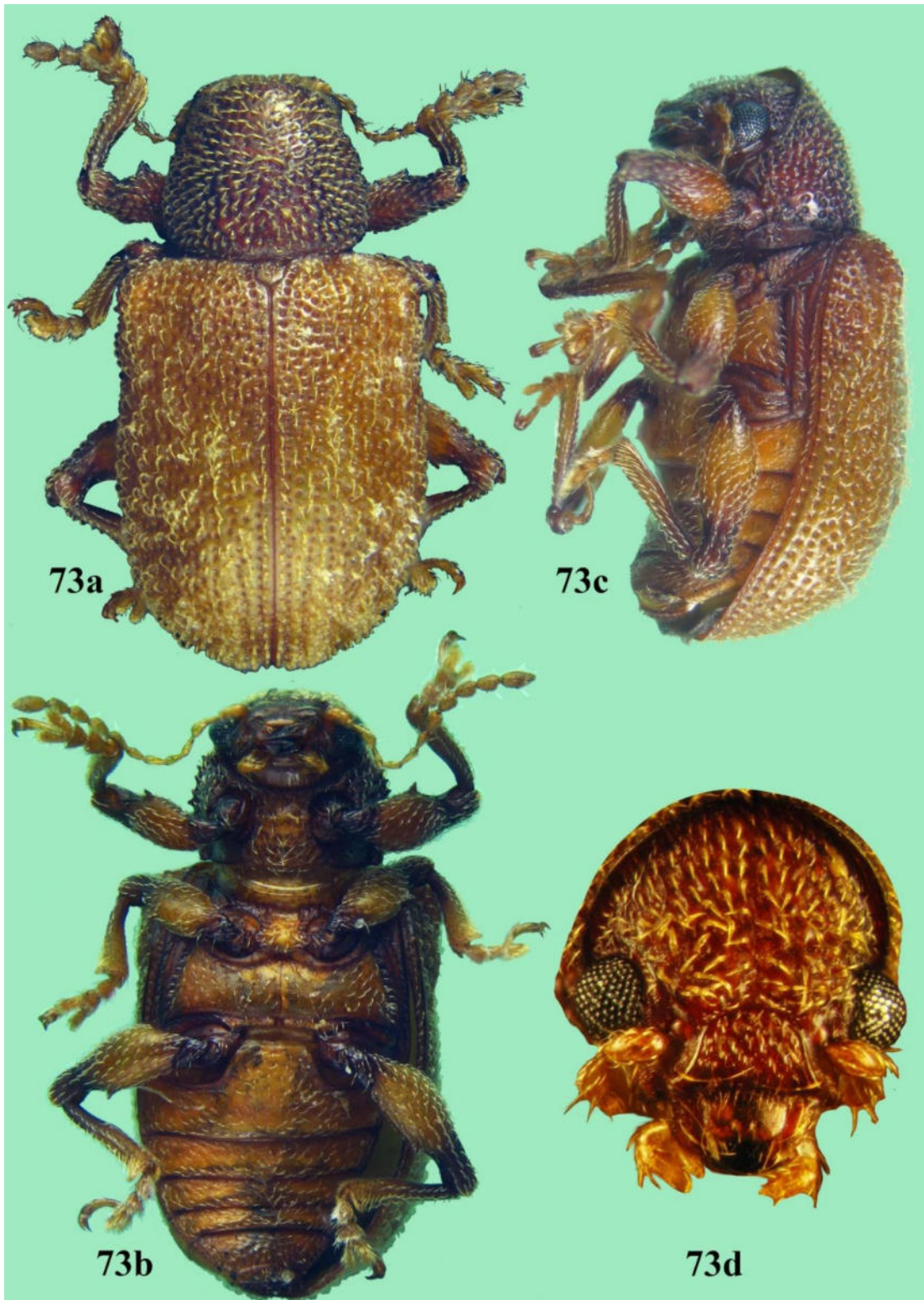
Propleura coarsely punctate, setose, posteriorly depressed. **Prosternum** broad, curved inwards medially, widened posteriorly, with coarse punctures and setae.

Ventrites pubescent, first ventrite broader than following two combined, lateral margins of last two ventrites with dentations, apical margin of last ventrite emarginate, last **tergite** strongly serrate with long setae preapically; **legs** yellow brown, joints and nearby areas red brown, femur with acute tooth beneath, setae distributed regularly, **tarsomeres** short and claws bifid; **tibiae** entire, longitudinally sulcate with rows of setae.

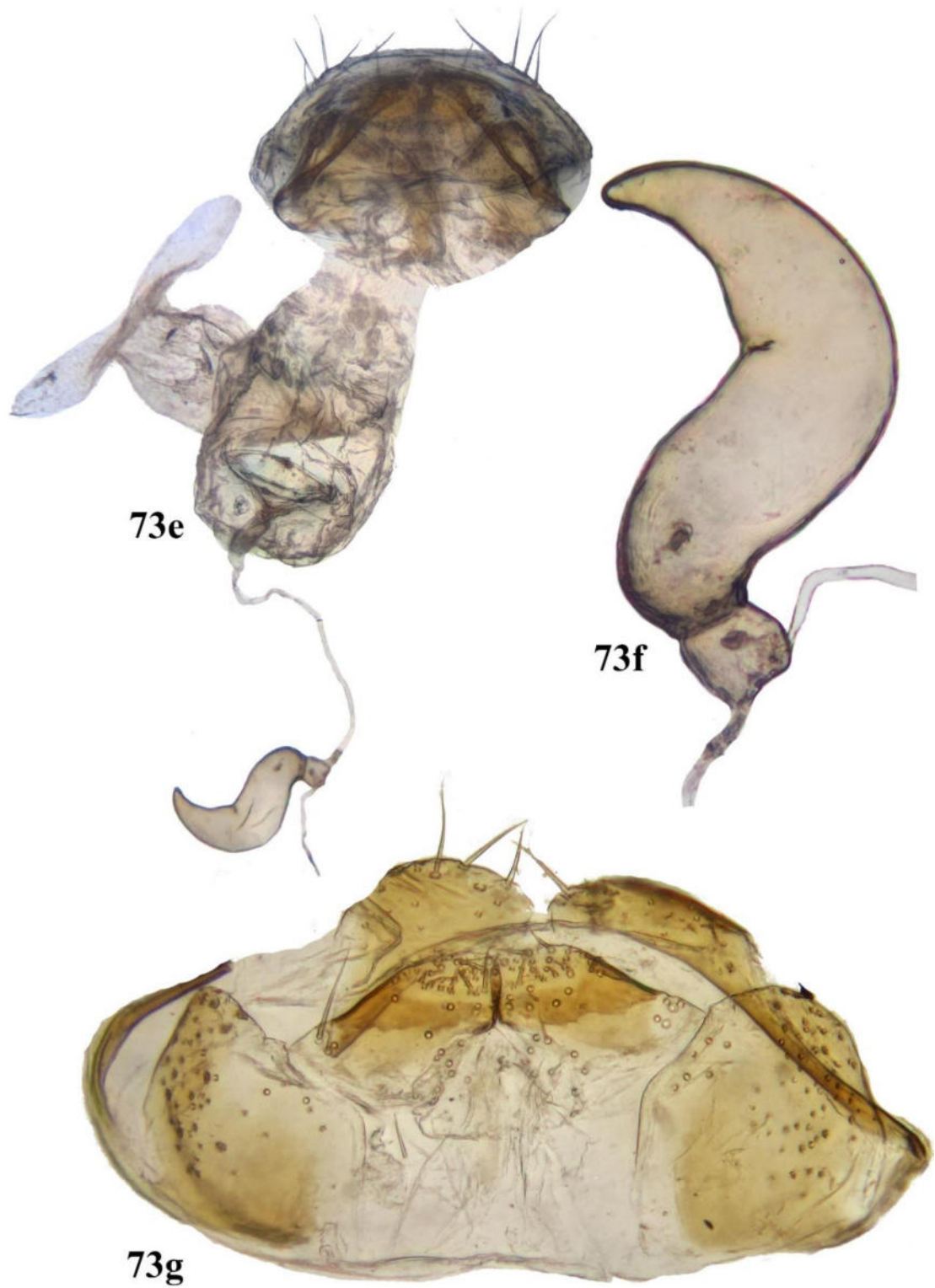
Female genitalia having spermathecal capsule with a short subquadrate proximal region where spermathecal capsule and spermathecal duct attached, distal region kidney-shaped; bursa copulatrix indistinct, spermathecal gland long, tubular, translucent; eighth sternite indistinct or absent, tignum absent; tergite VIII simple and crescent-shaped, with number of long setae on apical margin. Ovipositor short with four distinct sclerotized plates: coxite, valvifer, paraproct, proctiger.

Remarks. So far only three species are known under the genus *Mesocolaspis*. Two species, *M. indica* and *M. nigrita*, were described by Jacoby from south India. The third species, *M. spinulosum*, was described by Medvedev and Zoia (1996) from Thailand. The present species can be separated from *M. nigrita* by its large size, color, and punctations. The present species is closely similar but distinctly different from *M. indica*. *Mesocolaspis indica* is around 2 mm long and elytra has a sutural triangular patch, a lateral stripe and two obscure fuscous spots, while the present species is larger (around 3 mm) and elytra has no spots, stripes or maculations. *Mesocolaspis spinulosum* is larger (around 4mm) than the present species, body and legs black, antennae with terminal five antennomeres black and proximal ones yellow; while the present species is around 3 mm long, generally yellow brown and antenna is entirely yellow brown. The spermathecal capsule of *M. spinulosum* and the present species are distinctly different.

Distribution. India (Kerala).



Figures 73a–d: *Mesocolaspis* sp. 1, habitus: 73a. Dorsal view, 73b. Ventral view, 73c. Lateral view, 73d. Head, frontal view.



Figures 73e–g. Female genitalia of *Mesocolaspis* sp. 1 **73e.** Ventral view, **73f.** Spermatheca **73g.** Ovipositor.

Material examined.

1 ♀ “India: Kerala/ Vellayani/ 8°25’47.5”N 76°59’8.3”E/12.x.2018/ Viswajyothi K Coll.”

4.2.14. *Microeurydemus* Pic, 1938

Type species: *Microeurydemus unimaculatus* Pic, 1938 (Gaboon)

Microeurydemus Pic, 1938: 35; Selman, 1965: 149; Selman, 1972: 6

Generic diagnosis. Body oblong, slightly flattened dorsoventrally; head inserted, anterior portion of vertex much narrower; eyes very large, almost flat, very close together, distinctly emarginated at mesal angle; antenna filiform, reaching almost up to half of elytra; pronotum transverse, broadly margined, lateral margins entire and strongly convex; anterior margin of proepisternum convex; legs stout, front femora each with a very large triangular tooth, basal width and height of tooth much greater than maximum width of tibiae, tibiae longitudinally carinate, intermediate and posterior tibiae emarginated preapically, claws bifid; elytra elongate, strongly and regularly punctate, distance between rows of punctures more than distance between punctures in a row, interstices between rows gently convex giving a costate appearance.

Remarks. *Microeurydemus* is similar to *Eurydemus* Chapuis and *Afroeurydemus* Selman. *Microeurydemus* is distinguished by very large femoral spines (Selman, 1965) and eyes very close together (Selman, 1972). (Explain how these characters are in *Eurydemus* and *Afroeurydemus*). These genera belong to the tribe Typophorini (Zoia, 2019), however, they were placed in Nodini by Selman (Selman, 1965, 1972). This is the first report of the genus to the Oriental region.

4.2.14.1. *Microeurydemus* sp. 1 (Figs. 74a–l)

Description

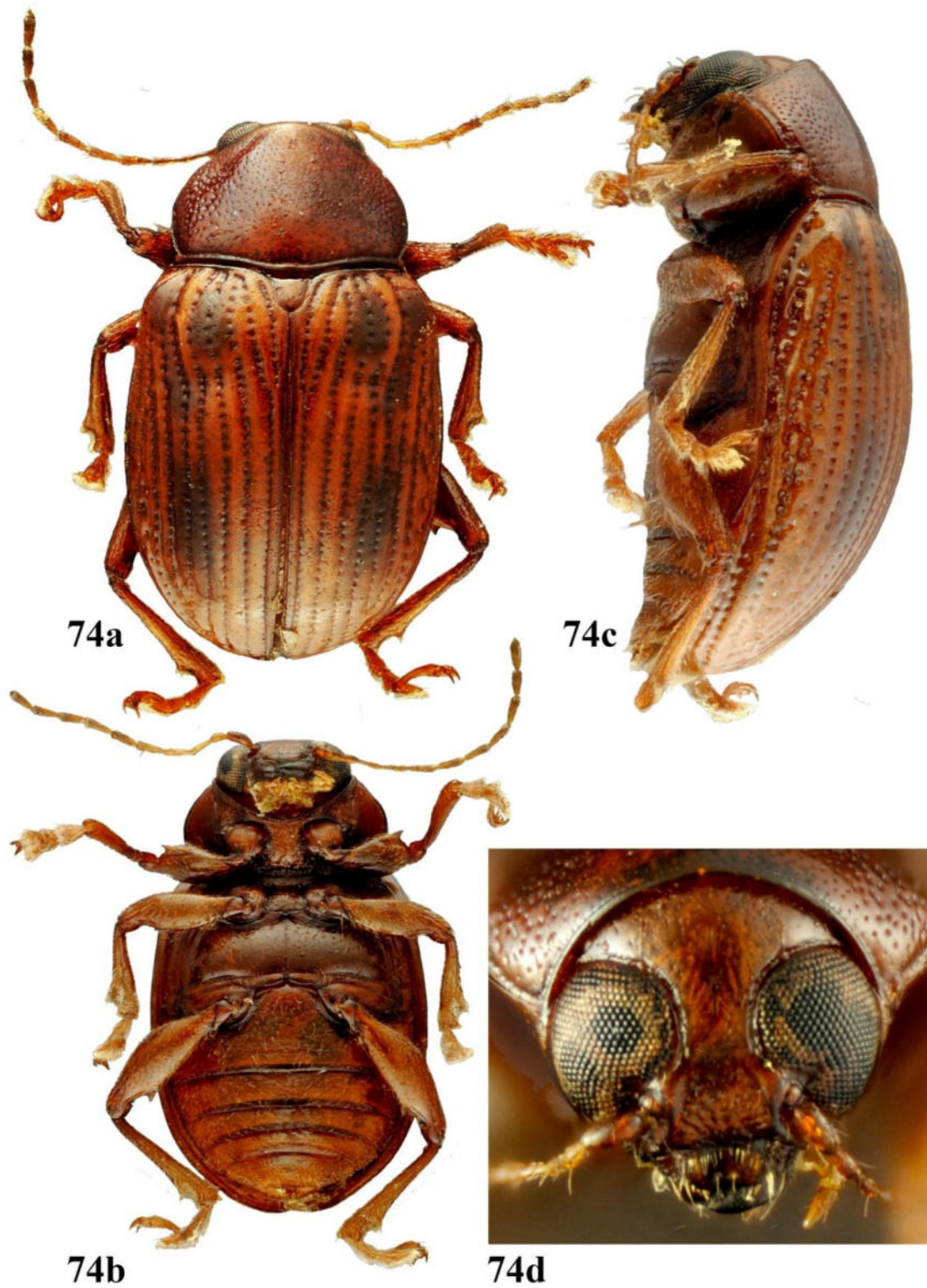
Body: Length 3.9–4.2 mm, width 2.3–2.4 mm; oblong, elongate and shiny, body entirely red brown with light piceous shades on head and pronotum; elytra with one piceous irregular spot each on both humeral calli and basal calli, both rarely joined posteriorly or with a third spot on post basal depression, rarely with an irregular longitudinal piceous spot in middle of elytra, at times elytral spots are obscure or absent.

Head inserted, punctate, punctures small and minute, sparsely setose, vertex strongly narrowed anteriorly, broader in females; coronal sulcus weak but distinct; suprafrontal

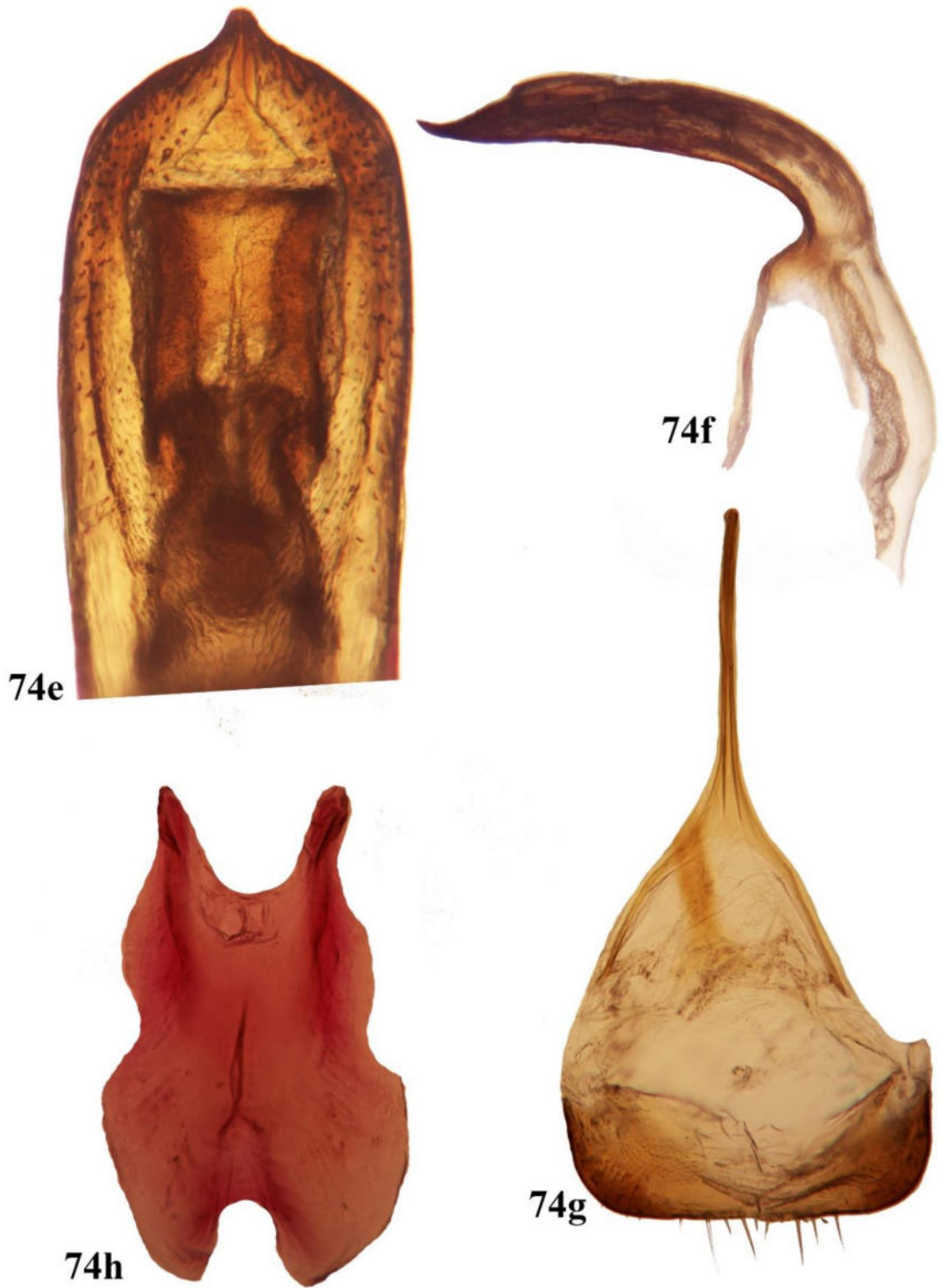
sulcus well marked and punctate, frons and vertex differentiated, weaker in females, frons gently rugose with bolder punctures; antennal calli distinct, raised, trapezoidal; supraorbital pore near dorsal margin of eye, distinct, raised, round with a long setae; orbital sulcus distinct, deep, narrow; punctate, lined with a row of short fine punctures; **clypeus** reduced to a narrow strip; labrum broader than long with a pair of widely placed setae in middle; a group of three setae each anterolaterally, apex deflexed and gently sinuate, apical margin with a row of setae discontinuous in middle; labial palpi with last palpomere subequal to penultimate; maxillary palpi with last palpomere longest, and almost twice longer than penultimate, first longer than penultimate; **compound eyes** very large, cordate; occupies major portion of head, distinctly notched at its mesal angle near antennal socket, transverse diameter of eye 2.7–3.9 times distance between eyes, 1.4–1.5 times distance between antennal sockets; maximum width of head 6–8 times interocular space, 3.1–3.3 times interantennal space, 2.0–2.3 times transverse diameter of eye, vertical diameter of eye 1.2–1.3 times transverse diameter of eye, **antenna** filiform, extending upto half of elytra, first antennomere thicker and distinctly longer than second, second shortest and thicker than third and fourth separately, third and fourth thin, rest of antennomeres gradually broadened with last antennomere longest, first four antennomeres smooth and shiny with a few long setae, distal seven thickly covered with short setae. Proportionate length of antennomere I to XI equals 1 : 0.6 : 1–1.1 : 1.1–1.3 : 1.1–1.3 : 1.2 : 1.3 : 1.2–1.3 : 1.1–1.3 : 1.1–1.3 : 1.4–1.5.

Pronotum 1.5–1.6 times broader than long, posteriorly 1.3 times longer than anteriorly, pronotal disc convex with a mixture of small and minute punctures and fine setae, punctures stronger laterally, lateral margins distinct and evenly curved, anterolateral angles deflexed, posterolateral callosity gently protrude beyond lateral margin; **scutellum** as broad as long with minute punctures, with a sclerotized triangular impression in middle, apex narrowly rounded.

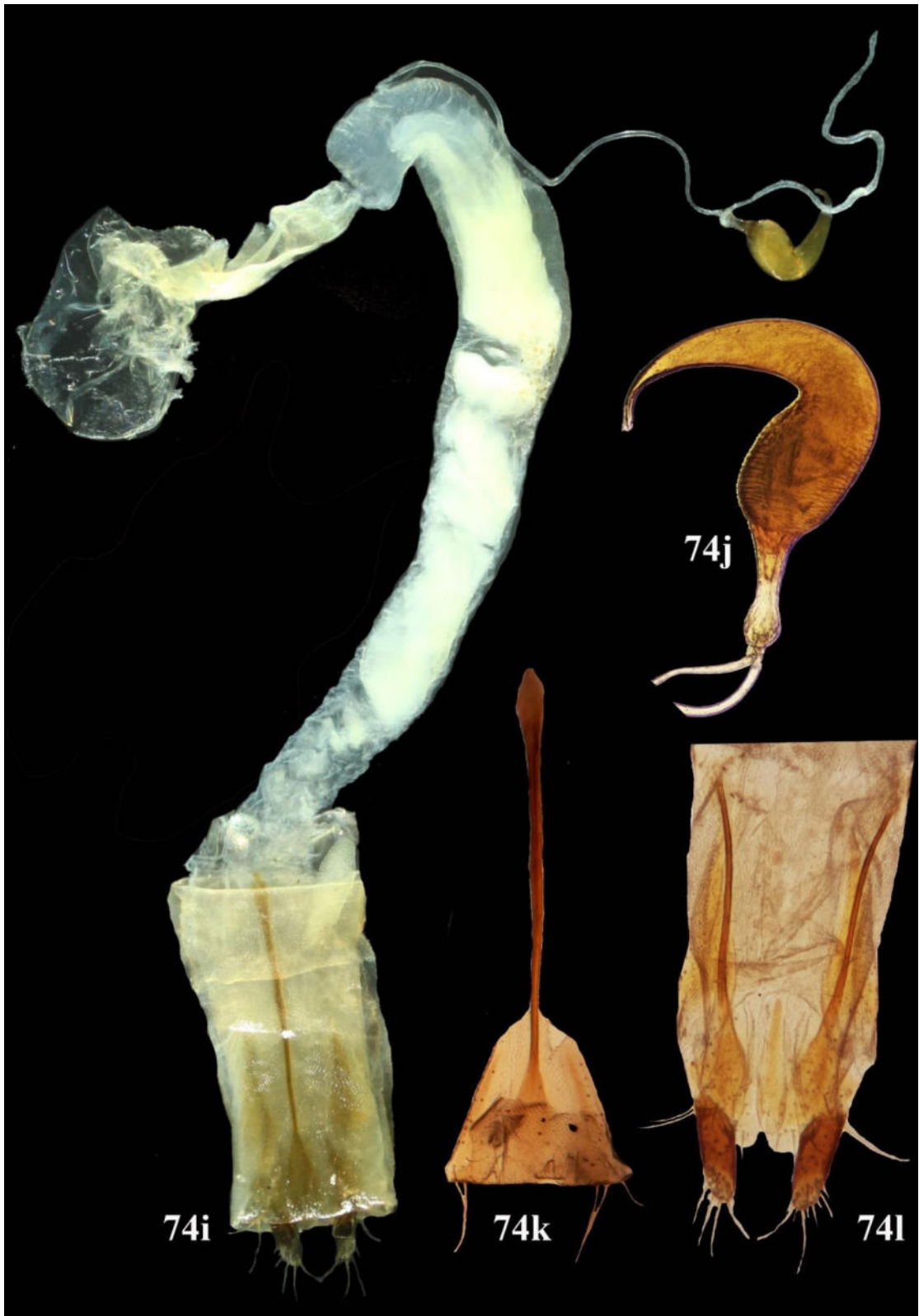
Elytra 1.1–1.3 times longer than wide, costate, punctures regular in middle, partially confused laterally, punctures stronger than those on head and pronotum, interstices convex with numerous minute punctures, distance between punctures in a row is less than distance between rows; scutellar striae more than two times longer than scutellum, merges with adjacent row near post basal depression; elytra with 11 striae postbasally



Figures 74a–d: *Microeurydemus* sp. 1, habitus: **74a.** Dorsal view, **74b.** Ventral view, **74c.** Lateral view, **74d.** Head, frontal view.



Figures 74e–h. Male genitalia of *Microeurydemus* sp. 1 **74e.** Aedeagus, dorsal view. **74f.** Aedeagus, lateral view, **74g.** Spiculum gastrale, spiculum relictum and 8th tergite. **74h.** Tegmen.



Figures 74i–l. Female genitalia of *Microeurydemus* sp. 1 **74i.** Ventral view, **74j.** Spermatheca, **74k.** Fused 8th sternite and 8th tergite with tignum, **74l.** Ovipositor.

immediately behind humeral calli, humeral calli prominent with a few punctures and irregular marks, basal calli distinct with an evident post basal depression, **epipleura** outwardly oblique with minute punctures, widest basally, gradually narrowing, hardly reaching elytral apex.

Prosternum constricted, more than 1.5 times longer than wide, punctate with long fine setae; mesosternum longer than wide, adorned with setose punctures.

Proepisternum with anterior margin convex, with bold punctures and setae anteriorly, anterolateral margins of pronotum and propleura confluent and bears a setae at junction, hypomeron depressed posteriorly without punctures or setae.

Legs long, femora dilated, forefemora with moderately strong tooth ventrally beneath middle, metafemoral tooth smaller than that on forefemora but stronger than that on mesofemora, tibiae longitudinally carinate with rows of setae in between, tarsomeres ventrally fringed with diverse forms of setae, probasitarsomere and mesobasitarsomere in males with closely arranged capitate setae bordered by long pointed setae, all basitarsomers in females and metabasitarsomere in males fringed with only pointed setae, second tarsomere with pointed setae, bilobed third tarsomere with varieties of setae like triangular, inverted arrowhead-shaped, pointed or truncate.

Ventrites sparsely and finely pubescent, first ventrite longer than following two combined medially, ventrites 3 and 4 subequal, shorter than 2 and 5 separately, last ventrite hardly dimorphic sexually, last tergite without longitudinal groove medially.

Male genitalia with **aedeagus** in lateral view sharply bent almost at right angle near base, dorsal and ventral margin gradually narrowed distally, apex acutely narrowed and gently recurved; ventral surface distinctly and uniformly concave, lateral margins subparallel, anterolateral angles arcuate, apex projected into a short subacute denticle; **tegmen** flat, membranous, distinctly lobed posteriorly, lateral margins gently sinuate; **spiculum gastrale** Y-shaped with median arm almost straight, lateral arms gently curved, shorter than median arms; tergite VIII with spindle shaped sclerotization on either side, with a few setae on posterior margin; spiculum relictum weakly sclerotized.

Female genitalia. Spermathecal capsule differentiated into basal and distal regions; basal region almost dumbbell shaped where spermathecal duct and gland duct joins;

Distal region sharply curved like a beak, broader proximally, acutely narrowed apically with a blunt apex, length of spermathecal capsule almost three times its maximum width; bursa copulatrix indistinct or absent; vaginal wall long, slightly curved proximally; ovipositor long and stylus absent; 8th sternite and 8th tergite fused laterally forming a membranous tube with sclerotizations laterally. 8th sternite bears a long tignum longer than ovipositor.

Remarks. This species is closely related to *M. airensis* (Pic, 1950). Scutellum is triangular in *M. airensis* while it is U-shaped in the new species and narrowly rounded posteriorly. Pronotal punctures are stronger in *M. airensis* than in the new species. Emargination of intermediate and posterior tibiae prominent in the new species while it is weaker in *M. airensis*. The new species is generally stouter than *M. airensis*. Spines on forefemora are stronger in *M. airensis* than the new species.

Distribution. India (Kerala).

Material examined (15 specimens).

2♂ 7♀ “India: Kerala/Kollam, Kappil/3.vii.2015/Prathapan. K. D. Coll./Ex. *Rhizophora* sp.” 4♂ 2♀ same collection data except host *Bruguiera* sp.

Host plants. *Rhizophora* sp. and *Bruguiera* sp. (Rhizophoraceae).

4.2.15. *Pachnephorus* Chevrolat, 1836

(Type species. *Pachnephorus pilosus*, Rossi from Europe.)

Pachnephorns, Redtenb, 1848: 569; Baly, 1865: 436; Chapuis, 1874: 323; Weise, 1893: 282; Selman, 1972: 67.

Generic diagnosis. Body oblong, clothed with scale like setae; head deeply inserted into thorax; compound eyes small; antenna short with terminal antennomeres dilated, as wide as long; pronotum nearly as wide as long, base distinctly narrower than base of elytra, lateral margins distinct, anterior margin convex; posterior margin lobed; elytra punctate striate; prosternum with deep grooves at sides for receiving antennae; mesosternum short, transverse; first ventrite medially as long as rest combined; legs long, pubescent, clothed with scales; intermediate and posterior tibiae gently emarginated at apex; claws appendiculate.

Remarks. *Pachnephorus* belongs to the tribe Adoxini. Its relationships to other genera are at present uncertain. *Pachnephorus* is identified within the Adoxini by the tarsal

claws appendiculate and the body covered with small scales; both characters are variable (Zoia, 2007).

Two species of *Pachnephorus* are reported from south India.

4.2.15.1. *Pachnephorus bistriatus* Mulsant & Wachanru, 1852 (Figs. 75a–h)

Pachnephorus bistriatus Mulsant & Wachanru, 1852: 17; Clavaraeu, 1914: 131; Moseyko & Sprecher-Uebersax, 2010: 627.

Pachnephorus impressus Rosenhauer, 1856: 310; Jacoby, 1908: 461; Clavaraeu, 1914: 131.

Pachnephorus convexicollis Baly, 1867: 95; Jacoby, 1908: 461; Clavaraeu, 1914: 131.

Description

Body length 2.5 mm, width 1.9 mm; entirely pubescent, colored metallic cupreous to piceous; dorsum, pleuron and legs clothed with adpressed cream colored short curved thick bifurcated scale like deciduous setae and a few brown setae; ventrally with cream coloured adpressed pointed setae; elytra, legs, proximal antennomeres, palpi, labrum red brown; antennomeres 7–11 proximally red brown and distally dark brown; venter dark brown except last ventrite light red brown.

Head coarsely and densely punctured, setose, less densely punctured than pronotum and elytra; coronal suture distinct, setae on anterior area of vertex and frons thinner and bifurcated distally; suprafrontal sulcus weak; frons and vertex hardly differentiated, posterior area of frons gently depressed; frons with a long seta near anterolateral angle on either side; antennal calli distinct, almost rectangular, posteriorly depressed; ocular sulcus distinct; **clypeus** indistinct; **labrum** broader than long, with a pair of widely spaced setose punctures preapically, anterolateral corners with a group of three setae, apex sinuate with a row of setae absent in middle; **maxillary and labial palpi** with apical palpomere longest. **Compound eyes** globular, emarginated at mesal angle, posterior area hidden by pronotum. **Antenna** short, hardly reaching base of elytra, first antennomere thick; second curved, as long as first; 3rd and 4th subequal, shorter and thinner than 2nd, 5th and 6th, rest distinctly broadened. Proportionate length of antennomeres I to XI equals 1 : 1 : 0.44 : 0.44 : 0.6 : 0.56 : 0.7 : 0.7 : 0.7 : 0.7 : 1.

Pronotum as long as broad, closely and strongly punctate, gently convex, narrowing posteriorly, anteriorly 1.2 times wider than posteriorly, anterior margin rounded, posterior margin weakly lobed, lateral margins distinct but obsolete in anterior fourth.

Elytra 1.5 times longer than broad, closely and strongly punctate but smaller than those on pronotum, punctures regular and form striae, elytra with ten rows of punctures, interstices gently costate; humeral calli prominent with setae and punctures; basal calli and post basal depression weak; **epipleura** without setae, narrowing towards elytral apex.

Proepisternum distinctly convex with setose punctures; hypomeron with bold setose punctures.

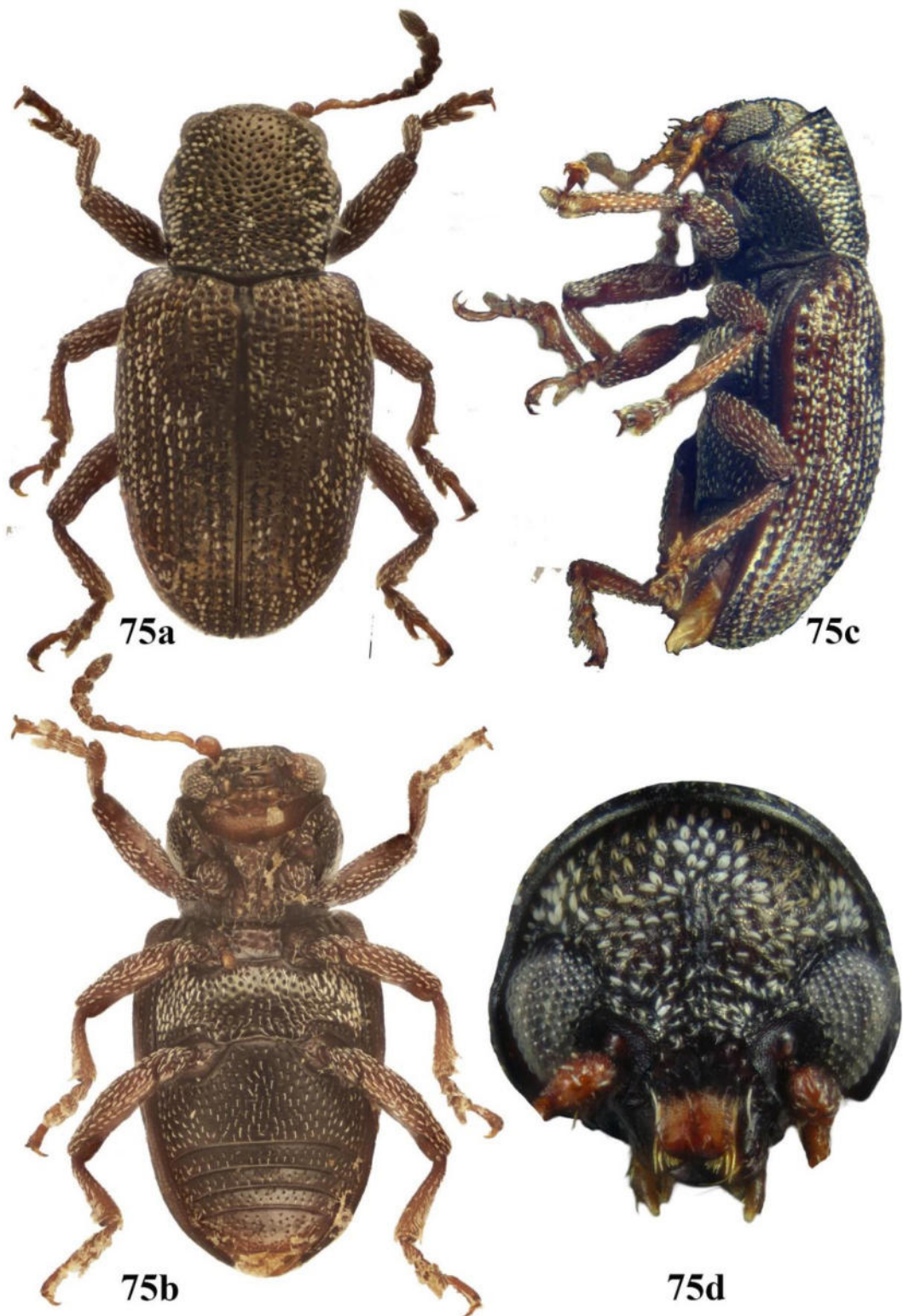
Legs moderately long, femora unarmed; tibiae short, longitudinally carinate, intermediate and posterior tibiae emarginate preapically,

Prosternum narrow, triangular with a deep groove on either side for reception of antennae, mesosternum rectangular with setose punctures, metasternum setose with pointed setae medially and bifid setae laterally.

Ventrites with uniformly distributed setose punctures, first ventrite medially longer than following three or four ventrites combined, ventrites 2–4 subequal, last ventrite longer than penultimate; almost half as long as first, apex of last ventrite gently sinuate with a row of triangular teeth like dentations and a row of setae. **Pygidium** without median groove; with numerous sensillae preapically.

Male genitalia with **aedeagus**, in lateral view, sharply bent almost at right angle near base of aedeagus proper, gradually converging distally with a gently curved subacute apex; ventral surface flat, lateral margins gently converging towards distally, strongly converging in apical quarter with subacute apex; dorsal and ventral surface with sensillae, denser near apex; **spiculum gastrale** weakly sclerotized; spiculum relictum indistinct; **tegmen** Y-shaped, proximal arms thin, bifurcated, much longer than distal arm, encircles aedeagus near base of aedeagus proper.

Remarks. *Pachnephorus bistriatus* is closely related to *P. bretinghami* Baly, 1878. *Pachnephorus bistriatus* is much more elongate and narrowly subcylindrical than *P. bretinghami*.



Figures 75a–d: *Pachnephorus bistriatus*, habitus: **75a.** Dorsal view, **75b.** Ventral view, **75c.** Lateral view, **75d.** Head, frontal view.



75e



75f



75g



75h

Figures 75e–h. Male genitalia of *Pachnephorus bistratus*. **75e.** Aedeagus, dorsal view. **75f.** Aedeagus, lateral view, **75g.** Spiculam gastrale, spiculam relictum and 8th tergite. **75h.** Tegmen.

Distribution. India (Bengal, Kerala); Jacoby (1908) reported this species from Europe, Africa, India (Bengal, Kerala), Philippines and Madagascar. Many authors reported it from Africa (Weise, 1893; 1910; Clavareau, 1914; Jolivet, 1953; Warchalowski, 2003). Zoia (2007) reported it from the Palaearctic Region.

Material examined.

1 ♂ “India: Kerala/ KFRI, Peechi/10^o31’53.7”N 76^o20’44.9”E/8.iv.2018 @ Light/S R Hiremath Coll.”.

4.2.16. *Pagria* Lefèvre, 1884

(Type species: *Pagria suturalis*, Lefevre from Africa) *Colposcelis* Dejean, 1835: 408 (nec Dejean, 1834: 185) ; 1837: 432; 1849: 13; Monros & Bechyne, 1956: 1126; Gressitt & Kimoto, 1961: 232; Kimoto, 1964: 242; Selman, 1965: 147.

Pagria Lefèvre, 1884: 67; 1885: 62; Jacoby, 1908: 356; Chen, 1935: 324; 1940: 488. Chujo, 1956: 56; Aslam, 1968: 128.

Aphthonesthis Weise, 1895: 329

Generic diagnosis

Body short, ovate, strongly convex, compound eyes obseletely emarginate, ocular sulcus deep and broad, antenna subfiliform, hardly reaching middle of body; **pronotum** broader than long, sides angulate behind middle in most cases; **legs** elongate, femora dilated and armed with a small tooth ventrally, intermediate and posterior tibiae emarginate preapically, claws appendiculate; **prosternum** broad, subquadrate, anterior margin of thoracic episternum concave.

Remarks.

Pagria is closely related to *Basilepta* Baly, especially small species of *Basilepta* resembles the former. However, *Pagria* can be readily differentiated from *Basilepta* by its broad and deep ocular sulcus (ocular sulcus in *Basilepta* is weak or indistinct).

Key to select species of *Pagria* of south India

1. Lateral margins of pronotum angulate posterior to middle, length around 2mm, colored brown and black, dorsum without costae**2**
- Lateral margins of pronotum not angulate, evenly curved, length 3.5 to 4 mm; black; dorsum distinctly costate.....***P. restituens***

2(1). In ventral view, apex of aedeagus spatulate with apical margin convex.....	3
- In ventral view, apex of aedeagus spatulate with apical margin concave.....	5
3(2). Lateral margins of vertex angulate, apex of aedeagus weakly differentiated.....	4
- Lateral margins of vertex gently wavy near middle with apex of aedeagus distinctly differentiated	<i>P. zeylonica</i>
4(3). Lateral margins of vertex strongly angulate, body yellow, aedeagus mildly sclerotized and almost linear in lateral view.....	<i>Pagria new sp.</i>
- Lateral margins of vertex weakly angulate, body fulvous, aedeagus strongly sclerotized and almost L-shaped in lateral view.....	<i>P. signata</i>
5(2). Apex of aedeagus much narrowed.....	<i>P. ingibbosa</i>
- Apex of aedeagus much wider or gradually narrowed.....	6
6(5). Apex of aedeagus short and anterior area of vertex distinctly narrowed.....	<i>P. pseudograta</i>
- Apex of aedeagus comparatively longer and anterior area of vertex wider.....	<i>P. grata</i>

4.2.16.1. *Pagria grata* (Baly, 1867) (Figs. 76a–g)

Nodostoma gratum Baly, 1867: 224.

Pagria grata (Baly, 1867): Bryant, 1942: 34.

Nodostoma flavopustulatum Baly, 1874: 169; Moseyko, 2013: 208 (synonymy).

Pagria flavopustulata (Baly, 1874): Jacoby, 1908: 356; Chûjô, 1956: 62.

Nodostoma kanaraense Jacoby, 1895: 279; Moseyko, 2013: 208 (synonymy).

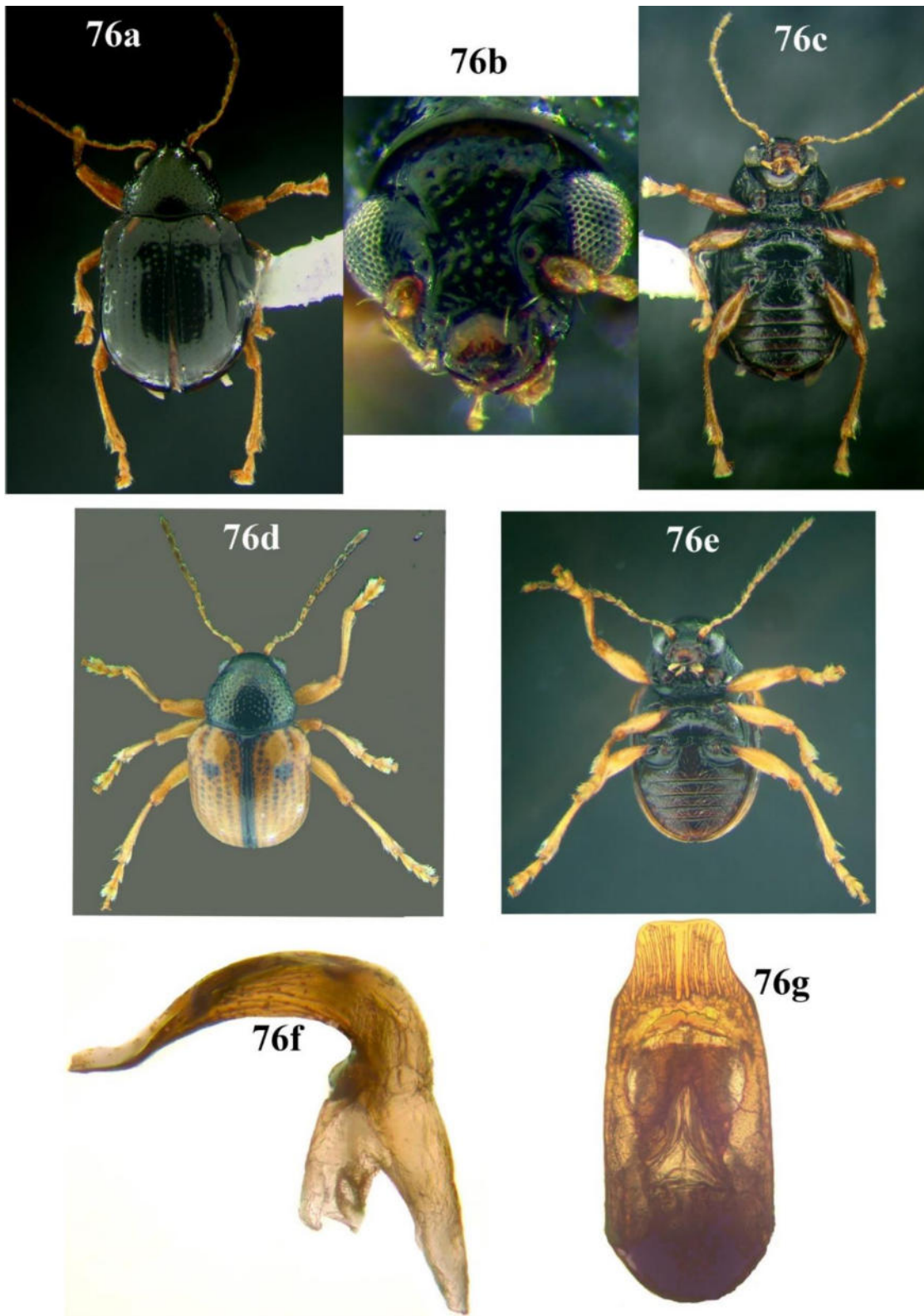
Pagria flavopustulata ab. *bicolor* Weise, 1922: 451; Moseyko, 2013: 208 (synonymy).

Pagria signata grandis Chûjô, 1938: 28; Moseyko, 2013: 208 (synonymy).

Pagria signata var. *innotata* Pic, 1929: 35; Moseyko, 2013: 208 (synonymy).

Nodostoma fulvipes Baly, 1867: 228 (nec *N. fulvipes* Motschulsky, 1860); Moseyko, 2013: 208 (synonymy).

Nodostoma xanthopus Harold, 1874: 152 (replacement name for *N. fulvipes* Baly, 1867); Moseyko, 2013: 208 (synonymy).



Figures 76a–g: *Pagria grata*: **76a–e:** Habitus: **76a.** Dorsal view, female **76b.** Head, frontal view, **76c.** Ventral view, female, **76d.** . Dorsal view, male, **76e.** Ventral view, female. **f–g:** Aedeagus: **76f.** Lateral view, **76g.** Dorsal view.

Pagria xanthopus (Harold, 1874): Bryant, 1942: 34.

Pagria nodieri Pic, 1949: 55; Moseyko, 2013: 208 (synonymy).

Pagria vignaphila Bryant, 1942: 32; Moseyko, 2013: 208 (synonymy).

Pagria aeneicollis Lefèvre, 1890: 181; Moseyko, 2013: 208 (synonymy).

Description

Body length 1.9–2.1 mm, width 1.1–1.2 mm; short ovate, generally yellow brown or black; head black with tinge of brown; antennae with basal joints yellow or light brown and rest piceous, pronotum black and red brown, elytra yellow brown with margins piceous, some females entirely piceous or black with an oblique yellow marking basally between humeral calli and basal calli, elytral apex yellow; venter dark brown or brown black; pleural region brown black, legs yellow to yellow brown.

Head irregularly punctured, setose; lateral margins of vertex almost straight or slightly wavy near middle; **frons** subquadrate, hardly differentiated from vertex; **antennal calli** distinct, subtriangular; **clypeus** distinct, narrow, strip-like; **labrum** longer than broad, rarely short, with a pair of widely spaced setose punctures medially, rarely with an acute denticle between setose punctures, apical margin feebly emarginated, anterolateral angle with a few setae; labial palpi with last palpomere subequal to penultimate, maxillary palpi with last palpomere twice longer than penultimate; **mandibles** stout with setae on lateral side. **Compound eyes** lateral, longitudinally oval; orbital sulcus broad and deep, vertical diameter of eye 1.26 to 1.29 times transverse diameter. **Antenna** filiform, longer than half of body, I antennomere thick, curved, II shorter than I, III and IV thin, rest progressively broadened, proportionate length of antennomeres I–XI as follows: 1 : 0.78–0.88 : 0.72–0.88 : 0.83–0.88 : 0.83–1.06 : 0.83–1 : 0.83–1.18 : 1–1.18 : 1.11–1.18 : 1.11–1.18 : 1.28–1.35; ratio of interantennal space, interocular space, distance between antennae and eye, maximum width of head, vertical diameter of eye and transverse diameter of eye as follows 1 : 1.95 : 0.17–0.2 : 3.16–3.52 : 1.29–1.32 : 1–1.04.

Pronotum 1.5 times longer than wide, profusely punctured, lateral margins angulate after middle, posterior margin lobed, anterior margin convex, punctures denser and coarser towards lateral margins; **scutellum** almost triangular or tongue like.

Elytra 1.17 to 1.26 times longer than broad, punctate striate, punctures small and minute surrounded by a circular or rectangular translucent halo giving an extra bold appearance, punctures reduced post medially; humeral calli prominent with or without punctures or markings, basal calli prominent and punctate; **epipleura** outwardly oblique with or without punctures, narrowing towards apex from apical third.

Pleurites punctured, **proepisternum** with concave anterior margin; **legs** long, longitudinally sulcate with rows of fine setae, intermediate and posterior tibiae emarginated at apex, posterior tibia with paired short spurs apically, femora dilated and dentate, claws appendiculate.

Venter finely pubescent; **prosternum** subquadrate with setose punctures, first ventrite longer than following two combined medially, II–IV subequal, shorter than V.

Male Genitalia. Aedeagus with dorsal surface convex, narrowed anteriorly, spatulate apically, apical margin concave; aedeagus bent at right angle near base in lateral view, curved anteriorly, apex gently recurved dorsad.

Remarks. *Pagria grata* is very much similar to *P. pseudograta* (Baly) and *P. ingibbosa* Pic. It is very difficult to segregate these species except by male genitalia.

Material examined (2 specimens).

1♂ “India: Manipur/Churachandpur/Ngaloi falls/N 24° 19’ 53.7” E 93° 38’ 47.7” 1148 m 18.viii.2014/Prathapan & Shameem Coll.”. 1♂ “India: south Andaman/Garacharama/ 1.iv.2015/Bharathi Meena Coll.”

Distribution. Japan, China, Taiwan, Vietnam, Thailand, Myanmar, Nepal, India, Indonesia, Sumatra, Philippines, Mindoro Island, Laos.

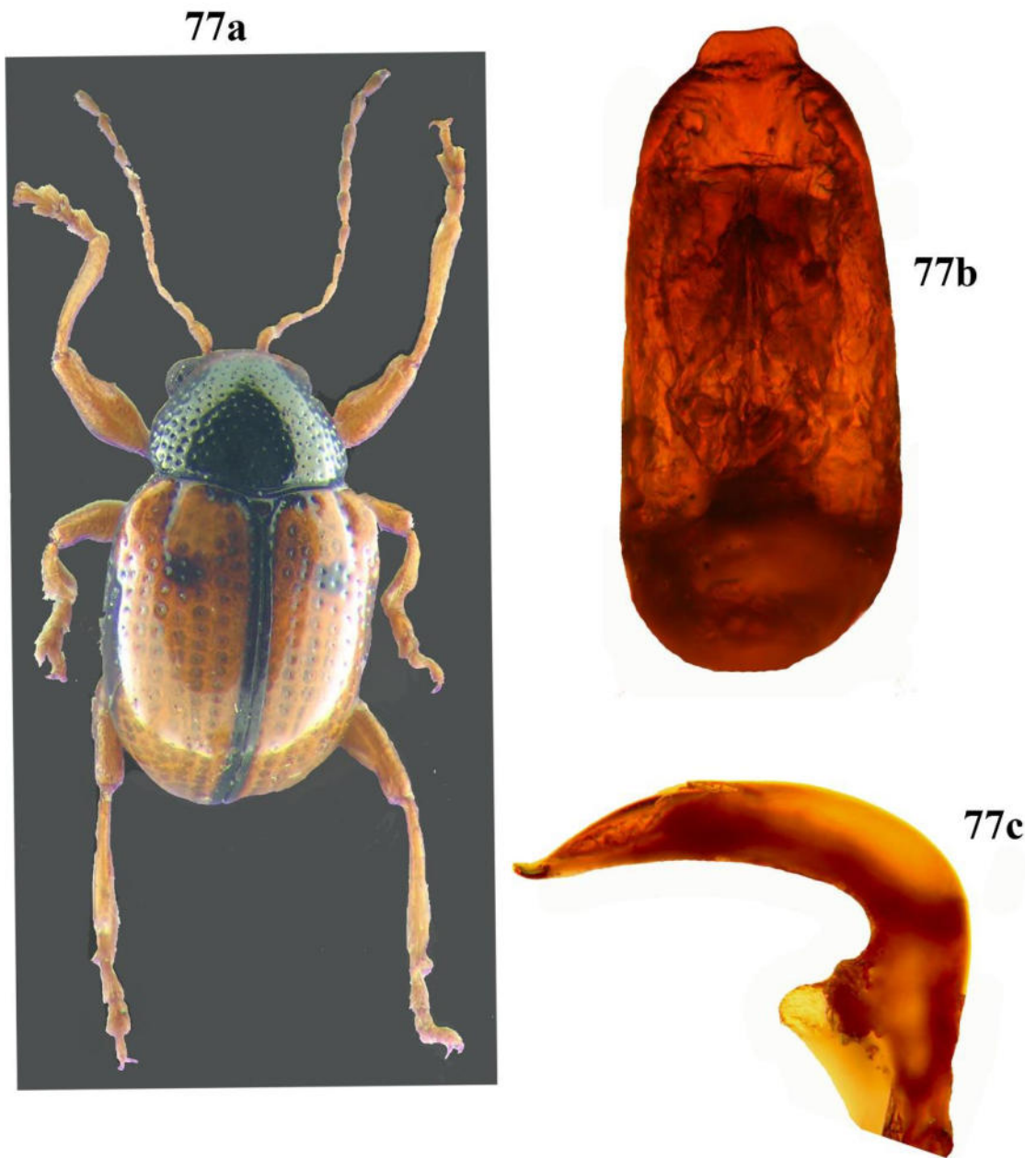
4.2.16.2. *Pagria ingibbosa* Pic, 1929 (Figs. 77a–c)

Pagria ingibbosa Pic, 1929: 35; Moseyko & Medvedev, 2005: 751.

Description

Body length 1.65 to 1.87 mm, width 1.0 to 1.1 mm; short, ovate, generally black and yellow brown, head and pronotum black, head with tinges of brown; antennae with first four or five antennomeres yellow or light brown and rest darker, pronotum piceous near anterior margin, black posteriorly,

Head randomly punctured, setose; **coronal sulcus** weak, suprafrontal sulcus indistinct, frons hardly differentiated from vertex, **vertex** with lateral margins almost straight or



Figures 77a–c: *Pagria ingibbosa*: **77a.** Habitus, dorsal view, female. **77b–c:** Aedeagus: **77b.** Dorsal view, **77c.** Lateral view.

gently wavy after middle, merging with frons, **frons** subquadrate or subtriangular, irregularly punctate with a long seta on anterolateral margin on either side; **clypeus** distinct, narrow, strip-like; **labrum** longer than broad or rarely indistinct or short, with a pair of widely spaced setose punctures medially, apical margin feebly emarginate, anterolateral angle with a few setae; **palpi** yellow, labial palpi with last palpomere subequal to penultimate, maxillary palpi with last palpomere more than twice longer than penultimate one; orbital sulcus deep and broad; **mandibles** stout with setae on lateral side; **compound eyes** lateral, longitudinally oval; vertical diameter of eye almost 1.3 times transverse diameter; **antenna** filiform, more than half as long as body; I antennomere thick, II shorter than I, III and IV thin, following antennomeres progressively broadened, last antennomere longest. Proportionate length of antennomeres I – XI 1 : 0.76–0.93 : 0.59–0.87 : 0.94–1 : 0.88–1 : 0.88–1 : 1–1.33 : 1–1.2 : 0.98–1.27 : 1.05–1.2 : 1.17–1.4; ratio of interantennal space, interocular space, distance between antenna and eye, maximum width of head, vertical diameter of eye and transverse diameter of eye respectively as 1 : 1.87–2 : 0.22–0.29 : 3.39–3.57 : 1.39 : 1.09.

Pronotum 1.3 to 1.4 times longer than wide, convex, randomly punctured, lateral margins angulate after middle, posterior margin lobed, irregularly punctured; punctures denser and coarser towards lateral margins, anterolateral callosity distinct, **scutellum** almost triangular or tongue like.

Elytra 1.3 to 1.5 times longer than broad, punctate striate, punctures surrounded by circular or rectangular translucent halo and appears bold, punctures reduced or absent post medially; humeral calli prominent with or without punctures or marks; basal calli distinct with or without fine punctures and occasionally with cream or yellow coloured spot, post basal concavity distinct with deeper punctures, most cases with round, irregular or rectangular black or brown spot on post basal depression medially and a longitudinal trapezoidal black spot on lateral margin of elytra extending from post basal region to post medial region, either one or both may be present or both may be absent, sutural margin brown to black. **Epipleura** outwardly oblique with or without small and minute punctures, narrowing towards apex from apical third.

Pleurites randomly punctured, **proepisternum** with concave anterior margin; **legs** long, tibiae longitudinally sulcate with rows of fine setae, intermediate and posterior tibiae emarginated at apex, posterior tibia with paired, stout, short spines apically, femur dilated and acutely dentate, claws appendiculate.

Venter sparsely pubescent; **prosternum** subquadrate, remotely punctate, I ventrite longer than following two combined medially, ventrites II–IV subequal shorter than V.

Male Genitalia. Dorsal surface of aedeagus convex, lateral margins subparallel with a spatulate apex, apical margin concave; aedeagus bent at right angle near base of aedeagus proper in lateral view, apex recurved dorsad, ventral surface more or less flat.

Remarks. *Pagria ingibbosa* closely resembles *P. pseudograta* Moseyko and *P. grata* (Baly). It is very difficult to segregate these species except by male genitalia.

Material examined (1 specimen).

1♂ “India: Kerala/ COA Vellayani/24.vi.2016/Amritha Kumari S Coll.”

Distribution. Japan, China, Nepal, Vietnam, Thailand, Singapore, USA, Hawaiian Islands, India. (First report from India).

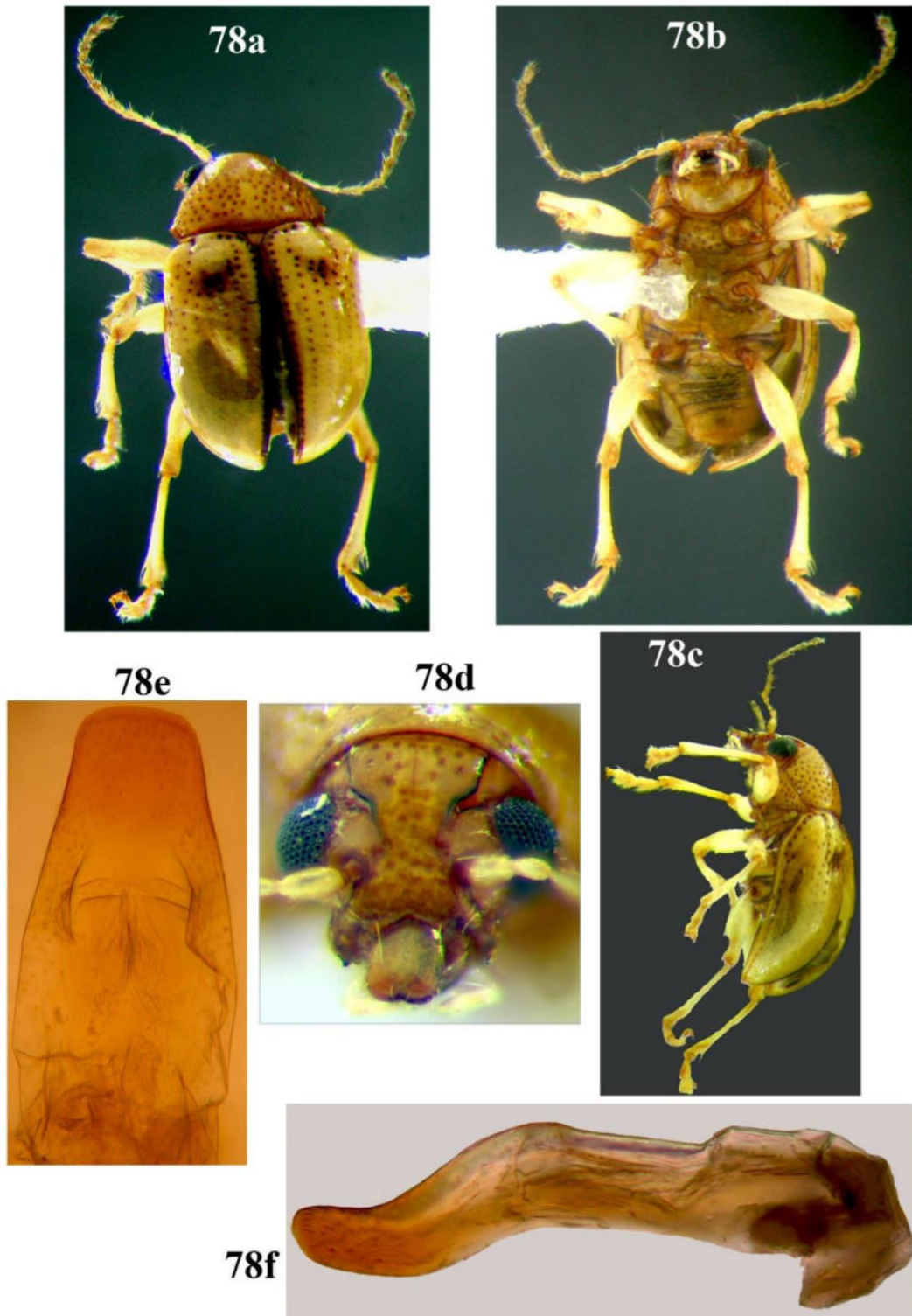
4.2.16.3. *Pagria* sp.1 (Figs. 78a–f)

Description

Body length 2.3 to 2.4 mm, width 1.3 to 1.5 mm; short-ovate, weakly sclerotized, entire body light yellow with brown margins, **vertex** with lateral margins brown, **palpi** yellow or light brown, mandibles yellow basally, black distally; **antennae** yellow to light yellow brown.

Head inserted, randomly punctured with fine setae; coronal sulcus weak, suprafrontal sulcus indistinct, **frons** subquadrate, hardly differentiated from vertex; lateral margins of **vertex** distinctly angulate at middle or immediately beneath; **antennal calli** distinct, subquadrate; **clypeus** distinct, narrow, strip-like, curved; **labrum** longer than broad, rarely short, apical area slightly sloping with a pair of widely spaced setose punctures medially and with an acute denticle between setose punctures, apical margin feebly emarginate, anterolateral angles with a few setae, apical margin with a row of short setae; **palpi** with apical palpomere longest; **mandibles** stout with setae on lateral side.

Compound eyes lateral, longitudinally oval, vertical diameter of eye 1.24 to 1.32 times transverse diameter of eye; **antenna** filiform, more than half as long as body, I



Figures 78a–f: *Pagria sp. 1*: **78a–d:** Habitus: **78a.** Dorsal view, **78b.** Ventral view, **78c.** Lateral view, **78d.** Head, frontal view, **78e–f:** Aedeagus: **78e.** Dorsal view, **78f.** Lateral view.

antennomere curved, thick, II curved, shorter than I, III and IV thin, following antennomeres progressively broadened, proportionate length of antennomeres I–XI equals 1 : 0.80–0.86 : 0.71–0.81 : 0.78–0.86 : 0.95 : 1 : 0.93–1.05 : 1–1.1 : 1 : 0.83–0.95 : 1–1.1; ratio of interantennal space, interocular space, distance between antenna and eye, maximum width of head, vertical diameter of eye and transverse diameter of eye respectively as follows 1 : 1.62–1.69 : 0.15–0.27 : 2.77–3.19 : 0.99–1.1 : 0.80–0.83. **Pronotum** almost 1.51 to 1.61 times wider than long, posterior margin almost 1.43 times anterior, irregularly punctured, punctures coarser towards lateral margins and finer towards anterior margins, lateral margins angulate after middle, posterior margin lobed, punctures denser and coarser towards lateral margins, anterolateral and posterolateral callosity distinct, bears a long seta. **Scutellum** almost triangular or tongue like.

Elytra 1.3 to 1.4 times longer than broad, punctate striate with small and minute punctures, punctures reduced post medially; humeral calli prominent with or without punctures or markings, basal calli prominent, sometimes post basal concavity bears an obscure brown spot medially and longitudinal irregular obscure black spot on lateral margin of elytra, either one or both may be present or absent. **Epipleura** outwardly oblique with or without small and minute punctures, and narrowing towards apex from apical third.

Pleurites punctured; **proepisternum** with concave anterior margin; **legs** light yellow, tibiae long, longitudinally sulcate with rows of fine setae, intermediate and posterior tibiae emarginate at apex, femur dilated and dentate, claws appendiculate.

Venter finely pubescent; **prosternum** broad with setose punctures; I ventrite longer than following two combined medially; III to IV almost subequal in length, shorter than V.

Male Genitalia. In dorsal view, aedeagus gradually narrowed distally, apical third strongly narrowed, apex transverse with convex margin, in lateral view almost straight, apex bent dorsad.

Remarks. This species is close to *P. signata* and *P. zeylonica* morphologically and anatomically.

Material examined (1 specimen).

1 ♂ “India : Kerala / COA Vellayani / N 8^o 25’ 47.5” E 76^o 59’ 8.3” / Amritha Kumari S Coll. / Ex. *Desmodium*”

Distribution. India (Kerala).

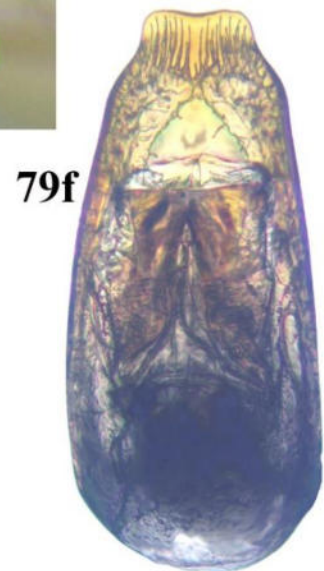
4.2.16.4. *Pagria pseudograta* Moseyko, 2013 (Figs. 79a–f)

Pagria pseudograta Moseyko, 2013: 210.

Description

Body length 1.7 to 1.9 mm; width 0.95 to 1.15 mm; short ovate; generally black and yellow brown; head red brown, dark brown, black or mixture of colour; clypeus red brown; palpi yellow, mandibles dark brown or red brown, pleurites black and red brown, venter red brown or brown black, elytra light yellow or yellow brown, pronotum red brown anteriorly, piceous to black posteriorly; frons anteriorly red brown, posteriorly brown; antenna with first four or five antennomeres yellow or light brown, rest with darker shades.

Head randomly punctured, setose; coronal sulcus weak, lateral margins of vertex straight or gently wavy; suprafrontal sulcus indistinct, frons and vertex undifferentiated, **frons** subquadrate or subtriangular, irregularly punctate with a long seta on anterolateral margins on either side; **clypeus** distinct, narrow, strip-like; **labrum** longer than broad, rarely shorter; with a pair of widely spaced setose punctures preapically, often with an acute denticle between setose punctures, apical margin gently emarginate, anterolateral angles with a few setae; labial palpi with last palpomere subequal to penultimate; maxillary palpi with last palpomere more than twice as long as penultimate; **mandibles** with setae on lateral side; **compound eyes** lateral, large and oval with deep and broad orbital sulcus, vertical diameter of eye almost 1.3 times transverse diameter of eye; **antenna** filiform, more than half as long as body; I antennomere thick and elliptical, II elliptical but shorter than I, III thin, following antennomeres progressively broadened, last antennomere longest; proportionate length of antennomeres I – XI 1 : 0.76–0.93 : 0.59–0.87 : 0.94–1 : 0.88–1 : 0.88–1 : 1–1.33 : 1–1.2 : 0.98–1.27 : 1.05–1.2 : 1.17–1.4; ratio of interantennal space, interocular space, distance between antenna and eye, maximum width of head, vertical diameter of eye and transverse diameter of eye respectively as 1 : 1.87–2 : 0.22–0.29 : 3.39–3.57 : 1.39 : 1.09.



Figures 79a–f: *Pagria pseudograta*.: 79a–d: Habitus: 79a–b. Dorsal view, 79c. Ventral view, 79d. Head, frontal view, 79e–f: Aedeagus: 79e. Lateral view, 79f. Dorsal view.

Pronotum 1.26 to 1.35 times longer than wide, convex, randomly punctured, lateral margins angulate, posterior margin lobed, irregularly punctured; punctures denser and coarser towards lateral margins, anterolateral callosity distinct; **scutellum** almost triangular or tongue like.

Elytra 1.3 to 1.45 times longer than broad, punctate striate, punctures surrounded by circular or rectangular translucent halo and appears bold, punctures reduced or absent post medially; humeral calli prominent with or without punctures or marks; basal calli distinct with or without fine punctures and sometimes appear as cream or yellow spot, post basal concavity distinct with deeper punctures, most cases with round, irregular or rectangular black or brown spot on post basal depression medially and a longitudinal trapezoidal black spot on lateral margin of elytra extending from post basal region to post medial region, either one or both may be present or both may be absent; sutural margin brown to black. **Epipleura** outwardly oblique with or without small and minute punctures, narrowing towards apex from apical third.

Pleurites randomly punctured, **proepisternum with** concave anterior margin; **legs** long, tibiae longitudinally sulcate with rows of fine setae, intermediate and posterior tibiae emarginated at apex, posterior tibia bears a paired stout and short spines apically, femur dilated and acutely dentate, claws appendiculate.

Venter sparsely pubescent; **prosternum** subquadrate, remotely punctate, first ventrite longer than following two combined medially, II to IV subequal, shorter than apical.

Male Genitalia. Dorsal surface of aedeagus convex, narrowed towards anterior, lateral margins gently convex, apex transverse, spatulate with apical margin concave; aedeagus bent at right angle near base of aedeagus proper in lateral view, apex recurved dorsad, ventral surface more or less flat.

Material examined (63 specimens).

3♂, 4♀ 21 unsexed “India : Kerala / Vellayani / N 08^o 25’ 47.5” E 76^o 59’ 8.3” / 4.viii.2018 18 m / Amritha Kumari Coll. / Ex.Cowpea”. 8 unsexed same date except host *Vigna radiata* and date 6.viii. 2016. 4♂, 1♀ & 7 unsexed same data except host *Macrotyloma uniflorum*. 2♂, 4♀ & 9 unsexed “ India : Kerala / Myladumpara / July 2015 / Prathapan K D Coll. / Ex. *Desmodium*”

Distribution. Sri Lanka, India (Kerala). First report from India

Remarks. *Pagria pseudograta* is more or less similar to *P. grata* (Baly) and *P. ingibbosa* Pic. It is very difficult to segregate these species except by male genitalia. *Pagria pseudograta* differs from *P. grata* in having a narrower frons and shorter deflexed apex of the aedeagus. This species is also very similar to *P. ceylonica* in the structure of the head and in the majority of the external characters, however, clearly differs with a wider apex of the aedeagus and the black pronotum. Both the insular species might have originated from *P. grata* and diverged under the insular conditions, since the differences in the structure of the genitalia between these partly sympatric species are greater than those between each of the species and *P. grata* (Moseyko, 2013).

4.2.16.5. *Pagria restituens* Walker, 1859 (Figs. 80a–n)

Pagria restituens Walker, 1859:263; Jacoby, 1908: 359.

Pagria aenea (Motschulsky, 1866) (= *Odontionopa aenea*); Medvedev, 2006: 413 (synonymy).

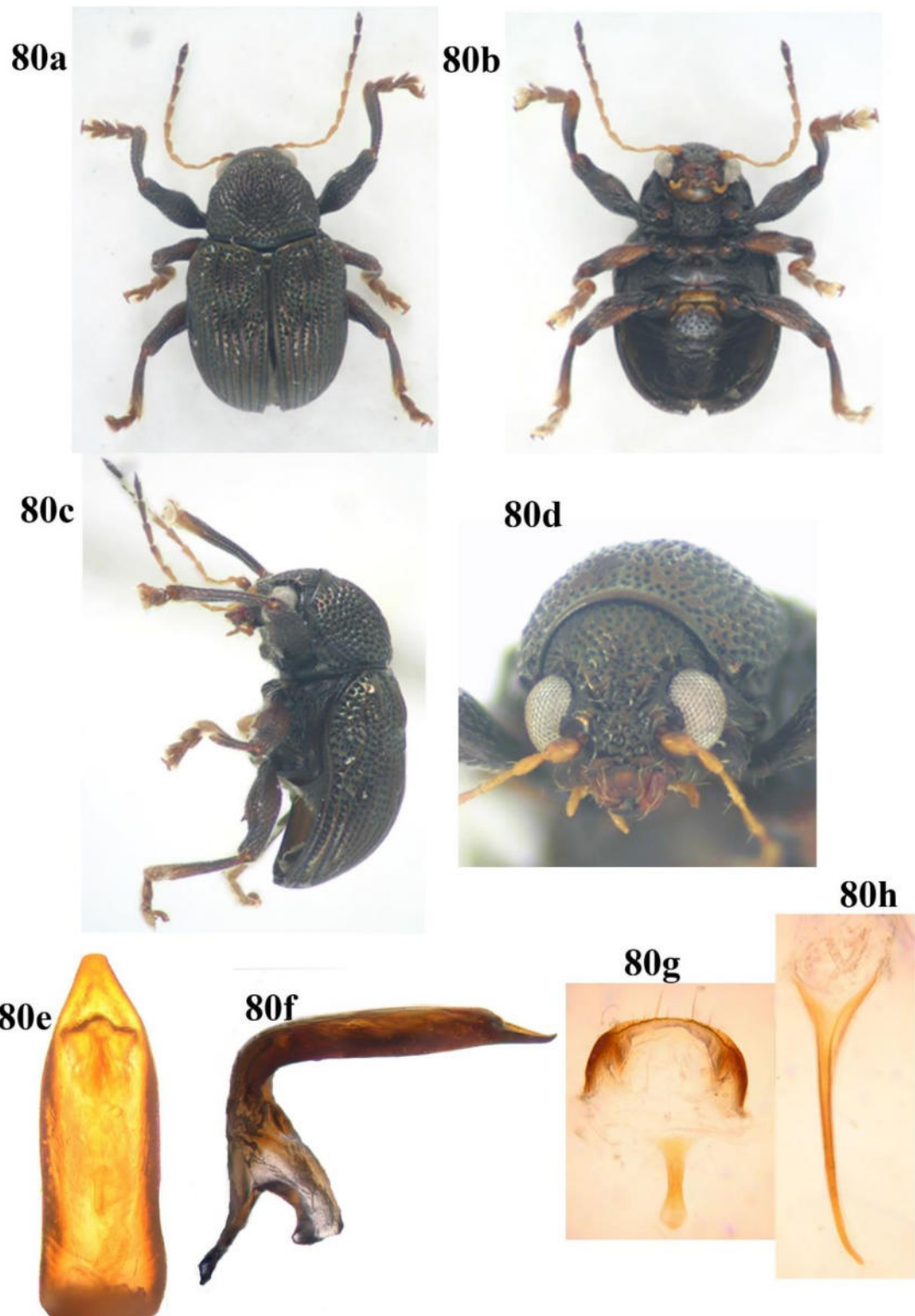
Pagria costatipennis Jacoby, 1887; 1908: 358; Medvedev, 2006: 413 (synonymy).

Pagria strigicollis Lefevre, 1887: clxviii; Jacoby, 1908: 358.

Description

Body length 3.26 to 3.8 mm, width 2 to 2.3 mm; ovate, generally black except palpi yellow or yellow brown, first four or five antennomeres yellow, rest red brown; entire dorsum rugose punctate.

Head coarsely punctate, sparsely pubescent, **vertex** rugose punctate; suprafrontal sulcus distinct; **frons** distinctly separated from vertex; **clypeus** very narrow, semicircular, strip-like; **labrum** red brown, longer than broad with a pair of widely spaced setose punctures medially, apex sinuate, anterolateral angles with a few setae; **orbital sulcus** distinct, deep with a row of setae; orbital pore near dorsal margin of eye, with an extra-long setae; **antennal calli** distinct, subquadrate; **mandibles** stout, laterally with two widely placed setae; maxillary palpi with palpomere almost thrice as long as penultimate; labial palpi with last palpomere more than twice as long as penultimate. **Compound eyes** lateral, hemispherical, sinuate near inner margin. **Antenna** subfiliform, reaching nearly half of elytra, I antennomere thick, II thinner than first, II and III thin, rest gently broadened towards apex; proportionate length of antennomeres



Figures 80a–h: *Pagria restituens*.: **80a–d:** Habitus: **80a.** Dorsal view, **80b.** Ventral view, **80c.** Lateral view, **80d.** Head, frontal view. **80e–h:** Male genitalia: **80e.** Aedeagus, Lateral view, **80f.** Aedeagus, lateral view, **80g.** Spiculum relictum & 8th tergite, **80h.** Spiculum gastrale.



Figures 80i–n. Female genitalia of *Pagria restituens*: **80i.** Ventral view, **80j–n.** Variation in spermatheca.

I–XI equals 1 : 0.92–1.22 : 1–1.04 : 0.96–1.26 : 1.04–1.3 : 0.8–1.21 : 1.08–1.26 : 1.04–1.3 : 1.04–1.21 : 0.96–1.17 : 1.24–1.47.

Pronotum 1.14 to 1.3 times wider than long, strongly convex, strongly punctate with interstices rugose forming reticulate sculpture, pronotum slightly depressed medially at times; punctures deeper and coarser laterally; punctures on pronotum larger than those on head, smaller than those on elytra; lateral margins entire, posterior margin gently lobed, anteapical area transversely depressed without punctures or costae, antebasal sulcus distinct, posterolateral callosity slightly projects laterally.

Elytra 1.16 to 1.29 times longer than wide, punctate striate, strongly costate longitudinally, post basal depression distinct; humeral calli prominent; basal calli distinct with three longitudinal parallel costae, sutural angle obtuse, apex slightly concave with a few flat short transparent pointed setae; epipleura with small minute punctures, outwardly oblique, narrowing beyond middle.

Proepisternum finely punctate; **legs** long, robust, anterior joints black, posterior parts red brown, femur dilated and dentate, tibia long, longitudinally sulcate with rows of setae, tarsomeres ventrally fringed with setae, setae on probasitarsomere sexually dimorphic, females with long pointed setae and males with capitate setae bordered by pointed setae, second tarsomere with pointed setae, third bilobed tarsomere with pointed setae and setae having triangular or arrowhead-like apex, both in male and female.

Prosternum broad and strongly punctate with fine setae; **ventrites** finely pubescent, I ventrite longer than following two combined medially, apex of last ventrite slightly concave in female and convex or straight in male.

Male genitalia. Adeagus with lateral margins subparallel upto apical third, then strongly converging towards apex, apex obtusely narrowed.

Female genitalia. Spermatheca sickle-shaped, weakly constricted or entire at base, inner and outer margin strongly curved at centre, abruptly converging apically, apex narrowly obtuse. Shape of spermatheca highly variable.

Remarks. The male genitalia of *P. restituens* collected from south Kerala is distinctly different from those from northern Kerala and south Karnataka. Aedeagus is distinctly different in apical third in dorsal and lateral views. Spiculum gastrale, spiculum

relictum and VIII ventrite also have significant differences. However, there is no distinct difference in external morphology. It is clear that these are two different species. However, for resolving this issue, all the type specimens need to be examined.

Distribution. India (Karnataka, Kerala, Pondicherry), Srilanka.

Material examined (42 specimens).

4♂, 3♀ 13 unsexed “India: TBGRI Palode/ N 08° 45’ 2.08” E 77° 01’ 40.50”/30.viii.2017/Amritha Kumari Coll./Ex.*Naravelia zeylanica*”. 2 unsexed “India : Kerala/Kattilappara/ 12.ix.2017/Viswajyothy K Coll.”. 3 unsexed “India: Kerala/CRS Pampadumpara/ N09° 48’ 23.7” E77° 10’4.9”/7.iii.2017/ Amritha & Sangamesh Coll. 1♂, 1♀ 2 unsexed India:Kerala/Kannur:Malappattom/ 16.vii.2016/ SRH & AKS Coll. 2♂ & 3 unsexed “India:Kerala/Palode, Peringamala/4.viii.2016/Amritha Kumari S Coll./Ex. Pepper”. 2 unsexed “India: Kerala/Wayanad, Mazhuvannur/10.x.2016/Viswajyothy K Coll”. 4 unsexed “India: Karnataka/Kalaza, Mavinakere/13°14’16.4”N 75°22’45.1”/4.x.2017/ Amritha Kumari S Coll./Ex. *Terminalia paniculata*”. 2♂ & 3 unsexed “India:Karnataka/COH Mudigere/13.1152° N 75.6328°E/Ex. *Lagestromia microcarpa*”. 19 unsexed same date except host *Vigna radiata* and date 6.viii. 2016. 3♂, 2♀ & 11 unsexed same date except host *Glycine max* and date 6.viii. 2016. 2♂, 1♀ & 9 unsexed same data except host *Macrotyloma uniflorum*. 3♂, 1♀ & 8 unsexed “India: Kerala/Myladumpara/N 9°53.306’ E77° 9.355’ 1083 m./ 22.x.2015 / Prathapan K D Coll.” 3♂, 4♀ & 5 unsexed “India: Kerala / Myladumpara / July 2015 / Prathapan K D Coll. / Ex. *Desmodium*”

Host plants. *Naravelia zeylanica* L. (Ranunculaceae), pepper, grasses, *Lagerstroemia*. *Pagria restituens* is apparently polyphagous.

4.2.16.6. *Pagria signata* (Motschulsky, 1858) (Figs. 81a–f)

Metachroma signata Motschulsky, 1858: 110.

Pagria signata (Motschulsky, 1858): Jacoby, 1908: 356.

Colposcelis signata (Motschulsky, 1858): Gressitt & Kimoto, 1961: 232.

Pagria diversepunctata Pic, 1950: 3.

Pagria signata var. *rufithorax* Pic, 1929: 35.

Pagria bipunctata Lefèvre, 1891: 266; Moseyko, 2013: 211 (synonymy).

Description

Body length 2.4 to 2.9 mm, width 1.4 to 1.8 mm; short, ovate, generally yellow to dark brown, head yellow to brown or red brown; **palpi** yellow or brown, mandibles piceous, antennae with first four or five antennomeres yellow or light brown and rest with dark shades of brown or brown black; pronotum yellow to dark brown or dark red brown; **elytra** yellow, yellow brown or dark brown; sutural margin brown to black; **pleurites** yellow to dark brown; venter light yellow to brown black or red brown with sparse pubescence.

Head inserted, randomly punctured and setose; coronal sulcus weak; **vertex** remotely punctured, finely setose, lateral margins distinctly angulate; suprafrontal sulcus indistinct; **frons** subquadrate or subtriangular, irregularly punctate with a long seta on anterolateral margin on either side; **clypeus** distinct, narrow, strip-like, with a few fine setae; **labrum** broad, sometimes longer than broad, with a pair of widely spaced setose punctures medially, rarely with an acute denticle between setose punctures, apex feebly emarginate, anterolateral angles with a few setae; labial palpi with last palpomere subequal to penultimate, maxillary palpi with last palpomere almost 1.5 as long as penultimate; **mandibles** stout with a seta on lateral side. **Compound eyes** lateral, globular with deep and broad orbital sulcus margined with a row of setose punctures; orbital pore near dorsal margin of eye with a long seta. **Antenna** filiform, extend beyond half of body, I antennomere thick, II shorter than I, III thin, following antennomeres progressively broadened, last antennomere longest, proportionate length of antennomeres I – XI equals 1 : 0.77–0.93 : 0.64–0.70 : 0.82–0.95 : 0.9–0.95 : 1 : 1–1.14 : 1.1–1.14 : 1 : 1–1.2; ratio of interantennal space, interocular space, distance between antenna and eye and maximum width of head equals 1 : 1.5–2.1 : 0.2–0.3 : 3.0–3.34.

Pronotum 1.4 to 1.5 times wider than long, convex, profusely punctured, punctures denser and coarser towards lateral margins, lateral margins acutely angulate post medially, rarely with a pair of widely separated obscure black or brown spots medially; posterior margin lobed; posterolateral angle slightly projects beyond lateral margin.

Elytra 1.2 times longer than broad, punctate striate, punctures mostly surrounded by a circular or rectangular translucent hallow like area, appear bold, punctures reduced or

absent post medially; humeral region with a prominent callus with or without punctures, basal calli prominent, sometimes impunctate and appear as yellow spot; post basal depression distinct with bolder punctures, in most cases there is a round, irregular or rectangular black or brown spot on post basal depression immediately behind basal callus and a longitudinal trapezoidal black spot on lateral margin of elytra extending from post basal region to post medial region, either one or both may be absent, sutural and lateral margins punctate throughout, punctures semiregular with seven rows post basally, leaving scutellar row and row next to lateral margin short and incomplete. **Scutellum** almost triangular or tongue like, **epipleura** outwardly oblique with or without small and minute punctures. Sutural and lateral margin punctate throughout, punctures semiregular with seven rows post basally, leaving scutellar row and row next to lateral margin short and incomplete.

Proepisternum sparingly punctate or impunctate, anterior margin concave; **hypomeron** strongly, unevenly or sparsely punctate; **legs** long light yellow to dark brown, tibiae long, intermediate and posterior tibiae emarginated at apex, femur dilated and toothed, claws appendiculate; **prosternum** broad, strongly punctate; I ventrite longer than following two combined medially, ventrites II to IV subequal, shorter than last.

Male Genitalia with aedeagus in dorsal view slightly narrowed at apical third, apex spatulate, apical margin convex; bent at right angle near base in lateral view with apex gently recurved.

Female genitalia. Spermathecal capsule sickle shaped and highly variable in shape.

Material examined (102 specimens).

5♂, 7♀ 19 unsexed “India: Kerala/Vellayani/ N 08° 25’ 47.5” E 76° 59’ 8.3”/4.viii.2018 18 m/Amritha Kumari Coll./Ex.Cowpea”. 19 unsexed same date except host *Vigna radiata* and date 6.viii. 2016. 3♂, 2♀ & 11 unsexed same date except host *Glycine max* and date 6.viii. 2016. 2♂, 1♀ & 9 unsexed same data except host *Macrotyloma uniflorum*. 3♂, 1♀ & 8 unsexed “India: Kerala/Myladumpara/N 9°53.306’ E77° 9.355’ 1083 m./ 22.x.2015/ Prathapan K D Coll.” 3♂, 4♀ & 5 unsexed “India: Kerala/Myladumpara/July 2015/ Prathapan K D Coll./Ex. *Desmodium*”



Figures 81a–f: *Pagria signata*.: **81a–d:** Habitus: **81a.** Dorsal view, **81b.** Ventral view, **81c.** Lateral view, **81d.** Head, frontal view, **81e–f:** Aedeagus: **81e.** Dorsal view, **81f.** Lateral view.

Distribution. Vietnam, Laos, Thailand, Myanmar, India (Kerala, Karnataka, Tamilnadu).

4.2.16.7. *Pagria ceylonica* Pic, 1929 (Figs. 82a–f)

Pagria ceylonica Pic, 1929: 35; Moseyko, 2013: 209.

Description

Body length 1.8 to 2.2 mm, width 1.2 to 1.3 mm; short ovate in shape; **head** yellow to brown black; **palpi** yellow or light brown, **mandibles** red brown or black brown, proximal **antennomeres** yellow or light brown, distal ones darker, **pronotum** light yellow to black or mixture of yellow to red brown with black; **elytra** light yellow to red brown with brown black margins and a longitudinal black irregular or trapezoidal spot near lateral margins, **pleurites** brown to black, **legs** light yellow to yellow brown, coxa red brown, trochanter dark red brown to black, **venter** yellow to brown black.

Head randomly punctured with fine setae; coronal sulcus weak, suprafrontal sulcus indistinct, frons hardly differentiated from vertex, lateral margins of vertex feebly angulate beneath middle, **frons** subquadrate with a long seta anterolaterally on either side; **antennal calli** distinct, subtriangular, **clypeus** distinct, narrow, strip-like and curved; **labrum** longer than broad, short rarely, a pair of widely spaced setose punctures medially, sometimes with an acute denticle between setose punctures, apical margin emarginate, anterolateral angle with a few setae; labial palpi with last palpomere subequal to penultimate, maxillary palpi with last palpomere almost twice as long as penultimate; **mandibles** setose laterally; **orbital sulcus** broad, deep; **compound eyes** lateral, longitudinally oval, feebly emarginate at inner angle, vertical diameter of eye 1.3 to 1.35 times transverse diameter. **Antenna** filiform, longer than half of of body, I antennomere thick, curved, II shorter than I, III and IV thin, following antennomeres progressively broadened; proportionate length of antennomeres I – XI 1 : 0.72–0.83 : 0.56–0.61 : 0.67–0.78 : 0.83 : 0.83 : 0.83–1 : 1 : 0.83–1 : 0.83–0.94 : 1–1.1; ratio of inter antennal space, interocular space, distance between antenna and eye, maximum width of head, vertical diameter of eye and transverse diameter of eye respectively are 1 : 1.72–1.93 : 0.26–0.28 : 3.2–3.26 : 1.16–1.3 : 0.88–0.96.

Pronotum 1.2 to 1.4 times wider than long, posterior margin almost 1.4 times longer than anterior, punctures larger towards lateral margins and finer towards anterior

margin, lateral margins feebly angulate behind middle, posterior margin lobed; punctures denser and coarser towards lateral margins, anterolateral and posterolateral callosity visible.

Elytra 1.2 to 1.3 times longer than broad, punctate striate, punctures small and minute, mostly surrounded by a circular or rectangular translucent halo, punctures reduced post medially; humeral calli prominent with or without punctures and markings, basal calli prominent, punctate and appears as an yellow spot in some specimens, basal calli less prominent in some cases, sometimes post basal concavity bears an obscure black or brown spot medially; **scutellum** almost triangular or tongue like; **epipleura** outwardly oblique with or without small and minute punctures, narrowing towards apex from apical third.

Elytral punctation similar to that of *P signata*.

Pleurites punctured, **proepisternum** with concave anterior margin; **legs** long, tibiae long, longitudinally sulcate with rows of fine setae, intermediate and posterior tibiae emarginated at apex, posterior tibia bears paired short spurs apically, femur dilated and dentate, claws appendiculate.

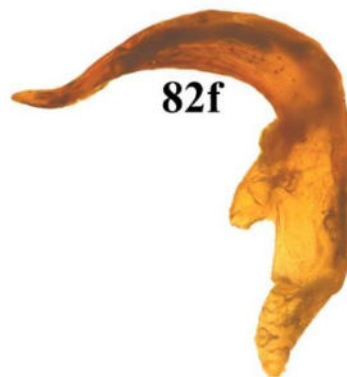
Ventrites finely pubescent; **prosternum** broad with setose punctures, lateral margin of prosternum indistinctly angulate; I ventrite longest, longer than following two combined medially, ventrites II to IV subequal, shorter than apical segment.

Male Genitalia. Adeagus with dorsal surface convex, narrowed distally, spatulate apically, apical margin convex; aedeagus bent at right angle in lateral view, gently curved, apex slightly recurved.

Remarks. *Pagria ceylonica* is closely related to *P. grata*. According to Moseyko (2013), this species is intermediate between *P. grata* and *P. signata* complexes of species and he concluded that *P. ceylonica* has originated from *P. grata* as a result of the insular speciation and its divergence from *P. pseudograta*.

Material examined (38 specimens).

4♂, 2♀ 9 unsexed “India: Kerala/Vellayani/ N 08° 25’ 47.5” E 76° 59’ 8.3”/4.viii.2018 18 m/Amritha Kumari Coll./Ex.Dolichos bean”. 13 unsexed same date except host *Vigna mungo* and date 6.viii. 2016. 2♂, 2♀ & 6 unsexed “India: Kerala/Myladumpara/July 2015/ Prathapan K D Coll.”



Figures 82a–f: *Pagria ceylonica*.: **82a–d:** Habitus: **82a–b.** Dorsal view, **82c.** Head, frontal view, **82d.** Ventral view, **82e–f:** Aedeagus: **82e.** Dorsal view, **82f.** Lateral view.

Distribution. Sri Lanka, India (Kerala). First report from India.

4.2.17. *Pseudocolaspis* Laporte, 1833

(Type species. *Pseudocolaspis coerulea* from Senegal)

Pseudocolaspis Laporte, 1833: 23; Selman, 1963: 638; Jacoby, 1908: 466 (year wrongly typed as 1853); Chapuis, 1874: 288; Baly, 1877: 248; Jolivet, (vol.51) : 128; Selman, 1972: 71

Eubrachis Dejean, 1837: 438; Selman, 1963: 638

nec Eubrachys Baly, 1878: 248

nec Eubrachys Burgeon, 1940

Generic diagnosis. Body oblong, metallic, densely setose; proepisternum convex; scutellum tricuspidate; pygidium more than half exposed; femora dilated, with a ventral tooth, mid tibia shorter than fore- and hindtibiae, intermediate and posterior tibiae not emarginated preapically, claws bifid; pronotum subcylindrical, as long as broad, lateral margins obsolete, widest near base, narrowing anteriorly; antennae short with transversely dilated terminal antennomeres; orbital sulcus weak, first ventrite exceptionally long, longer than rest combined; elytra with prominent humeral calli, setae often arranged in rows.

Remarks. *Pseudocolaspis* is closely related to *Macrocoma* Chapuis and *Tanybria* Selman. More than half of pygidium is exposed in *Pseudocolaspis*, while in *Tanybria* and *Macrocoma*, pygidium is entirely covered by the elytra. *Pseudocolaspis* and *Macrocoma* are densely pubescent, however, *Tanybria* is glabrous. Anterior and middle tibiae are almost equal in *Tanybria*, while in *Pseudocolaspis* and *Macrocoma*, middle tibia is shorter than foretibia. In *Tanybria*, pronotum is anteriorly as wide as posteriorly, however, pronotum is anteriorly narrowed in the other two genera.

4.2.17.1. *Pseudocolaspis* sp. 1 (Figs. 83a–k)

Body length 4.0 mm, width 2.2–2.3 mm; entirely metallic aeneous, except legs, clypeus, mouth parts and antennae dark red brown with aeneous gloss, body entirely clothed with adpressed silvery setae arranged in rows.

Head profusely and closely punctured with long setae; coronal suture distinct, indicated by a weak depression in middle of vertex; interstices appear finely rugose, longitudinal

rugosities evident near posterior margin of vertex; suprafrontal sulcus weakly indicated, frons and vertex undifferentiated; frons with some impunctate areas; clypeus distinct, narrow, band like, strongly emarginate anteriorly; **labrum** broader than long, setose, sloping anteriorly, anterior margin with a row of short setae discontinuous medially, apex distinctly sinuate; **mandibles** bidentate apically; **maxillary palpi** with last palpomere more than two times as long as penultimate; **labial palpi** with last and penultimate palpomeres subequal. **Compound eyes** lateral, hemispherical, mesal margin obsoletely sinuate, transverse diameter of eye subequal to vertical; orbital sulcus weak; supraorbital pore adjacent to dorsal margin of eye with a long suberect seta. **Antenna** short with transversely dilated terminal joints, reaching up to base of pronotum; first antennomere thick, longer than second, second thicker than following 4 separately which are almost subequal, antennomeres 7 to 11 transversely widened, antennomeres 8–10 are broader than long; **antennal calli** indistinct; distance between compound eyes 1.5 times transverse diameter, 1.7 times distance between antennal socket; maximum width of head 2.7 times transverse diameter of eye, almost three times distance between antennal socket, 1.7 times distance between compound eyes.

Pronotum as long as wide, maximum width post medially near base, narrowing anteriorly; posterior margin 2.2 times longer than anterior, closely punctate than head, clothed with long adpressed setae, posterior margin distinctly lobed, straight medially and sinuate on either side, anterior margin straight, lateral area weakly margined posteriorly and obsoletely margined anteriorly.

Scutellum as broad as long, punctured with long adpressed setae. Almost pentagonal in outline, apex cuspidate, posterior margin tricuspidate.

Elytra 1.2 times longer than broad, maximum width postbasally near humerus, closely and boldly punctured with short suberect setae except a few adpressed setae at base, setae arranged in widely separated longitudinal rows, humeral calli prominent; basal calli, post basal depression weak; sutural angle subacute; elytral apex almost straight; **epipleura** outwardly oblique, arise post basally, gradually narrowing post medially towards apex.

Prosternum large, subquadrate, slightly longer than broad, densely setose, lateral margins slightly concave.



Figures 83a–d: *Pseudocolaspis* sp. 1, habitus: **83a.** Dorsal view, **83b.** Ventral view, **83c.** Lateral view, **83d.** Head, frontal view.



Figures 83e–h. Male genitalia of *Pseudocolaspis* sp. 1. **83e.** Aedeagus, dorsal view. **83f.** Aedeagus, lateral view, **83g.** Spiculum gastrale, spiculum relictum and 8th tergite. **83h.** Tegmen.



83i



83j



83k

Figures 83i–k. Female genitalia of *Pseudocolaspis* sp. 1. **83i.** Spermatheca, **83j.** Ovipositor, **83k.** VIII Tergite.

Proepisternum convex, densely setose, metasternum much broader than long.

Legs long, femora dilated with an acute tooth ventrally beyond middle, hindfemur strongly dilated, tibiae longitudinally carinate with rows of setae between carinae, intermediate tibia shorter than fore- and metatibiae, metatibia with single long and strong apical spur with a sharp depression nearby; tarsomeres ventrally fringed with setae of varying shape, males with capitate setae ventrally on fore- and mesobasitarsomeres, metabasitarsomere ventrally with pointed setae and non-setose area medially, third bilobed tarsomere of all legs with long setae of varying shapes such as capitate setae proximally and distally with clavate, arrow-head-shaped, triangular, truncated or pointed setae, females with all basitarsomeres ventrally with pointed setae.

Ventrites finely punctate and setose with round, raised sensillae; first ventrite exceptionally long, medially longer than rest combined, ventrite 2 – 4 subequal, shorter than ventrite 5.

Male genitalia in lateral view with **aedeagus** bent at right angle in middle, apex sharply narrowed; dorsal surface with lateral margins concave basally, distal portion widened and apex rounded, apical opening broad; spiculum gastrale Y-shaped, median arm distinctly curved, less than half as long as lateral arms; spiculum relictum subtriangular; 8th sternite semicircular; apex with short setae; tegmen narrowing towards bilobed apex, lateral margins sinuate.

Female genitalia with spermathecal capsule U-shaped, with proximal part short knob like where spermathecal duct and spermathecal gland duct attached, deeply curved distally, almost uniform in width up to middle, thence narrowed with apex subacute, spermathecal gland tubular. **Ovipositor** very short, with partially reduced structures.

Remarks. This species superficially resembles *P. longicollis* Baly. In *Pseudocolaspis* sp. 1, body is aeneous while *P. longicollis* is cupreous or metallic green. Thorax in *Pseudocolaspis longicollis* is about a quarter as long as broad, however, in *Pseudocolaspis* sp. 1, pronotum is as long as broad. Elytra is post basally rugulose in *P. longicollis* while it is smooth in *Pseudocolaspis* sp. 1.

Distribution. India (Kerala).

Material examined.

1 ♂ & 1 ♀ “India: Kerala/ Chinnar WLS/10.VI.2010/ Prathapan Coll.”.

4.2.18. *Pseudostonopa* Jacoby, 1903: 98

(Type species: *Pseudostonopa bicolor* Jacoby, 1903 from south India)

Sharp, 1903: 208; Carus, J.V. & Field, H.H. 1903: 350; Seidlitz, 1904: 349; Royal Society (Great Britain), 1906: 902. Jacoby, 1908: 350; Clavareau, 1914: 60; Lucas, 1919: 553; Seeno & Wilcox 1982: 51; ZSI, 1996: 626; ZSI, 2000: 262; Kimoto, 2005: 36; Moseyko & Sprecher-Uebersax 2010: 642.

Generic diagnosis. Anterior margin of thoracic episternum concave. Antennae filiform. Thorax broader than long, lateral margins obtusely angulate or biangulate. Elytra slightly wider than prothorax at base, punctate striate. Femora dilated and unarmed; intermediate and posterior femora emarginate preapically. Claws appendiculate.

Remarks. *Pseudostonopa* is closely related to *Basilepta* Baly, 1860. However, in *Pseudostonopa*, all femora lacks a ventral tooth (all femora ventrally dentate in *Basilepta*) and the lateral margins of pronotum are never dentate (lateral margins of pronotum often dentate in *Basilepta*).

The genus, restricted to the Indian subcontinent, is represented by six described species, of which two occur in south India.

4.2.18.1. *Pseudostonopa palynophaga* n. sp. (Figs. 84a–q)

Description

Description. **Body** oblong elongate, length 2.6 to 3.3 mm; width 1.4 to 1.6 mm. Dorsum yellow to dark brown, head and pronotum darker, anterior area of head lighter rarely, mandibles red brown to piceous, antennae piceous or black except first two or three antennomeres yellow, palpi yellow brown to black, scutellum concolorous with elytra or darker in some specimens; ventral aspect yellow to piceous; legs yellow to dark brown to piceous.

Head exerted, exceptionally long, profusely punctured with impunctate areas in between, punctures on head more or less equal to or larger than those on pronotum, often shallow with short seta. Coronal sulcus weak but distinct, suprafrontal sulcus evident but weakly indicated, antennal calli neither raised nor delimited by sulci; labrum broader than long with a pair of widely spaced setose puncture preapically, anterolateral corners with three setae each, apex gently emarginate with a row of setae

rarely absent in middle. Mandibles bidentate apically with a long bent setae laterally; mandibular mola moderately developed. Maxillary palpi with last palpomere longest, almost two times longer than penultimate which is shorter than preceding one. Labial palpi with last palpomere slightly longer than penultimate. Supraorbital pore near dorsal margin of eye, with a long seta. Orbital sulcus weak. Gular area visible, subquadrate, with a few minute punctures. **Antennae** long, filiform, extends up to half of elytra; antennomere I longer and thicker than II; III and IV thin, subequal; III longer than II, shorter than IV; V–X broader, subequal, XI longer than X. **Compound eyes** small, lateral, inner angle gently concave, vertical diameter of eye 1.5 times transverse. Distance between compound eyes 2.5 times transverse diameter of one eye, 1.5 times distance between antennal sockets, maximum width of head 3.6 times transverse diameter of one eye, 1.5 times distance between compound eyes, 2.1 times distance between antennal sockets.

Pronotum 1.5 to 1.7 times broader than long, posteriorly 1.4 to 1.5 times wider than anteriorly, maximum width post medially, converging anteriorly, both anterior and posterior margins nearly straight, lateral margins obtusely angulate beyond middle, clothed with short fine adpressed yellow setae; densely punctate, punctures closely placed, interstices narrower than half diameter of a puncture, pronotal punctures smaller than elytral punctures, interstices more or less granulose in some specimens; posterolateral callosity well developed, with a long seta, not projecting beyond lateral margin. **Scutellum** broader than long, minutely punctate, apex rounded.

Elytra 1.4 to 1.6 times longer than broad, maximum width near middle, punctate striate, elytral base slightly broader than base of pronotum, basal calli distinct with closely arranged confused punctures, humeral calli prominent; an elongate callosity arise posteroventral to humeral calli, proximally prominent, well differentiated from humerus in females than in males. Punctures regular, rows countable from middle till apex, distance between punctures in a row less than distance between rows of punctures; post basal depression weak, lateral portion of elytra depressed all around; apex narrow, convex.

Venter setose, abdomen narrowed posteriorly, prosternum distinctly longer than broad with a few bold punctures and fine setae, mesosternum longer than broad with setose

punctures, metasternum strongly punctate laterally, nearly impunctate medially. Ventricle I subequal to or longer than following two combined, ventrites I to IV each longer than preceding, ventrite V longer than IV. Pygidium granulate with long setae near apex, without elytral locking groove.

Proepisternum concave anteriorly, with long setae and bold punctures, hypomeron depressed posteriorly with bold setose punctures.

Legs long except middle pair shorter, femur dilated medially without tooth beneath, tibia distinctly carinate anteriorly, intermediate tibia distinctly emarginated preapically with a convexity medially, posterior tibia weakly emarginate, intermediate and posterior femora with short paired spurs at apex, probasitarsomere and mesobasitarsomere in males ventrally with capitate setae bordered by pointed setae, metabasitarsomere in male and all basitarsomeres in female with pointed setae, second tarsomere irrespective of gender with pointed setae, third bilobed tarsomere with diverse forms of setae with majority arrow-head or triangular shaped. Claws appendiculate.

Male genitalia. **Aedeagus** in lateral view strongly curved, apex narrowed; gently curved dorsad; in dorsal view, aedeagus gently narrowed preapically, ventral portion more or less flat or gently convex. **Tegmen** proximally with a pair of narrow, sclerotized arms which encircle aedeagus by means of membranous connections, gradually narrowed towards posterior, apex weakly bilobed. **Spiculum gastrale** Y-shaped, median arm distinctly longer than two times lateral arms, spiculum relictum weakly sclerotized, VIII tergite semicircular with setose apex.

Endophallus connected to aedeagus with a pair of long laminae dorsally and a pair of shorter laminae ventrally, endophallus long and tubular with three distinct regions: basal phallomere, median phallomere and apical phallomere. Basal phallomere (BP) short, elongate and subparallel, with three indistinct irregular lateral lobes, paired central sclerite (CS) present at junction of basal and median region. Median phallomere (MP) longest; more than three times BP; curved with small triangular setae like spicules. Apical phallomere (AP) subglobular with multiple lateral lobes and an apical sclerite (AS). Apical sclerite single, almost Ω -shaped.



84a



84c

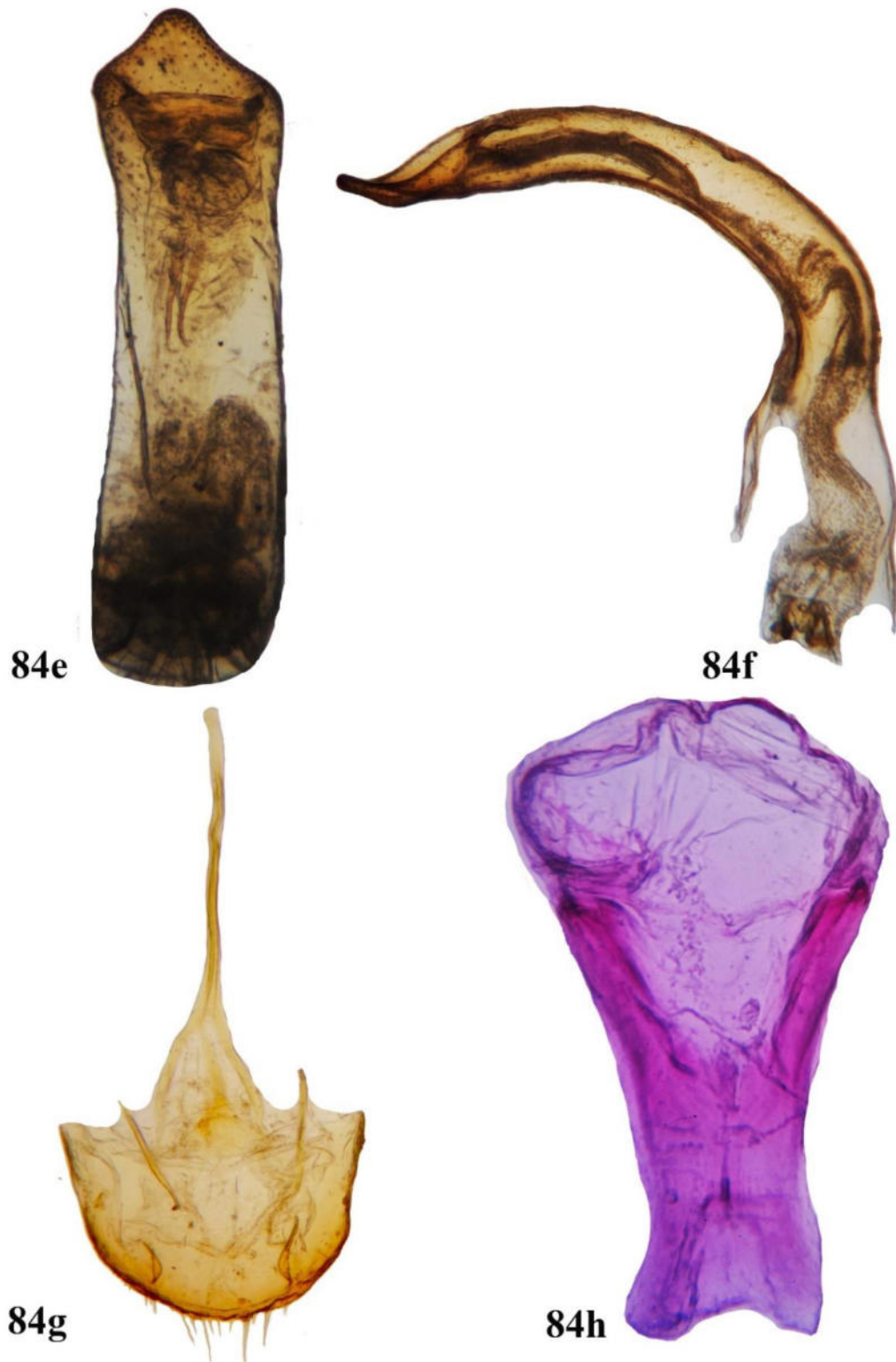


84b

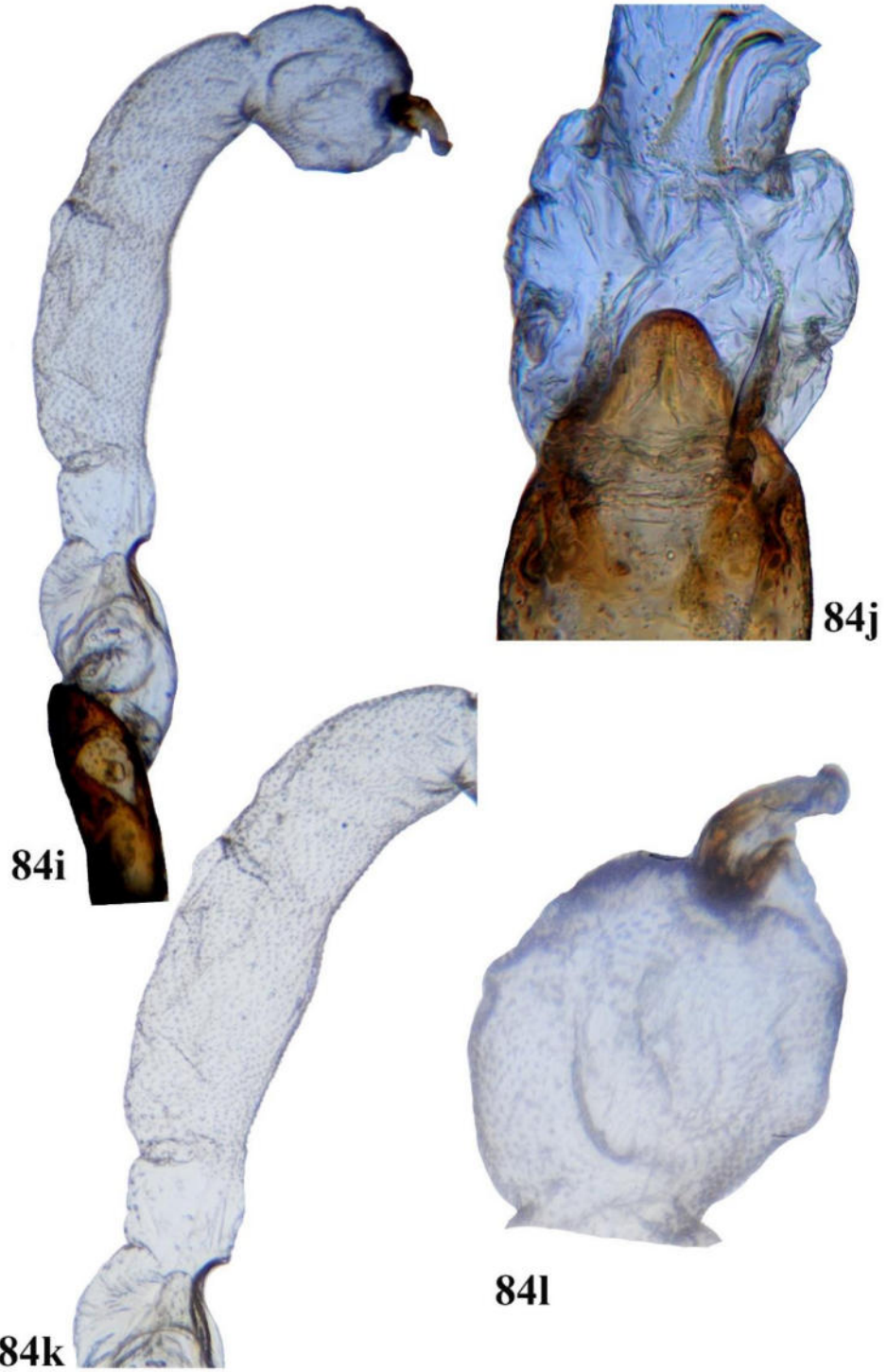


84d

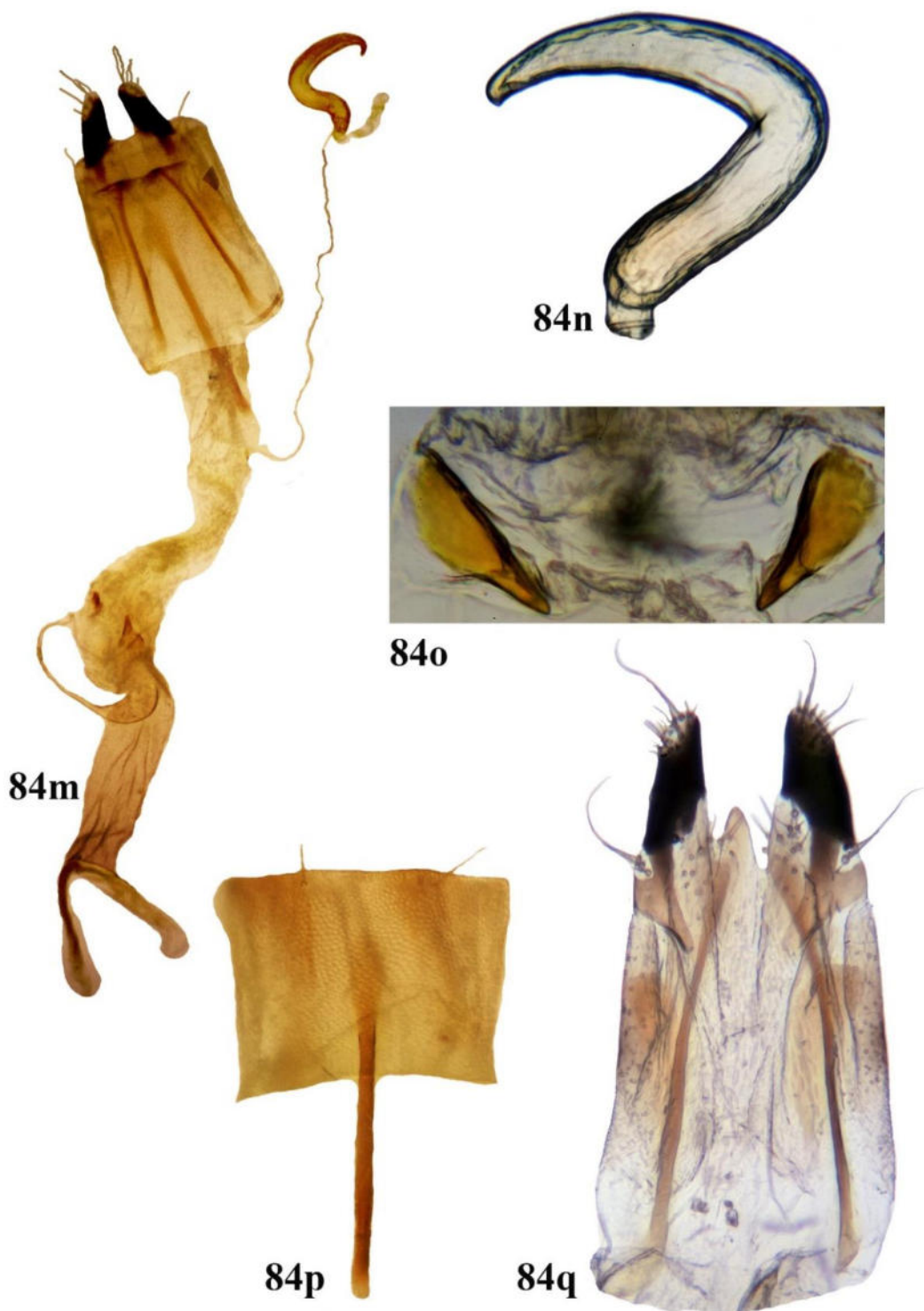
Figures 84a–d: *Pseudostonopa palynophaga* n. sp., habitus: **84a.** Dorsal view, **84b.** Ventral view, **84c.** Lateral view, **84d.** Head, frontal view.



Figures 84e–h. Male genitalia of *Pseudostonopa palinophaga* n. sp. **84e.** Aedeagus, dorsal view. **84f.** Aedeagus, lateral view, **84g.** Spiculum gastrale, spiculum relictum and 8th tergite. **84h.** Tegmen.



Figures 84i–l. Endophallus of *Pseudostonopa palinophaga* n. sp., **84i.** Endophallus, everted through apical opening or ostium, lateral view. **84j.** BP. **84k.** MP. **84l.** AP.



Figures 84m–q. Female genitalia of *Pseudostonopa palinophaga* n. sp. **84m.** Ventral view, **84n.** Spermatheca. **84o.** Vaginal plates, **84p.** Fused 8th sternite and 8th tergite with tignum, **84q.** Ovipositor.

Female genitalia not properly everted. **Spermathecal capsule** almost sickle shaped with a very short proximal region where the spermathecal duct and spermathecal gland attached; distal region strongly curved near middle, its inner margin being V-shaped and outer margin U-shaped; spermathecal gland short, tubular, translucent, gently dilated; spermathecal duct longer than vagina, base of which sclerotized, dilated, curved like sickle; bursa copulatrix sac-like with paired bursa sclerites, broader basally, acutely pointed distally; VIII sternite and ventrite laterally fused to form a membranous cylinder with longitudinal sclerotizations; ovipositor longer than tignum, coxite without stylus.

Remarks. Five species of *Pseudostonopa* have so far been described. Head is exerted and exceptionally long in *P. palynophaga* **n. sp.** compared to all other species. *Pseudostonopa bicolor*, the type species, sympatric with *P. palynophaga* **n. sp.**, is colored dark fulvous with black bands or spots on thorax and elytra or nearly black with flavous elytral apex (*P. palynophaga* **n. sp.** is yellow to dark brown without maculations). Antennae entirely fulvous except terminal joints piceous in *P. bicolor* (antennae piceous or black except first two or three antennomeres yellow in *P. palynophaga* **n. sp.**). Anterior sulcus on thorax is absent in *P. bicolor* (anterior sulcus weakly developed in *P. palynophaga* **n. sp.**).

Pseudostonopa biplagiata has fulvous head and elytra, pronotum piceous, elytra each with a discoidal oval black spot (*P. palynophaga* **n. sp.** colored yellow without spots or maculations). Sides of thorax in *P. biplagiata* is biangulate and gently narrowed towards both base and apex (lateral margins of pronotum is obtusely angulate behind middle and distinctly narrowed anteriorly in *P. palynophaga* **n. sp.**).

Pseudostonopa castanea is red brown with legs black (*P. palynophaga* **n. sp.** is yellow to brown with legs yellow to aeneous); supra frontal sulcus is distinct in *P. castanea* (supra frontal sulcus weak in *P. palynophaga* **n. sp.**); lateral margins of thorax obtusely biangulate in *P. castanea* (*P. palynophaga* **n. sp.** with lateral margins obtusely angulate behind middle, narrowed anteriorly); anterior sulcus deep at sides and obsolete medially in *P. castanea* while it is weak in *P. palynophaga* **n. sp.**; and pronotum is remotely punctured in *P. castanea* (profusely punctured in *P. palynophaga* **n. sp.**). Humeral callus in *P. castanea* is followed inwardly by a short, anteriorly divided costa

(*P. palynophaga* **n. sp.** with an elongate callosity posteroventral to humeral calli and is prominent in females).

Pseudostonopa picea is piceous with fulvous elytral apex (general color of *P. palynophaga* **n. sp.** is yellow brown to brown), humeral calli tuberculate in *T. picea* (humeral calli not tuberculate in *P. palynophaga* **n. sp.**, however, an elongate callosity arise posteroventral to humeral calli, which is prominent in females). *Pseudostonopa picea* has second antennomere longer or as long as third (second antennomere shorter than third in *P. palynophaga* **n. sp.**)

Pseudostonopa flaviventris differ from *P. palynophaga* **n. sp.** in having subquadrate-oval body (body elongate and oblong in *P. palynophaga* **n. sp.**); and the antenna is pitchy brown with four or five basal antennomeres paler in *P. flaviventris* while it is piceous or black except first two or three antennomeres yellow in *P. palynophaga* **n. sp.** Sides of pronotum strongly angulate at basal 1/3rd in *P. flaviventris* (obtusely angulate in *P. palynophaga* **n. sp.**).

Distribution. India (Kerala).

Types. Holotype. 1 ♂ (1) “India: Kerala/ Eravikulam NP/10^o 11’ 13.5”N 77^o 05’ 13.4” E/ 24.ix.2019/ K D Prathapan Coll.”. (2) HOLOTYPE/ *Pseudostonopa palynophaga* **sp. n.** /des. Amritha, Moseyko & Prathapan, 2020/(red label) BMNH.

Paratypes (20 specimens). 14 ♂ & 6 ♀ same labels as holotype.

Host plants. Probably *Cymbopogon flexuosus* (Nees ex Steud.) Will. Watson (Cochin grass, East-Indian lemon grass or Malabar grass) (Poaceae), a common grass of montane grasslands in southern Western Ghats, a biodiversity hot spot (Myers *et al.*, 2000) in India.

Natural history. Specimens of *P. palynophaga* **n. sp.** were collected from the montane grasslands, 11.5 km north of Munnar, located along the southern Western Ghats in the Idukki district, Kerala state. The type locality encompasses a high rolling hill plateau with a base elevation of about 2000 m. The terrain consists of high altitude grasslands interspersed with shola forests. The gut of the insects were packed with pollen ingested from grasses. Microscopic examination of the pollen revealed that the host plant of the insects belong to Poaceae, *Cymbopogon* (Spreng.). As the dominant species in the grasslands from where the beetles were collected being *Cymbopogon flexuosus*

(Nees ex Steud.) W. Watson, most probably the pollen grains recovered from the gut of *P. palyonophaga* **n. sp.** could belong to this species.

4.2.19. *Scelolanka* Medvedev, 1974

Generic diagnosis. Body oblong, clothed with adpressed scale-like setae; anterior margin of proepisternum concave; orbital sulcus deep; antennal calli well developed; compound eyes oval; antenna short; pronotum almost rounded laterally, base distinctly narrower than elytra; lateral margins obsolete; prosternum strongly narrowed; epipleura absent; legs slender, femora weakly dilated and unarmed, intermediate and posterior tibiae emarginate preapically with paired apical spurs, claws bifid.

Remarks. *Scelolanka* is closely related to *Heteraspis* (= *Scelodonta*). However, *Heteraspis* can be separated by the distinct lateral pronotal margins (obsolete in *Scelolanka*); sparsely pubescent body (body densely pubescent in *Scelolanka*); broad and distinct prosternum (much narrower and elongate in *Scelolanka*); all femora are armed (all femora unarmed in *Scelolanka*). In *Heteraspis*, the legs are concolorous with dorsum (legs and dorsum differently colored in *Scelolanka*). Epipleura is absent in *Scelolanka* but distinct in *Heteraspis*. Another genus related to *Scelolanka* is *Malegia* and the only difference is weak orbital sulcus (orbital sulcus is very strong and deep in *Scelolanka*). This is the first report of the genus to India.

Of the three described species, one occur in Sri Lanka while the other two are restricted to Vietnam.

4.2.19.1. *Scelolanka* sp. 1 (Figs. 85a–l)

Description.

Body length 2.7–2.94 mm, breadth 1.6–1.6 mm; oblong ovate, entirely clothed with patches of white and brown setae except compound eyes and mouth parts, body dark chocolate brown or piceous, venter piceous; labrum, mandibles red brown with apex of mandibles piceous; legs yellow brown except coxa, trochanter, femora anteriorly piceous, dorsum closely and shallowly punctured with adpressed setae.

Head finely and closely punctured with white and brown medially directed setae; coronal sulcus weak and long; vertex sloping anteriorly; suprafrontal sulcus weak, hardly differentiating frons and vertex; clypeus less distinct and narrow; labrum broader than long, anterior margin deflexed, apex gently sinuate with a transverse row of four

widely spaced setae preapically; mandible bidentate apically; maxillary and labial palpi with apical palpomere longest, maxillary palpi with three palpomeres with basal two subequal, labial palpi with last palpomere slightly longer than penultimate, orbital sulcus deep with multiple rows of setae; antennal calli oblique, narrow, acutely pointed ventrally; orbital pore near dorsal margin of eye with a thin long seta; antenna short, subfiliform, hardly extending beyond base of elytra, proximal antennomeres yellow, distal five piceous; first antennomere thick, oval and longer than second, 3–6 thin, rest progressively widened; proportionate length of antennomeres I to XI equals 1 : 0.8 : 0.94 : 0.8 : 0.94 : 0.7 : 1.1 : 1 : 1.1 : 1 : 1.5. Compound eyes lateral, hemispherical, vertical diameter 1.15 times horizontal, distance between compound eyes more than two times transverse diameter of eye and 1.5 times distance between antennal sockets, maximum width of head more than three times transverse diameter of eye, 1.6 times distance between compound eyes and 2.4 times distance between antennal sockets.

Pronotum almost rounded laterally, 1.1 times longer than wide, distinctly narrower than elytra, lateral margins obsolete. Scutellum rectangular, broader than long, closely and finely punctate and pubescent.

Elytra oblong, 1.3 times longer than wide, base of elytra broader than base of thorax, closely and finely punctured, clothed with white and brown setae, arranged in alternate longitudinal patches or mixtures; humeral calli prominent; basal calli, post basal depression weak; epipleura obsolete.

Prosternum strongly narrowed medially, much longer than broad, concave laterally; mesosternum narrow, longer than broad.

Proepisternum concave, closely punctate, clothed with setae, hypomeron merged with pronotum as lateral margin of pronotum obsolete.

Legs slender, femora dilated without tooth, tibiae weakly carinate, hind tibia dorsoventrally flattened, intermediate and posterior tibiae emarginated preapically and bears paired apical spurs, claws bifid.

Ventrites with first medially longer than following two combined, 1–4 each shorter than preceding one, ventrite 5 longer than 4, apical margin of last ventrite gently concave. **Pygidium** convex with preapical area gently depressed.



85a



85c



85b



85d

Figures 85a–d: *Scelolanka* sp.1, habitus: **85a.** Dorsal view, **85b.** Ventral view, **85c.** Lateral view, **85d.** Head, frontal view.



85e



85f

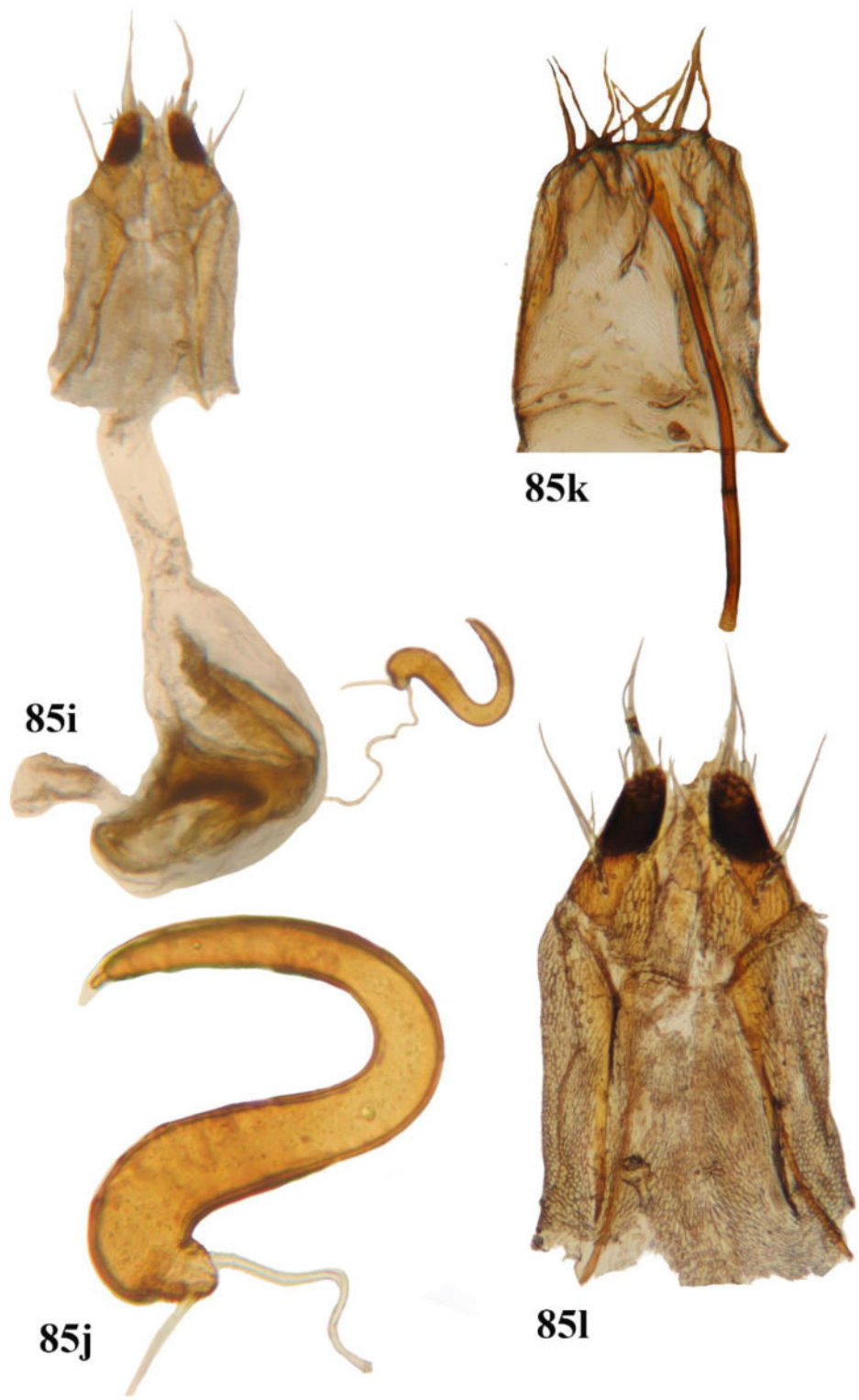


85g



85h

Figures 85e–h. Male genitalia of *Scelolanka* sp.1. **85e.** Aedeagus, dorsal view. **85f.** Aedeagus, lateral view, **85g.** Spiculum gastrale, spiculum relictum and 8th tergite. **85h.** Tegmen.



Figures 85i–l. Female genitalia of *Scelolanka* sp.1. **85i.** Ventral view, **85j.** Spermatheca, **85k.** Fused 8th sternite and 8th tergite with tignum, **85l.** Ovipositor.

Male genitalia with aedeagus in dorsal view having lateral margins gently converging towards anterior, apical quarter strongly narrowed, apex with truncated denticle; in lateral view, strongly curved, arc-like, strongly narrowed apically, terminating in acute denticle slightly recurved upwards, ventral surface gently concave medially.

Female genitalia with spermathecal capsule almost 2-shaped, proximally narrowed, short, knob-like where spermathecal duct and spermathecal gland attached, distal region gently curved basally and abruptly curved medially, basal region wider and gradually narrowed towards posterior, apex abruptly narrowed into an acute denticle, spermathecal gland tubular, bursa copulatrix indistinct, ovipositor long, 8th sternite and 8th tergite fused laterally with mild longitudinal sclerotizations, tignum longer than ovipositor.

Remarks. Compare with the type species and other relevant ones. The new species is somewhat similar to *Malegia* sp. 1. *Malegia* is smaller and elongate but the Genus 1 sp.1 is larger and stout. As discussed under the genus, orbital sulcus is weak in *Malegia* sp. 1 (strong and deep in Genus 1 sp.1). Prosternum is much narrower; epipleura and lateral margins of pronotum are obsolete and body adorned with similar scale like setae in both cases.

Distribution. India (Tamil Nadu).

Material examined. (4 specimens).

1♀, 1♂, 2 unsexed "India: Tamil Nadu/Annamalai Nagar, N 11° 23' 8.8", E 79° 43' 23.9"/5.x.2016, Ex. *Pongmia pinnata*/ S R Hiremath Coll.

Host plant. *Millettia pinnata* (L.) Panigrahi (Fabaceae).

4.2.20. *Trichochrysea* Baly, 1860

(Type species. *Trichochrysea mouhoti* Baly, 1861 from Cambodia)

Trichochrysea Baly, 1861: 195; Jacoby, 1908: 387; Chen, 1935: 235; 1940: 490; Chujo, 1956: 83; Gressitt & Kimoto, 1961: 244; Kimoto, 1964: 252; Kimoto & Gressitt, 1982: 62.

Bromius Baly, 1865: 439 (*nec* Chevrolat); 1867: 96.

Heteraspis Chapuis, 1874: 284 (*nec* Chevrolat; *nec* Leconte); Lefevre, 1877: 309; 1885: 83.

Generic diagnosis

Body metallic and densely pubescent with long setae, thorax almost semicircular, elytral base broader than that of thorax, anterior margin of thoracic episternum convex, intermediate femora emarginate preapically, claws bifid. This is the first report of the genus to south India. More than 50 species described so far.

4.2.20.1. *Trichochrysea* sp. 1 (Figs. 86a–h)

Description

Body. Length 5 mm, breadth 2.9 mm. Body oblong ovate, dorsum metallic green with a central violet transverse band before the middle of elytra, ventral aspect, metallic bluish green with brownish patches in between, elytra with a violaceous transverse band before the middle, legs in dorsal aspect metallic green, ventral aspect metallic bluish green with brownish patches in between, legs in dorsal aspect metallic green, ventral aspect brownish with metallic green lustre, mouth parts and antennae piceous with metallic green lustre except first antennomere metallic green, maxillary palpi with last two segments piceous, first palpomere yellowish brown with metallic green lustre.

Head inserted densely punctured with setae, vertex feebly rugose, coronal suture well developed indicated by a deep longitudinal depression in the middle of vertex, punctures turns denser towards posterior, antennal calli weak, suprafrontal sulcus indistinct, frons and vertex hardly differentiated, clypeus reduced and much narrow with semicircularly emarginated anterior margin, labrum broader than long anteriorly deflexed with a few paired punctures bearing short and long setae preapically, apical margin with a row of setae discontinuous in the middle, mandibles robust, apex acute, lateral margin with fine setose punctures, maxillary and labial palpi with last segment chisel shaped, maxillary palpi with last palpomere the longest, middle one shorter than first palpomere, only last segment visible in labial palpi. Compound eyes lateral, pear shaped, vertical diameter 1.25 times horizontal diameter, distance between compound eyes 2.4 times the transverse diameter of eye and 1.3 times the distance between antennal sockets, maximum width of head more than three times the transverse diameter of eye, 1.5 times the distance between compound eyes almost twice the distance between antennal sockets, antennae moderately long, reach almost upto middle of elytra, first antennomere thick, longer than second, second one thicker than 3 and 4,



Figures 86a–d: *Trichochoyseia* sp. 1, habitus: **86a.** Dorsal view, **86b.** Ventral view, **86c.** Lateral view, **86d.** Head, frontal view.



Figures 86e–h. Male genitalia of *Trichochrysea* sp. 1. **86e.** Aedeagus, dorsal view. **86f.** Aedeagus, lateral view, **86g.** Spiculum gastrale, spiculum relictum and 8th tergite. **86h.** Tegmen.

antennomeres 3 to 6 almost linear, rest of the segments progressively broadened and densely covered with short setae, proportionate length of antennomeres as follows, 1 : 0.7 : 0.8 : 0.7 : 1 : 1 : 1.3 : 1.3 : 1.5 : 1.3 : 1.7.

Pronotum 1.4 times broader than long, profusely punctured with long setae, pronotum semicircular in shape, anterior margin round, posterior margin lobed medially and almost straight on either sides, lateral margins weakly formed anteriorly, distinct on posterior 2/3rd. **Scutellum** broader than long, setose.

Elytra profusely and irregularly punctate, punctures less bolder than those on pronotum, humeral calli prominent with setose punctures, basal calli and post basal depression weak, apex round, **Epipleura** narrow outwardly oblique with setose punctures, posteriorly narrowed, hardly reaching the apex.

Proepisternum with anterior margin concave, hypomeron oblique gently rugose posteriorly, metasternum sparsely pubescent.

Prosternum medially depressed, as broad as long, mesosternum posteriorly diverging with apex emarginate.

Ventrites sparsely pubescent, first ventrite medially longer than following two combined, ventrites 1 to 4 each shorter than preceding one, fifth ventrite distinctly emarginated at apex.

Legs moderately long, femur dilated medially, tibia longitudinally carinate, only intermediate femora emarginate preapically, tarsomeres ventrally fringed with variously shaped setae, male with basitarsomere with capitate setae bordered with pointed setae, females with pointed setae, second tarsomere with pointed setae, third bilobed setae bears variously shaped setae, claws bifid.

Male genitalia. Aedeagus in lateral view, distinctly curved, almost 'U' shaped including basal hood, narrow at the base of aedeagus proper diverging towards median again narrowed towards posterior, apex with an acute denticle. Ventral plate concave, Dorsal plate convex, narrow basally, then broadened, apical opening or ostium wide, converging towards anterior, apex with a blunt denticle, anterolateral corners round. Spiculum gastrale 'Y' shaped, median arm and lateral arms almost subequal, median arm acute distally, spiculum relictum less sclerotized, 8th tergite semicircular with a row of setae. Tegmen distinctly bilobed apically, gently concave laterally, basal area with

membraneous connectives which encircles aedeagus. Endophallus much longer than aedeagus with paired curved central sclerite.

Remarks. This species is close to *Trichochrysea hirta* except for the violaceous transverse band on the elytra and genitalia.

Material examined.

1 ♂ “India: Kerala/CRS Pampadumpara/ 27.iii.2017/Amritha Kumari S Coll.”

DISCUSSION

5. DISCUSSION

Results of the systematic studies on Eumolpinae of south India is discussed here. Most of the discussion relating to individual taxa is given as 'Remarks' under each taxon in the previous chapter. An attempt is being made here to discuss the information gathered from the study under the following heads viz. 1) Generic affinities; 2) Host plant associations and palynophagy; 3) Endophallus eversion techniques and the taxonomic value of endophalli in Eumolpinae; 4) Zoogeography; and 5) Economic importance.

5.1. Generic affinities.

Eumolpinae is the least explored subfamily under Chrysomelidae. The generic placements are arbitrary and controversial. Tribal classification of eumolpines is still precursory. Most authors do away with the available classifications that are artificial and non-phylogenetic.

Chapuis (1874) considered eumolpines as a tribe and divided them into 21 groups. Jacoby (1908) divided the subfamily into 18 groups or tribes. Genera with similar external morphological characters were placed in different groups, while the vitally important characters of male and female genitalia were unknown to both Chapuis and Jacoby. Chen (1940) treated eumolpines as a separate family Eumolpidae and divided them into four tribes based on his study of the Chinese fauna. He placed the genera *Basilepta*, *Pagria*, *Bathseba* (as *Tricliona*) and *Cleoporus* in a single tribe Nodinini. Here they are segregated into group I and II based on the characters of tarsal claws, proepisternum and compound eyes. *Pachnephorus*, *Heteraspis* (as *Scelodonta*), *Fidia* (= *Lypesthes*) and *Trichochrysea* were placed in the tribe Adoxini by Chen (1940). Here they are grouped into two, based on the characters of female genitalia. *Colasposoma* was placed in a separate monotypic tribe by Chen (1940), Jacoby (1908) and Chapuis (1874). Here I tend to agree with them and place the genus in Group IV. Seeno & Wilcox (1982) grouped *Bathseba* (as *Tricliona*), *Microeurydemus* and *Cleoporus* along with *Basilepta*, *Pseudostonopa*, *Chrysonopa*, *Pagria* and *Edistus*. Here they are segregated into two different groups based on the characters of claw, compound eyes and proepisternum. Seeno & Wilcox (1982) placed *Eurypelta* within Adoxini. Here it is assigned to a new group along with *Dermorhytis*. Clavaraeu (1914)

divided the subfamily Eumolpinae into 26 tribes. Here the genus *Edistus* has been placed in Callisini, after Jacoby (1908). Jacoby (1908) placed *Pagria* in a monotypic tribe Pagrini. Here *Edistus* and *Pagria* are grouped with *Nodostoma*, *Pseudostonopa* and *Chrysonopa*. Clavaraeu (1914) placed the genera *Heteraspis* (as *Scelodonta*), *Malegia*, *Trichochrysea*, *Mesocolaspis* and *Pseudocolaspis* in their own tribes. Here they are accommodated in three groups based on the characters of ovipositor, presence or absence of 8th sternite and its structure, even though there is variability in other basic characters. In general, the available tribal classifications are based on a few, inconsistent, highly variable characters. Flowers (1999) divided the subfamily Eumolpinae into 9 tribes based on the characters of male genitalia, including endophallus. However, he included Synetini as a tribe within Eumolpinae.

Hence based on some important external morphologic characters and a few relevant characters of the genitalia, the 20 genera treated here are divided into VI groups.

5.1.1. Group I

Anterior margin of proepisternum concave, claws appendiculate, intermediate and posterior tibiae emarginated preapically, pronotal lateral margins distinct and compound eyes feebly sinuate mesally. Five genera are included in this group: *Basilepta*, *Chrysonopa*, *Pseudostonopa*, *Pagria* and *Edistus*.

5.1.2. Group II

Anterior margin of proepisternum convex, claws bifid, intermediate and posterior tibiae emarginated preapically, pronotal lateral margins entire and round, compound eyes distinctly sinuate mesally, ocular sulcus distinct, femora distinctly armed, body glabrous. Three genera are placed under group II: *Bathseba*, *Cleoporus* and *Microeurydemus*.

5.1.3. Group III

Anterior margin of proepisternum convex, claws appendiculate, intermediate and posterior tibiae not emarginated preapically, pronotal margins feebly angulate, compound eyes sinuate mesally and ocular sulcus weak, femora distinctly unarmed, body strongly punctured, pygidium with distinct elytral locking groove, ovipositor with a distinct stylus, male genitalia with lateral ejaculatory ducts leading to a translucent

spindle shaped ejaculatory sac from where the median ejaculatory duct arises. Two genera are placed under group III: *Dermorhytis* and *Eurypelta*.

5.1.4. Group IV

Anterior margin of proepisternum convex, thorax not narrower than elytra, pronotal margins entire and rounded, intermediate and posterior tibiae not emarginated, claws bifid, ocular sulcus obsolete. Only *Colasposoma* is included in this group.

5.1.5. Group V

Body adorned with scales or scale like setae, ovipositor with partially reduced structures, 8th sternite absent or reduced, orbital sulcus weak, femora toothed, claws bifid. The genera under the group are *Fidia*, *Pseudocolaspis*, *Macrocoma* and *Mesocolaspis*.

5.1.6. Group VI

Body pubescent, pronotal lateral margins incomplete or obsolete, ocular sulcus absent to distinct and deep, anterior margins of proepisternum concave, femoral tooth rarely present, intermediate and posterior femora emarginated preapically, claws bifid, characters of proepisternum and tibiae are variable, 8th sternite fused with 8th tergite forming a membranous pouch with distinct tignum. The genera included here are *Heteraspis*, *Scelolanka*, *Trichochrysea* and *Malegia*.

5.1.7. Group VII

Body covered with scales or setae, pronotal lateral margins distinct, ocular sulcus weak but distinct, proepisternum convex, tarsal claws simple, bifid or appendiculate, femora unarmed, eighth sternite forms a distinct plate with tignum attached to its middle. Only one genus, *Pachnephorus* is included here.

5.2. Host plant association and palynophagy.

Over 40,000 species of leaf beetles have been described so far and they use more than 210 families of plants as hosts (Jolivet & Hawkeswood, 1995). The evolution of leaf beetles has been closely associated with the radiation of flowering plants or angiosperms. As the angiosperms are an immensely successful and much diversified group, chrysomelids evolving with them have also become a group of great diversity. Farrell *et al.* (1992) and Farrell (1998) convincingly demonstrated the coevolution of plants and phytophagous beetles. Petitpierre (1997) discussed the significance of

genetics in the taxonomy and evolution of leaf beetles. A much higher correlation was observed between the rate of chromosomal evolution per genus and the number of host plant families selected by these congeneric species.

Jolivet (1988) reported Eumolpinae as oligophagous, basically feeding on Asclepiadiaceae, Apocynaceae and Convolvulaceae. In south India, *Colasposoma asperatum* was observed feeding on *Decalepis arayalpathra* (J. Joseph & V. Chandras.) Venter (= *Janakia arayalpathra*) and an unknown species of Asclepiadaceae. Medvedev (2003) reported that all species of *Colapsosoma* feed on Convolvulaceae, especially on *Ipomoea* and *Argyreia* and some are dangerous pests of sweet potatoes. In south India, *C. auripenne* feeds on *Ipomoea batatas* (L.) and *Argyreia* sp. (Convolvulaceae). Trophic selection of *C. downesi* that feeds on *Aegle marmelos* (Rutaceae) is noteworthy. Jolivet (1982) reported food plants of several Eumolpinae belonging to Asclepiadaceae and Apocyanaceae.

In general, Eumolpinae are oligophagous to polyphagous. Many species choose a few host plants in one or a few related families, as in the case of *Colasposoma* and *Pagria*. Some species like *Pagria costatipennis* (= *P. restituens*) feed on a range of host plants across plant families such as *Naravelia zeylanica* L. (Ranunculaceae), *Piper nigrum* L. (Piperaceae), grasses (Poaceae) and *Lagerstroemia* (Combretaceae). Jolivet (1988) reported that Eumolpinae are generally oligophagous, while many genera are polyphagous, feeding on many wild and cultivated plants.

Jolivet (1988) reported that a few eumolpines feed on fruits. Fruit feeding eumolpines recorded here are *Cleoporus* nr. *lefevrei* and *Basilepta subcostatum*. *Cleoporus* nr. *lefevrei* is a fruit scraper of *Punica granatum* (Lythraceae). Jayanthi & Verghese (2014) reported *Tricliona* nr. *nigra* as a surface scraper of all parts of *P. granatum*, including fruits, flowers, buds and leaves. After comparing the specimens collected on *P. granatum* by Jayanthi & Varghese (2014) with the type, we confirmed that the above report of *Tricliona* nr. *nigra* pertains to that of *Cleoporus* nr. *lefevrei*. Specimens of *Cleoporus* nr. *lefevrei* feeding on the leaves of *Terminalia catappa* L. were also examined. Prathapan *et al.* (2019) reported *Musa sapientum*, *M. acuminata* (Musaceae, Zingiberales) as principal hosts of *B. subcostatum*. The same beetles were also observed feeding on ginger (*Zingiber officinale* Roscoe, Zingiberaceae), *Canna*

indica L. (Cannaceae, Zingiberales) and turmeric (*Curcuma longa* L., Zingiberaceae). *Basilepta viridipennis* has been erroneously reported in the literature as a pest of banana in the Indian subcontinent.

Apparently there is a tendency in Eumolpinae to choose tall plants. Many species of Eumolpinae feed on canopies of trees belonging to different families. *Fidia kanaraensis* and *Bathseba bifasciata* (= *Tricliona bifasciata*) on *Mangifera indica* and *Anacardium occidentale* (both Anacaediaceae), *B. syzygium* n. sp. on *Syzygium cumini* (Myrtaceae) and *B. variabilis* and *B. picea* on *Terminalia paniculata* (Combretaceae) are examples. There are reports of *B. picea* on *Terminalia arjuna* and *T. tomentosa* (Mishra *et al.*, 1994); *Bathseba* sp. (= *Tricliona*) on *T. paniculata* (Prathapan *et al.*, 2013), *B. picea* and *B. variabilis* on *T. arjuna* and *T. tomentosa* (Sharma *et al.*, 2006) and *T. picea* on *T. arjuna* and *T. tomentosa* (Siddaiah & Kujur, 2016) (all Combretaceae). *Cleoporus* nr. *lefevrei* was recorded on the canopy of both *Terminalia catappa* (Combretaceae) and *Punica granatum* (Punicaceae). *Scelolanka* sp. was found feeding on *Millettia pinnata* (L.) Panigrahi (Fabaceae).

Rhyparida spiridonovi Romansov & Moseyko and *Bathseba trimaculata* were reported feeding on the mangrove, *Lumnitzera* sp. (Combretaceae) from Malaysia (Romansov & Moseyko, 2016). Three unidentified species of *Bathseba* were reported from mangroves *Avicennia* (Avicenniaceae), *Sonneratia* (Lythraceae), *Lumnitzera* (Combretaceae), *Ceriops* (Rhizophoraceae), *Rhizophora* (Rhizophoraceae) and *Bruguiera* (Rhizophoraceae) by Veenakumari *et al.* (1997). An unknown species of *Bathseba* was reported by Murphy (1990) on *Lumnitzera racemosa* Willd. *Basilepta* sp. 4 and *Microeurydemus* sp. feed on the mangrove plants *Rhizophora* sp. and *Bruguiera* sp. at Kollam in Kerala.

Palynophagy, that plays a key role in evolution, is common in Chrysomeloidea, however, reports on pollen consumption in these insects are rare (Samuelson, 1994). Pollen and nectar are not only rich in nutrients but also low in digestibility reducers, secondary substances and antinutritional chemicals (Kirmse & Chaboo, 2018). Pollen feeding adds additional complementary proteins to the diet and is common among Criocerinae, Cryptocephalinae, Eumolpinae and Chrysomelinae (Jolivet & Hawkeswood, 1995).

The gut of adult *Pseudostenopa palynophaga* n. sp., on dissection was observed packed with pollen grains of grass (Poaceae). Similar observations were recorded in *Nonarthra* Baly, a pollen feeding alticine (Samuelson, 1994). Crowson (1981) gave a brief note on the features of flower visiting Coleoptera such as a tendency for an elongate body, tendency to become rostrate etc. Compared to other described species in the genus, *P. palynophaga* n. sp. has comparatively elongate body and its head is exerted and long, instead of being rostrate. The mandibles of *Pseudostenopa palynophaga* n. sp. has molar area moderately developed. According to Mann & Crowson (1981), a definite molar part is present in pollen feeding chrysomelids.

A few eumolpine species were reported as palynophagous. *Nycterodina bordoni* Bechyné and Bechyné feeds on pollen and occasionally on petals of *Rosa* sp. (Rosaceae) in Venezuela (Bechyné 1997). *Cleptor inermis* Lefevre adults actively feed on petals and stamens of *Pultenaea villosa* Willd. (Fabaceae) and occasionally on *Leptospermum flavescens* Sm. (Myrtaceae) in Queensland (Hawkeswood & Jolivet, 1988). Jolivet & Hawkeswood (1995) mentioned that *Malegia* Lefevre probably feeds on the pollen of *Pennisetum* (Poaceae).

It is hypothesized that the first chrysomelids initiated into pollen feeding were Orsodacninae (now treated as a family) and Aulacoscelinae (Jolivet, 1988). It is almost evident that during the Jurassic and the Cretaceous periods, the Chrysomelidae were pollen feeders and then they became external and later on internal feeders on or in leaves, buds, twigs and roots. From generalists, leaf beetles became specialists and a few of them returned to pollen feeding, as in the case of certain Eumolpinae (Jolivet, 1988).

5.3. Endophallus eversion techniques and the taxonomic value of endophallus in Eumolpinae

Flowers (1999) illustrated the endophalli of a number of eumolpines after teasing out the endophallus through the apical orifice using hooked insect pins. Copulatory linking of male and female genitalia of a few eumolpines were studied by freezing and dissecting pairs of beetles in copulation by Flowers & Eberhard (2006) and illustrated naturally everted endophallus of *Metaxyonycha amasia*. As the eversion and inflation of endophallus is a tedious procedure, it is difficult to standardize a fool-

proof method to study the completely everted endophallus. Many workers (eg. Skelley, 1993; Sharp & Muir, 1912) had tried eversion of endophallus following methods such as squeezing out through the apical opening (for which fresh, field collected specimens are necessary), eversion and inflation using syringe, pulling out through the apical opening with a pin etc. Meurgues & Ledoux (1966) provided illustrations and descriptions of fully everted and inflated endophalli in Carabidae. Janovska *et al.* (2013) discussed different endophallus inflation techniques and their limitations. Structure of fully everted endophallus was used to separate sibling species of *Cassida* by Bukejs and Anichtchenko (2019) following Janovska *et al.*(2013). Techniques adopted by Flowers (1999) in Eumolpinae do not fully inflate the endophallus. Flowers & Eberhard (2006) studied the endophallic structure in pairs of beetles in copula, which provided satisfactory results. However, this method is impossible, unless mating pairs are collected and frozen with ethyl chloride spray. The endophallus in preserved specimens, can be fully everted and inflated using the method followed by us or with slight modifications (Sangamesh, 2018a, 2018b; Kumari *et al.*, 2020). Complete eversion and inflation are essential to reveal the exact structure of the endophallus, including lobes, bulbs, sclerites and spicules. However, the endophallus is deflated once the aedeagus is detached from the fine nozzle. Optimum diameter of the nozzle depends on the diameter of the aedeagus and thus vary considerably between species. Difficulty in procuring nozzles of appropriate diameter is yet another limitation of the method.

Endophallus in Eumolpinae mostly has three regions: basal phallomere (BP), median phallomere (MP) and apical phallomere (AP) and are adorned with spicules of varying size and shape. There is a paired or unpaired Central Sclerite (CS) in between BP and MP in most cases. The genus *Basilepta* has the shortest BP with lateral lobes; MP the longest and AP asymmetrical and shorter but longer than BP with lateral lobes; CS paired and straight and AP undifferentiated in some cases as in *B. fulvicornis*. In *Cleoporus* nr. *lefevrei*, different regions are distinctly differentiated, BP is paired flap like, MP is too long with paired subapical sclerite and the AP is too short and bell shaped with paired apical sclerite (AS). In *Eurypelta*, MP is almost as long as the AP. CS is paired and C-shaped, AP bears a rod shaped sclerite inside and is connected to ejaculatory duct. Endophallus of *Dermorhytis* also bears a rod shaped sclerite inside

the AP and is connected to the ejaculatory duct. In *Fidia*, AP is the shortest with paired apical sclerite (AS), BP is slightly shorter than MP. *Bathseba bifasciata* with apex of BP bilobed, CS single and thick, MP long and AP again differentiated into lobes; BP short with three indistinct lateral lobes, CS paired, AP subglobular with Ω -shaped AS.

Flowers (1999) illustrated endophalli in species of *Metachroma* (Fig. 10 in Flowers, 1999) and *Typophorus* (Fig. 6 in Flowers, 1999) in Typophorini, to which *Tricliona* belongs. However, finer details are not available in this work as the endophallic sac is not maximally inflated when pulled out through the apical opening with a hooked insect pin. In *Typophora*, a small apical sclerite is present, while the same is absent in *Metachroma* and *T. bifasciata*. A single, thick, partially sclerotized central sclerite is present in *T. bifasciata* which is not given by Flowers (1999) in the other two. Endophallus is entirely finely spiculate in *Typophora*, where as in *Metachroma*, it is finely spiculate in the middle third and sparsely and finely spiculate in the apical third. In *T. bifasciata*, spicules of varying shapes are densely arranged in the distal portion of middle third and dense and large spicules mixed with fine spicules are present in the apical third.

Flowers (1999), described structure of endophallus in the Leprotites (now in Adoxini). However, in this study, the endophallus of *Fidia kanaraensis* (Adoxini) was everted through the apical opening and or inflated (without eversion) through the basal opening. Due to the differing techniques used, comparison of structures with that of Flowers (1999) is difficult.

5.4. Zoogeography

Eumolpinae are mostly tropical (Jolivet, 2008). The known diversity of tropical countries such as China (50 genera, 366 species: Kimoto & Takizawa, 1994, 1997; Tan *et al.*, 1980, 2005), South Africa (38 genera, 175 species: Scholtz & Holm, 1985), Australia (30 genera, 500 species: Lawrence & Britton, 1994; Reid, 2006), Madagascar (39 genera, 256 species: Paulian, 1961), or Malaysia (31 genera, 170 species: Mohamedsaid, 2004) far outnumber those of European part of Russia (23 genera, 50 species: Kurcheva, 1967), France (5 genera, 13 species: Jolivet, 2008) or Hungary (4 genera, 6 species: Kaszab, 1962). No eumolpines are known from England, Ireland and Iceland (Jolivet, 2008). According to Jolivet (2008), New Guinea is the richest tropical

subregion of Eumolpinae, however, tropical Africa, Brazil and the rest of the neotropical realm should be much richer in species numbers than on record (Jolivet, 2008).

Eumolpinae in south India is represented by 146 species (12 undescribed) placed in 35 genera (see checklist). The south Indian eumolpine fauna is predominantly Oriental. Eighteen south Indian genera are limited to the Oriental Region, while four each occur in both Oriental and Palearctic or Oriental and Afrotropical Regions and nine are widely distributed with their component species occurring in three or more zoological realms. Interestingly, two genera – *Trichotheca* and *Nodostella* – are endemic to south India. The Afrotropical *Microeurydemus* is here reported for the first time from the Oriental Region.

The eumolpine species have narrow distributional ranges, with 107 (73%) species being endemic to south India. Probably *Pachnephorus bistriatus* that occurs in Afrotropical, Oriental and Palearctic Regions, is the most widely distributed species of eumolpinae that occurs in south India. Species of *Pagria signata* group also are broadly distributed. Distribution of a few species such as *Basilepta nigromarginatus*, *Basilepta flavolimbatus* and *Bathseba bifasciata* is disjunct, with populations being widely separated between south India and north east India.

5.5. Economic importance

At least 14 species of eumolpines are economically important pests in south India. Their nomenclature and taxonomy has been updated, with description and illustrations for the benefit of economic entomologists and other end users of the work. These include the grape flea beetle *Heteraspis dillwyni* (earlier *Sceledonta strigicollis*), cardamom white grub *Basilepta fulvicornis* (earlier *Nodostoma fulvicorne*), banana scarring beetle *Basilepta subcostatum* (earlier identified as *Nodostoma subcostata*, *Basilepta subcostata* or *Basilepta viridipenne*), *Fidia kanaraensis* (earlier *Lypsthes kanaraensis*), *Bathseba bifasciata* (earlier *Tricliona bifasciata*), one putative new species and one unidentified species of *Basilepta* on cashew and mango, *Pagria restituens* on black pepper, *Pachnephorus bistriatus* on millets and sugarcane, *Eurypelta modesta* on *Ixora* spp, *Cleoporus* sp. on pomegranate, *Bathseba syzygium* on *Syzygium cumini* and *Colasposoma auripenne* on sweet potato.

SUMMARY

6. SUMMARY

The present study entitled 'The Eumolpinae (Chrysomelidae: Coleoptera) of southern India' deals with the systematics of the leaf beetle subfamily Eumolpinae. Fifty three species belonging to 20 genera collected from various ecosystems in south India are treated here. Ecological and biological information are provided in all possible cases. Brief descriptions of genera and detailed descriptions of species with emphasis on male and female genitalia, are provided. Endophallus is described and illustrated in all possible cases. Illustrated keys to genera and species are provided.

The Afrotropical genus *Microeurydemus*, is newly reported from the Oriental Region. The genera *Malegia* and *Scelolanka* are new reports to India. *Trichochrysea* is a first report to south India. *Tricliona* Lefèvre, 1885 is a new junior synonym of *Bathseba* Motschulsky, 1866. *Neofidia* Strother, is proposed as the replacement name for *Fidia* Baly, 1863, a junior homonym of *Fidia* Motschulsky, 1861 (Kumari *et al.*, 2020).

Bathseba syzygium **n. sp.** and *Pseudostonopa palynophaga* **n. sp.** are described as new to science. Eleven putative new species are described in the genera *Mesocolaspis*, *Malegia*, *Microeurydemus*, *Basilepta*, *Cleoporus*, *Dermorhytis*, *Edistus*, *Pagria*, *Scelolanka* and *Trichochrysea*. One of the most economically important eumolpine pests of the Oriental Region, the banana scarring beetle *Basilepta subcostata*, is newly reported from south India. *Pagria ingibbosa*, *P. zeylonica* and *P. pseudograta* are new species reports to India.

New host records include *Aegle marmelos* (for *Colasposoma downesi*), *Anacardium occidentale* L. (for *Fidia kanaraensis*), *Antidesma acidum* (for *Edistus* sp.), *Ixora* (for *Eurypelta modesta*), *Mallotus atrovirens* (for *Cleoporus inornatus*) and *Milletia pinnata* (for *Scelolanka*). *Bathseba syzygium*, **n. sp.** has been reported on *Syzygium cumini* and *Pseudostonopa palynophaga* **n. sp.** is a pollen feeder of Poaceae.

Pagria signata species group remains unresolved. Seven species, including three species new to India, belonging to this group were studied. Existence of multiple species in this group is questionable, as characters, including those of the male and female genitalia, are highly variable. Sympatric occurrence of multiple species, feeding on the same Fabaceae host plants, is a strong indication that some of the named species

of the *Pagria signata* group are one and the same. Molecular analysis using Mt Cox gene was found to be unreliable. Further investigations, including the use of other molecular markers, and breeding experiments are necessary to ascertain the status of the nominate species in *P. signata* group.

One of the most speciose groups in south India is *Basilepta* and the identity is much confusing at generic as well as species levels. Presence of bursa sclerite is a unique character in *Basilepta*, that was newly discovered during the present study. Based on the presence and structure of the sclerite, *Basilepta* can be easily separated from the allied genera.

Tribal level classification in Eumolpinae is still in infancy. Characters of male and female genitalia, including unexplored structures like spiculum gastrale, tegmen, bursa sclerites, tignum and ovipositor, in combination with morphological features, are of great value in suprageneric classification of the subfamily.

All species treated here are copiously illustrated to facilitate unambiguous identification by the end-users. Special emphasis has been placed on components of genitalia in species descriptions and illustrations as they are critical in species determination.

Checklist of eumolpine beetles of southern India

1. *Aoria nigripes* Baly, 1860
2. *Basilepta nobilitata* Jacoby, 1895
3. *Basilepta fulvicornis* Jacoby, 1904
4. *Basilepta unipunctata* Jacoby, 1908
5. *Basilepta andrewesi* Jacoby, 1903
6. *Basilepta maculipenne* Jacoby, 1908
7. *Basilepta dharwarensis* Jacoby, 1908
8. *Basilepta bipunctata* Jacoby, 1887
9. *Basilepta wallardiense* Jacoby, 1908

10. *Basilepta nigro-bimarginata* Jacoby, 1908
11. *Basilepta hampsoni* Jacoby, 1908
12. *Basilepta oblongo-punctata* Jacoby, 1908
13. *Basilepta thoracica* Jacoby, 1908
14. *Basilepta binghami* Jacoby, 1908
15. *Basilepta congregata* Jacoby, 1908
16. *Basilepta aggregata* Jacoby, 1908
17. *Basilepta maheense* Jacoby, 1908
18. *Basilepta orientale* Jacoby, 1908
19. *Basilepta dormeri* Baly, 1877
20. *Basilepta subcostata* Jacoby, 1889
21. *Basilepta glabricolle* Jacoby, 1908
22. *Basilepta nilgiriense* Jacoby, 1908
23. *Basilepta flavolimbata* Jacoby, 1908
24. *Basilepta pubicolle* Jacoby, 1895
25. *Basilepta cribricolle* Jacoby, 1908
26. *Basilepta antiquua* Jacoby, 1908
27. *Basilepta maculiceps* Jacoby, 1908
28. *Basilepta instabile* Jacoby, 1908
29. *Basilepta dimidiatipes* Jacoby, 1908
30. *Basilepta discicolle* Jacoby, 1895
31. *Basilepta nigrolineata* Jacoby, 1908
32. *Basilepta obscuro-maculata* Jacoby, 1908

33. *Basilepta ornata* Jacoby, 1908
34. *Basilepta* sp. 1
35. *Basilepta* sp. 2
36. *Basilepta* sp. 3
37. *Basilepta* sp. 4
38. *Basilepta* sp. 5
39. *Bathseba semivittata* Baly, 1864
40. *Bathseba puncticeps* Duvivier, 1891
(=*B. apicata* Jacoby, 1895)
41. *Bathseba glabricollis* Jacoby, 1908
42. *Bathseba inconspicua* Jacoby, 1908
43. *Bathseba variabilis* Jacoby, 1895
44. *Bathseba bifasciata* Jacoby, 1895
45. *Bathseba picea* Jacoby, 1895
46. *Bathseba bicolor* Jacoby, 1895
47. *Bathseba nigra* Jacoby, 1908
48. *Bathseba marginata* Jacoby, 1908
49. *Bathseba subdepressa* Jacoby, 1908
50. *Bathseba lakshmi* Takizawa, 1984
51. *Bathseba syzygium* **n. sp.**
52. *Callisina balyi* Jacoby, 1895
53. *Chrysochus nilgiriensis* Jacoby, 1908
54. *Chrysonopa viridis* Jacoby, 1908

55. *Chrysonopa brunnea* Jacoby, 1908
56. *Cleoporus variegatus* Jacoby, 1904
57. *Cleoporus inornatus* Jacoby, 1908
58. *Cleoporus* sp. 1
59. *Cleorina bevani* Baly, 1877
60. *Cleorina fulva* Jacoby, 1908
61. *Colaspoides melanocephala* Jacoby, 1908
62. *Colaspoides semipicea* Jacoby, 1895
63. *Colasposoma villosulum* Lefevre, 1885
64. *Colasposoma lividipes* Jacoby, 1903
65. *Colasposoma downesi* Baly, 1862
66. *Colasposoma clavareaui* Jacoby, 1908
67. *Colasposoma coromandeliana* Jacoby, 1908
68. *Colasposoma pretiosum* Baly, 1860
69. *Colasposoma robustum* Jacoby, 1881
70. *Colasposoma nigriventre* Baly, 1867
71. *Colasposoma ornatum* Jacoby, 1895
72. *Colasposoma versicolor* Lefevre, 1887
73. *Colasposoma auripenne* Motschulsky, 1860
74. *Colasposoma asperatum* Lefevre, 1885
75. *Colasposoma splendidum* Fabricius, 1792
76. *Colasposoma* sp. 1
77. *Demotina andrewesi* Jacoby, 1904

78. *Dermorhytis viridinitens* Jacoby, 1908
79. *Dermorhytis imitans* Jacoby, 1908
80. *Dermorhytis biangulata* Jacoby, 1908
81. *Dermorhytis fulvipes* Jacoby, 1903
82. *Dermorhytis andrewesi* Jacoby, 1895
83. *Dermorhytis speciosa* Jacoby, 1895
84. *Dermorhytis* sp. 1
85. *Edistus indicus* Jacoby, 1903
86. *Edistus* sp.1
87. *Eurypelta modesta* Fabricius, 1792
88. *Eurypelta splendidum* Medvedev, 2018
89. *Fidia kanaraensis* Jacoby, 1895
90. *Heteraspis niigiriensis* Jacoby, 1908
91. *Heteraspis granulosa* Baly, 1867
92. *Heteraspis immaculata* Jacoby, 1908
93. *Heteraspis dillwyni* Stephens, 1831
94. *Hyperaxis duvivieri* Jacoby, 1904
95. *Hyperaxis fulvohirsuta* Jacoby, 1904
96. *Hyperaxis foveolatus* Jacoby, 1908
97. *Hyperaxis variegata* Jacoby, 1904
98. *Hyperaxis pencillata* Jacoby, 1908
99. *Hyperaxis malabarica* Jacoby, 1908
100. *Hyperaxis dubia* Jacoby, 1908

101. *Hyperaxis grisea* Jacoby, 1908
102. *Macrocoma orientalis* Jacoby, 1895
103. *Macrocoma* sp. 1
104. *Malegia* sp.1
105. *Mesocolaspis indica* Jacoby, 1904
106. *Mesocolaspis nigrita* Jacoby, 1908
107. *Mesocolaspis* sp. 1
108. *Microeurydemus* sp.1
109. *Mouhotina rugifrons* Jacoby, 1908
110. *Nodina indica* Jacoby, 1895
111. *Nodina nigrilabrum* Jacoby, 1908
112. *Nodina tarsalis* Jacoby, 1908
113. *Nodina belgaumensis* Jacoby, 1908
114. *Nodina aeneicollis* Jacoby, 1895
115. *Nodina hirta* Jacoby, 1908
116. *Nodostella elongata* Jacoby, 1903
117. *Pachnephorus bistriatus* Mulsant & Wachanru, 1852
118. *Pagria signata* Motschulsky, 1858
119. *Pagria restituens* Walker, 1859
120. *Pagria conglomerata* Jacoby, 1908
121. *Pagria grata* Baly, 1867
122. *Pagria ingibbosa* Pic, 1929
123. *Pagria ceylonica* Pic, 1929

124. *Patria* sp. 1
125. *Patria pseudograta* Moseyko, 2013
126. *Paria lefevrei* Jacoby, 1895
127. *Platycorynus decemnotatus* Baly, 1860
128. *Platycorynus amethystinus* Marshall, 1865
129. *Platycorynus sheppardi* Baly, 1864
130. *Platycorynus cavifrons* Jacoby, 1908
131. *Platycorynus travancorensis* Jacoby, 1908
132. *Platycorynus nitidus* Fabricius, 1792
133. *Pseudocolaspis longicollis* Baly, 1877
134. *Pseudocolaspis* sp. 1
135. *Pseudopiomera andrewesi* Jacoby, 1908
136. *Pseudostonopa bicolor* Jacoby, 1903
137. *Pseudostonopa palynophaga* **n. sp.**
138. *Scelolanka* sp.1
139. *Trichochrysea* sp.1
140. *Trichotheca duvivieri* Jacoby, 1904
141. *Xanthophorus andrewesi* Jacoby, 1903
142. *Xanthophorus balyi* Jacoby, 1903
143. *Xanthophorus pallidus* Jacoby, 1903
144. *Xanthophorus laevicollis* Jacoby, 1904
145. *Xanthophorus carinatus* Jacoby, 1908
146. *Xanthophorus montanus* Jacoby, 1903

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APPENDIX -I



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Research article

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***Neofidia* Strother, a new name for *Fidia* Baly, 1863 and redescription of *Fidia kanaraensis* (Jacoby, 1895) with a new host record and notes on natural history (Coleoptera, Chrysomelidae, Eumolpinae)**

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Abstract. *Neofidia* Strother nom. nov., is proposed as the replacement name for *Fidia* Baly, 1863, a junior homonym of *Fidia* Motschulsky, 1861 (not 1860, Griffin 1936). A list of the included species of *Neofidia* Strother nom. nov. and *Fidia* Motschulsky, 1861 is provided for clarity. *Fidia medvedevi* nom. nov. is the new replacement name proposed for *Lypesthes vietnamicus* Medvedev, 2015. *Fidia kanaraensis* (Jacoby, 1895) is redescribed and habitus, male and female genitalia are figured. Cashew (*Anacardium occidentale* L.) is reported as a new host of *F. kanaraensis* and partial information on the life history is provided. Eggs are laid singly on the surface of soil, and are covered with excreta and soil. Larvae tunnel into the tender roots. Adults are nocturnal and feed on tender leaves.

Keywords. India, leaf beetles, new combinations, endophallus, female genitalia.

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Introduction

The genus group name *Fidia*, coined by Dejean (1836), remained unavailable till Motschulsky (1861) described *Fidia atra* from the Old World, as Dejean (1836) had merely listed two New World species,

F. lurida Dejean, 1836 and *F. murina* Dejean, 1836, without a description, definition or indication. Motschulsky's species description, in combination with the generic name *Fidia*, unwittingly made this generic group name available. Baly (1863) described the Old World genera *Leptotes* (type species: *Adoxus gracilicornis* Baly, 1861 by original designation) as well as *Lypesthes* (type species: *Fidia atra* Motschulsky, 1861 by original designation), provided a description of *Fidia* Dejean, 1836 and listed the New World *Fidia lurida* Dejean, 1836 as its type species. Baly's description made both the names *Fidia* and *Fidia lurida* available, in effect making *Fidia* Baly, 1863, a junior homonym of *Fidia* Motschulsky, 1861. Chen (1935) treated *Leptotes* Baly, 1863 as a junior synonym of *Lypesthes* Baly, 1863. Following Baly (1863) and Chen (1935), the name *Lypesthes* has been applied consistently for the Old World genus based on the type species *Fidia atra* Motschulsky, 1861. Similarly, *Fidia* Baly, 1863 has been applied to the New World genus group established on the type species *Fidia lurida* Baly. Strother & Staines (2008) reviewed the New World *Fidia* Baly, 1863 and provided an account of the nomenclatural history of the generic name. Strother *et al.* (2007) applied to the ICZN for suppression of the name *Fidia* Motschulsky, 1861 (not 1860, Griffin 1936) and conservation of the usage of *Lypesthes* Baly, 1863. The Commission, however, rejected this proposal and upheld the priority of *Fidia* Motschulsky, 1861 (ICZN 2009). Löbl (2010) mentioned this issue, but did not make the nomenclatural changes. The Old World genus *Fidia* Motschulsky, 1861 is distinct from the New World *Fidia* Baly, 1863. Following the ruling of the Commission, reaffirming the priority of *Fidia* Motschulsky, 1861 the junior homonym *Fidia* Baly, 1863 is renamed here, as no available junior synonym exists for *Fidia* Baly, 1863.

Fidia Motschulsky comprises 34 species distributed in the Oriental and Palearctic Regions (Jacoby 1908; Pic 1923, 1924, 1928; Chen 1935; Eroshkina 1992; Medvedev & Zoia 1996; Moseyko & Sprecher-Uebersax 2010).

Information on the biology of *Fidia* Motschulsky is limited. Isono (1988) stated that the eggs are covered entirely with excrement in *Lypesthes*. Lee (2012) described the larva of *F. atra*. According to Jolivet *et al.* (2014), the coating of eggs or egg masses with glandular secretions and/or faeces is known in a number of genera including *Lypesthes*. A number of host plants is recorded for species of the genus (Table 1).

Fidia kanaraensis (Jacoby, 1895) comb. nov. was described originally by Jacoby (1895) in the genus *Leptotes*, based on the specimens from Mahe and the erstwhile Kanara in south India. Jacoby (1908) treated it under the *Fauna of British India* and extended its known range of distribution to the erstwhile southern Bombay and Bengal. No further information on its morphology, genitalia or natural history is known, except that it was listed as a pest of mango (*Mangifera indica* L.) by Rajendran & Singh (2016). The species is here redescribed with detailed information on its external morphology and genitalia. An attempt was made to elucidate its life cycle, that however, could not be completed successfully in the laboratory.

Material and methods

Specimens of *Fidia kanaraensis* were collected from Cardamom Research Station, Pampadumpara, Idukki (9°48'23.7" N, 77°10.04'9" E); College of Agriculture, Vellayani campus (8°25'47.5" N, 76°59'8.3" E) and Kallar Reserve Forest (8°41'48.9" N, 77°7'53.6" E). All beetles were collected either from cashew or mango trees, except two specimens attracted to light.

Material from the following collections is examined:

- BMNH = Natural History Museum, London, UK
- KAU = Travancore Insect Collection, Kerala Agricultural University, Vellayani, India
- MCZ = Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA

- NBAIR = National Bureau of Agricultural Insect Resources, Bengaluru, India
UASB = University of Agricultural Sciences, Bengaluru, India
USNM = National Museum of Natural History, Smithsonian Institution, Washington D.C., USA
ZIN = Zoological Institute, Russian Academy of Sciences, St Petersburg, Russia

Dissection

The specimens were relaxed by immersing in soap solution for about 20 minutes. The abdomen was cut off from the body by inserting a no. 3 sized insect pin between the metasternum and the abdomen and then severing the membranous connections and tissues in between. The severed abdomen was macerated in 10% KOH solution by keeping it overnight in a hot air oven, set at 50°C. Alternatively, for quick processing, the specimens were boiled in 10% KOH for about two minutes. The former method yielded better results as all the relevant structures, including ducts of the reproductive system, were intact, especially in females. The digested abdomen was thoroughly washed in water, followed by immersion in 2% acetic acid to remove excess alkali. One more round of washing with water was done to remove excess chemicals. The tergites and sternites were detached and the genitalia were completely pulled out of the muscles and tissues. The transparent membranous structures were stained with acid fuchsin and then transferred to glycerin for observation, photography and preservation.

Genitalia

The terminology for genitalia and associated structures follows Konstantinov (1998), Jolivet & Verma (2008) and Moseyko (2008). The endophallus was everted through the apical opening (ostium) as well as inflated through basal opening. Inflation of the endophallus follows Yamasako & Obhayashi (2011) with appropriate modification. A TSK STERiJECT hypodermic needle 0.2 × 9 mm ($\frac{3}{8}$ "') (The invisible needles™ Japan) was mounted on a syringe filled with K-Y® gel. The tip of the needle was inserted into the apical opening and affixed with the cyanoacrylate glue Fevikwik®. After allowing five minutes to dry, the aedeagus was kept in water for a minute, then immersed in K-Y® gel in a cavity slide and inflated by pushing the plunger flange slowly under controlled pressure. Eversion of endophallus was carried out using KK-3 type C fine nozzle. The endophallus was pushed towards the apical opening using the blunt end of a flexible fine needle through the basal opening. The tip of the fine nozzle, filled with K-Y® gel, was affixed at the base of the aedeagus proper with cyanoacrylate glue (Fevikwik®). The assembly was allowed to dry for five minutes and kept in water for one minute to relax the endophallic membrane. Then the aedeagus was immersed in K-Y® gel in a glass slide. The endophallus was then everted under controlled pressure of a syringe filled with K-Y® gel.

Measurements were taken using an ocular micrometer. Images were stacked using Zerene stacker ver. 1.04. Photographs and stacked images were edited with Adobe Photoshop CS4. A line diagram of female genitalia was drawn using Adobe Illustrator.

Biology

Attempts were made to study the biology of *F. kanaraensis*. Live beetles were collected from the field and pairs of beetles were released into transparent plastic jars with a layer of top soil and a twig of mango or cashew with new growth. The mouths of the jars were covered with cloth and fastened with rubber bands. Beetles were allowed to mate and oviposit. The leaves were changed at three-day intervals, and the layer of soil was kept moist by spraying water.

Table 1 (continued on the next page). Host plants of *Fidia* Motschulsky, 1861.

No. Species	Host family and species	Reference
1 <i>Fidia</i> sp.	Carpinaceae: <i>Carpinus</i> L. Fagaceae: <i>Castanea</i> Mill. <i>Quercus</i> L. Hamamelidaceae: <i>Corylopsis</i> Siebold & Zucc. Juglandaceae: <i>Juglans</i> L. <i>Pterocarya</i> Nutt. ex Moq. Lauraceae: <i>Cinnamomum</i> Schaeff. <i>Machilus</i> Desr. Rosaceae: <i>Malus</i> Mill. <i>Prunus</i> L. <i>Pyrus</i> L. Sapindaceae: <i>Aesculus</i> L Styracaceae: <i>Styrax</i> L. Taxodiaceae: <i>Cryptomeria</i> D.Don Ulmaceae: <i>Zelkova</i> Spach.	Jolivet & Hawkeswood 1995
2 <i>F. anger</i> (Chûjô, 1935) (= <i>L. fulvus</i> Baly, 1878)	Lauraceae: <i>Cinnamomum daphnoides</i> Sieb & Zucc	Chûjô 1958a
3 <i>F. itoi</i> (Chûjô, 1954)	Cupressaceae: <i>Cryptomeria japonica</i> D.Don	Chûjô 1954; Ohno 1958; Chûjô & Kimoto 1961; Kimoto 1964
4 <i>F. atra</i> (Motschulsky, 1861)	Betulaceae: <i>Carpinus tschonoskii</i> Maxim. Fagaceae: <i>Castanea crenata</i> Sieb & Zucc. <i>Quercus acutissima</i> Carruthers Hamamelidaceae: <i>Corylopsis spicata</i> Sieb & Zucc Hippocastanaceae: <i>Aesculus turbinata</i> Blume Juglandaceae: <i>Juglans mandshurica</i> Maxim. <i>Juglans ailanthifolia</i> Carruthers <i>Juglans sinensis</i> Dode <i>Pterocarya rhoifolia</i> Sieb & Zucc Rosaceae: <i>Malus pumila</i> (Willd.) <i>Malus prunifolia</i> (Willd) <i>Pyrus pyrifolia</i> (Burm.f.) <i>Pyrus asiatica</i> (Nakai) M.F.Fay & Christenh. <i>Prunus mume</i> Sieb & Zucc Styracaceae: <i>Styrax japonica</i> Sieb & Zucc Ulmaceae: <i>Zelkova serrata</i> (Thumb.)	Ohno 1958; Chûjô & Kimoto 1961; Kimoto 1964 Chûjô & Kimoto 1961; Kimoto 1964; Lee 2012 Ohno 1958; Chûjô & Kimoto 1961; Kimoto 1964 Chûjô 1954; Ohno 1958; Chûjô & Kimoto 1961; Kimoto 1964 Chûjô & Kimoto 1961; Kimoto 1964 Chûjô & Kimoto 1961; Kimoto 1964 Chûjô & Kimoto 1961; Kimoto 1964 Lee 2012 Ohno 1958 Chûjô 1954; Ohno 1958; Chûjô & Kimoto 1961; Kimoto 1964; Lee 2012 Chûjô & Kimoto 1961; Kimoto 1964 Lee 2012 Chen 1940; Lee 2012 Ohno 1958; Chûjô & Kimoto 1961; Kimoto 1964; Lee 2012 Ohno 1958; Chûjô & Kimoto 1961; Kimoto 1964 Ohno 1958; Chûjô & Kimoto 1961; Kimoto 1964

Table 1 (continued). Host plants of *Fidia* Motschulsky, 1861.

No. Species	Host family and species	Reference
5 <i>F. fulva</i> (Baly, 1878)	Lauraceae: <i>Cinnamomum daphnoides</i> Sieb & Zucc <i>Machilus thunbergii</i> Sieb. & Zucc Fagaceae: <i>Quercus salicina</i> Blume	Chûjô & Kimoto 1961; Kimoto & Gressitt 1966 Kimoto & Gressitt 1966 Chûjô & Kimoto 1961; Kimoto & Gressitt 1966
6 <i>F. kanaraensis</i> (Jacoby, 1895)	Anacardiaceae: <i>Anacardium occidentale</i> L. <i>Mangifera indica</i> L.	New record Rajendran & Singh 2016
7 <i>F. kiiensis</i> (Ohno, 1958)	Fagaceae: <i>Quercus</i> L.	Ohno 1958; Chûjô & Kimoto 1961; Kimoto 1964
8 <i>F. lewisii</i> (Baly, 1878)	Lauraceae: <i>Machilus thunbergii</i> Sieb & Zucc	Ohno 1958; Chûjô & Kimoto 1961; Kimoto 1964

Results

Genus *Neofidia* Strother nom. nov.

Fidia Dejean, 1836: 412 (catalog), nom. nud.

Atonia Gistel, 1848: 123 (*nec* Williston 1889, Diptera: Asilidae) (synonym of *Fidia* Dejean), nom. nud.

Fidia Baly, 1863: 153 (*nec* Motschulsky 1861: 22) (original description).

Fidea Glover, 1868: 71 (misspelling).

Fidia Dejean, 1836 – Dejean 1837: 436 (catalog). — Sturm 1843: 295 (catalog). — Crotch 1873: 33 (faunal treatment, species description). — Chapuis 1874: 275 (classification).

Atonia – Gistel 1851: 123.

Fidia Baly, 1863 – Gemminger & Harold 1874: 3376 (catalog). — Lefèvre 1877: 164 (species descriptions); 1885: 75 (catalog, species description). — Henshaw 1885: 108 (catalog). — Lefèvre 1885: 75 (catalog, species description). — Horn 1892: 198 (faunal treatment, species description). — Blatchley 1910: 1142 (faunal treatment). — Clavareau 1914: 76 (catalog). — Leng 1920: 293 (catalog). — Blackwelder 1946: 662 (checklist). — Bechyné 1950: 288 (taxonomic treatment); 1953: 249 (catalog). — Wilcox 1954: 402 (faunal treatment). — Arnett 1963: 928 (faunal treatment). — Balsbaugh & Hays 1972: 73 (faunal treatment). — Riley *et al.* 2003: 151 (catalog). — Ciegler 2007: 168 (faunal treatment). — Strother *et al.* 2007: 36 (nomenclature).

Fidia – Walsh, 1867: 87 (species description). — Wilcox 1975: 57 (checklist). — Seenó & Wilcox 1982: 62 (checklist). — Arnett 1985: 376 (faunal treatment). — LeSage 1991: 309 (faunal treatment). — Flowers 1996: 36 (checklist). — Riley *et al.* 2002: 671 (catalog).

Type species

Fidia lurida Baly, 1863: 153 (not *Fidia lurida* Dejean, 1836, nom. nud.)

Etymology

The name *Neofidia* alludes to the new name for *Fidia* Baly, 1863, as well as its Nearctic and Neotropical distribution. The gender is feminine.

Checklist of species

- Neofidia albovittata* (Lefèvre, 1877) comb. nov.
Fidia albovittata Lefèvre, 1877: 166
Fidia sallei Lefèvre, 1877: 166
Fidia sallaei Jacoby, 1882: 167 [unjustified emendation]
Fidia unistriata Jacoby, 1882: 168
- Neofidia cana* (Horn, 1892) comb. nov.
Fidia cana Horn, 1892: 199 (*Fidia*)
- Neofidia clematis* (Schaeffer, 1904) comb. nov.
Fidia clematis Schaeffer, 1904: 227
- Neofidia comalensis* (Strother in Strother & Staines, 2008) comb. nov.
Fidia comalensis Strother in Strother & Staines, 2008: 29
- Neofidia confusa* (Strother, 2003) comb. nov.
Fidia confusa Strother, 2003: 151
Fidia murina Crotch, 1873: 33 [not Glover, 1868: 71]
- Neofidia convexicollis* (Strother in Strother & Staines, 2008) comb. nov.
Fidia convexicollis Strother in Strother & Staines, 2008: 33
- Neofidia costaricensis* (Strother in Strother & Staines, 2008) comb. nov.
Fidia costaricensis Strother in Strother & Staines, 2008: 35
- Neofidia delilahae* (Strother in Strother & Staines, 2008) comb. nov.
Fidia delilahae Strother in Strother & Staines, 2008: 37
- Neofidia dicelloposthe* (Strother in Strother & Staines, 2008) comb. nov.
Fidia dicelloposthe Strother in Strother & Staines, 2008: 38
- Neofidia dichroma* (Strother in Strother & Staines, 2008) comb. nov.
Fidia dichroma Strother in Strother & Staines, 2008: 39
- Neofidia guatemalensis* (Jacoby, 1879) comb. nov.
Fidia guatemalensis Jacoby, 1879: 778
- Neofidia humeralis* (Lefèvre, 1877) comb. nov.
Fidia humeralis Lefèvre, 1877: 165
Fidia plagiata Lefèvre, 1877: 165
- Neofidia longipes* (Melsheimer, 1847) comb. nov.
Eumolpus longipes Melsheimer, 1847: 169
Pachnephorus viticolus Uhler, 1855: 418
- Neofidia lurida* (Baly, 1863) comb. nov.
Fidia lurida Baly, 1863: 153
Colaspis flavescens Sturm, 1826: 123 [nom. nud.]
Fidia lurida Dejean, 1836: 412 [nom. nud.]
Fidia viticida Walsh, 1867: 87
- Neofidia marraverpa* (Strother in Strother & Staines, 2008) comb. nov.
Fidia marraverpa Strother in Strother & Staines, 2008: 49
- Neofidia papillata* (Strother in Strother & Staines, 2008) comb. nov.
Fidia papillata Strother in Strother & Staines, 2008: 50
- Neofidia pedestris* (Lefèvre, 1877) comb. nov.
Fidia pedestris Lefèvre, 1877: 164
- Neofidia pedinops* (Strother in Strother & Staines, 2008) comb. nov.
Fidia pedinops Strother in Strother & Staines, 2008: 54
Fidia murina Dejean, 1836: 412 [nom. nud.]
- Neofidia rileyorum* (Strother in Strother & Staines, 2008) comb. nov.
Fidia rileyorum Strother in Strother & Staines, 2008: 56

Neofidia spuria (Lefèvre, 1877) comb. nov.

Fidia spuria Lefèvre, 1877: 165

Fidia atra Jacoby, 1882: 168 (not Motschulsky, 1861)

Neofidia texana (Schaeffer, 1933) comb. nov.

Fidia viticida var. *texana* Schaeffer, 1933: 472

Neofidia tibialis (Jacoby, 1890) comb. nov.

Fidia tibialis Jacoby, 1890: 232

Neofidia xanthonioides (Strother *in* Strother & Staines, 2008) comb. nov.

Fidia xanthonioides Strother *in* Strother & Staines, 2008: 94

Remarks

Strother & Staines (2008) provided a diagnosis and description of the genus. Both the genera, *Fidia* Motschulsky, 1861 and *Neofidia* Strother nom. nov., belong to the same tribe, Adoxini Baly, 1863 (*sensu* Moseyko & Kirejtshuk 2013). The Old World genus *Fidia* can be separated from the New World genus *Neofidia* Strother nom. nov. by the presence of a tooth on the ventral side of all femora (absent in *Neofidia* Strother nom. nov.). Another character mentioned by Strother & Staines (2008), the absence of paired apical spurs on the apex of fore tibia, cannot be used for separating these genera as spurs are present in some species of *Fidia*, at times being small and poorly visible. Among the Old World genera, *Neofidia* Strother nom. nov. is mostly close to *Aoria* Baly, 1863 and the similar genera *Aloria* Bryant, 1939 and *Bromius* Chevrolat *in* Dejean, 1836. It can be separated from *Aoria* by simple intercoxal mesothoracic process (bifurcated or with two spines in *Aoria*), from *Aloria* by 11-segmented antennae (9-segmented in *Aloria*) and from *Bromius* by the straight fore margin of lateral arms of pronotum (“propleura” of Jacoby 1908; convex in *Bromius*).

Distribution

North and Central America (Strother & Staines 2008)

Generic diagnosis

Body oblong, punctate-setose, frons and vertex hardly differentiated, antenna filiform, longer than ½ to ¾ of body length, second antennomere shorter than first, longer than half of it, shorter than next four or five. Compound eyes lateral, convex and entire, antennal calli triangular, pronotum as long as wide or gently wider than long, narrower than elytra, without lateral margins, fore margin of lateral arms of pronotum (‘propleuron’) straight, legs long and slender, tibia longitudinally carinate, all femora lack a ventral tooth, intermediate and posterior tibiae not emarginate preapically, apex of each tibia with a pair of small spurs, claws bifid.

Genus *Fidia* Motschulsky, 1861

Fidia Motschulsky, 1861: 22 (Strother *et al.* 2007 referred to International Commission on Zoological Nomenclature (ICZN) for suppression); ICZN (2009) rejected Strother *et al.* 2007 and reaffirmed priority.

Endoxus Baly, 1861: 285 (misspelling).

Lypestes Baly, 1863: 152, type species *Fidia atra* Motschulsky, 1861.

Leptotes Baly, 1863: 158, type species *Adoxus gracilicornis* Baly, 1861 (synonymized with *Lypestes* Baly, 1863).

Talmonus Fairmaire, 1889: 71, type species *Talmonus farinosus* Fairmaire, 1889 (*Fidia atra* Motschulsky, 1861) (synonymised with *Lypestes* Baly, 1863).

Lypesthinia Pic, 1939: 32 (valid subgenus) [type species *Lypesthinia multidentata* Pic, 1939: 32].

- Lypesthes* – Chapuis 1874: 273. — Gemminger & Harold 1874: 3376 (catalog). — Lefèvre 1885: 74. — Jacoby 1908: 395, 412. — Clavareau 1914: 76 (catalog). — Chen 1935: 370–371; 1940: 491. — Chûjô 1938: 30; 1956: 88, 101. — Ohno 1958: 178. — Gressitt & Kimoto 1961: 198, 269. — Chûjô & Kimoto 1961: 145. — Kimoto 1964: 256; 2005: 34. — Kimoto & Gressitt 1982: 73. — Seeno & Wilcox 1982: 62 (checklist). — Moseyko & Sprecher-Uebersax 2010: 624.
- Leprotus* – Baly 1878: 250. — Chapuis 1874: 273. — Lefèvre 1885: 80. — Jacoby 1885: 203; 1908: 396, 425–426. — Chen 1935: 370–371.
- Talmonus* – Jacoby 1890: 115.
- Lypesthinia* – Seeno & Wilcox 1982: 62 (checklist).

Type species

- Fidia atra* Motschulsky, 1861: 22 (not *Fidia atra* Jacoby, 1882).

Checklist of species

- Fidia albida* (Pic, 1923) comb. nov.
Lypesthes albidus Pic, 1923: 16
- Fidia atra* Motschulsky, 1861: 22
Leprotus pulverulentus Jacoby, 1885: 203
Talmonus farinosus Fairmaire, 1889: 71
Leprotus testaceipes Pic, 1928: 26
Lypesthes ater fulvipes Chûjô, 1954: 106
Lypesthes ater ater f. *tibialis* Ohno, 1958: 174
- Fidia basalis* (Chen, 1940) comb. nov.
Leprotus atra Pic, 1936: 15
Leprotus basalis Chen, 1940: 517 [replacement name for *Leprotus atra* Pic, 1936: 15]
- Fidia bicoloripes* (Pic, 1936) comb. nov.
Leprotus bicoloripes Pic, 1936: 15
- Fidia bisquamosa* (Chen, 1935) comb. nov.
Lypesthes bisquamosus Chen, 1935: 374
- Fidia brancuccii* (Medvedev, 1993) comb. nov.
Hyperaxis brancuccii Medvedev, 1993: 362
- Fidia carinata* (Eroshkina, 1992) comb. nov.
Lypesthes carinatus Eroshkina, 1992: 86
- Fidia fulva* (Baly, 1878) comb. nov.
Leprotus fulvus Baly, 1878: 250
Lypesthes anger Chûjô, 1935: 204
Lypesthes taiwanus Chûjô, 1956: 105
- Fidia gracilicornis* (Baly, 1861) comb. nov.
Adoxus gracilicornis Baly, 1861: 285
Lypesthes sauteri Chûjô, 1938: 30
- Fidia impressa* (Pic, 1928) comb. nov.
Leprotus impressus Pic, 1928: 26
- Fidia indica* (Jacoby, 1908) comb. nov.
Lypesthes indica Jacoby, 1908: 412
- Fidia irregularis* (Eroshkina, 1992) comb. nov.
Lypesthes irregularis Eroshkina, 1992: 88
- Fidia itoi* (Chûjô, 1954) comb. nov.
Lypesthes itoi Chûjô, 1954: 103
- Fidia japonica* (Ohno, 1958) comb. nov.

- Lypesthes japonicus* Ohno, 1958: 179
Lypesthes babai Chûjô, 1958b: 4
Fidia kanaraensis (Jacoby, 1895) comb. nov.
Leprotos kanaraensis Jacoby, 1895: 270
Fidia kiiensis (Ohno, 1958) comb. nov.
Lypesthes kiiensis kiiensis Ohno, 1958: 177
Lypesthes kiiensis ab immaculatus Ohno, 1958: 179
Fidia laeta (Medvedev, 2007) comb. nov.
Lypesthes laetus Medvedev, 2007: 8
Fidia lewisi (Baly, 1878) comb. nov.
Leprotos lewisi Baly, 1878: 251
Fidia mausonica (Eroshkina, 1992) comb. nov.
Lypesthes mausonica Eroshkina, 1992: 87
Fidia medvedevi nom. nov.
Lypesthes vietnamicus Medvedev, 2015: 324 (*nec Lypesthes vietnamicus* Eroshkina, 1992: 89)
Fidia multidentata (Pic, 1939) comb. nov.
Lypesthinia multidentata Pic, 1939: 32
Fidia perelegans (Gressitt & Kimoto, 1961) comb. nov.
Lypesthes perelegans Gressitt & Kimoto, 1961: 271
Fidia phoebicola (Tan, 1983) comb. nov.
Hyperaxis phoebicola Tan, 1983: 130
Fidia picea (Gressitt & Kimoto, 1961) comb. nov.
Lypesthes piceus Gressitt & Kimoto, 1961: 271
Fidia regalis (Medvedev & Zoia, 1996) comb. nov.
Lypesthes regalis Medvedev & Zoia, 1996: 116
Fidia rufa (Pic, 1924) comb. nov.
Leprotos rufus Pic, 1924: 6
Fidia shirozui (Kimoto, 1969) comb. nov.
Lypesthes shirozui Kimoto, 1969: 17
Lypesthes farinosus Chûjô, 1938: 30 (*nec* Pic, 1923, *nec* Fairmaire, 1889)
Lypesthes gracilicornis Chûjô, 1956: 106 (*nec* Baly, 1861)
Fidia sinensis (Gressitt & Kimoto, 1961) comb. nov.
Lypesthes sinensis Gressitt & Kimoto, 1961: 272
Fidia striata (Eroshkina, 1992) comb. nov.
Lypesthes striatus Eroshkina, 1992: 84
Fidia submaculata (Pic, 1924) comb. nov.
Leprotos submaculatus Pic, 1924: 6
Fidia subregularis (Pic, 1923) comb. nov.
Leprotos subregularis Pic, 1923: 17
Leprotos farinosus Pic, 1923: 17
Fidia sulcatifrons (Gressitt & Kimoto, 1961) comb. nov.
Lypesthes sulcatifrons Gressitt & Kimoto, 1961: 273
Fidia vietnamica (Eroshkina, 1992) comb. nov.
Lypesthes vietnamicus Eroshkina, 1992: 89
Fidia vittata (Zhou & Tan, 1997) comb. nov.
Lypesthes vittatus Zhou & Tan, 1997: 189

Remarks

For comparison of *Fidia* with the genus *Neofidia* Strother nom. nov., see ‘Remarks’ under *Neofidia* Strother nom. nov. The Old World genus *Fidia* belongs to a comparatively large genus-group of the

tribe Adoxini, including the genera with bifid claws, straight fore margin of lateral arms of pronotum ('propleura'), simple intercoxal mesothoracic process and tooth on underside of each femur. It is poorly delimited from the genus *Hyperaxis* Gemminger & Harold, 1874, having a difference in longer pronotum, narrower hind femora with smaller tooth and smaller eyes.

Distribution

China, Indo-China, India, Japan, Korea, Laos, Myanmar, Nepal, Pakistan, Taiwan, Thailand, Vietnam.

Generic diagnosis

Body oblong, adorned with setae and or scales. Frons merges with vertex, hardly differentiated. Antenna filiform, longer than half of body length, longer than body length in some cases. Second antennomere usually shorter than first, longer than half of it, shorter than next three or four. Compound eyes lateral, hemispherical, feebly or not emarginate near antennal sockets. Antennal calli absent. Pronotum longer than wide or subquadrate, narrower than elytra, lateral margins incomplete, fore margin of lateral arms of pronotum ('propleuron') straight. Pygidium with or without elytral locking groove. Legs long, slender, all femora slightly thickened and toothed beneath, all tibiae longitudinally sulcate with rows of setae, mid- and hind tibiae not emarginate at apex, with short stout paired spines on apex. Claws bifid.

Fidia kanaraensis (Jacoby, 1895) comb. nov.

Figs 1–22, 24–25

Leprotes kanaraensis Jacoby, 1895: 270.

Leprotes kanaraensis – Jacoby 1908: 426. — Clavareau 1914: 76 (catalog).

Material examined

Type material

INDIA • 1 spec. (syntype of *Leprotes kanaraensis*, right antenna without five distal antennomeres; left antenna without three distal antennomeres; tibia and tarsi of right foreleg missing); Kanara; Jacoby leg.; NHM 1909-28a (Fig. 18) • 1 spec. (syntype of *Leprotes kanaraensis*, labelled as "Cotype"); Kanara; H.E. Andrewes Bequest leg.; BMNH B.M. 1922–221 (Fig. 19) • 1 spec. (syntype of *Leprotes kanaraensis*, labelled as "Cotype"); Mahe, Malabar; MCZ Type 9764 (images available from: http://140.247.96.247/mcz/Species_record.php?id=9383).

Other material (44 specimens)

INDIA • 1 unsexed; India, Kerala, Vellayani; 08° 25'47.5" N, 76° 59'8.3" E; 18 m a.s.l.; 12 May 2017; Amritha Kumari leg.; cashew; KAU • 1 ♀; same collection data as for preceding; 12 Apr. 2017; KAU • 1 unsexed; same collection data as for preceding; 13 Jun. 2017; KAU • 3 unsexed; same collection data as for preceding; 15 Jun. 2017; KAU • 1 unsexed; same collection data as for preceding; 26 Jun. 2017; KAU • 1 unsexed; same collection data as for preceding; 24 Jun. 2017; H. Sangamesh leg.; at light; KAU • 1 unsexed; same collection data as for preceding; 15 May 2019; KAU • 1 ♂, 1 ♀, 1 unsexed; Kerala, Kallar; 8°41'48.9" N, 77°7'53.6" E; 25 Mar. 2018; S.R. Hiremath leg.; *Mangifera indica*; NBAIR • 2 ♂♂, 1 ♀, 13 unsexed; Kerala, CRS, Pampadumpara; 9°48'23.7" N, 77°10.04'9" E; 23 Apr. 2018; S. Amritha Kumari. leg.; mango; NBAIR • 1 unsexed; Karnataka, Bangalore; 916 m a.s.l.; 27 May 2006; K.J. David leg.; mango; UASB • 2 unsexed; Karnataka, Bangalore, GKVK; 8 Jun. 2006; K.S. Girish leg.; *Mangifera indica*; UASB • 1 unsexed; Karnataka, Bangalore, Hessarghatta; 12 Jul. 2009; H.M. Yeshwanth; UASB • 1 unsexed; Karnataka, Bangalore, Attur, 10 May 2012; mango; C.A. Viraktamath leg.; UASB • 1 unsexed; S Malabar, Walayar; 2000 ft. a.s.l.; 8 Aug. 1938; UASB • 1 unsexed; N Malabar, Taliparamba; 4 Aug. 1927; A.G.R. Coll leg.; pepper; UASB • 3 unsexed; Karnataka, Shanthigodu; Apr. 1988; cashew

sp. 17, CIE A20806, Pres. by Comm. Inst. Entomol. BM1990-1; identified by M.L. Cox as *Neculla ?pollinaria*; BMNH • 1 unsexed; Sindhudurg, Vengurla; 16 Apr. 1989; ?mango/cashew sp. 60, N. Khochare, CIE A20874, Pres. by Comm. Inst. Entomol. BM1990-1; identified by M.L. Cox as *Neculla ?pollinaria*; BMNH • 1 unsexed; Côte de Malabar; T. Deschamps leg.; 1900; F. Monros leg.; USNM • 2 unsexed; Chota-Nagpore, Barway, P. Cardon; Jun.–Aug. 1896; F. Monros leg.; USNM • 2 unsexed; Kerala, Chalakudy; 9 May 2008; J. Thomas leg.; cashew; ZIN • 1 unsexed; Kerala, Erattupettah, Wagamon Pass; 25 Apr. 2010; Prathapan leg.; ZIN.

Redescription

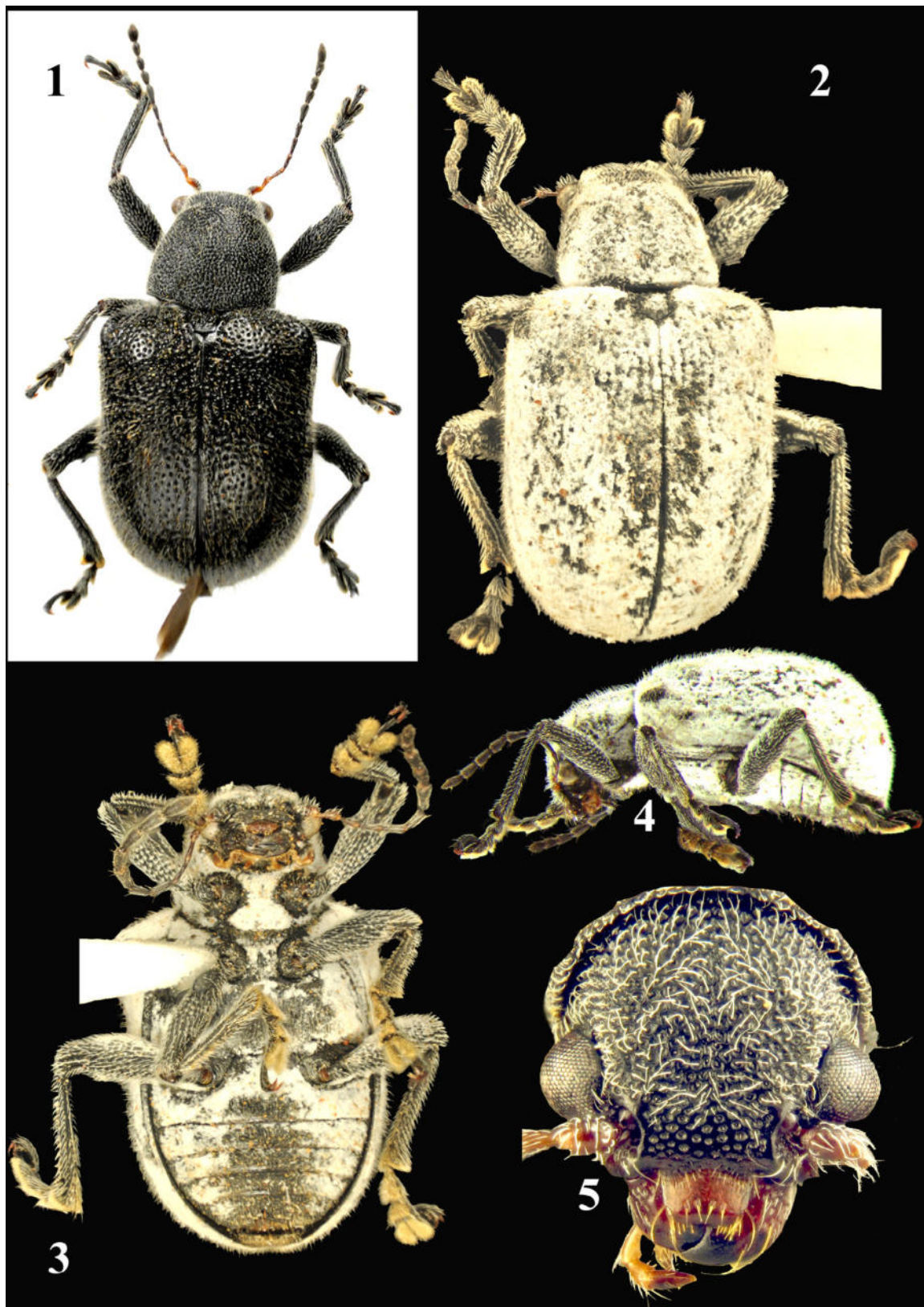
BODY LENGTH. 4.6–5.0 mm (male); 6.4–7.2 mm (female). Width 2.6–2.8 mm (male); 3.3–3.9 mm (female). Body covered with white powdery encrustation (Figs 2–4, 25) absent on antennae, eyes, mouth parts and distal portion of legs. Integument entirely black except labrum, labium, maxilla, basal three or four antennomeres and claws dark chocolate brown. Entire dorsum covered with creamy white, dorsoventrally flattened, erect or curved pointed setae (Figs 1, 4).

HEAD. As densely setose as pronotum; punctures dense and coarse, distance between adjacent punctures less than half of diameter of a puncture (Fig. 5). Frons flat or gently depressed medially; anteriorly sparsely setose, sloping with smaller punctures, merges with narrow clypeus; anterolateral corners obtusely projecting. Antenna exceeds half of body length in male, shorter in female. First antennomere curved, thick, proximally black, distally brown; second antennomere thinner than first; 3–6 thin; 7–11 progressively broadened. Ratio of length of antennomeres 1–11 equals 1 : 0.64–0.9 : 0.7–0.8 : 0.7–0.87 : 0.87–0.93 : 0.78–0.87 : 1.04–1.16 : 0.87–0.96 : 0.9–1.01 : 0.87–0.99 : 1.16–1.19 (male); 1 : 0.68–0.78 : 0.78 : 0.85 : 0.9 : 0.78–0.83 : 0.93–1.1 : 0.78–0.85 : 0.73–0.88 : 0.75–0.85 : 1–1.15 (female). 8th and 9th antennomeres 1.8–2 times longer than broad. Transverse diameter of eye subequal to vertical, 3.7 to 4.8 times distance between antennal socket and eye. Interocular space 1.75 to 2 times wider than interantennal space in males, 1.3–1.5 times wider in females. Transverse diameter of eye about 2.9 times diameter of antennal socket in male, 3.4–3.6 times in female. Interantennal space 1.3–1.8 times transverse diameter of one eye. Maximum width of head 1.5–1.7 times interocular space, 2.6–2.9 times interantennal space. Clypeus indistinct, narrow, with very short setae, anterior margin concave. Labrum broad apically; anterior margin thick, sloping, feebly emarginate; with a transverse row of four setose punctures, anterolateral corners each with a group of three longer setae, anterior margin of labrum with a row of short setae on either side, absent in middle. Maxillary palpi with apical palpomere longest, broadest; penultimate palpomere apparently shorter than one preceding it. Labial palpi with apical palpomere longer than preceding one. Mandibles stout, with long, bent setae laterally.

PRONOTUM. 1.3–1.5 times broader than long; posteriorly 1.2–1.4 times wider than anteriorly; lateral margin weakly formed in posterior half, absent anteriorly, weakly but regularly convex. Anterolateral callosity rounded with setae bearing pore placed laterally, not distinctly protruding laterally; posterolateral callosity rounded with seta bearing pore slightly protruding laterally. Punctures on pronotum subequal to those on vertex, distinctly smaller than elytral ones.

SCUTELLUM. Longer than broad, apex weakly angulate presenting pentagonal appearance, with dense setae and punctures anteriorly, impunctate and shiny posteriorly.

ELYTRA. 1.28–1.38 times longer than broad. Elytra convex, sloping from apical third; lateral margins distinctly curved in middle; apex concave, obtusely angulate at sutural angle; humeral calli well developed with depression mesally and posteriorly; basal calli weakly but distinctly developed with weak depression posteriorly; punctures semiregular with a few countable rows in posterior half near sutural margin; interstices setose; setae flat, pointed.



Figs 1–5. *Fidia kanaraensis* (Jacoby, 1895) comb. nov. 1. Dorsal view of habitus after removing powdery encrustation. 2. Dorsal view of habitus with powdery encrustation. 3. Ventral view of habitus. 4. Lateral view of habitus. 5. Head.



Figs 6–9. Male genitalia of *Fidia kanaraensis* (Jacoby, 1895) comb. nov. **6.** Aedeagus, dorsal view. **7.** Aedeagus, lateral view. **8.** Tergite VIII, sternite VIII & IX. **9.** Tegmen.

THORAX. Propleura with setose punctures. Thoracic sternites pubescent. Prosternum subquadrate with concave lateral margins, broadened posteriorly, densely punctate.

ABDOMEN. Ventrites setose; first ventrite longer than following two combined; first ventrite longest, ventrites 2–4 each shorter than preceding one, fifth longer than fourth, shorter than 3 and 4 combined.

MALE GENITALIA. Tegmen (first spiculum of Jolivet & Verma 2008) membranous with ‘Y’-shaped sclerotization, bifurcated distally, basal region narrow, encircles aedeagus (Fig. 9). Aedeagus in ventral view broadest proximally with lateral margin slightly concave medially, narrowed towards apex; apex triangular with tip truncated, ventral surface concave medially, more or less flat distally (Fig. 6). Spiculum gastrale (second spiculum of Jolivet & Verma 2008) Y-shaped with curved lateral arms, stem distinctly bent at tip. Tergite VIII semi-elliptical in shape with setose apical margin; spiculum relictum indistinct, Y-shaped (Fig. 8). Endophallus everted completely through apical opening, much longer than aedeagus proper with three distinct regions: basal phallomere (BP), median phallomere (MP) and apical phallomere (AP) (Fig. 10). Basal phallomere slightly shorter than median phallomere, narrowed in proximal half with a pair each of longitudinal sclerites dorsally and ventrally; distal half bulged with a large ventral bulb, covered with circular and triangular spicules. Median phallomere longest with a shorter proximal part and a longer distal part; proximal part with a small ventral bulb, membrane with a few circular spicules; distal part widest medially, membrane covered with small triangular spicules arranged serially. Apical phallomere globular, with three pairs of ventro-apical lobes (L1, L2 & L3) and a bifurcated apical sclerite (AS). Endophallus, when inflated through basal opening (Figs 11–12), only part of median phallomere and apical phallomere were visible; basal phallomere completely and proximal region of median phallomere being hidden.

FEMALE GENITALIA (Fig. 13). With spermathecal capsule sickle shaped, weakly constricted proximally, apex subobtuse, inner margin almost V-shaped, outer margin strongly curved (Fig. 16). Length of spermathecal capsule 2.6–3.1 times its maximum width. Bursa copulatrix distinctly sclerotized, almost bean shaped (Fig. 14); spermathecal duct short, enters bursa copulatrix at its apex; spermathecal gland long, tubular, translucent, bifurcated in distal $\frac{2}{3}$, arise close to spermathecal duct. Tergite VIII simple and crescent-shaped (Fig. 17), bears a number of long setae on its apical margin. Sternite VIII unrecognizable and tignum *sensu* Konstantinov 1998 (spiculum ventrale *sensu* Ślipiński & Escalona 2013) absent. Ovipositor very short, with partially reduced structures (Fig. 15). Proctiger is represented by a pair of baculi, connected basally with paraprocts. Paraprocts are small, connected with baculi of proctiger and valvifers. Valvifers are slightly elongate, coxites are with pointed apex and lack long setae on the apex. Styli are absent.

Distribution

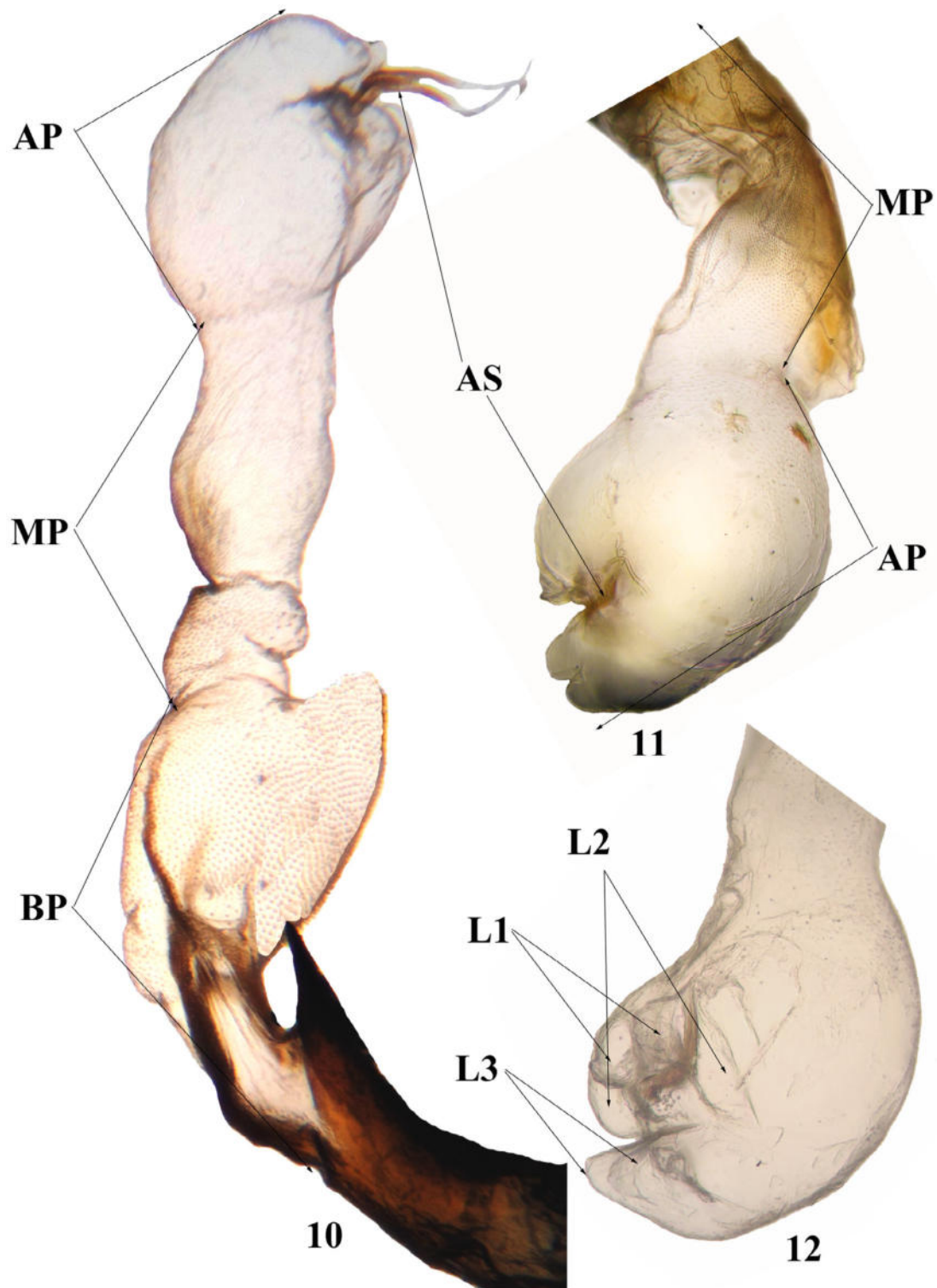
India (Bengal, ‘southern Bombay’, Karnataka, Kerala).

Host plants

Anacardium occidentale L. (**new record**) and *Mangifera indica* L. (Rajendran & Singh 2016) (both Anacardiaceae).

Biology

Fidia kanaraensis is a pest of cashew (*Anacardium occidentale*) and mango (*Mangifera indica*) in south India. Adults create moderate sized circular or irregular holes on the tender leaves (Fig. 26), mostly during the night and late evening hours, and hardly come out during the day. Infestation is apparently higher in cooler areas. Rajendran & Singh (2016) listed it as a pest of mango. No further information was available on its immature stages or biology. This is the first record of *F. kanaraensis* on cashew. Eggs were laid singly on the surface of soil and covered with a mixture of excreta and soil (Fig. 20).



Figs 10–12. Endophallus of *Fidia kanaraensis* (Jacoby, 1895) comb. nov., lateral view. **10.** Endophallus, everted through apical opening or ostium. **11.** Endophallus, everted through basal opening. **12.** Apical phallomere with three pairs of lobes. Abbreviations: AP = apical phallomere; AS = apical sclerite; BP = basal phallomere; L 1 = first pair of lobes; L 2 = second pair of lobes; L 3 = third pair of lobes; MP = median phallomere.

They are elliptical (0.58–0.73 mm × 0.40 mm) in shape and are cream or light yellow in color (Fig. 21). Eggs hatched after about 15 days. Grubs are scarabaeiform, C-shaped, dorsum covered with long setae and actively moved forward using the anal pseudopod (Figs 22, 24). Larvae bored into the roots. In the laboratory, they created a tunnel inside pieces of root and stem of seedlings of mango and cashew (Fig. 23). However, none of the larvae survived till the final instar in the laboratory.

Remarks

The genus in India is represented by two species. *Fidia indica* (Jacoby, 1908), the other Indian species, can be separated from *F. kanaraensis* by the more regularly arranged elytral punctures (rather confused, with countable rows in posterior half of elytra in *F. kanaraensis*) and finely transversely wrinkled elytral interstices in the basal area (interstices not wrinkled in *F. kanaraensis*). *Fidia shirozui* (Kimoto, 1969), from Taiwan, closely resembles *F. kanaraensis* and differences between these species require additional study.

Discussion

Fidia kanaraensis, though originally described from southern India, was also recorded in Bengal in eastern India (Jacoby 1908). Such a disjunct distribution is common for many peninsular Indian species

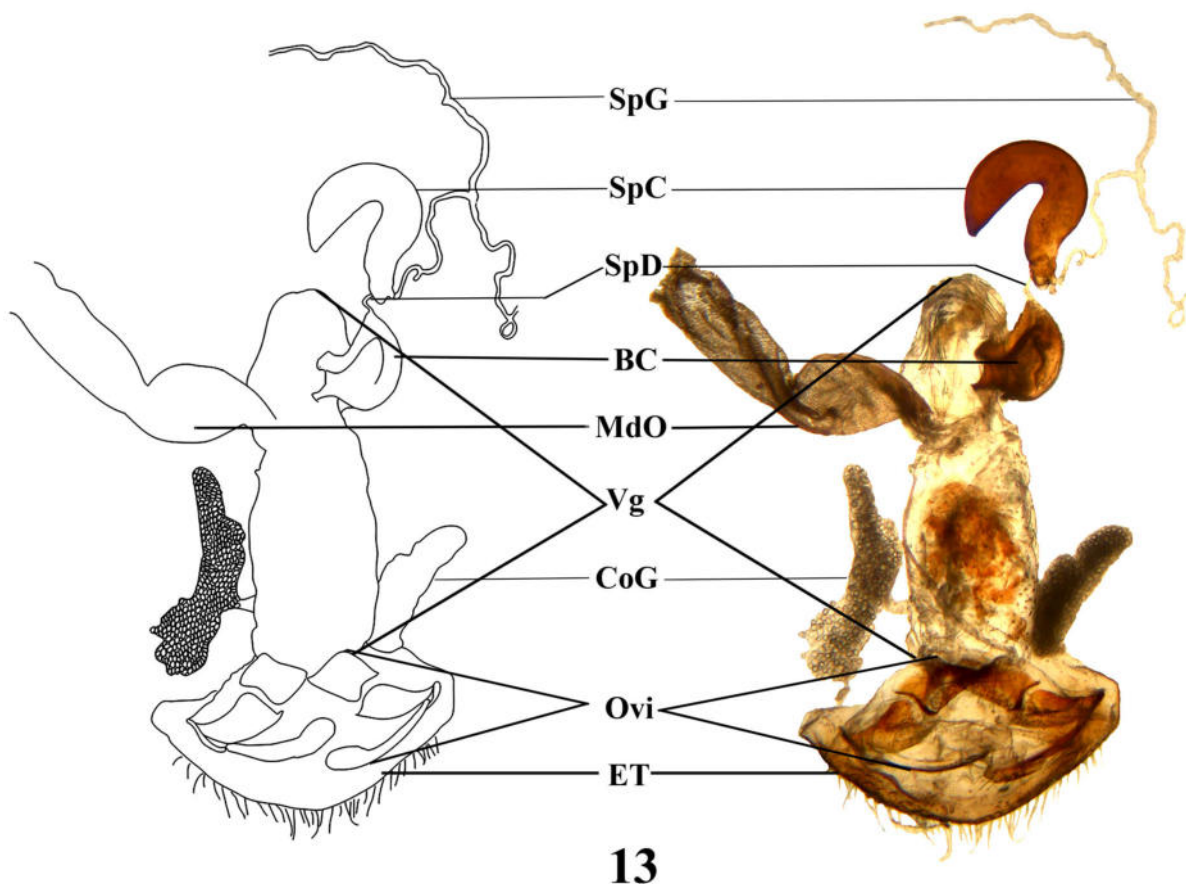
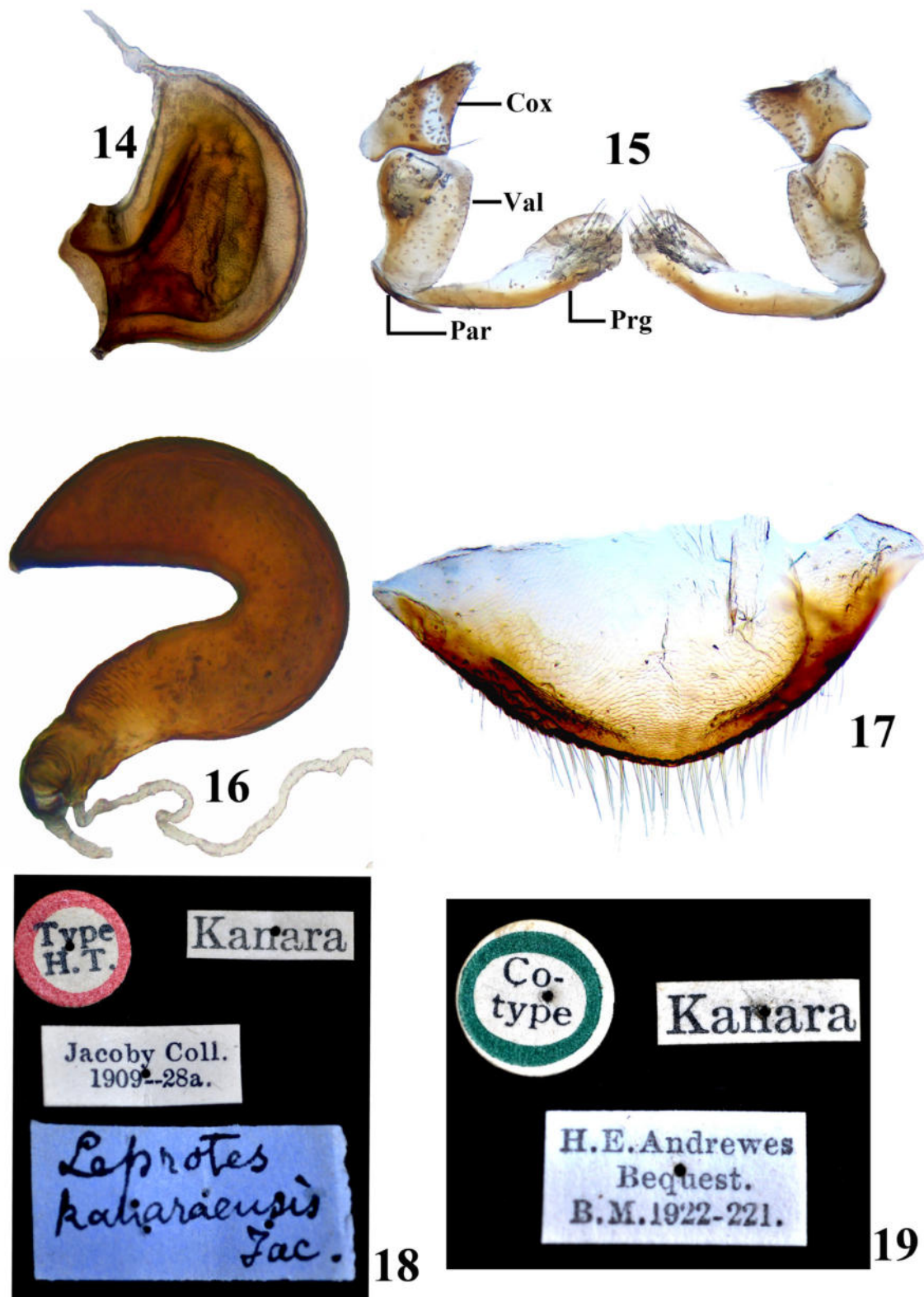
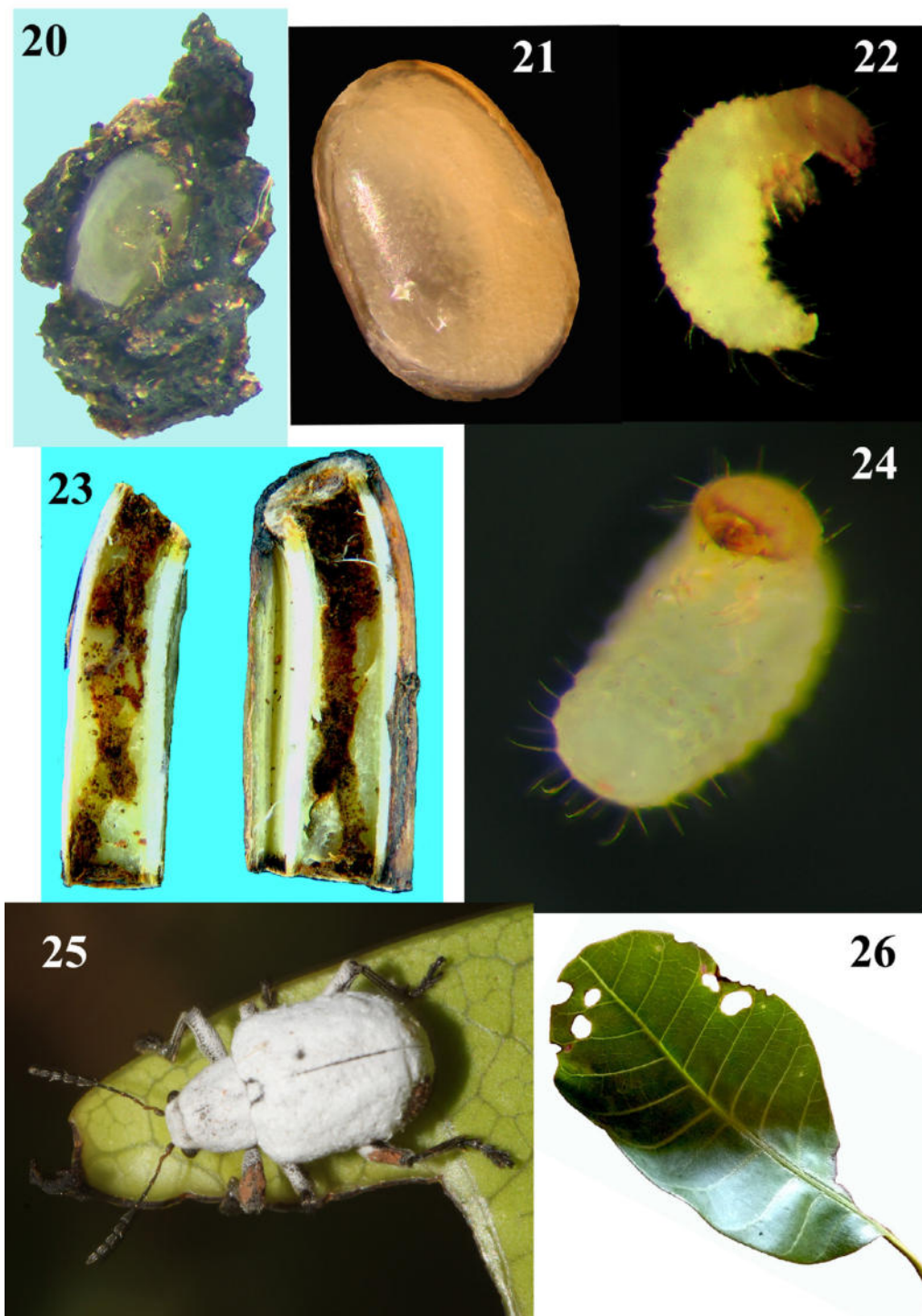


Fig 13. Female genitalia of *Fidia kanaraensis* (Jacoby, 1895) comb. nov. along with line diagram. Abbreviations: BC = bursa copulatrix; CoG = collateral gland; ET = eighth tergite; MdO = median oviduct; Ovi = ovipositor; SpC = spermathecal capsule; SpD = spermathecal duct; SpG = spermathecal gland; Vg = vagina.



Figs 14–19. Close up of parts of female genitalia of *Fidia kanaraensis* (Jacoby, 1895) comb. nov. **14.** Bursa copulatrix. **15.** Ovipositor. **16.** Spermatheca. **17.** Eighth tergite. **18.** Holotype labels. **19.** Paratype labels. Abbreviations: Cox = coxite; Par = paraproct; Prg = proctiger; Val = valvifer.

(Hora 1953). The body of *F. kanaraensis* is covered with a white, waxy secretion. This is also known in *F. atra*, the type species (Chûjô 1954), *F. japonicus* Ohno, 1958 (= *F. babai*) (Chûjô 1958b) and *F. shirozui* Kimoto, 1969. In the Oriental tortoise beetle, *Silana farinosa* (Boheman), the dorsum is



Figs 20–26. Biology and ecology of *Fidia kanaraensis* (Jacoby, 1895) comb. nov. **20.** Eggs covered with excreta. **21.** Naked eggs. **22.** First instar grub, lateral view. **24.** First instar grub, ventral view. **23.** Damage on mango root. **25.** Adult beetle on mango leaves. **26.** Damage on cashew leaves.

completely covered with a white coating (Maulik 1919). Similarly, in *Myrmeconycha* Konstantinov & Tishechkin 2017, a myrmecophilous flea beetle genus from the Neotropics, the head and pronotum are covered with white, waxy exudate. However, the actual origin, chemical nature or function of this white, waxy covering remains unknown.

Flowers (1999), using a different technique for teasing out the endophallus through the apical orifice, studied the endophallus in Eumolpinae and described the structures in the *Leprotites*. However, in our studies, we have everted the endophallus through the apical opening as well as inflated it (without eversion) through the basal opening. Due to the differing techniques used, comparison of structures with those shown by Flowers (1999) is difficult. A sclerotization on the vaginal wall near the base of the duct is present, as in some other eumolpines (Moseyko 2008; Zoia 2009). The short ovipositor as in *Fidia* is a progressive character in Chrysomelidae and an adaptation for open oviposition of groups of glued eggs or eggs with some coverage (Moseyko 2008). According to Li & Liang (2018), females with shorter ovipositors lay eggs on substrate surfaces or in shallow excavations. The female genitalia of *F. kanaraensis* are different from those of eumolpines such as *Platycorynus* Chevrolat, 1837 *Colasposoma* Laporte, 1833 and *Chrysochus* Chevrolat, 1836, but show a structural similarity to those of Synetinae (Li & Liang 2018). Treating Synetinae as a tribe within the subfamily Eumolpinae has already been implied by Crowson (1992). The presence of vaginal glands as in *Fidia* has been reported in *Syneta* by Reid (1995), who provides evidence strongly in favor of *Syneta* being a plesiomorphic eumolpine with many adult autapomorphies. However, Verma & Jolivet (2000) considered Synetinae as a separate subfamily. The pair of vaginal glands (CoG in Fig. 13), observed in *F. kanaraensis*, are either collateral glands or organs of symbiont transmission (Suzuki 1988). Covering the eggs with excreta and soil along with a glandular secretion (Jolivet *et al.* 2014) may be a means of transmission of symbionts. Trophic selections of the genus are distributed across plant families (Table 1). However, *F. kanaraensis* is the only species that feeds on Anacardiaceae. More information on the subterranean immatures of the species is necessary to formulate a management strategy in agro-ecosystems.

Acknowledgments

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APPENDIX -II

Species composition and diagnoses of leaf- and fruit-scarring beetles (Coleoptera, Chrysomelidae) infesting bananas and plantains (Zingiberales, Musaceae) in the Indian subcontinent

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Abstract

Leaf- and fruit-feeding chrysomelids (Coleoptera) on bananas and plantains (Musaceae, Zingiberales) cause major losses to banana growers in the northern and northeastern regions of India, Bangladesh, and other parts of Southeast Asia. The species composition of these beetles has not been studied so far in India and wrong names or wrong name combinations in the literature have caused confusion. Most particularly, the Central and South American species of *Colaspis hypochlora* Lefèvre (Chrysomelidae, Eumolpinae) has been erroneously reported as occurring in India and Bangladesh, and this name has been used for the Indian species. Based on extensive surveys for leaf- and fruit-feeding chrysomelids in the northern and northeastern regions of India from 2015 to 2019, three species of banana-feeding chrysomelids, namely, *Basilepta subcostata* (Jacoby) (Eumolpinae), *Bhamoina varipes* (Jacoby), and a new species, *Sphaeroderma cruenta* sp. nov. (Galerucinae, Alticini), are documented. Of these, the latter two are recorded as pests of banana in India for the first time. An illustrated diagnostic account of these three species is given to facilitate their identification by economic entomologists. COI sequences of populations of *B. subcostata* from Assam and Uttar Pradesh showed 98–100% homology, indicating that these populations are conspecific and that COI sequences can be used for rapid species determination. Brief notes on the biology and available management options for these pests are also given.

Key Words

COI sequences, leaf beetles, *Sphaeroderma cruenta* sp. nov., new records, South Asia, pest management

Introduction

India is one of the major centres of diversity for bananas and plantains (Zingiberales, Musaceae) and the largest producer of bananas in the world, with its annual production greater than what the rest of the world produces for export (Promusa 2019). The term “plantain” is often used specifically to refer to cooking bananas while “banana” is mainly used to refer to dessert bananas (Promusa 2019). Data from the Food and Agriculture Organization of the United Nations indicate the area under banana cultivation in India in 2017 was 860000 ha with a production of 30.48

million metric tonnes (FAOSTAT 2019). Rhizome weevil (*Cosmopolites sordidus* (Germar)) and pseudostem weevil (*Odoiporus longicollis* (Olivier)) (Coleoptera, Curculionidae) are considered as the most economically important insect pests of banana in this region. Besides these, leaf- and fruit-scarring beetles (Coleoptera, Chrysomelidae) are major seasonal pests of bananas and plantains in many states of northern, eastern, and north-eastern India, Bangladesh, and parts of Southeast Asia.

At present, there is no systematic study on the species composition of leaf and fruit feeding chrysomelids from the Indian subcontinent. Ostmark’s (1974) review of the

economic insect pests of banana was restricted to insect pests of mainly Central and South America and did not focus on the major South Asian pests of bananas, including the fruit-scarring beetles. The name “*Colaspis hypochlora* Lefèvre” (Coleoptera, Chrysomelidae) has been most extensively associated with bananas in the literature, but it is known to be a pest only in South and Central American countries (Ostmark 1975). Gowdey (1926) gave an overview of the biology of *C. hypochlora*. Ostmark (1975) gave an account of four species of *Colaspis* considered to be established pests of banana leaves and fruits in Central and South America. He also listed three more species of *Colaspis* collected in association with banana. He reported *C. hypochlora* as “common on plants near banana plantations” (Ostmark 1975: 2), but as only occasional or accidental feeders on banana. He recorded it as a frequent feeder on banana candelas in newly planted orchards in Panama and as an occasional pest of banana fruits. Hill (2008: 309) also referred to *C. hypochlora* as “a pest of some past importance in C. and S. American banana-growing areas”. Hill (1983: 518) listed “*Colaspis* spp.” as banana fruit scarring beetles in India, Central and South America with a note “larvae scar fruits”. *Myochrous melancholicus* Jacoby is another potentially serious banana fruit-feeding chrysomelid reported from Mexico (Cruz-Zapata et al. 2018).

In South and Southeast Asia, three of the 24 chrysomelid genera on Musaceae are known to feed on banana (Jolivet and Hawkeswood 1995): *Basilepta*, *Bhamoina*, and *Sphaeroderma*. *Basilepta subcostata* (Jacoby) (Chrysomelidae, Eumolpinae) is rated as one of the major seasonal pests of regional importance in India, particularly in the northeastern region, which is host to a wide diversity of bananas. The extent of damage to banana bunches by this pest has been estimated at 30% (Ahmad et al. 2003) and 11.47–95.68% (Choudhary et al. 2010) in Bihar, north India, and is as high as 80% in Assam, north-eastern India (unpublished observations) in the rainy and post-rainy seasons.

Despite its economic importance, the nomenclature has not been clarified and incorrect names have been used for this species in literature. Indian workers have erroneously applied the name “*Colaspis hypochlora*” to the Indian scarring beetles (e.g. Verghese and Kamala Jayanthi 2001), and Sah et al. (2018) used both “*Basilepta* sp.” and “*Colaspis* sp.” to refer to the leaf- and fruit-scarring beetle of banana occurring in Bihar. The names *Nodostoma* spp., *Nodostoma (Basilepta) subcostatum*, *Nodostoma subcostatum*, and *Nodostoma viridipenne* have been used for the common fruit-scarring beetle in the northeastern region even though *Nodostoma* is a junior synonym of *Basilepta* (Weise 1922; Kimoto and Gressitt 1982). Furthermore, taxonomic treatments of *B. subcostata* are sparse; Kimoto and Gressitt (1982) provided a key to *Basilepta* spp. of Thailand, Vietnam, and Laos which included *B. subcostata*, but a recent redescription of *B. subcostata* with illustrations of the genitalia is not available. Besides

B. subcostata, the other chrysomelid species feeding on bananas were not identified.

The aim of this study is a) to determine the species composition of leaf- and fruit-scarring beetles infesting bananas and plantains in the Indian subcontinent, b) to describe or redescribe these species, and c) to provide a determination key facilitating their correct identification. In this way, we hope to provide a basis for a reliable identification of the banana-feeding chrysomelids, which is needed for species-specific, effective pest management strategies in future.

Materials and methods

Field collections

Surveys were carried out over a period of five years (2015–2019) for banana-feeding chrysomelids in seven states of India, namely, Uttar Pradesh, Bihar, Assam, Manipur, Meghalaya, West Bengal, and Odisha. Banana fruit-scarring beetles are major pests in the states surveyed (unpublished data from All India Co-ordinated Research Project on Fruits, operated by the Indian Council of Agricultural Research (ICAR), New Delhi).

Taxonomy

Morphological terminology follows Konstantinov (1998), Jolivet and Verma (2008), and Moseyko (2008). Males and females of *B. subcostata* were distinguished by the basitarsomeres having closely arranged capitate setae bordered by long, pointed setae on the ventral side in males, and only pointed setae in females. In the other two species, sexes were separated by the apical abdominal ventrites. Male and female genitalia of all species, including different colour morphs of *B. subcostata* from various Indian states, were dissected, photographed, and stored in glycerine in microvials pinned with the respective specimens.

The endophallus was everted using a KK-3 type C fine nozzle as follows. The endophallus was pushed towards the apical opening using the blunt end of a flexible fine needle through the basal opening and the tip of the fine nozzle, filled with K-Y gel, and affixed at the base of the aedeagus proper with a cyanoacrylate glue (Fevikwik). The assembly was allowed to dry for 5 min. and kept in water for 1 min. to relax the endophallic membrane. Then the aedeagus was immersed in K-Y gel on a glass slide and the endophallus was everted under controlled pressure of a syringe filled with K-Y gel.

Imaging

Photographs of whole specimens and their diagnostic characters were taken using a Leica M205A stereo microscope fitted with a Leica DMC 4500 digital camera. Im-

age stacks were processed into composite, high resolution images using CombineZP software. Types of *Basilepta* spp. at the Natural History Museum, London, were studied and photographed with a Canon EOS 1500D DSLR camera fitted with a Canon MP-E 65 mm macrolens and processed with Helicon Focus Pro.

COI sequencing and analysis

Sequencing of a 660-base pair (bp) fragment of the mitochondrial cytochrome *c* oxidase subunit 1 (COI) was done for samples of *B. subcostata* from Assam and Uttar Pradesh. Morphologically identified specimens were used for extraction, amplification and sequencing of 5' end of COI mtDNA. Genomic DNA was extracted using QiagenDNeasy kit, following the manufacturer's protocols using the following primers: forward primer (LCO 1490 5'-GGTCAACAAATCATAAAGATATTGG-3'), and reverse primer (HCO 2198 5'-TA- AACTTCAGGGTGACCAAAAAATCA-3'). Amplified products were sequenced using Sanger technology and the sequences were submitted to GenBank and accession numbers obtained.

Sequence identity matrix and alignment of COI sequences of *B. subcostata* from Assam and Uttar Pradesh were executed using the CLUSTAL W multiple alignment tool of BioEdit sequence alignment editor 7.0.5.3. Phylogenetic analysis was performed using the Maximum likelihood phylogenetic tree construct in MEGA X. Sequences of *Basilepta leechi* (MN343857), *B. variable* (MN344143), *Eumolpinae* sp. (KF946194), *Chrysomelidae* (MK083043), *Oryctes rhinoceros* (L.) (KP898260), and *Coccinella septempunctata* L. (MH976795) from GenBank were used for phylogenetic analysis with the last two forming outgroup taxa..

Specimen repositories

The specimens studied are deposited in the following collections:

BMNH	Natural History Museum, London, UK [formerly British Museum (Natural History)]
NPC	National Pusa Collection, Indian Agricultural Research Institute, New Delhi, India
ICAR-NBAIR	ICAR-National Bureau of Agricultural Insect Resources, Bangalore, India
KAU	Travancore Insect Collection, Kerala Agricultural University, Vellayani
UASB	University of Agricultural Sciences, Bangalore, India
USNM	National Museum of Natural History, Washington DC, USA
ICAR-NRCB	ICAR-National Research Centre for Banana, Tiruchirappalli, India

Results

About 1200 specimens of leaf and fruit feeding chrysomelids were collected on banana from seven states of India. The genera and species were identified by the keys given by Jacoby (1908), Kimoto and Gressitt (1982) (for *Eumolpinae*), Maulik (1926), and Scherer (1969) (for *Alticini*). One species, *Basilepta subcostata* (*Eumolpinae*), was collected from all seven states and was the most predominant and economically important leaf- and fruit-feeding chrysomelid in all locations. Two species, *Bhamoina varipes* (Jacoby) and a hitherto undescribed species of *Sphaeroderma* Stephens (*Galerucinae*, *Alticini*), were found to be restricted to the northeastern region. *Bhamoina varipes* was collected from the states of Assam and Meghalaya, and *Sphaeroderma* was collected only from the state of Meghalaya. These two species are recorded for the first time on banana in India.

Taxonomy

Chrysomelidae

Eumolpinae

Basilepta subcostata (Jacoby, 1889)

Figs 1–8

Nodostoma subcostatum Jacoby, 1889: Jacoby 1889: 164; Jacoby 1908: 334.

Nodostoma cyanipenne: Lefèvre 1893: 120; Kimoto and Gressitt 1982: 51 (synonymy).

Basilepta subcostatum: Kimoto 1967: 69; Medvedev 1990: 8–9; Chûjô 1964: 268–269.

Basilepta subcostata: Kimoto and Gressitt 1982: 51; Sprecher-Uebersax 1997: 144; Medvedev and Sprecher-Uebersax 1999: 288; Kimoto 2001: 27; Medvedev 2001: 608; Kimoto 2005: 31–32; Moseyko and Sprecher-Uebersax 2010: 639.

Material examined. Type material: syntype female, “SYNTYPE (blue bordered circular label)/ Bhamò, Birmania, Fea, VII.1886/ Jacoby Coll. 1909-28a/ *Nodostoma subcostatum* Jac./ abdomen missing, S.L. Shute 1976/NHMUK014016383” (BMNH). **Other material:** 64016/Birmah, Momeit/Doherty/Fry Coll. 1905-100, 1 ex.; Tharrawaddy, Burma/ Andrewes Bequest 1922-221/ *Nodostoma subcostatum* Jac., 1 male with genitalia glued to the same card; Assam, Sudiya/ Doherty/ Fry Coll. 1905-100, 1 male; Assam, Patkai Mts./ Doherty/ Fry Coll. 1905-100/ Jacoby det., 1 ex.; Thailand, Lot 1830, Nakhonratchasima, June 15, 1912/24/To B.M. List 153.10/ C.I.E. Coll. A1720/ Pres. By Com. Inst. Ent. B.M.1967-2, 2ex. (BMNH); S.INDIA, Mysore, Vittal 1964, Arecanut Res. Stn., on banana/ C.I.E. Coll. No.19658, 2 ex; Deccan/ 67.56, 1 ex; NEPAL: Rampur, 14.vii.1981, Ex. Banana, 6 ex; NEPAL: Dhunibesi, 22.vi.65, Banana, Dept. Agric. C.I.E. A.573, Col.161/ Pres. By Com. Inst. Ent. B.M. 1966-22, 2 females and 2 unsexed; 61647/ Doherty/ Assam, Patkai Mts/ Fry Coll. 1905-100, 4 ex; Bacan, N. India/ 67.56, 3 ex.; Calcutta

/ Atkinson Coll. 92-3, 2 ex; Doherty/ Tenasserim, Mergui/ Fry Coll. 1905-100; W. Almora Divn., Kumaon, UP, Aug. 1917, HGC/ E8/ H.G. Champion Coll. B.M. 1953-156, 4 ex; Lansdowne Division, UP, India, F.W.C./ H.G. Champion Coll. B.M. 1953-156, 1 ex.; Ind./ Baly Coll., 1 ex.; Khasis/ Coll. Kraatz/ Pres. by Imp. Inst. Ent. BM 1938-351/ *Nodostoma occipitale* Jac., Det. G.E. Bryant, 1 ex. (BMNH). India: Assam: 7 ♂ and 5 ♀ Balipara 74 m msl/26°49'56"N, 92°46'41.1"E/17.v.2019/ K D Prathapan Coll.; 3 ♂ Jorhat /19–22.xi.2007/ Prathapan K D Coll.; 4 ♂ and 10 ♀, Assam: Dergaon, 26°42'01.00"N, 093°54'01.26"E/2.x.2018, R. Thanigairaj; Assam: 2 ♂, 2 ♀ Nameri Nat. Park 85 m msl/ 26°55'27.4"N, 92°49'38.9"E/17.v.2019/ K D Prathapan Coll.; Assam: 17 ♂, 13 ♀ and 7 unsexed, Tezpur 72 m msl/ 26°37'33.4"N, 92°48'41.5"E/19.v.2019/ K D Prathapan Coll.; 25 ♂ and 14 ♀, Assam: Kaziranga, Kohora 70 m msl/ 26°35'29.6"N, 93°23'56.1"E/18.v.2019/ K D Prathapan Coll./Ex Banana; 2 ♂ same data, except Host *Canna* sp.; Meghalaya: 11 ♂, 13 ♀, Barapani/25°41'17.6"N, 91°55'5.1"E/5.vi.2013 993 m/Prathapan K D Coll./Ex. Banana; 3 ♂, 1 ♀, Meghalaya: Nongpoh 587 m msl/25°50'34.4"N, 91°52'34.4"E/22.v.2019/ K D Prathapan Coll.; 1 ♂, 6 ♀ Meghalaya: Cherrapunjee 1426 m msl/ 25°17'11.0"N, 91°43'07.8"E/21.v.2019/ K D Prathapan Coll.; 3 ♂, 3 ♀ Meghalaya: Umroi/2.xii.2007/Prathapan K D Coll.; 4 ex, Meghalaya: Jorabat, 04.x.2018, 26°04'59.52"N, 091°52'36.59"E, R.Thanigairaj; Meghalaya: 2 ex, Umi-am/19.vii.2019/D. M. Firake/Ex ginger; 3 ♂ and 10 ♀, West Bengal: Cooch Behar, x.2016, B. Padmanaban; Uttar Pradesh: 4 ♂, 9 ♀ Faizabad Dist, 27°37'06.96"N, 081°36'29.54"E, 12.xi.2018, J. Poorani; Bihar: 6 ♂ and 1 ♀ Bhagalpur, 6.iii.2016, B. Padmanaban; Bihar: Falka, 11–12.x.2017, B. Padmanaban; Odisha: 4 ex, Bhubaneswar, 29.v.2015, Sangeetha.

Generic diagnosis. Body oblong; head mildly sulcate above eyes; antennae filiform or distal antennomeres widened; pronotum wider than long, widest posteriorly, lateral margins often angulate; anterior margin of proepisternum concave; legs long, all femora dilated, minutely dentate ventrally, tibia longitudinally sulcate with a sharp ridge along dorsal side; intermediate and posterior tibiae emarginated preapically; metatibia with a pair of short apical spines; prosternum broader than long. Claws appendiculate; bursa sclerites present in female genitalia.

Related species. *Basilepta makiharai* Kimoto, described from Nepal, is stated to “resemble *B. subcostata* in having the elytron with humeral ridge but differs by its shorter body length and in having the surface of vertex finely shagreened” (Kimoto 2001: 26). It is generally pitchy black to dark reddish brown with entirely yellowish-brown antenna. *Basilepta viridipennis* (Motschulsky), another species widely distributed in Southern Asia and erroneously reported as the banana fruit-scarring beetle from India and Bangladesh, is also externally similar to *B. subcostata*, but its antenna is almost fully blackish except for the first four antennomeres and the posterolateral callosity of pronotum does not project beyond lateral margin, and hence, the posterolateral corners of pronotum

are obtuse and not angulate as in *B. subcostata*. Besides, the elytra are metallic green to violaceous and shinier and lack a distinct lateral costa.

Nodostoma obscurum Jacoby, 1908 and *Basilepta sakaii* Takizawa, 1987 were listed as synonyms of *B. subcostata* in the catalogue of Nepalese Chrysomelidae by Medvedev and Sprecher-Uebersax (1997: 288), but they did not mark it as a new synonymy. This appears to be incorrect because the type of *N. obscurum* is not even morphologically similar to *N. subcostatum*, whereas *B. sakaii* is a smaller insect according to the description (Alexey Moseyko, personal communication).

Description. Length 2.34–3.00 mm, width 1.36–1.86 mm, 1.6–1.7× longer than broad. Body (Fig. 1a–c) oblong ovate, shiny. Colour highly variable from red-brown to dark blue, black, or their mixtures without any spots, stripes or maculations; head entirely red-brown to tinted black except vertex red-brown, palpomeres light yellow to brown, some specimens with apex of last palpomere black; basal 4–6 antennomeres light brown and rest gradually turning piceous to black; colour of pronotum and elytra varies from red-brown or dark blue to shiny black, pronotum concolorous with elytra or not, general color of legs red-brown to dark brown or testaceous, tibia distally and tarsomeres darker.

Three major color morphs and their intermediates were commonly observed:

1. Head and pronotum red-brown; elytra blue, blue-black, dark green, or black; all ventrites dark (Fig. 1a). A syntype, images of which were made available by the Museum of Comparative Zoology (http://140.247.96.247/mcz/Species_record.php?id=9291), belongs to this category.
2. Entirely red-brown, except distal antennomeres, legs and palpi piceous to black (Fig. 1c);
3. Entirely dark blue, blue-black, dark green, or black (Figs 1b, 2), except head medially red-brown; metasternum and abdominal ventrites piceous to black; all entirely dark variants observed were females.

Head (Fig. 3a, b) distinctly punctured with impunctate areas on vertex and frons; punctures bold, slightly smaller than those on pronotum. Coronal suture weak but evident. Supraorbital pore adjacent to dorsal margin of eye, rounded, with a long seta. Orbital sulcus with deep, bold punctures. Frons hardly differentiated from vertex, supra frontal sulcus weak. Frons with a few bold punctures, impunctate medially. Antennal calli trapezoidal, raised; supracallinal sulcus well developed with a few bold punctures. Clypeus forms narrow transverse band with strongly concave anterior margin; frontoclypeal suture with a few small punctures. Labrum broader than long, with a pair of broadly placed setose punctures in middle and a pair of setae anterolaterally; anterior margin with thick short setae on either side of middle, apical margin emarginate medially. Antennae hardly extend up to middle of elytra; first antennomere thick, longer than second; second antennomere thinner than first, thicker than 3rd and 4th separately; 5th onwards antennomeres progressively thicker; basal four anten-

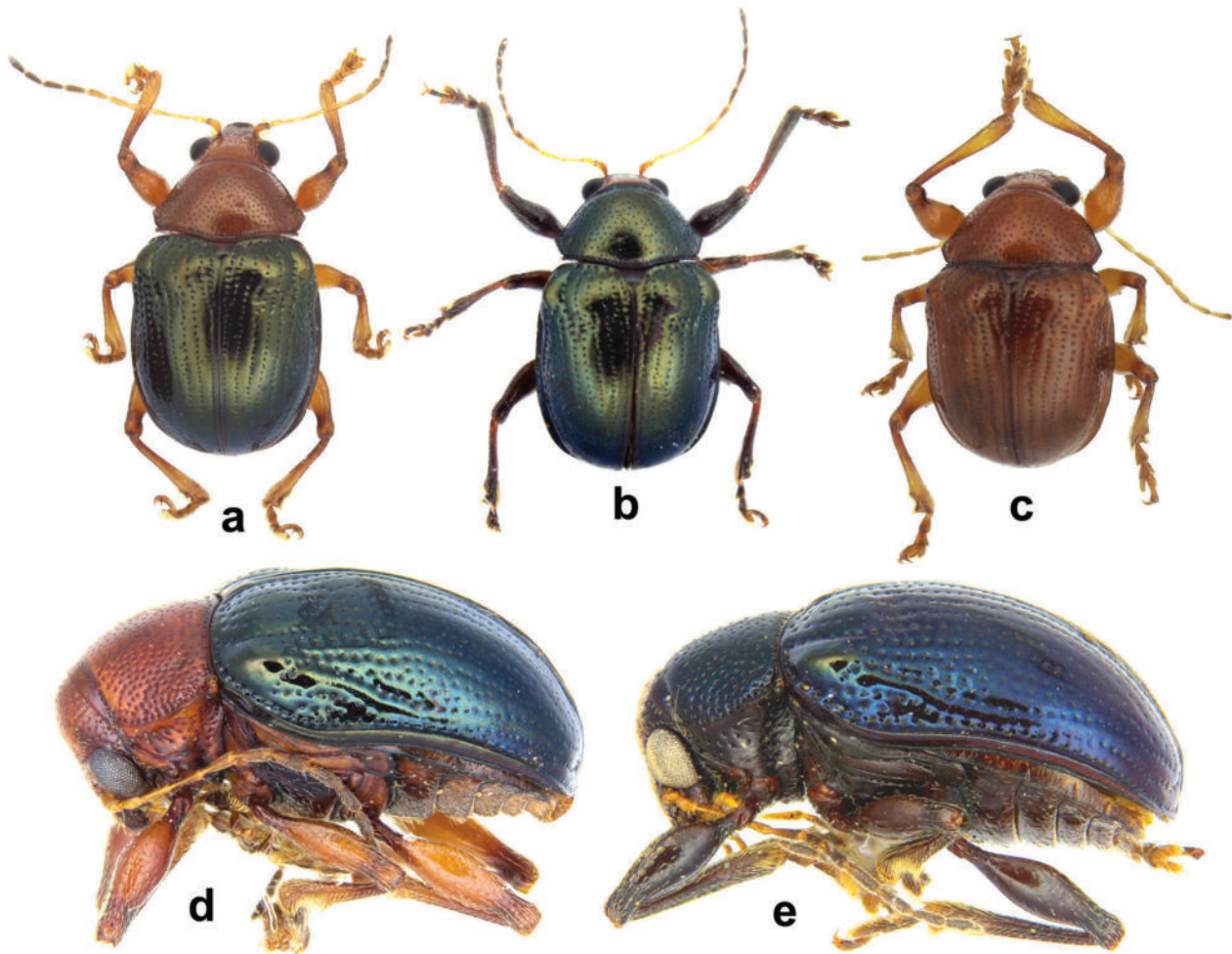


Figure 1. *Basilepta subcostata* (Jacoby). **a–c.** Habitus, dorsal: **a.** Nominat form, male; **b.** Female; **c.** Rufous form, male; **d.** Male, lateral view; **e.** Female, lateral view.



Figure 2. Syntype (female) of *Basilepta subcostata* (Jacoby) (BMNH). **a.** Dorsal view; **b.** Lateral view.

nomeres smooth, shiny, sparsely setose; distal seven thickly covered with short pointed setae, proportion of antennomeres as follows: 1 : 0.80 : 1.13 : 1.33 : 1.27 : 1.20 : 1.20 : 1.27 : 1.20 : 1.13 : 1.33.

Compound eyes with inner margin feebly emarginate, transverse diameter about 1.4–1.5× vertical. Distance between eyes 1.8× distance between antennal sockets, shortest distance between compound eye to adjacent an-

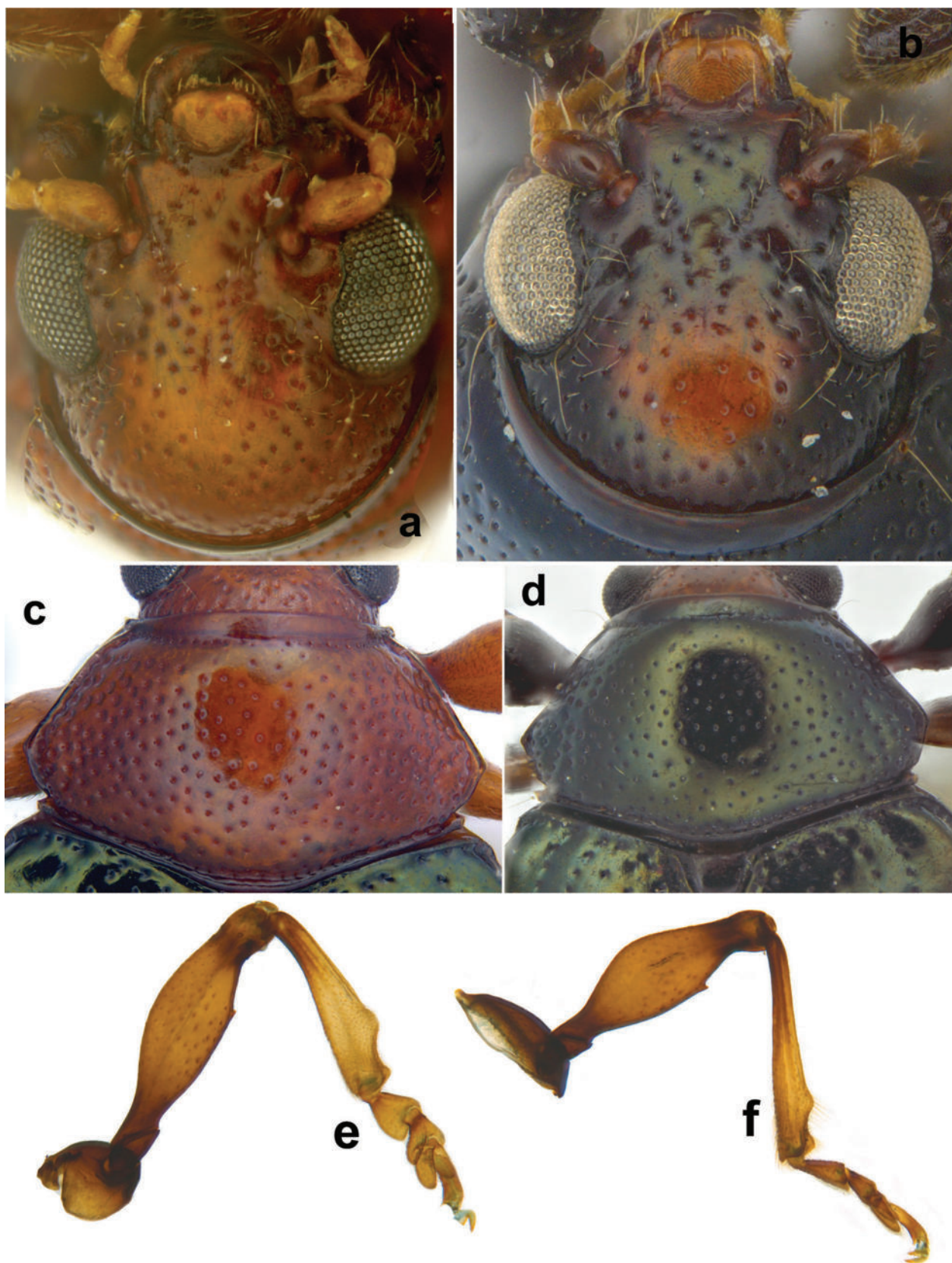


Figure 3. *Basilepta subcostata* (Jacoby). **a.** Head, dorsal view, male; **b.** Head, dorsal view, female; **c.** Pronotum, male; **d.** Pronotum, female; **e.** Middle leg; **f.** Hind leg.

tennal socket about $3.5\times$ distance between antennal sockets. Mandibles with two large denticles; maxillary palpi three-segmented excluding palpifer; last palpomere lon-

gest, penultimate palpomere less than half length of last palpomere. Labial palpi with three palpomeres, excluding palpiger, first palpomere being shortest and last longest.

Pronotum (Fig. 3c, d) about 1.6× broader than long, posteriorly 1.6–1.7× wider than anteriorly, somewhat trapeziform in outline, narrowed anteriorly, with posterolateral callosity laterally projecting beyond lateral margin, hence posterolateral corners appear sharply angulate, lateral margins angulate at posterior one-third presenting octagonal appearance, densely punctate, punctures larger than those on head and smaller than those on elytra, posterior margin gently lobed in middle, anterior sulcus and posterior sulcus distinct with a row of punctures, posterior sulcus deeper than anterior. Scutellum wider than long, broadly rounded posteriorly, sparsely and minutely punctate. Elytra 1.2× longer than wide, punctate striate, punctation weaker towards apex, punctures regular post medially with 10 striae; partially confused and semiregular in anterior half of elytra due to incomplete or broken striae; distance between punctures in a row less than distance between adjacent rows; extreme lateral row of elytral punctures regular, complete, extending up to apex; second row merged with first row from anterior one-fourth to middle of elytra; third row arising from humerus extending up to apex of elytra; interstice between 2nd and 3rd lateral rows distinctly costate, extending as far as middle of elytra or beyond, costa variable in prominence, strongly convex and sinuate in the syntype female (Fig. 2b) (BMNH, examined), but only moderately prominent in most of the Indian material examined. Humeral calli well developed, post basal depression shallow but distinct; basal calli distinct, vary in prominence. Elytral apex narrowly convex. Epipleura outwardly oblique with sparse and fine punctures, narrowing beyond proximal one-third, hardly reaching elytral apex.

Prosternum broader than long, broader posteriorly than anteriorly, with bold punctures, posterior margin straight; mesosternum nearly twice as broad as long with a few punctures smaller than those on prosternum. Proepisternum depressed; hypomeron with bold punctures. Legs long; all femora dilated, minutely dentate ventrally beyond middle (Fig. 3e, f); tibia (Fig. 3f) with eight sharp carinae, variable in prominence: three each dorsally and ventrally, one each on either side laterally. Tarsomeres ventrally fringed with diverse forms of setae, basitarsomere with closely arranged capitate setae bordered by long pointed setae in males and only pointed setae in females, second tarsomere ventrally with pointed setae, bilobed third tarsomere with triangular or inverted arrowhead-shaped setae ventrally.

Ventrites sparsely punctate, pubescent; first ventrite medially longer than following two combined, ventrites 3 and 4 subequal, shorter than 2 and 5 separately which are subequal, last ventrite hardly sexually dimorphic, last tergite without longitudinal groove medially.

Male genitalia: aedeagus in lateral view (Fig. 4a, c, e, h, k, m, n, o) sharply bent almost at right angle near base of aedeagus proper, apical portion acutely narrowed and slightly recurved dorsally; in ventral view (Fig. 4b, d, f, g, i, j, l), depressed along ventral surface, apex narrowed forming obtuse denticle; apical opening wide, partial-

ly covered by a lamina with a pair of sclerotized stripes fused basally and joining dorsal surface. Tegmen (Fig. 4q) flat, membranous, lightly sclerotized, bilobed distally, proximally with a pair of arms which turn narrowed and encircle base of aedeagus proper. Spiculum gastrale (second spiculum of Jolivet and Verma 2008) Y-shaped, sclerotized. Tergite VIII semicircular with spindle-shaped sclerotization on either side, with short setae apically. Spiculum relictum (sensu Slipinski and Escalona 2013) spoon-shaped, distally dilated (Fig. 4p).

Endophallus (Fig. 5a) long, membranous, tubular, about 3.7–3.9× longer than aedeagus proper; with three distinct regions: basal phallomere (BP), median phallomere (MP), and apical phallomere (AP); basal phallomere (Fig. 5b) very short with a lateral lobe on either side, followed by two inwardly curved central sclerites (CS) dorsally; median phallomere (Fig. 5c) longest, tubular, with setae or hair like spicules, a few circular spicules present near apical region; apical phallomere (Fig. 5d) much wider than other two regions, asymmetrical, with spicules varying in shape such as triangular, angular, oval; apical region proximally with three minute lobes facing median phallomere, apex with large lateral lobes and several smaller lobes medially.

Female genitalia (Fig. 6) with spermathecal capsule sickle-shaped (Fig. 6a, b), proximal portion very short, constricted medially, dumbbell-shaped where spermathecal duct and spermathecal gland join side by side, distal portion sickle-shaped, sharply curved, subacutely narrowed towards distal end; spermathecal gland long and tubular, length of spermathecal capsule 7.7× its maximum width. Bursa copulatrix (Fig. 6c) sac like, longer than wide, with a long bursa sclerite (BS) on either side, spermathecal duct joins bursa copulatrix between these sclerites, median oviduct attached on the other side of bursa copulatrix. Ovipositor (Fig. 6d) elongate, sclerotized distally, with almost 10–16 long setae, stylus absent; 8th sternite and 8th tergite fused laterally to form a membranous cylinder with mild sclerotizations laterally (Fig. 6f); 8th sternite with a long tignum *sensu* Konstantinov, 1998 (spiculum ventrale *sensu* Slipinski & Escalona, 2013) longer than ovipositor (Fig. 6e); collateral gland (CoG) present (Fig. 6g).

Distribution. India [Karnataka (new record); Delhi (Batra 1952); Uttarakhand; Uttar Pradesh; Bihar; Odisha; West Bengal; Sikkim; Assam; Manipur; Meghalaya]. Bangladesh. Myanmar, Thailand, Laos, Cambodia (Kimoto and Gressitt 1982; Vansilalom 2016); Nepal (Medvedev 1990; Sprecher-Uebersax 1997; Kimoto 2001). A distribution map is available at this link: https://www.google.com/maps/d/edit?hl=en&mid=1QgHVswL3eaPJ2soJ16_R5BTkIu8mRM6z&ll=23.692266951458954%2C78.67937627596257&z=6.

Host plants. *Musa* spp. (*Musa sapientum*, *M. acuminata*; Musaceae, Zingiberales) are principal hosts. Beetles were observed feeding on ginger (*Zingiber officinale* Roscoe; Zingiberaceae, Zingiberales) in Meghalaya (D.M. Firake, personal communication). In Assam, northeastern India, adult beetles were observed feeding on *Canna indica* L. (Cannaceae, Zingiberales) and tur-

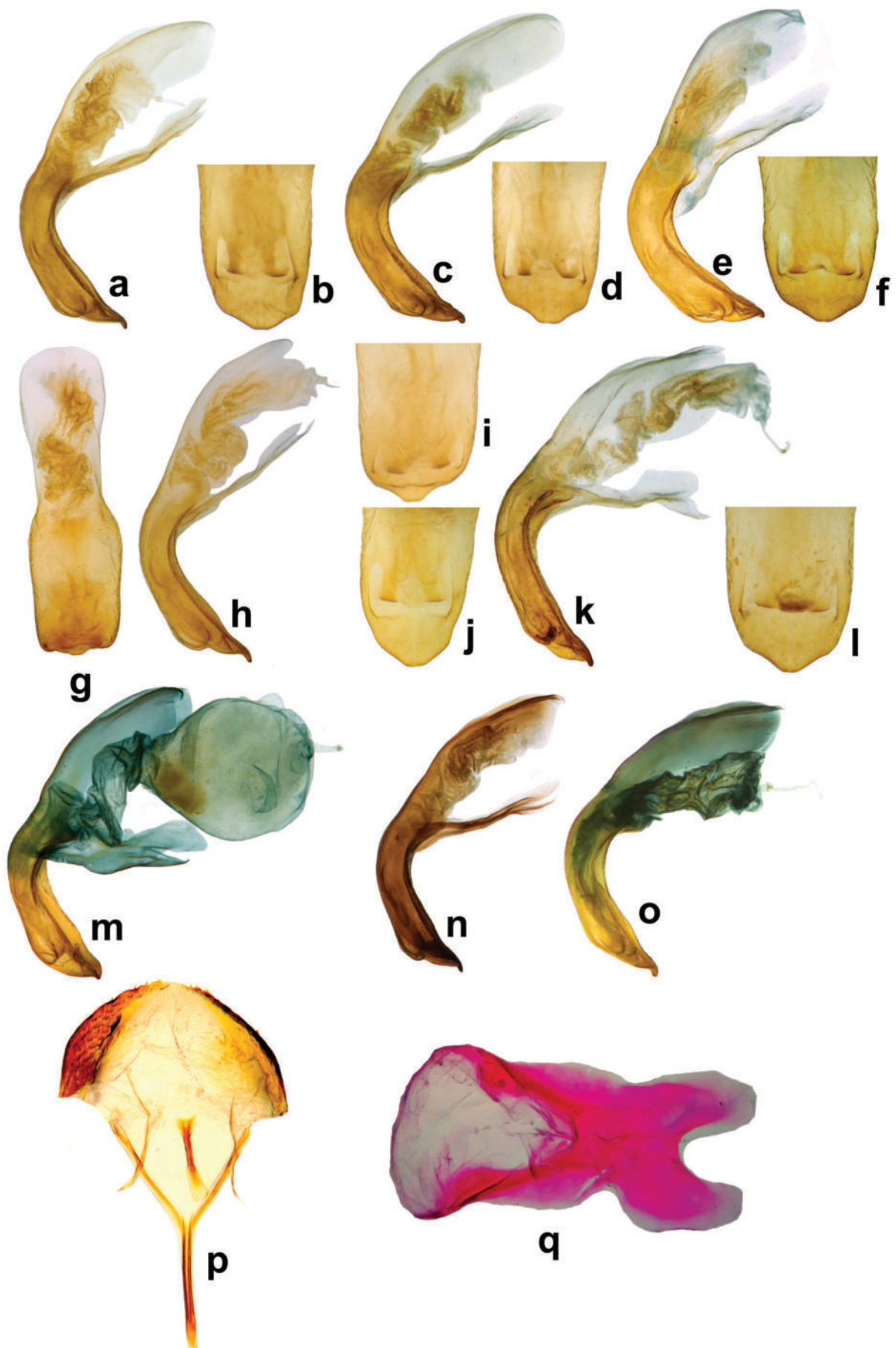


Figure 4. Male genitalia of different populations of *Basilepta subcostata* (Jacoby). **a, c, e, h, k, m–o.** Aedeagus, lateral view; **b, d, f, g, i, j, l.** Apex of aedeagus, ventral view; **p.** Male: tergite VIII, sternite VIII and IX; **q.** Male genitalia, tegmen.

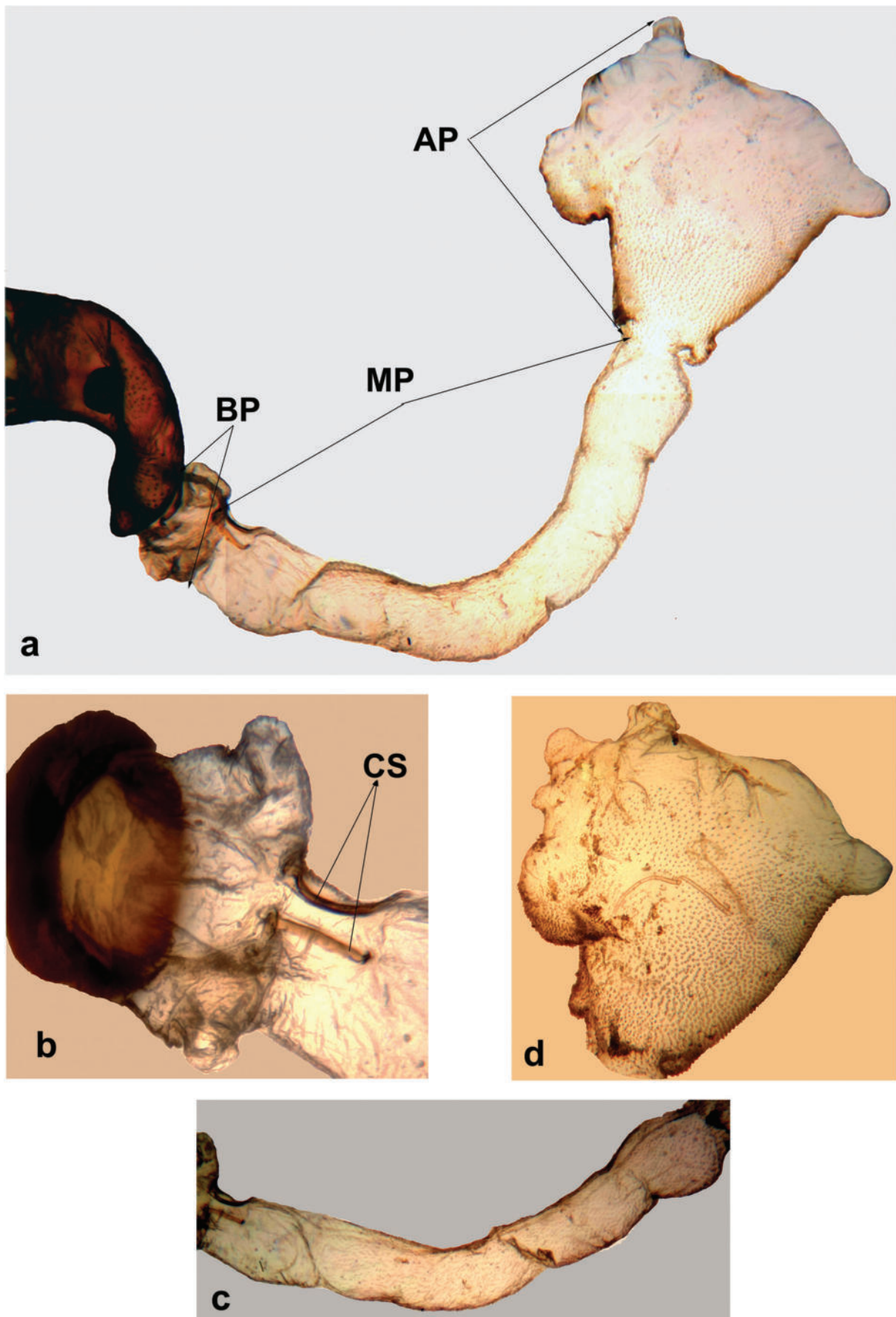


Figure 5. Endophallus of *Basilepta subcostata* (Jacoby). **a.** Endophallus completely everted, lateral view; **b.** Basal phallomere and central sclerite, dorsal view; **c.** Median phallomere, lateral view; **d.** Apical phallomere, dorsolateral view. Abbreviations: BP = Basal phallomere; MP = Median Phallomere; AP = Apical phallomere; CS = Central Sclerite.

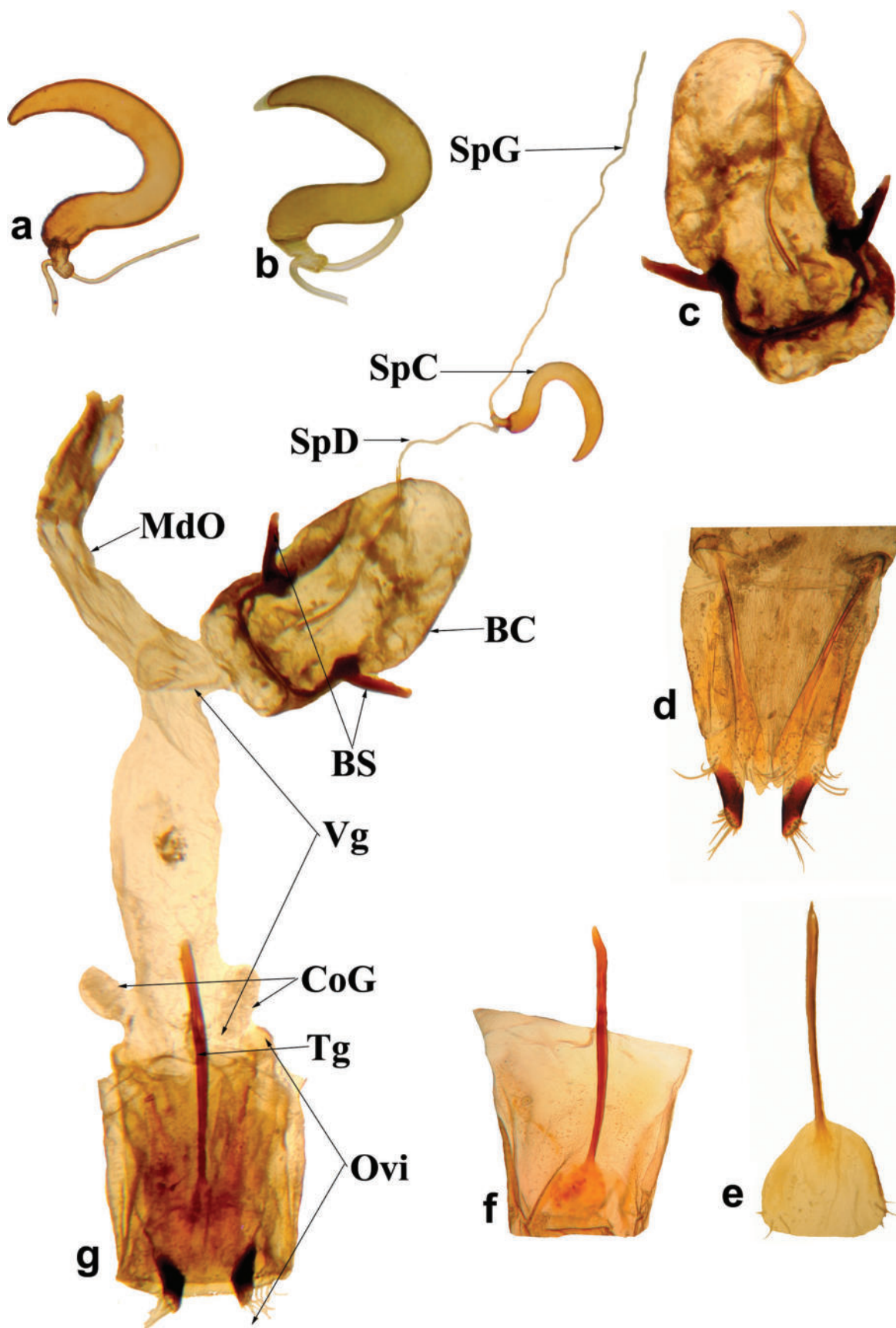


Figure 6. Female genitalia of *Basilepta subcostata* (Jacoby). **a, b.** Spermatheca; **c.** Bursa copulatrix; **d.** Ovipositor; **e.** Eighth sternite and tignum; **f.** Eighth sternite and 8th ventrite along with tignum; **g.** Female genitalia. Abbreviations: SpG = spermathecal gland; SpC = spermathecal capsule; SpD = spermathecal duct; MdO = median oviduct; BC = Bursa copulatrix; BS = bursa sclerite; Vg = vagina; CoG = collateral gland; Tg = tignum; ovi = ovipositor.

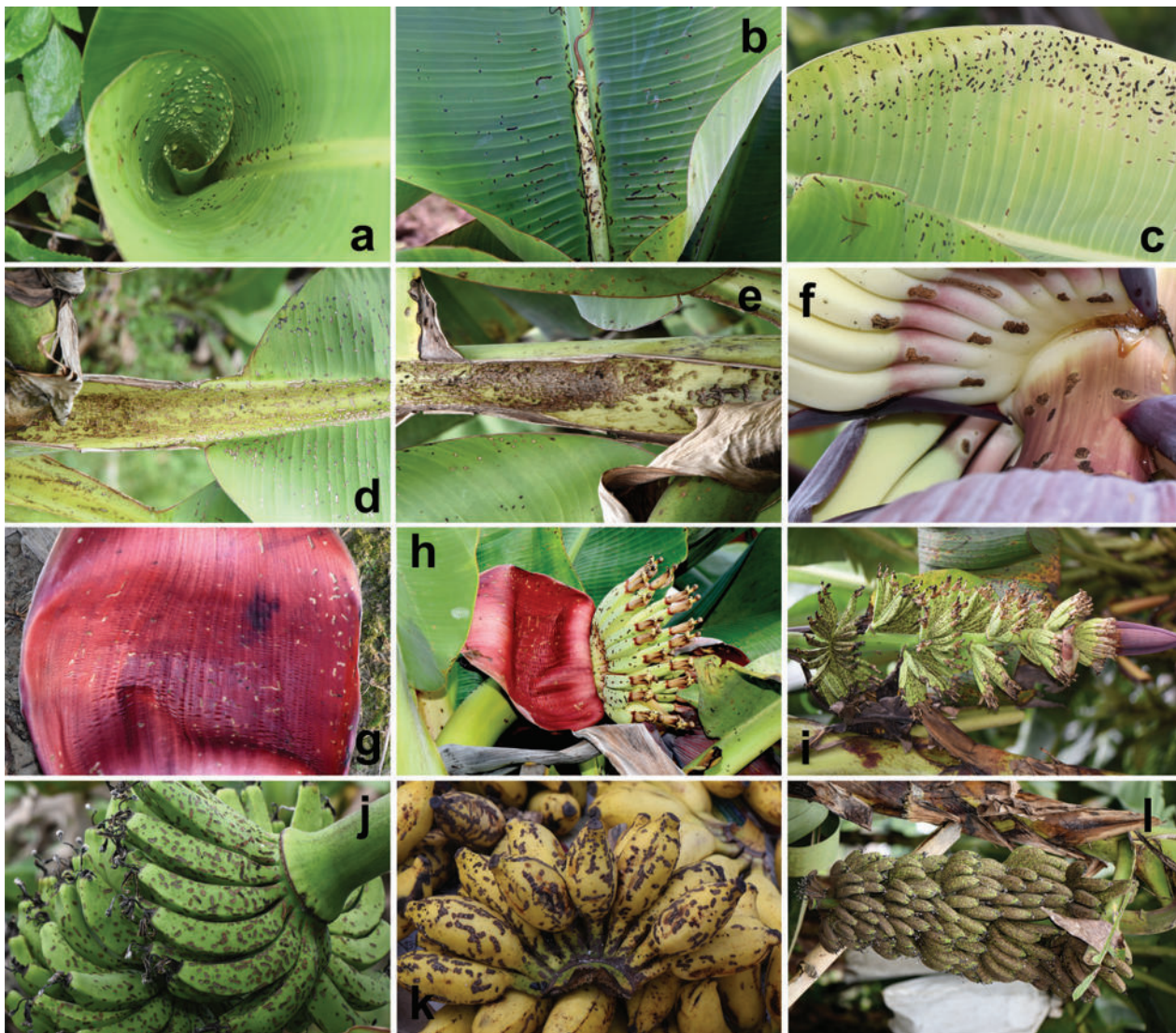


Figure 7. Damage caused by *B. subcostata* (Jacoby) on banana. **a.** Leaf whorl showing scarring damage; **b.** Scars on spindle leaf; **c.** Scars on leaf; **d., e.** Scarring on leaf petiole; **f.** Flower damage; **g.** Bract damage; **h–i.** Damage on young fruits and emerging bunch; **j–l.** Fruit damage.

meric (*Curcuma longa* L., Zingiberaceae) and characteristic feeding marks were observed on the latter. This is the first documentation of other hosts of *B. subcostata* besides banana. Adults were also found to be resting on taro (*Colocasia* sp., Araceae, Arales) (unpublished data).

Bioecology. The adult beetles are most active during the monsoon and post-monsoon seasons and summer. They are nocturnal and usually found hiding inside the leaf whorls and come out only when disturbed. They feed on the young unfurled leaves (Fig. 7a), leaf petioles (Fig. 7d, e), and stems of banana, and the emerging leaves (Fig. 7b, c) are badly scarred. Feeding damage was also observed on flowers (Fig. 7f) and bracts (Fig. 7g), as well as young, developing fruits (Fig. 7h, i). For more images of the damage symptoms on cultivated banana, see the website of ICAR-National Research Centre for Banana (2019). In severe cases, the developing bunches and fruits (Fig. 7j–l) are so badly scarred that they lose their market value.

Eggs are laid in the soil and the larvae feed on the roots of grasses and other weeds. Pupation takes place in the soil. Emerging adults feed on young leaves and fruits. Adults hibernate during winter. Seasonal incidence and population dynamics of fruit scarring beetles have been studied from some parts of India, including Assam (Mishra et al. 2015) and Bihar (Ahmad et al. 2010; Sah et al. 2018).

Pest status. Mukherjee et al. (2006) reported that meteorological factors accounted for about 85% of the beetle incidence in Bihar (India) and minimum temperature and maximum relative humidity had a positive and significant effect on scarring beetle populations. Though damage due to scarring beetles is believed to be mainly cosmetic, the fruit quality is also badly affected. Zahan et al. (2001) and Sah et al. (2018) reported that scarring beetle infestation significantly delayed fruit ripening, reduced the fruit weight, and adversely affected the skin colour and thickness of fruits and the



Figure 8. Naturally occurring epizootic of fungal pathogen, *Beauveria bassiana* on *Basilepta subcostata*.

taste and smell of the pulp. This damage considerably affects the consumption value.

Natural enemies. In Uttar Pradesh, North India, adults of the predatory beetle, *Paederus fuscipes* Curtis (Coleoptera, Staphylinidae), were found to be commonly associated with *B. subcostata*. Natural epizootics of entomofungal pathogens, such as *Beauveria bassiana*, are commonly observed on *B. subcostata* in the northeastern region of India (Fig. 8) and exert some control in the post-monsoon months.

Basilepta viridipennis (Motschulsky, 1860)

Fig. 9

Nodostoma viridipenne Motschulsky, 1860: Motschulsky 1860: 177; Jacoby 1908: 349; Kimoto 1967: 69.

Nodostoma frontale: Baly 1867: 253; Medvedev 2006: 412 (synonymy).

Nodostoma occipitale: Jacoby 1908: 335–336; Kimoto and Gressitt 1982: 36 (synonymy).

Nodostoma haroldi: Jacoby 1908: 331 (new name for *Nodostoma aeneipenne* Baly); Kimoto and Gressitt 1982: 36 (synonymy).

Nodostoma aeneipenne: Baly 1867: 235; Jacoby 1908: 331 (synonymy)

Nodostoma haroldi var. *apicipes*: Jacoby 1892: 87; Jacoby 1908: 331.

Basilepta viridipenne: Medvedev 2006: 412.

Basilepta viridipennis: Moseyko and Sprecher-Uebersax 2010: 639.

Basilepta occipitalis: Moseyko and Sprecher-Uebersax 2010: 639.

Material examined. *Type material* of *Nodostoma occipitale* Jacoby: 62590/ Type (red bordered circular label)/ Doherty/ Tenasserim, Mergui/ Fry Coll. 1905-100/ *Nodostoma occipitale* Jac., Type (blue label)" (BMNH). **Other material:** Fea/ Birmah, Carin Cheba/ Fry Coll. 1905-100/ NHMUK0114016244, 1 ex; Doherty/ Tenasserim, Javoy/ Fry Coll. 1905-100/ NHMUK014016300, 1 ex (BMNH).

Remarks. *Basilepta viridipennis* (Fig. 9) has been erroneously reported in the literature as a pest of banana in the Indian Subcontinent (India and Bangladesh), and Waterhouse (1993) also listed it as a major pest of banana in Southeast Asia. All reports of its occurrence in northeastern India (Das and Baruah 2018), Bangladesh (Ahmed 1963; Zahan et al. 2001, 2003, 2004; Rahman et al. 2004), and Thailand (Wongsiri 1991) are most likely to refer to *B. subcostata*. The type of *N. occipitale* Jacoby (Fig. 9a, b) (BMNH, examined), a synonym of *B. viridipennis*, has only a superficial resemblance to *B. subcostata* and can be easily separated from the latter by the pronotum forming an obtuse angle posterolaterally (Fig. 9b) and its lateral margins abruptly converging an-

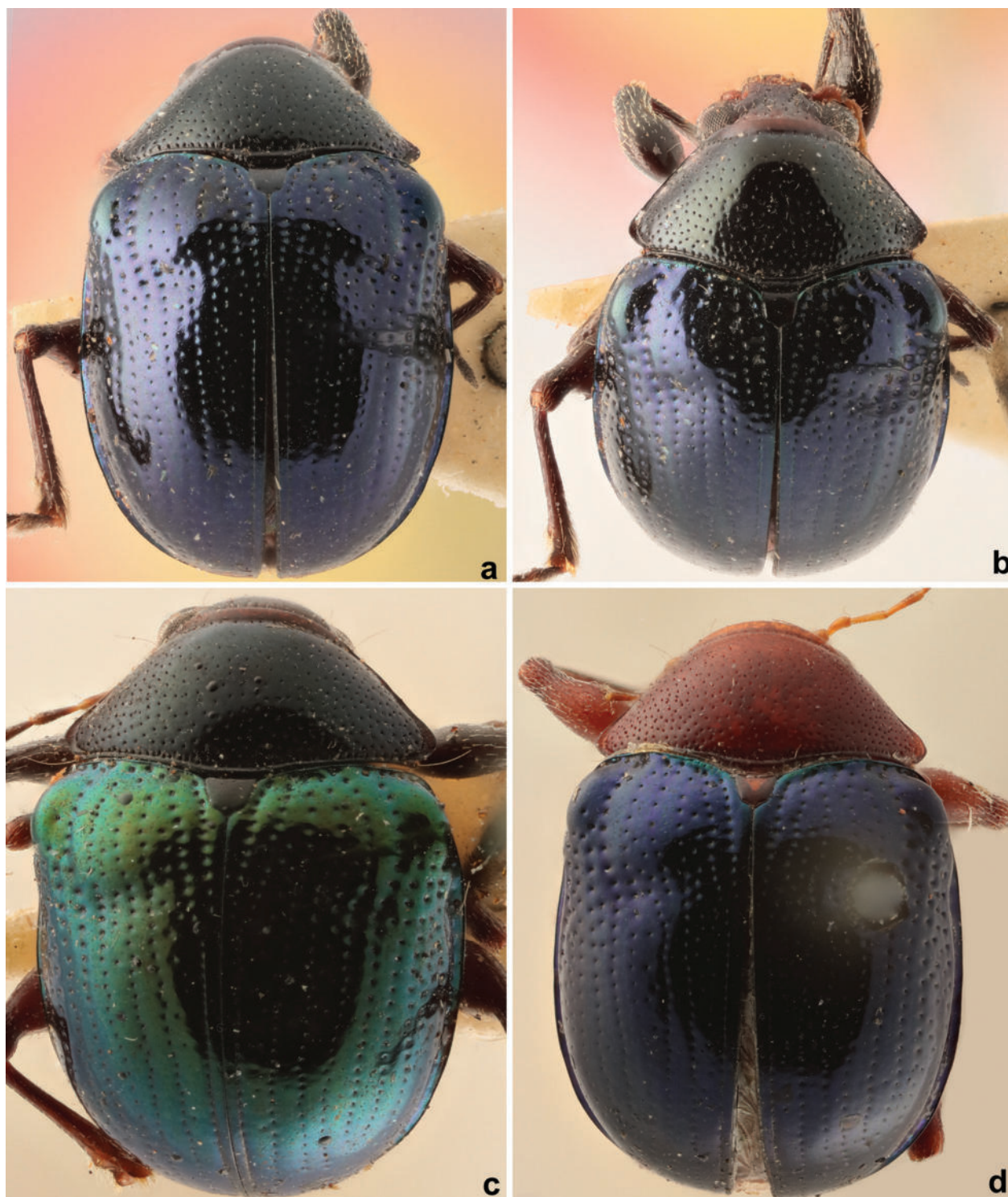


Figure 9. *Basilepta viridipennis* (Jacoby). **a, b.** Syntype of *Nodostoma occipitale* Jacoby, a synonym of *B. viridipennis* (BMNH); **c, d.** Colour forms of *B. viridipennis*.

teriorly in almost a straight line. Besides, pronotal punctures in *B. viridipennis* are smaller than average elytral punctures and finely and more closely impressed on lateral part and more sparsely and finely so on median and anterior parts. *Basilepta viridipennis* is of variable coloration and includes reddish, brownish, bluish, greenish,

violaceous, and blackish forms. Medvedev (2006) designated a lectotype for *N. viridipenne* and synonymised *Basilepta frontalis* (Baly) with it, as he found the types of both species were identical.

Distribution. India, Nepal, Myanmar (= Burma), Thailand, Laos, Vietnam, Hainan, Malaya, Sumatra.

Chrysomelidae
Galerucinae
Alticini

***Bhamoina varipes* (Jacoby, 1884)**

Figs 10–12

Eucycla varipes Jacoby, 1884: Jacoby 1884: 210 (Sumatra; Mus. Leiden); Duvivier 1885: 42 (Is. Bodjo).

Sphaeroderma varipes: Jacoby 1889: 193 (N Burma: Teinzo, Bhamo; Tenasserim: Meetan); Maulik 1926: 318, 328 (Burma: Karen Mts., Assam: Khasi Hills).

Bhamoina varipes: Bechyné 1958: 91; Scherer 1969: 202–203; Döberl 2010: 505.

Bhamonia [sic] *varipes*: Kimoto 2005: 80.

Sphaeroderma varipennis Jacoby 1892: 928 (Carin Cheba, Palon, Rangoon; Mus. Genova); Maulik 1926: 318, 325; Scherer 1969: 202 (synonymy).

Material examined. *Type material* of *Sphaeroderma varipennis* Jacoby: “Type (H.T.) (red bordered circular label) / Carin Cheba, 900–1100 m, L. Fea, v.XII.88 / Jacoby Coll. 1909-28a / Sphaerod. varipennis Jac. (blue label)” (BMNH); Others: “Sumatra / Jacoby Coll. 1909-28a / varipennis Jac. In B.M. Coll. C.M.F. Von Hayek det. 1967 / *Bhamoina varipennis* (Jacoby), G. Scherer det. 1967” (BMNH). India: Assam: 5♂, 6♀♀, Balipara 74 m msl; 26°49'56.0"N, 92°46'41.1"E; 17.V.2019; K. D. Prathapan Coll. (KAU); Meghalaya: 3♂, 8♀ Barapani 993 m msl; 25°41'17.6"N, 91°55'5.1"E; 5.vi.2013; K. D. Prathapan Coll. Ex banana (KAU); Meghalaya: 11♂, 16♀, Ri Bhoi Dst., Saiden 540 m msl; 25°52'41.0"N, 91°53'1.4"E; 4.vi.2013; K. D. Prathapan Coll. Ex banana (KAU); Meghalaya: 5♂, 2♀, Nongpoh, 587 m msl; 25°50'34.4"N, 91°52'34.4"E; 22.v.2019; K. D. Prathapan Coll. (KAU).

Remarks. The genus *Bhamoina* closely resembles *Sphaeroderma* (see below for the generic diagnosis of *Sphaeroderma*). *Bhamoina acutangula* (Jacoby), the type species of the genus, was originally described in *Sphaeroderma*. *Bhamoina* can be easily separated from *Sphaeroderma* by the anteriorly produced anterolateral corners of pronotum (in *Sphaeroderma*, the anterolateral corners of pronotum are not produced forward, or only slightly produced). *Sphaeroderma varipennis* Jacoby, treated as a synonym of *B. varipes* by Scherer (1969), is bicolored (Fig. 11a) with the elytra fully black and the head and pronotum reddish. It has a slightly more robust body form, and the anterolateral corners of pronotum (Fig. 11b, c) are less produced and somewhat obtusely rounded compared to those of *B. varipes*.

Scherer (1969) gave a key to the Oriental species of *Bhamoina*. *Sphaeroderma varipennis* has been known to be a pest of banana in Thailand, and adults defoliate banana (Hill 2008). Dean (1978) recorded “*Sphaeroderma varipennis*” on banana in Laos. Although *B. varipes* is distributed in India, there has been no previous records of its host plant association from India.

Description. Entirely red-brown (Fig. 10a, b), except eyes and distal portion of mandibles black. Elytra darker in a few examples. Proximal 5–7 antennomeres lighter than distal ones. Anterolateral corners of pronotum, palpi, fore- and midfemora, tarsomeres, and last abdominal ventrites often lighter than dorsum.

Length 2.71–3.41 mm, width 1.97–2.80 mm, 1.34× longer than broad. In lateral view vertex weakly convex, forming a concavity where it joins frons; frons strongly arched, joining clypeus at an obtuse angle. In frontal view vertex moderately flat, sparsely punctate with a mixture of small and minute punctures. Supraorbital pore circular, without shallow groove surrounding it, placed just above orbital sulcus, two or three smaller punctures anterior to supraorbital pore present. In frontal view (Fig. 10c), frontal ridge broad and raised between antennal sockets; narrowed dorsally entering between antennal calli; ventrally narrower than dorsally; frontolateral area anteriorly with a few setae; anterofrontal area flat, not forming ridge, with long and short setae. Antennal calli transverse-oblique, trapezoidal, slightly higher than vertex, narrowly separated dorsally; anteromesal ends acutely angulate, entering into interantennal space. Supracallinal sulcus deep, gently convex, oblique, narrower than orbital sulcus. Suprafrontal, supraorbital, supraantennal sulci well developed, all weaker than supracallinal sulcus. Distance between antennal sockets 1.57× diameter of a socket, antennal sockets separated from adjacent eye by a distance 0.38× transverse diameter of a socket. Labrum wider than long, dorsal surface convex anteriorly, anterior margin convex, with three pairs of labral setae arranged in a transverse row. First antennomere longer than second and third combined, second a little longer than third and fourth separately, sixth onwards antennomeres progressively thickened. Proportionate length of antennomeres I to XI: 1 : 0.48 : 0.41 : 0.52 : 0.56 : 0.44 : 0.59 : 0.52 : 0.52 : 0.52 : 0.8. Maxilla with penultimate palpomere thicker and longer than last and preceding palpomeres separately. Labium with penultimate palpomere thickened, subequal in length to thin, pointed last palpomere.

Pronotum (Fig. 10d) convex, distinctly narrowed anteriorly, 0.30× as long as wide, posteriorly 1.65–1.76× wider than anteriorly, profusely, uniformly covered with small punctures. Pronotal punctures as small as half of elytral punctures. Lateral margin weakly convex proximally, gently concave at anterolateral seta bearing pore; broader anteriorly than posteriorly. Anterior margin deeply concave, except gently convex in middle. Posterior margin bisinuate, forming a distinct lobe in middle. Anterolateral callosity (Fig. 10e) projecting forward on either side of head; seta bearing pore on dorsal posterior face of callosity. Posterolateral callosity not protruding laterally, with seta bearing pore on lateral face.

Scutellum triangular, acutely angulate posteriorly, shiny, flat on top, minutely punctate. Elytra as wide as pronotum at base, widened postbasally, lateral margin entirely visible in dorsal view. Elytral apex convex. Elytral punctures confused in mesal half, tend to form rows in

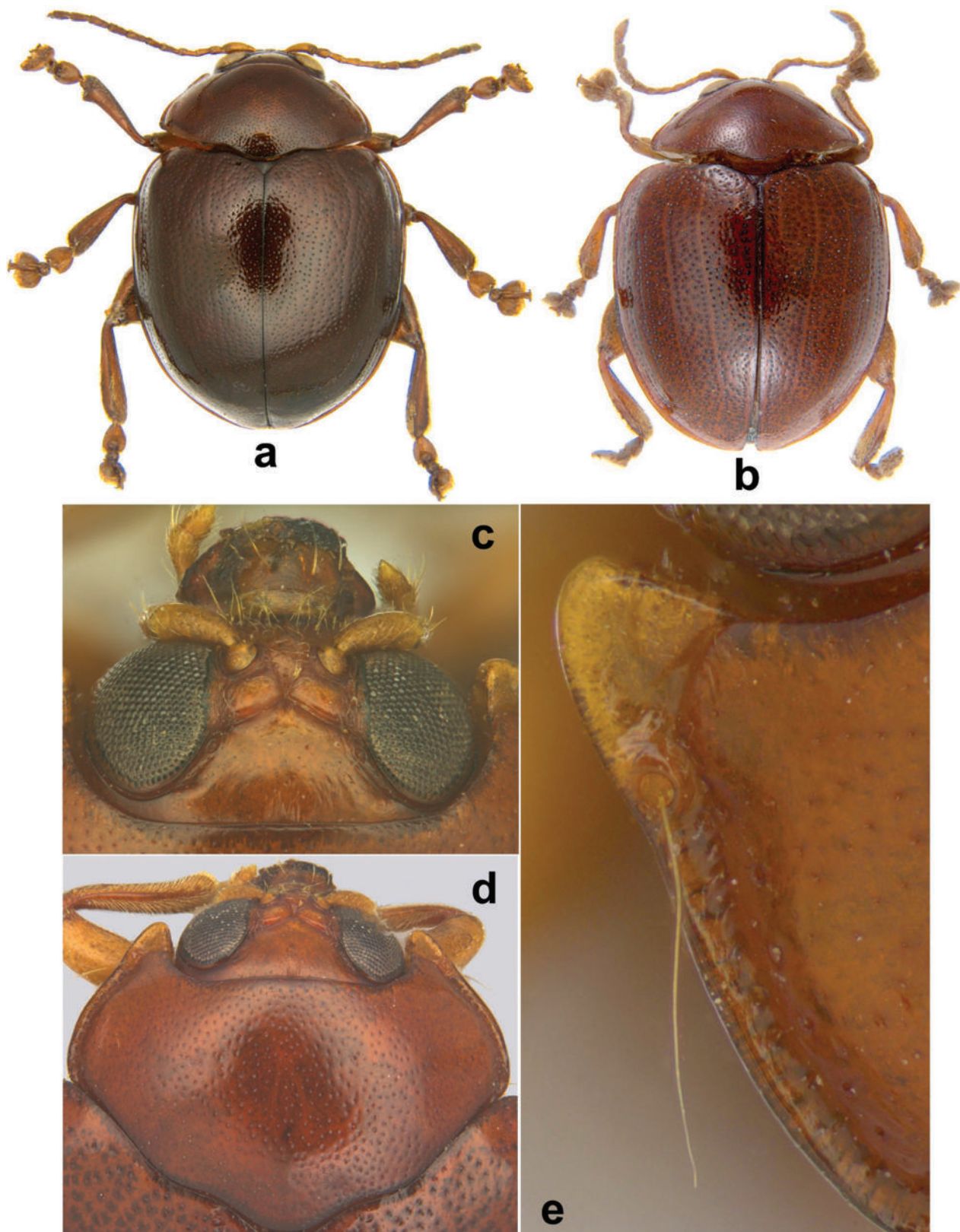


Figure 10. *Bhamoina varipes* (Jacoby). **a, b.** Dorsal view; **c.** Head, dorsal view; **d.** Pronotum, dorsal view; **e.** Lateral margin of pronotum.

lateral half, outermost punctures forming a regular row. Each elytral puncture surrounded by a dark halo, distance between adjacent punctures less than diameter of one puncture, including dark halo.

Maximum width of elytral epipleura subequal to that of midfemur. Epipleura subhorizontal, visible in lateral view, widest at proximal one-fourth, gradually narrowing till distal one-third and then abruptly narrowed, hardly

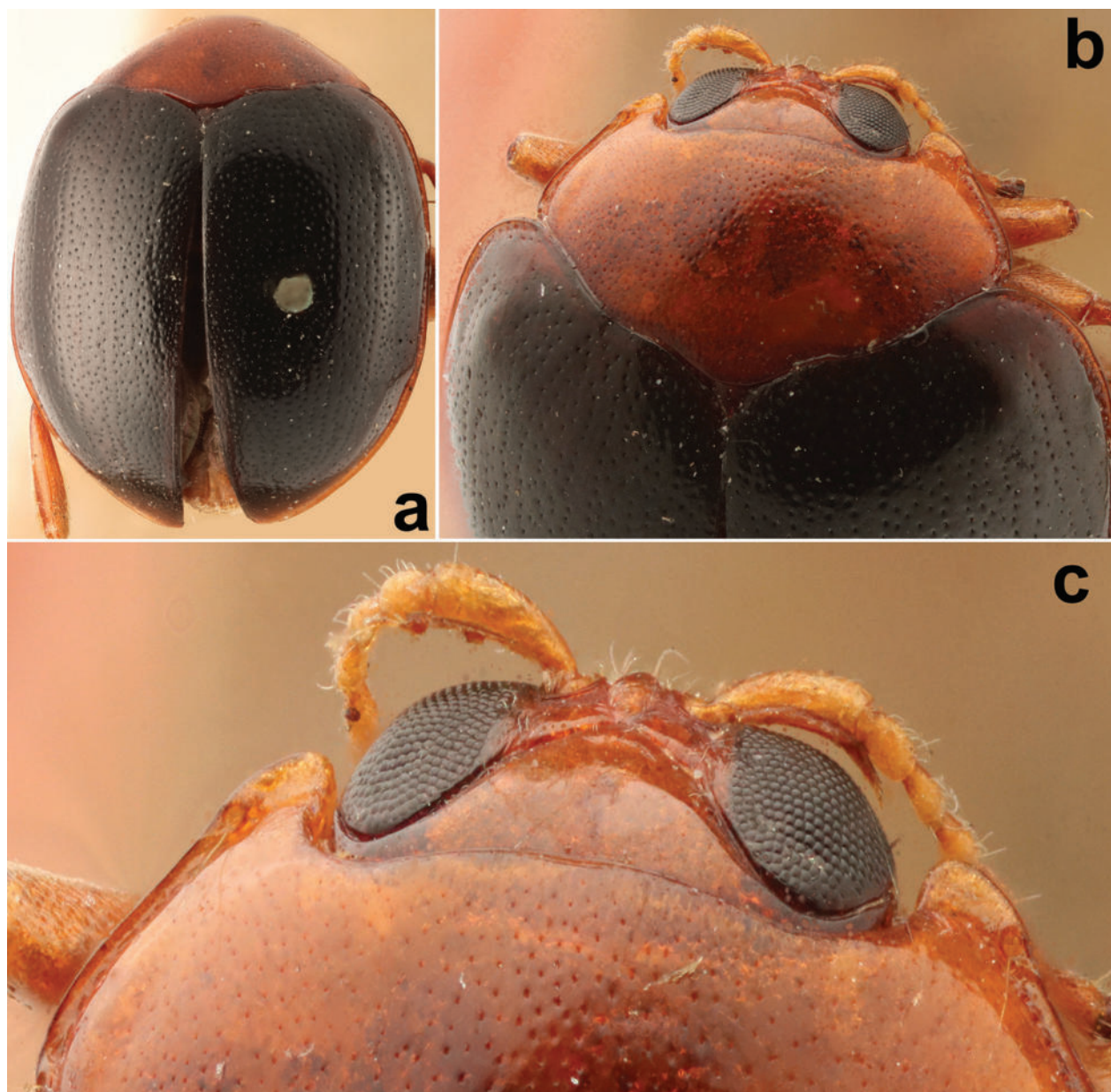


Figure 11. Type of *Sphaeroderma varipennis* Jacoby (= *B. varipes*) (female). **a.** Dorsal view; **b.** Pronotum of *S. varipennis*; **c.** Anterolateral corners of pronotum (magnified).

reaching apex. Prosternum gently depressed on top, setose, coarsely but shallowly punctate; minimum distance from anterior margin of prosternum to coxal cavity less than half of minimum width of prosternal intercoxal process; prosternal intercoxal process longer than wide, narrowed in middle, widened apically, posterior margin concave. Mesosternum transverse, nearly three times wider than long, with concave posterior margin; metasternum profusely setose medially, coarsely punctate. First abdominal ventrite profusely setose medially, coarsely punctate; in length, medially subequal to next three combined. Last ventrite a little longer than preceding two combined. Last visible tergite medially with a broad longitudinal groove not reaching apex.

Foretibia without apical spine. Mid- and hind tibiae with apical spine. First pro-, meso-, and metatarsomeres

distinctly wider in male than in female; with capitate setae ventrally in male and pointed setae in female. Posterior margin of last ventrite entire in female; forms a lobe notched on either side, in middle in male. Last ventrite internally with a longitudinal apodeme along mid-line in male (Fig. 12a), externally visible as a dark line; apodeme absent in female (Fig. 12b).

Male genitalia with aedeagus in lateral view (Fig. 12f) curved, apex acutely pointed, recurved dorsally. In ventral view (Fig. 12g), aedeagus with a longitudinal depression along middle of ventral side, depression being stronger distally; aedeagus narrowed apically forming a triangular denticle. Dorsal opening (Fig. 12h) partially covered with three laminae.

Female genitalia with spermathecal receptacle (Fig. 12e) oblong, widest in middle, narrowed to-

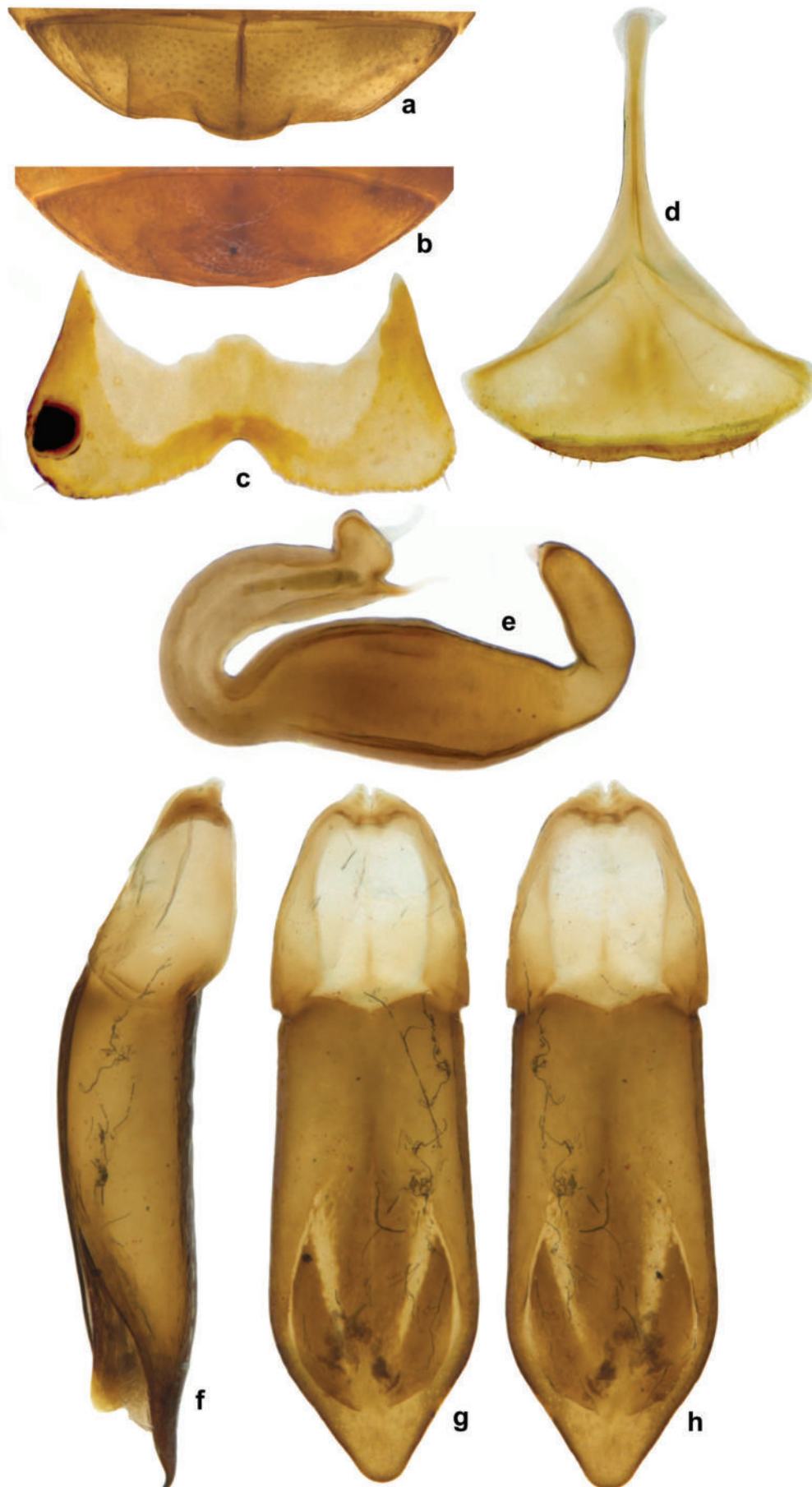


Figure 12. *Bhamoina varipes* (Jacoby). **a.** Abdominal apex, male; **b.** Abdominal apex, female; **c.** Vaginal palpi; **d.** Tignum; **e.** Spermatheca; **f–h.** Male genitalia: **f.** Aedeagus, lateral view; **g.** Aedeagus, ventral view; **h.** Aedeagus, dorsal view.

wards both ends, 2.2× longer than broad. Vaginal palpi (Fig. 12c) medially fused, both together 1.75× broader than long, posterior margin deeply emarginate with a seta on either side. Tignum (Fig. 12d) channeled along middle, posterior membranous area broadened greatly with posterior margin emarginate medially with a few short setae; tignum gently broadened anteriorly.

Nature of damage. Adults feed on the abaxial surface of the leaf lamina, making transverse, narrow linear scars. Feeding by *Basilepta subcostata* results in much shorter and broader feeding troughs, which is very different from that of *Bhamoina varipes*.

Distribution. India (Assam; Meghalaya; Uttarakhand (Dehra Dun)); Myanmar; Nepal (Medvedev 2000); Vietnam; China (Döberl 2010); Sumatra; Laos.

Sphaeroderma spp.

Notes. Unidentified species of *Sphaeroderma* Stephens have been reported from Laos as defoliators of banana (Dean 1978; Hill 2008; Vansilalom 2016). We collected a new species of *Sphaeroderma* feeding on banana from the state of Meghalaya, northeastern region of India, during our surveys, which is described and illustrated here.

Generic diagnosis. Small to medium sized flea beetles, convex and broadly oval. Red brown to black with

or without spots or stripes on elytra. Head hypognathous, frontal ridge raised, forming T-shaped ridge with apical margin of head capsule. Antennal calli well delineated by sulci, supracallinal sulcus deep. Pronotum broader than long, without impressions or furrows. Posterior margin bisinuate with a lobe in middle. Procoxal cavity open behind. Anterolateral corners of pronotum not greatly produced forward. Metatibia dorsally flat or concave, with lateral and mesal margins forming ridge. Third tarsomere broad, its anterior margin entire, not bilobed. First metatarsomere short, not longer than next two combined. Intercostal part of first abdominal ventrite truncate. Vaginal palpi broader than long.

Sphaeroderma cruenta Prathapan & Kumari, sp. nov.

<http://zoobank.org/3EC3F062-239F-4436-9647-EB5032384C7F>

Figs 13, 14

Material examined. Holotype: ♂: India: Meghalaya: Barapani, 25°41'17.6"N, 91°55'5.1"E; 5.vi.2013, 993 m; Prathapan K D Coll., Ex Banana (BMNH). **Paratypes:** (17♂, 8♀): India: Meghalaya: Barapani, 25°41'17.6"N, 91°55'5.1"E; 5.vi.2013, 993 m; Prathapan K D Coll., Ex Banana (2 BMNH; 2 USNM; 17 ICAR-NBAIR; 2 NPC; 2 UASB).

Diagnosis. This species closely resembles *S. mandarensis* Jacoby (Jacoby 1900: 123–124), from Mandar in

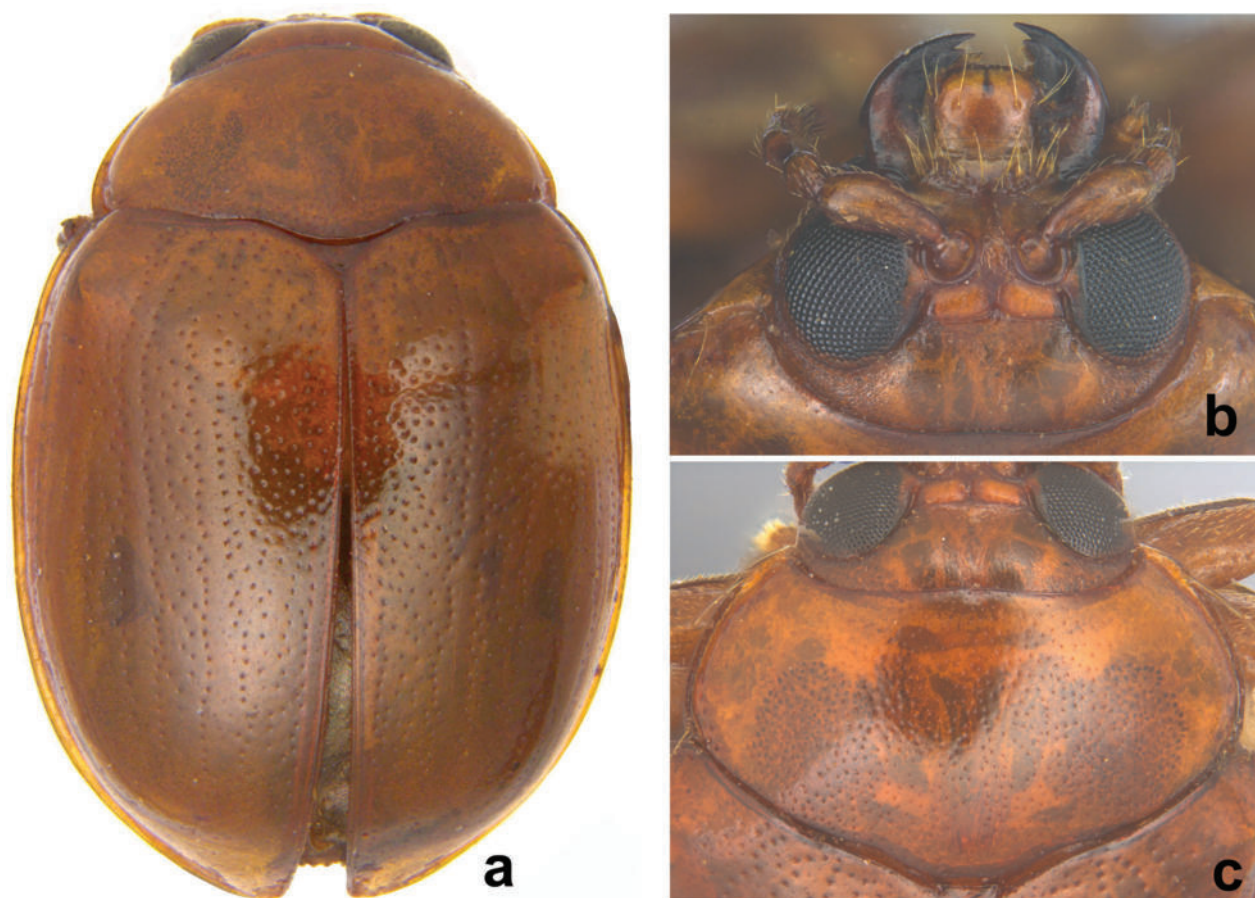


Figure 13. *Sphaeroderma cruenta* sp. nov. Paratype (female) **a.** Adult, dorsal view; **b.** Head, dorsal view; **c.** Pronotum, dorsal view.

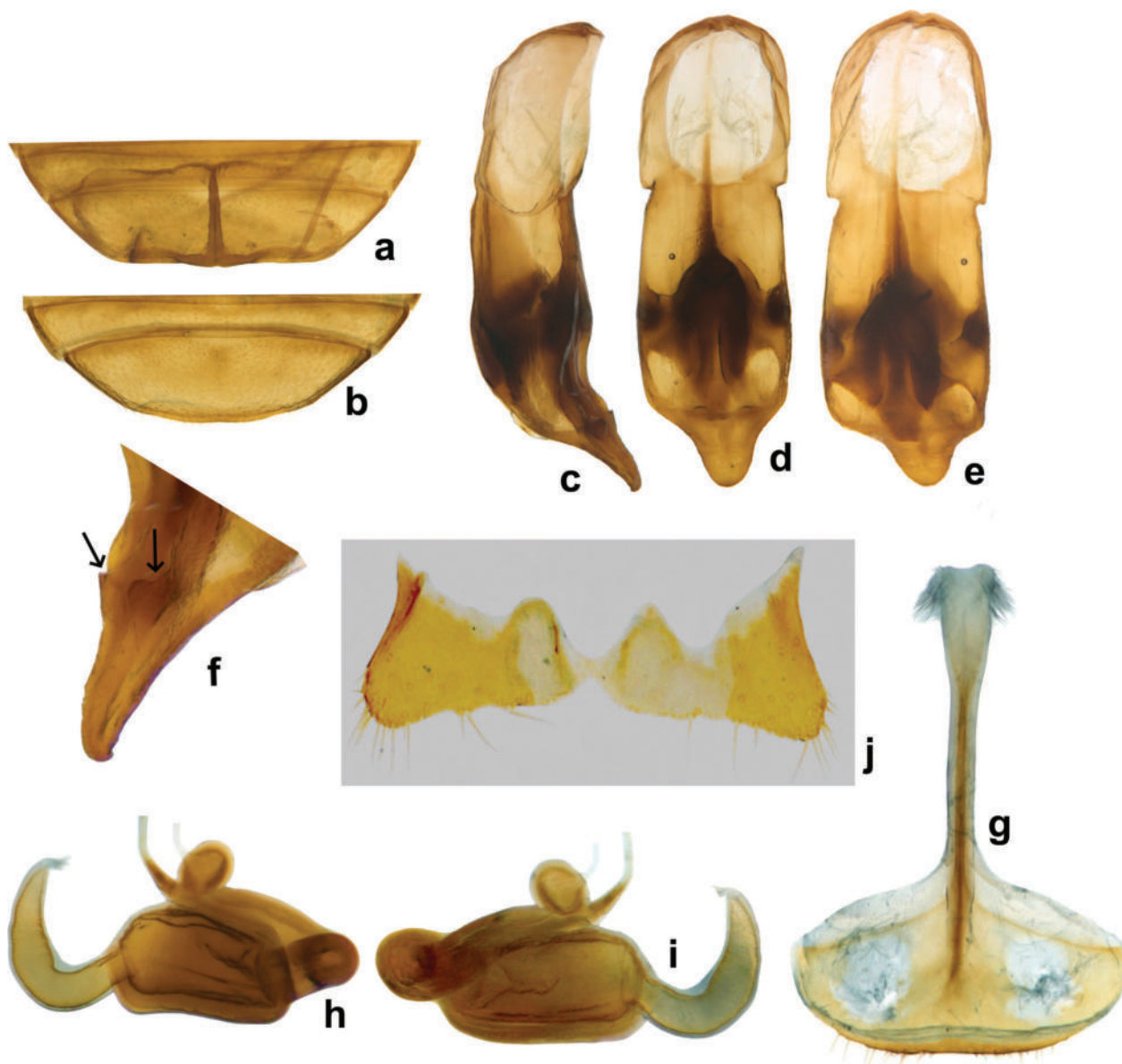


Figure 14. *Sphaeroderma cruenta* sp. nov. **a.** Abdominal apex, male; **b.** Abdominal apex, female; **c–f.** Male genitalia: **c.** Aedeagus, lateral view; **d.** Aedeagus, ventral view; **e.** Aedeagus, dorsal view; **f.** Aedeagus apex, lateral view; **g.** Tignum; **h, i.** Spermatheca; **j.** Vaginal palpi.

West Bengal, India, especially in size, coloration, structure of head and punctation. However, the pronotum is more narrowed anteriorly than in *S. mandarensis*. The male genitalia are diagnostic (Fig. 14c–f).

Description. Entirely red-brown (Fig. 13), except distal antennomeres darker. Length 2.97–3.33 mm, width 2.08–2.26 mm, ca 1.40× longer than broad. In lateral view, vertex and antennal calli form a gently curved line with an emargination at their meeting point; frontal ridge forms a strongly convex line that joins anterofrontal ridge at an obtuse angle. In frontal view (Fig. 13b), vertex gently convex on sides, flat in middle, with small punctures and indistinct rugosities. Antennal calli subhorizontal, laterally slightly narrower than medially, about twice wider than long, subquadrate. All sulci surrounding antennal calli well developed. Supracallinal sulcus gently convex.

Supraorbital pore circular, with a long seta on a convex tubercle, not surrounded by shallow groove. Frontal ridge sharply raised, narrower ventrally than dorsally. Frontoclypeal suture with closely placed, irregularly arranged long setae. Anterior margin of clypeus straight. Frontolateral area concave, without long setae or bold punctures. Anterofrontal ridge poorly developed, not convexly raised. Distance between antennal sockets 0.84× diameter of a socket, antennal sockets separated from adjacent eye by a distance 0.36× transverse diameter of a socket. Labrum distinctly wider than long, anterior margin convex, with three pairs of transversely arranged setae.

Maxillary palpi with four palpomeres, penultimate palpomere being thicker and longer than last palpomere. First palpomere smallest, second subequal to last. Labial palpi three-segmented with the second palpomere thicker

than last, subequal to last in length. Proportionate length of antennomeres I to XI: 1 : 0.61 : 0.57 : 0.61 : 0.74 : 0.70 : 0.74 : 0.70 : 0.70 : 0.70 : 1.09.

Pronotum (Fig. 13c) distinctly narrowed anteriorly, 0.38× times longer than wide, posterior margin 1.59× as wide as anterior margin, anterolateral corners only slightly produced forward, not reaching eye. Lateral margin gently and evenly curved, anteriorly as wide as posteriorly. Anterolateral callosity longer than wide, not forming denticle at pore, pore situated on posterior dorsal face of callosity. Posterolateral callosity not laterally protruding. Disc profusely covered with small punctures, much smaller than those on elytra.

Scutellum as broad as long, obtusely narrowed posteriorly, surface very minutely punctate. Elytra as broad as pronotum at basal margin, widening near humerus. Humerus convex, weakly depressed posteriorly. Elytra with a mixture of small and large punctures. Punctures confused, tend to form uncountable rows. Lateral most row regular, followed by one or two countable adjacent rows. Distance between adjacent punctures smaller than diameter of a puncture. Elytral apex convex. Maximum width of epipleura at anterior one-third; subequal to forefemur in width. Epipleura subhorizontal, narrowing posterior to anterior one-third, not reaching elytral apex.

Prosternum widened posteriorly, posterior margin concave medially, slightly depressed on top, setose with coarse shallow punctures. Mesosternum setose, transverse, with concave posterior margin. Metasternum with moderate sized, deep punctures, thickly setose on either side. First abdominal ventrite longest, 2–4 each shorter than fifth separately; fifth longer than preceding two combined, shorter than preceding three combined. Last visible tergite with a shallow groove along middle, not reaching apex. All tibiae with apical spine.

First pro-, meso-, and metatarsomeres slightly wider with capitate setae ventrally in male. In female, all first tarsomeres ventrally with pointed setae. Posterior margin of last ventrite entire in female, forms a lobe notched on either side in middle in male. Last ventrite internally with a longitudinal apodeme along mid-line in male (Fig. 14a), externally visible as a dark line; apodeme absent in female (Fig. 14b).

Male genitalia (Fig. 14c–f) with aedeagus in lateral view gently bent at middle (Fig. 14c), apex acutely narrowed, recurved (Fig. 14f). In ventral view (Fig. 14d), ventral surface depressed preapically, narrowed to apex, forming a broad denticle. Dorsal side (Fig. 14e) of aedeagus convex, dorsal opening partially covered by a lamina; a characteristic, narrowly elongate, bifid sclerotization present preapically on dorsal side, it laterally extends forming an internal ring around aedeagus.

Female genitalia with spermathecal receptacle (Fig. 14h, i) 1.5× as long as broad, outer margin concave, inner margin convex; pump with unsclerotized denticle apically, horizontal part longer than vertical. Duct twisted proximally, curved over receptacle, reaching a little beyond middle of receptacle. Vaginal palpi (Fig. 14j) narrowly connected medially, both together 2.4× as wide as long. Tignum (Fig. 14g) straight, channeled along middle, gently broadened anteriorly, posterior membranous part broadened greatly with a few short setae along posterior margin, unsclerotized on either side of middle of posterior membranous part.

Etymology. The specific epithet is a Latin adjective in nominative case in reference to the reddish colour of this species.

Distribution. India (Meghalaya).

Biology. Adults feed on the foliage of banana (*Musa* spp.).

Key to chrysomelids feeding on bananas and plantains in the Indian Subcontinent

- 1 Form oblong-oval, metallic red and blue or entirely reddish, dark green, or blue (Fig. 1a–c). Antennal calli poorly developed, not delimited by deep sulci (Fig. 3a, b). Lateral margin of pronotum sharply angulate at distal-third (Fig. 3c, d). Elytra with a sharply raised costa/ridge running parallel with lateral margin to about middle (Fig. 2b). Forecoxal cavities closed behind. Legs with all femora dilated and ventrally with a small tooth, mid- and hind tibiae preapically emarginate (Fig. 3e, f) *Basilepta subcostata* (Jacoby)
- Form elongate-oval, entirely reddish to dark reddish brown, not metallic. Antennal calli well developed, delimited by deep sulci. Lateral margins of pronotum curved, not angulate. Elytra without a lateral ridge/costa. Forecoxal cavities open behind. Hind femora greatly enlarged compared to fore- and midfemora, tibiae preapically not emarginate, without a ventral tooth 2
- 2 Form broad oval, reddish to dark reddish brown (Fig. 10a, b). Anterolateral angles of pronotum distinctly produced forward (Fig. 10d, e); lateral margin of pronotum in dorsal view convex in proximal two-thirds, gently concave behind anterolateral callosity (Fig. 10e); male genitalia with apex of aedeagus gently recurved and slightly curved dorsad in lateral view (Fig. 12f); preapical, ring-like sclerotization absent on aedeagus (Fig. 12f–h); spermathecal duct not twisted proximally (Fig. 12e) *Bhamoia varipes* (Jacoby)
- Form more elongate and less robust, entirely reddish (Fig. 13a). Anterolateral corners of pronotum rounded, not produced forward (Fig. 13c); lateral margin of pronotum in dorsal view evenly convex throughout; male genitalia with apex of aedeagus strongly bent ventrad in lateral view (Fig. 14c); a characteristic, narrowly elongate, bifid sclerotization present preapically on dorsal side of aedeagus (Fig. 14f), which laterally extends forming an internal ring around aedeagus; spermathecal duct twisted proximally (Fig. 14h, i) *Sphaeroderma cruenta* Prathapan & Kumari, sp. nov.

Molecular characterization of *B. subcostata*

In total 10 COI sequences of *B. subcostata* (six from Assam and four from Uttar Pradesh) were deposited in GenBank and accession numbers obtained (KY908365.1, MK414475.1, MK414474.1, MK414473.1, MK414472.1, K414470.1, MK414469.1, MK414468.1, MK414467.1 and MK414466.1). The pairwise nucleotide sequence identity of COI sequences of *B. subcostata* from Assam and Uttar Pradesh ranged from 98 to 100%, indicating that they were conspecific. The phylogenetic tree constructed by the maximum likelihood method based on COI gene sequence alignments revealed two clusters, with *B. subcostata* from Assam and UP forming one cluster (Group I), and the sequences from the outgroup taxa falling in another cluster (Group II) (Fig. 15).

Discussion

The chrysomelids recorded by us on banana here are also included in the host plants listed by Jolivet and Hawkeswood (1995). Of the three species of banana feeding chrysomelids studied by us, *B. subcostata* is the most predominant and widespread pest in northern and north-eastern regions of India and Bangladesh. The other two appear to be of minor importance as banana pests with a much more restricted distribution. *Bhamoina varipes* and *Sphaeroderma* are known from Thailand and Laos as defoliators of banana (Dean 1978; Hill 2008) but have not been reported from India until now. *Sphaeroderma cruenta* sp. nov. was collected from northeastern India; it still needs to be determined if the *Sphaeroderma* species reported from Laos (Dean 1978; Hill 2008; Vansilalom

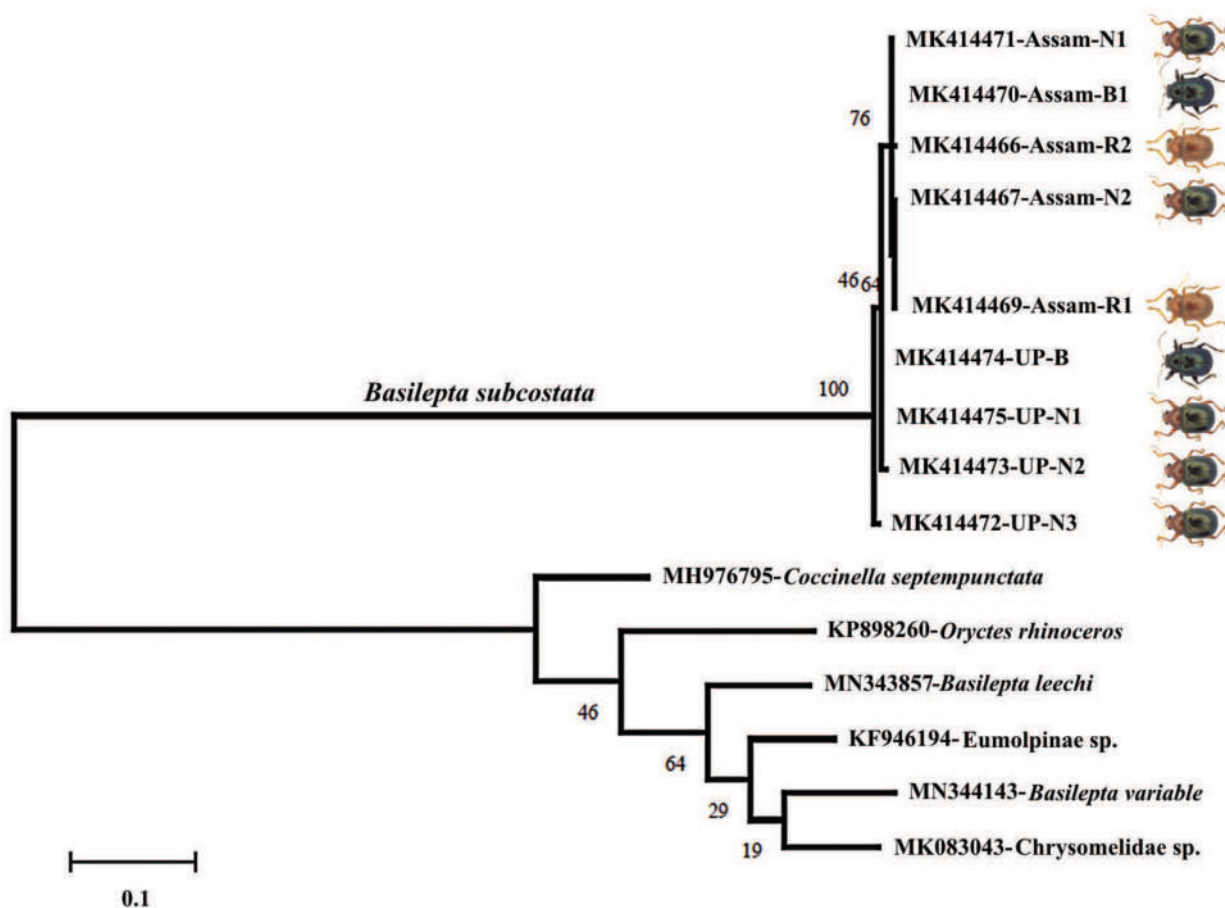


Figure 15. Maximum Likelihood phylogeny of *B. subcostata* populations from Assam and Uttar Pradesh, India. The evolutionary history was inferred by using the Maximum Likelihood method and Tamura-Nei model. The tree with the highest log likelihood (-3489.32) is shown. The percentage of trees in which the associated taxa clustered together is shown next to the branches. Initial tree(s) for the heuristic search were obtained automatically by applying Neighbor-Join and BioNJ algorithms to a matrix of pairwise distances estimated using the Maximum Composite Likelihood (MCL) approach, and then selecting the topology with superior log likelihood value. The tree is drawn to scale, with branch lengths measured in the number of substitutions per site. This analysis involved 16 nucleotide sequences. Codon positions included were 1st+2nd+3rd+Noncoding. There was a total of 660 positions in the final dataset. Evolutionary analyses were conducted in MEGA X.

2016) are conspecific with this new species or belong to a different species.

It is noteworthy that three species of chrysomelids belonging to two systematically distant subfamilies (Galerucinae and Eumolpinae) are feeding on the same host plant. More studies are needed to determine the nature and extent of damage to bananas caused by *B. varipes* and *S. cruenta* sp. nov. and to clarify their distribution in India, as they are not common pests. Taro (*Colocasia esculenta* L.) has been recorded as a host plant of *B. subcostata* [as "*Nodostoma subcostatum*"] in West Bengal (Bhattacharyya and Mandai 2006) and Manipur (Prasad and Singh 1987). We observed a few adults resting on taro, which is commonly grown with banana in homesteads and as an intercrop, but did not see any feeding damage. There is some doubt regarding the reliability of records of *B. subcostata* from Nepal (Medvedev 1990), as the specimens are not conspecific with *B. subcostata* and seem to belong to the genus *Pseudostonopa* Jacoby, 1903, which is closely related to *Basilepta* and probably can be included as a subgenus (Alexey Moseyko, personal communication). However, the specimens in the holdings of BMNH studied by JP seem to be conspecific with *B. subcostata*. The elytral costa characteristic of *B. subcostata* is highly variable in different populations and is distinctly convex and strongly sinuate in the female syntype (BMNH) and other specimens from Myanmar, but the Indian specimens have only a moderately convex and less sinuate costa. COI sequences of *B. subcostata* populations from Assam and Uttar Pradesh showed 98–100% similarity indicating they are conspecific and can be used as a rapid diagnostic tool by economic entomologists and plant protection workers. Morphological studies also did not show any major variations among different populations of *B. subcostata* and the genitalia of material from all locations surveyed were identical.

Although *Basilepta subcostata* is known to be a serious pest of bananas and plantains in the northeastern, eastern, and northern regions of India, there is no published record of its occurrence in any part of peninsular India. However, two specimens collected on banana from Vittal, Karnataka (South India), and one specimen from "Deccan" were examined by JP in the collections of the Natural History Museum, London. These specimens indicate that this pest is present in peninsular India albeit in very small numbers and highlights the importance of museum collections in determining the geographic range of economically important insect pests. Its occurrence in peninsular India is a major concern for banana growers, and it is essential to conduct more systematic surveys to acquire data on the extent of its presence there. Plant protection workers and applied entomologists in peninsular India need to be alerted about the presence of *B. subcostata*, as it is virtually unknown in peninsular India, although it has a huge potential to cause devastation. Management options for *B. subcostata* mainly involve removal of grassy weeds, application of insecticides, neem-based biopesticides, entomofungal pathogens like

Beauveria bassiana, and covering fruit bunches with polythene sleeves (Das and Baruah 2018; Rituraj et al. 2018). Soil application of entomofungal pathogens and entomophilic nematodes targeting the larvae and pupae may be more effective in controlling this pest.

It is a matter of concern that systematic revisions of pests and related species important in agriculture and horticulture are lacking in biodiversity-rich countries like India, as well as the rest of Asia, and even for cash crops like banana. The International Plant Protection Convention (IPPC) stipulates that contracting parties should "conduct surveillance for pests and develop and maintain adequate information on pest status in order to support categorization of pests, and for the development of appropriate phytosanitary measures" (Cock 2011: 22) which can be done only if a country's pests, including newly introduced ones, can be identified and necessary facilities like reference collections and diagnostic capabilities are put in place (Cock 2011). The clarification of the nomenclature of leaf and fruit feeding chrysomelids of the Indian region provided in this paper is essential for future phytosanitary, quarantine and management purposes, as most of the available literature on *Basilepta* spp. as banana pests in Asia use wrong names, and we hope the illustrations provided here and the COI sequences will be useful for economic entomologists and non-taxonomists in identifying these insects. Future studies, including further field surveys and focused systematic studies, for identifying the chrysomelid species feeding on banana in other Asian countries are much needed.

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**THE EUMOLPINAE (COLEOPTERA: CHRYSOMELIDAE) OF
SOUTHERN INDIA**

by

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ABSTRACT OF THE THESIS

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ABSTRACT

The present study entitled “The Eumolpinae (Coleoptera: Chrysomelidae) of southern India” was carried out at Collage of Agriculture, Vellayani from October 2015 to March 2020. The study was designed with the objectives of collection and identification of the eumolpine leaf beetles of south India, preparation of illustrated keys to genera and species with emphasis on the characters of male and female genitalia and documentation of host plants in all possible cases. One thousand five hundred and two specimens from various ecosystems in south India were studied. Hand picking, aspiration, sweep netting and light traps were used to collect eumolpines. Specimens were also procured on loan basis from different institutions in India and abroad. Collected specimens were mounted and labelled. Available ecological and biological information was gathered in all cases. Genitalia was dissected as per standard procedures. Inflation and eversion of endophallus follow Yamasako & Obhayashi (2011). Specimens were identified tentatively based on the available literature and then confirmed by comparing with type specimens or consulting with experts. Measurements were made with a calibrated ocular micrometer and pertinent ratios were worked out.

Illustrated keys, descriptions and diagnosis are provided. Male genitalia, including endophallus and female genitalia are described and illustrated.

The Afrotropical genus *Microeurydemus* is newly reported from the Oriental Region. *Malegia* and *Scelolanka* are new reports to India. *Pagria ingibbosa*, *P. ceylonica* and *P. pseudograta* are new species records for India. Range of distribution of *Basilepta subcostata* and *Trichochrysea* are extended to south India.

Tricliona Lefèvre, 1885 **new synonym** is a new junior synonym of *Bathseba* Motschulsky, 1866. *Neofidia* Strother **new name**, is proposed as the replacement name for *Fidia* Baly, 1863, a junior homonym of *Fidia* Motschulsky, 1861. *Bathseba syzygium* **n. sp.** and *Pseudostonopa palynophaga* **n. sp.** are described as new to science. Eleven putative new species in the genera *Mesocolaspis*, *Malegia*, *Microeurydemus*, *Basilepta*, *Cleoporus*, *Dermorhytis*, *Edistus*, *Pagria*, *Scelolanka* and *Trichochrysea* were described. New host plant records include *Anacardium occidentale* L. (for *Fidia kanaraensis*), *Ixora* (for *Eurypelta modesta*), *Aegle marmelos* (for *Colasposoma*

downesi), *Mallotus atrovirens* (for *Cleoporus inornatus*), *Antidesma acidum* (for *Edistus* sp.), *Milletia pinnata* (for *Scelolanka*). *Bathseba syzygium* **n. sp.** has been reported on *Syzygium cumini* and *Pseudostonopa palynophaga* **n. sp.** has been reported as a pollen feeder of Poaceae.

Pagria signata species group warrants further investigations, due to inconsistencies in morphological, genetical and molecular characters.

The eumolpine leaf beetle fauna of south India comprises 146 species placed in 35 genera. Checklist of Eumolpinae of south India is provided.

The study treated 53 species under 20 genera. Two new species, 11 putative new species in 10 genera, 12 new host plant records, several new distributional records and new characters of taxonomic value are reported. Nomenclature of many economically important eumolpines are updated.

സംഗ്രഹം

ദക്ഷിണേന്ത്യയിലെ യൂമോല്ലിനെ വണ്ടുകൾ (യൂമോല്ലിനെ: ക്രിസോമേലിടെ) എന്ന വിഷയത്തിൽ ഒക്ടോബർ 2015 മുതൽ മാർച്ച് 2020 വരെയുള്ള കാലഘട്ടത്തിൽ വെള്ളായണി കാർഷിക കോളേജിൽ നടത്തിയ ഗവേഷണ പഠനത്തിന്റെ സംക്ഷിപ്ത രൂപം ചുവടെ ചേർക്കുന്നു.

ദക്ഷിണേന്ത്യയിലെ യൂമോല്ലിനെ ഉപകൂടുംബത്തിൽപ്പെട്ട വണ്ടുകളെ ശേഖരിക്കുക, അവയുടെ ജനുസുകളുടെയും സ്പീഷീസുകളുടെയും ചിത്രീകരിച്ച ടാക്സോണമിക് കീ (വർഗ്ഗീകരണ കീ) തയ്യാറാക്കുക, അവയുടെ ആഹാര സസ്യങ്ങളുടെ വിവരങ്ങൾ ശേഖരിക്കുക മുതലായവയായിരുന്നു പഠനത്തിന്റെ മുഖ്യ ലക്ഷ്യങ്ങൾ.

ദക്ഷിണേന്ത്യയിലെ വിവിധ ആവാസ വ്യവസ്ഥകളിൽ നിന്നായി 1502 യൂമോല്ലിനെ ഇലവണ്ടുകളുടെ സ്പെസിമെന്റുകൾ ഗവേഷണ വിധേയമാക്കിയിട്ടുണ്ട്. കൈകൊണ്ടുള്ള ശേഖരണം, ആസ്റ്റിറേറ്റർ ഉപയോഗിച്ചുള്ള ശേഖരണം, സ്വീപ് നെറ്റുകൾ കൊണ്ടുള്ള ശേഖരണം, വിളക്കു കെണികൾ മുതലായവ വഴിയാണ് വണ്ടുകളെ ശേഖരിച്ചത്. ഇന്ത്യയിലും വിദേശത്തുമുള്ള ബന്ധപ്പെട്ട വിവിധ സ്ഥാപനങ്ങളിൽ നിന്നും വായ്പാടിസ്ഥാനത്തിലും വണ്ടുകളെ ശേഖരിച്ചു ഗവേഷണ വിധേയമാക്കിയിട്ടുണ്ട്. ലഭ്യമായ പാരിസ്ഥിതികവും ജീവശാസ്ത്ര പരവുമായ വിവരങ്ങൾ ശേഖരിച്ചു. വണ്ടുകളുടെ ആൺ പേൻ ജനനേന്ദ്രിയങ്ങൾ വിച്ഛേദിച്ച് കൂടുതൽ വിവരങ്ങൾ മനസ്സിലാക്കി. ലഭ്യമായ ഗവേഷണ വിവരങ്ങളുടെ അടിസ്ഥാനത്തിൽ സ്പെസിമെന്റുകൾ താൽകാലികമായി തിരിച്ചറിയുകയും അവയുടെ ടൈപ്പ് സ്പെസിമെന്റുമായി താരതമ്യ പഠനം നടത്തി ബന്ധപ്പെട്ട വിദഗ്ദ്ധരുമായി കൂടിയാലോചിച്ചും വണ്ടുകളുടെ ഐഡന്റിറ്റി സ്ഥിരീകരിച്ചു.

വിവിധ സ്പീഷീസുകളുടെ വിവരങ്ങൾ, ചിത്രീകരിച്ച വർഗ്ഗീകരണ കീ എന്നിവ തയ്യാറാക്കി. ആൺ പേൻ ജനനേന്ദ്രിയങ്ങളുടെ വിശദമായ വിവരണം തയ്യാറാക്കുകയും ചിത്രീകരിക്കുകയും ചെയ്തിട്ടുണ്ട്.

ആഫ്രോട്രോപ്പിക്കൻ ജനുസ്സായ മൈക്രോയുറിഡെമസ് ഓറിയന്റൽ മേഖലയിൽ നിന്നും ആദ്യമായി റിപ്പോർട്ട് ചെയ്തു. മലേഗിയ, സീലോലങ്ക എന്നീ ജനുസുകൾ ഇന്ത്യയിലേക്കുള്ള ആദ്യ റിപ്പോർട്ടുകളാണ്. പാഗ്രിയ ഇൻജിബോസ, പാഗ്രിയ സെയ്ലോണിക്ക, പാഗ്രിയ സൂഡോഗ്രേറ്റ എന്നീ സ്ലീഷീസുകളും ഇന്ത്യയിലേക്കുള്ള ആദ്യ റിപ്പോർട്ടുകളാണ്. ബേസിലെപ്റ്റ സബ്കോസ്റ്റാറ്റ എന്ന സ്ലീഷീസിന്റേയും ട്രൈക്കോക്രസിയ എന്ന ജനുസിന്റേയും വിതരണ പരിധി ദക്ഷിണേന്ത്യയിലേക്കു കൂടി വ്യാപിപ്പിച്ചു.

ട്രിക്ലിയോനാ എന്ന ജനുസ്സ് ബേത്സീബ എന്ന ജനുസ്സിന്റേ ജൂനിയർ സിനോണിം ആയി മാറി. ഫിഡിയ ബാലി, 1863 എന്ന ജനുസ്സ് വർഗ്ഗീകരണ നിയമങ്ങൾക്കു അനുസൃതമായി നിയോഫിഡിയ എന്ന് പുനർ നാമകരണം ചെയ്തു. ബേത്സീബ സൈസിജിയം, സൂഡോഗ്രോണോപ പാലിനോഫഗ എന്നീ പുതിയ സ്ലീഷീസുകൾ ശാസ്ത്രത്തിനു സംഭാവന ചെയ്തു. മീസോക്കോളാസ്പൈസ്, മലേഗിയ, മൈക്രോയുറിഡെമസ് ബേസിലെപ്റ്റ, ക്ലിയോപോറസ്, ഡെർമോറൈറ്റിസ്, എഡിസ്സസ്, പാഗ്രിയ, സീലോലങ്ക, ട്രൈക്കോക്രസിയ എന്നീ ജനുസുകളിൽ നിന്നും 11 പുതിയ സ്ലീഷീസുകളുടെ വിവരണം നൽകി. വിവിധ സ്ലീഷീസുകളുടെ പുതിയ ആഹാര സസ്യങ്ങൾ റിപ്പോർട്ട് ചെയ്തു.

സ്ലീഷീസിനുള്ളിൽ തന്നെയുള്ള സന്ഗീർണ്ണതകൾ മൂലം പാഗ്രിയ സിഗ്നറ്റ എന്ന സ്ലീഷീസ് ഗ്രൂപ്പ് കൂടുതൽ വിശദമായി ഗവേഷണ വിധേയമാക്കേണ്ടതുണ്ട്. ദക്ഷിണേന്ത്യയിൽ 35 ജനുസ്സുകളിലായി 146 സ്ലീഷീസ് യൂമോല്ലിനെ വണ്ടുകളുടെ സാന്നിധ്യം റിപ്പോർട്ട് ചെയ്തിട്ടുണ്ട്.

ഇരുപത് ജനുസ്സുകളിലായി 53 സ്ലീഷീസ് യൂമോല്ലിനെ വണ്ടുകൾ പഠന വിധേയമാക്കിയിട്ടുണ്ട്. അതിൽ രണ്ടു പുതിയ സ്ലീഷീസുകളും, 11 പൂട്ടറിവ് ആയിട്ടുള്ള പുതിയ സ്ലീഷീസുകളും, 12 പുതിയ ആഹാര സസ്യങ്ങളും വർഗ്ഗീകരണ മൂല്യമുള്ള പുതിയ സ്വഭാവങ്ങളും റിപ്പോർട്ട് ചെയ്തു. കാർഷിക പ്രാധാന്യമുള്ള വിവിധ യൂമോല്ലിനെ വണ്ടുകളുടെ നാമകരണം നവീകരിക്കപ്പെട്ടു.